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Determination Of Sport Awareness Levels Of Students In Physical Education And Sports School (Adıyaman Example)

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Abstract

The aim of this study is to determine the Sports Awareness Levels of the Students Studying at the School of Physical Education and Sports.A total of 95 students, 41 female and 54 male, who took courses in the spring semester of the 2021-2022 academic year at Adıyaman University School of Physical Education and Sports, participated in the research voluntarily.The population of the research consists of the students of Adıyaman University School of Physical Education and Sports.The sample of the study consists of a total of 95 students, 41 female and 54 male, who took courses in the Spring semester of the 2021-2022 Academic Year. As a data collection tool in the study; The "Sport Awareness Scale" developed by Uyar in 2019 was used. SST consists of 30 items and 2 sub-dimensions (social and individual benefit, sports knowledge and distinguishing knowledge) in a 5-point Likert type.A personal information form was used with the "Sport Awareness Scale (2019) developed by Uyar in 2019. Data; were analyzed using descriptive statistical methods, t-test and one-way analysis of variance (Anova). As a result of the research; In terms of gender variable, it was determined that the students studying in the physical education department participating in the research showed a significant difference over the scale total score. As a result of the analyzes made, there were no significant differences in the awareness dimension in terms of both knowledge discrimination and benefit sub-dimension in terms of the ages of the participants. In terms of the department variable, it was determined that the students studying in the physical education department participating in the research showed a significant difference over the scale total score.

Keywords: Physical Education,Sports,Awareness,Student.

Introduction

Schools within the scope of social life have the task of raising people and supporting individuals who are part of the social environment and the young generation to understand and define the world they experience, and take the responsibility to prepare them well for the future.Obligation that exists in all societies is interpreted as educating people to make them emotionally, physically and mentally healthy individuals after meeting their needs such as nutrition, shelter and health.

In countries with a high quality of life, it can be observed that physical education and sports activities are one of the most important parts of the bond that people associate with life.In this regard, it is necessary to create awareness at the level of knowledge, emotion and movement about physical education and sports activities, whose goals and objectives have been determined. Ensuring this necessary awareness is extremely important in terms of placing the future of the society on healthy foundations.

Sport does not only aim to complete the physical development of individuals. At the same time, it contributes to the acquisition of various information about the learning and people's being participative throughout their lives. In this respect, sport is not only a way to reach the peak of being healthy and happy, but also a means of education.Considering that education is a process that continues throughout people's lives, sports should be for everyone and people should be made aware of this issue and awareness should be created in the society. (Mirzeoğlu, 2011) Many studies have been conducted in the international literature on awareness in sports and the factors that affect awareness (Cialdini et al., 1976; Funk et al., 2000; Hill and Green, 2000; Kolbe and James, 2000; Milne and McDonald, 1999; Sloan, 1989; Wann, 1995).However, many of these studies have examined the awareness levels and factors affecting awareness on different issues such as fan awareness, brand awareness, sponsorship awareness. "Awareness is about focusing on the current situation and tending to instant experiences. Despite this seemingly simple explanation, awareness is a multi-faceted concept.

For this reason, it is seen that there are definitions in the literature that deal with the concept of awareness from different aspects" (Çatak & Ögel, 2010). Kabat-Zinn (2003) expressed awareness as directing attention to the flow of instant experiences voluntarily and without questioning. Awareness is a cognitive and affective activity. When the awareness process is complete, we have formed a number of new cognitive schemas and images. Creating a new scheme means the expansion and development of the field of consciousness. Through awareness, there is an increase in our consciousness of ourselves, of others, and of the universe; our field of consciousness expands (Dökmen, 2002).

"The starting point of a person's development and transformation throughout his life; is to realize" (Karakuş, 2008, p. 74). Erdemli (1996) stated that one of the clearest characteristics of a person ,regarding movement training which is a prerequisite for the concept of physical education, is that he is a being that moves. For this reason, a person's realization and survival depend on his own actions. Movement education gives new meanings to one's body and its language, action. Movement is the basic condition of human existence. Man perceives his outer world through movements, and realizes his environment through movements. Movement is a communication tool of society. Movement is at the center of physical education, sports, games and life (Mirzeoğlu, 2011). Concepts such as being aware, noticing, being aware of, and being aware of oneself refer to events related to the individual's mental competencies, affective characteristics, and psychomotor skills.

By using the five senses, a person can distinguish what he is aware of, what he thinks about and how he wants to feel while communicating with himself and others, and can use them at any moment of his life in line with his needs and wishes. Awareness in the field of physical education and sports, which includes cognitive, affective and psychomotor branches and goes from the past towards the fututre, is the moment when the selectiveness of the person's life is realized (Eski, 2010). Through physical activities, students learn the importance of health, beautiful body actions and exercise criteria in their lives and internalize its importance.They learn the importance of staying in fit and being physically fit and how they are maintained and improved. Another area that students can experience will be the opportunity to test their weaknesses and strengths through physical education (Tamer & Pulur, 2001)). Thus, they will be aware of the physical activities that they can and cannot achieve by being aware of their limits. All physical education activities are social experiences and often involve emotions.People who participate in such activities have the opportunity to express their feelings through movements. People get rid of their negative behaviors (shyness, jealousy, anger, aggression) by doing sports. They learn to control these kind of behaviors (Aracı, 1999, Maslow, 1970). In physical education classes, teachers should provide an environment for students to work together in the activities in their annual programs in order to support the development of students in the affective field, thus providing opportunities for students to socialize and learn collaboratively.

Such opportunities also help students develop positive identities. The basic perspective of physical education is awareness in the psychomotor field. Although awareness is aimed in other areas (cognitive, affective) with physical education lessons, the main task of a physical education teacher is to create areas where students can contribute to their psychomotor awareness. Awareness reaches the highest level in individuals who are provided with a good environment. The aim of this study is to determine the awareness levels of the students studying in the physical education department towards sports.

Method

The aim of this study is to determine the Sports Awareness Levels of the Students Studying at the School of Physical Education and Sports. Descriptive survey model was used in the research. The descriptive survey model is a research model that aims to determine the co-existence or degree of change in two or more variables. It would not be correct to interpret the relationships determined by scanning as a real cause-effect relationship; but by providing some clues in that direction, if the situation in one variable is known, it can yield useful results in estimating the other (Karasar, 1991).

Participants

A total of 95 students, 41 female and 54 male, who took courses in the spring semester of the 2021-2022 academic year, participated voluntarily in the research at Adıyaman University School of Physical Education and Sports.

Measures

The "Sport Awareness Scale" developed by Uyar in 2019 was used as a data collection tool in the research. SST consists of 30 items and 2 sub-dimensions (social and individual benefits, sports knowledge and distinguishing knowledge) in a 5-point Likert type.

Statistical Analysis

Within the scope of the current study, the data obtained from the students were analyzed using descriptive statistical methods, t-test and one-way analysis of variance (Anova). It was decided whether the data met the prerequisites of parametric tests by examining the Skewness and Kurtosis values and Levene test results. The analyzes showed that the data met the parametric test assumptions.

Findings

Table 1. T-Test Results for Comparing Sports Awareness Scale Mean Scores According to Gender Variable

Sub-Dimensions	Gender	n	x
Distinguishing the Knowledge	Females	41	3,50
	Males	54	3,80
Benefits Sub-Dimensions	Females	41	4,33
	Gender	n	x
Distinguishing the Knowledge Benefits Sub-Dimensions Distinguishing the Knowledge	Females	41	3,50
	Males	54	3,80
	Females	41	4,33
	Gender	n	x
	Females	41	3,50
Income Benefits Sub-Dimensions Distinguishing the Knowledge	Males	54	3,80
	Females	41	4,33
	Gender	n	x
	Females	41	3,50
	Males	54	3,80

As seen in Table 1, according to the results of the t-test, the mean score of male students ($\bar{X}$=-3.80) in the dimension of distinguishing knowledge from the sub-dimensions of sports awareness levels of female students ($\bar{X}$=-3.80) is higher than the average score of female students ($\bar{X}$=3.50). It was determined that there was a significant difference according to the results2 being high (t= -2,43 p> .5).

Table 2. T-Test Results for Comparing Sport Awareness Scale Mean Scores According to the Part 2 Variable

Sub-Dimensions	Department	n	x	Ss	sd	t	p

Distinguishing the Knowledge	Teaching	41	3,66	,606	,067	-,654	,496
	Training	54	3,76	,482	,133		
Benefits	Teaching	41	4,34	,682	,075	93	0,58
	Training	54	4,64	,460	,127		

As seen in Table 2, according to the t-test results, the average score of the students studying in the coaching department in the sub-dimension of the awareness level in sports, which is one of the sub-dimensions of the level of awareness in sports ($\bar{X}$=4.64), is higher than the average score of the students studying in the teaching department ($\bar{X}$=4.34). It was determined that there was a significant difference according to the results' being high (t= ,93 p> .5).

Table 3. Anova Test Results for Comparing Sports Awareness Scale Mean Scores by Age Variable

Sub-Dimensions	**Age**	**Variant Source**	**Total of Squares**	**sd**	**Average of the Squares**
Distinguishing the Knowledge	17-20 yaş	Between groups	1,168	2	,584
	21-24 yaş	In group	31,569	92	,343
	25 ve üzeri yaş				
	Total		32,737	94	
Benefits	17-20 yaş	Between groups	1,509	2	,754
	21-24 yaş	In Group	39,795	92	,433
	25 yaş ve üzeri				
	Total		41,304	94	

As seen in Table 3, the Anova test did not show a significant appearance compared to the averages of high scores in sports compared to those who saw it according to their expectations (F(1,702)=,1 p>.5). (F=(1.744)=,188 p> .5).

Discussion and Conclusion

According to the findings obtained as a result of the statistical analyzes made in the research; In terms of gender variable, it was determined that the students studying in the physical

education department participating in the research showed a significant difference over the scale total score. In the study conducted by Recep Cengiz (2006), it was determined that there was a significant difference between the gender variable and the awareness levels in sports.

The findings obtained from this study support the current research finding. In another study, in which the conscious awareness levels of the participants were examined according to the gender variable, it was found that awareness (t(546)=.049, p>.05), non-judgment (t(546)=.305, p>.05), refocusing (t(546)=-.698, p>.05) and total score (t(546)=-.444, p>.05) were not statistically significant (Erman,2021).

This study reveals the state of awareness of gender in sports, even though the result is the opposite of our research. The relationship between the awareness levels of the participants for sports according to their age was revealed. As a result of the analyzes made, there were no significant differences in the awareness dimension in terms of both knowledge discrimination and benefit sub-dimension in terms of the ages of the participants.

Although there are studies showing that the age variable is not effective on awareness levels (Brown et al., 2007; Newsome, 2009; Şentuna,2013, Erman,2021) it is expected that students who are athletes should have awareness levels in parallel with the increase in age. The study of Şeşen and Basım (2012) with students studying in sports sciences differs from our study in terms of age variable. In terms of the department variable, it was determined that the students studying in the physical education department participating in the research showed a significant difference over the scale total score.

In order to understand the reason for the appearance of significant differences between departments in terms of awareness, firstly, we must consider the art of living consciously, carefullness (Kabat-Zinn, 2009), as well as the state of being aware of the current events (Brown & Ryan, 2003) , which is the most basic definition of conscipus awarenes (mindfulness.) Although Physical Education and Sports School students exhibit similar behaviors at the beginning, over time they show different behaviors according to the characteristics of the departments they have studied (Eski, 2010; Funk et al, 2000; Hill and Green 2000; İmamoğlu, 2009).

As students' in the coaching department being more conscious aware may be due to the different opportunities their departments have brought them. Because students who graduated from other departments have created certain standards in their minds about the work they will do when they graduate. Generally, Physical Education Teaching students will teach at schools by studying for Public Personnel Selection Exam (PPSE). However, since the working areas of the coaching department vary in a much wider range, it is an explanation that the students in this department are more entrepreneurial and have a higher awareness.

In all departments of the School of Physical Education and Sports, lessons can be given to develop students' awareness tendencies, so that these differences between departments can be eliminated.With the curriculum arrangement, new lessons with social content can be created so that students know more about and be aware of the events around them. With the new studies to be done, the conscious awareness of the students in the School of Physical Education and Sports can be compared with the students in other departments.

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Does hand grip strength correlate to buttoning speed in young women?

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Abstract

Background: Hand grip strength is the measure of maximal force of the hand and is one of the primary indicators of the ability to live independently and perform activities of daily living, however does this correlate to shirt buttoning skills? **Material and method:** Female subjects (n = 28) volunteered for this study (age: 23.63 + 5.6 yrs; ht. 171.22 + 7.1 cm; mass: 73.21 + 23.1 kg). Participants were provided with a button shirt from the same manufacturer, with 5 buttons each. All subjects placed both hands on the collar with opposite fingers touching the first button before being given the start command. The research team digitally timed the participants in seconds on how fast the participant could button down the shirt. Of the three trials, the best time was recorded. Participants were then assessed 1 maximal grip strength test per hand via a Camry hand-grip dynamometer. **Results:** Pearson correlation from right-hand grip strength to best time (r = - 0.214; p = 0.274) and left-hand grip strength to best time (r = - 0.028; p = 0.888) was not significant. **Discussion:** No statistical significance was found between grip strength and the fastest trial of buttoning down a shirt.

Keywords: Activities of daily living, Buttoning, Grip strength, Women

Introduction

In the United States alone, there are over 1 million upper-extremity injuries each year (Le et al., 2021). The appropriate functioning of our hands in everyday life is often overlooked until a limitation arises. Additionally, effective hand function supports the independent execution of many Activities of Daily Living (ADLs), including picking up a toothbrush and dental hygiene, typing a paper, driving a car, drawing a picture, catching a ball, and buttoning a shirt. Owing to the high number of upper-extremity injuries per year, there are many individuals who are unable to complete tasks involving their hands (Novello et al., 2022). In conjunction with proper hand functioning, is the ability to produce and sustain appropriate amounts of hand grip strength. Grip strength can be a reliable and valid method to evaluate hand injuries and function (Sanders et al., 2022). Hand grip strength is considered a valid method to assessing and predicting health outcomes (Wang et al., 2018; Wong, 2016)). The ability to produce, maintain, and regulate grip strength is essential for the human hand to control objects and maintain functionality of daily tasks (Bobos et al., 2020).

Hand grip strength is the measure of maximal force of the hand and is one of the primary indicators of the ability to live independently and perform activities of daily living (ADLs) (Patrizio et al., 2021). ADLs consist of functional skills often needed to achieve a person's basic physical needs (Patrizio et al., 2021). Further examples of ADLs include bathing and showering, toilet hygiene, swallowing, feeding, functional mobility, and grooming (AOTA, 2020). In addition, ADLs are vital to daily function and independence due to an individuals' ability to complete daily tasks correlating with their ability to live and function freely (Patrizio et al., 2021). Individuals typically gain mastery of their fine motor skills in early life and display increased retention rates when compared to higher-level tasks (Mlinac & Feng, 2016).

Through the ability to independently complete basic ADLs and personal care, functional freedom is improved, thus leading to greater quality of life (Mlinac & Feng, 2016). Clinically, occupational therapists use ADL assessments to evaluate patients' function. Disadvantages to being dependent on external care in daily life skills include decreased quality of life, increased healthcare costs and mortality risk, and institutionalization (Mlinac & Feng, 2016). By way of suffering significant trauma to the hands, simple daily tasks and fine motor skills may be severely impacted.

Managing individual grip strength is crucial when performing various ADLs. Patients with a history of impaired tactile sensibility due to disease manifestations have all been observed to produce less than adequate grip strength while performing ADLs (Olczak, 2021). Buttoning is a skill that is considered as an ADL (Cheong et al., 2018). Buttoning a shirt or blouse involves a more skilled, complex motor task compared to unbuttoning skills based on muscle strength of the proximal limb (Cheong et al., 2018). Investigators studied how much time it took for stroke patients to complete 5 buttons sized 2.5 cm in diameter and compared this to the Jebsen-Taylor Hand Function Test (JTHFT). The JTHFT is a standardized measure of hand function using ADLs such as writing, simulated page-turning, lifting small objects, simulated feeding, stacking, and lifting objects (Berardi et al., 2022). The correlation among three groups based on their buttoning speeds and current level of health demonstrated strong correlations with both hands (r = .76-.91). However, there is an absence in the literature investigating the relationship between handgrip strength and buttoning skills among healthy or an impaired female population. Lindstrom-Hazel et al. (2016) compared the time it took males to button a shirt and complete a Nine Hole Peg Test with the intent of creating a normative reference value to assess fine motor skills (Sanders et al., 2022). However, women

were not included as subjects during this study and the size of the buttons were small (0.5 cm). There is currently an absence in the literature with assessing the grip strength of women and the speed of buttoning a shirt. The results of this study could provide valuable insight to healthcare providers regarding future treatment options and plan of care, should a strong relationship between the two variables be observed. Therefore, the purpose of this investigation was to determine if hand grip strength correlated to buttoning speed in young women.

Material and Method

Design of Research

To determine the correlation between hand grip strength and the speed of buttoning down a shirt, the investigators used a quantitative, one-shot case study (Creswell & Creswell, 2018). This design was implemented so the results could be acquired in one setting. An Institutional Review Board reviewed and approved the study prior to data collection.

Subject Demographics

The participants were recruited from a Midwestern institution of higher education. All participants were females between the ages of 19-40 years old (refer to Table 1). Participants were deemed to be healthy prior to testing with no previous injuries to the arms, wrists, spine, or brain. Before testing, each participant was provided with an informed consent which they were required to read and voluntarily sign to participate in this study.

Table 1. Subject demographic information (cm=centimeters; kg=kilograms).

N size	Age (years)	Height (cm)	Weight (kg)
28	23.63 $\pm$ 5.58	171.13 $\pm$ 7.06	73.21 $\pm$ 23.10

Table 2. Descriptive demographics of collected data (SD=Standard Deviation; N=Number of subjects).

Variable(s)	N	SD	Pearson Correlation (r-value)	P-value
Best Handgrip Right (lbs.)	28	69.81 $\pm$ 12.36	r = -0.214	p = 0.274
Best Handgrip Left (lbs.)	28	68.11 $\pm$ 17.10	r = -0.028	p = 0.888

Protocol

Data was collected on the campus of the Midwest institution of higher education. Due to the study being completed during COVID-19, researchers and participants were required to wear a face mask and social distance. Before each use, the equipment (shirts, buttons, and hand grip dynamometer) was sanitized. Each participant was provided with a button-down shirt that fit them best. All shirts used were the same style and from the same manufacturer with 5 buttons, 1 cm in diameter. During testing, the primary investigator digitally timed the participants on an Apple iPhone to 0.01 seconds on how fast they could completely button down the shirt. Every subject started with both hands holding on to the shirt collar. Upon command, they buttoned as quickly as possible until the 5th button completion signaled the stoppage from the timer. In between trials, everyone was provided one minute of rest. Three trials were completed, and the best time was recorded. After three buttoning trials were completed, the participant was provided a Camry hand-grip dynamometer. A hand grip dynamometer is considered a reliable and valid tool used for measuring force production of the hand (Sanders et al., 2022). The hand-grip dynamometer was set specifically to the participant's age and gender. The participants stood up with their arm at their side and the hand-grip dynamometer in their hand. They were instructed to squeeze the dynamometer with maximal effort. The investigators recorded both their left and right-hand grip strength in pounds.

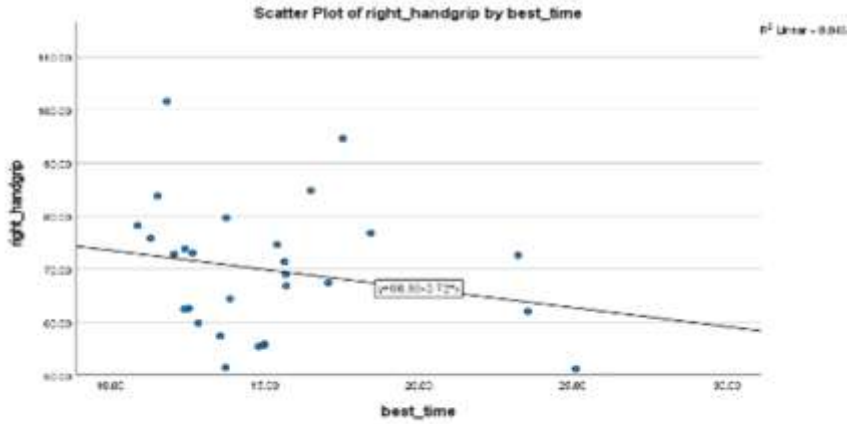
Statistical Analysis

The data analysis procedure was a Pearson correlation of two dependent variables. The two variables analyzed were the speed of buttoning (0.01 seconds) and hand-grip strength (in pounds). The data was analyzed using SPSS version 26 (New York, NY). Subject demographic data is listed in Table 1. Pearson correlation analyzed both right-hand and left-hand grip strength in comparison to the speed of buttoning down a shirt (refer to Table 2). The data was determined to be reliable based on the precise protocols followed for every participant and by allowing three trials to be used, only selecting the best time of all the attempts.

Findings

This novel pilot study determined if hand grip strength had a significant relationship to buttoning in females. By observing Table 2, Pearson correlation from right-hand grip strength to best time ($r=-0.214$; $p=0.274$) did not show a statistically significant relationship. Pearson correlation from left-hand grip strength to best time ($r=-0.028$; $p=0.888$) also did not show a statistically significant relationship. Figure 1 depicts the scatter plot for correlation of right and left-hand grip strength and best buttoning time, respectively. Even though a low to moderate relationship was seen, the p value demonstrated non-significance of the data.

Figure 1. Correlation of right-hand grip strength and best buttoning time.



Discussion and Conclusion

This novel study investigated the relationship between grip strength and the speed of buttoning a shirt. No statistical significance was identified between right-hand or left-hand grip strength and shirt buttoning speed. These results suggest that grip strengthening may not be the primary or sole therapeutic intervention when attempting to improve efficacy of fine motor function in ADLs, including buttoning skills. McGrath et al. investigated the association between a decrease in grip strength and impairments in ADL functioning (McGrath et al., 2018). Their findings indicated each five kilogram decrease in grip strength, yielding increased odds of ADL functional limitations. Specifically, the odds for functional limitations were increased by 9% in relation to dressing. While our observations of speed of buttoning a shirt did not correlate to grip strength, the task performance of dressing does hinge on grip strength to some degree, as presented in the study from McGrath et al.

Despite the fine motor skills necessary to button a shirt, the investigators of this study cannot completely rule out the role of grip strength in shirt buttoning. Rather, grip strength is not a single or sole contributor to the functional activity as indicated in the findings from Beqaj et al., (2018) which analyzed and concluded, a significant correlation between grip strength and time to completion of the 9 Hole Peg Test in adolescents. Upon analyzing our findings, perhaps the addition of a finger force assessment could have strengthened the data. When buttoning a shirt, pinch grips may be more appropriate than using hand grips due to primarily utilizing the fingers and associated fine motor skills instead of the entire hand or gripping when completing the task.

Numerous studies investigating the relationship between grip strength and fine motor tasks focus on the developing years in the pediatric population. Alaniz et al. (2015) observed a correlation between pencil control and grip strength in children with and without autism. Their observations suggested that grip strength and fine motor skills correlated with independence in performing functional motor activities. Further validation for this correlation was indicated in the investigation from Beqaj et al., (2018). These studies indicate that grip strength is a positive contributor to fine motor skills and function, and ultimately the ability to live independently with improved quality of life. The focus of our study on the relationship

between grip strength and shirt buttoning speed may speculate to a greater understanding of other upper-extremity strength and motor control factors with pinching vs grip. This could suggest a relationship between pinch strength and manual ability, which may demonstrate why we observed insignificant findings in our study between grip strength and shirt buttoning speed. Conversely, the performance of ADLs involves aspects of gross and fine motor performance that go beyond muscular strength, indicating a need to focus on improving fine motor skills concurrent with increasing hand grip strength.

Furthermore, performing one maximal grip strength test per hand after the 3 buttoning trials could have led to muscular fatigue in the hands and a temporary decrement of individual fine motor capabilities. Krause et al., (2022) indicated unilateral fatigue in one limb may cause fatigue in the other leading to decreased performance in fine motor tasks, especially with the onset of disease. Thus, even though the buttoning test time was short, the completion of 3 separate trials may have led to accumulating fatigue in both hands. Additionally, a maximal grip test on one hand, after 3 separate buttoning tests, may have led to poor test results on the opposite hand. Lastly, when investigating the quality of performance related to motor dexterity and strength in individuals who suffered a stroke compared to healthy subjects, Rinne et al., (2018) focused on the importance of the attention control system. Suppression of the attention control system, or distraction, leads to reduced performance in simple voluntary motor movements, such as gripping and buttoning a shirt. Therefore, distraction from the previously mentioned timing element could have led to insignificant results in our results. Future research should seek to investigate the role pinch grip strength and finger force have in determining ability to perform fine motor tasks and independently complete ADLs. Additionally, future research into therapeutic modalities to address and resolve weakness in pinch grip strength and finger force could lead to improved fine motor abilities, and ultimately, independence in completing ADLs.

Limitations of this study include a timing component in the methods, which could have served as a distraction in the participant's performance while buttoning the shirt. Schwartz et al., (2014) investigated comparing test anxiety and performance during timed and untimed tests. Their study found students' performance increased while their testing anxiety decreased during untimed tests. Data from this study suggests that the subjects may have had increased anxiety while buttoning which could have decreased their performance time. Practical implications from our study still suggest grip strength is a reliable and valid method towards assessing upper body functionality. However, it also would be noted to observe the ADL functional movement of women to suggest dexterity of the fingers could play a greater role towards buttoning performance than hand grip strength (Lindstrom-Hazel et al., 2016).

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Effective Communication in Team Sports from a Sociological Perspective

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Abstract

This research was carried out in order to examine the effect of effective communication on athletes in team sports from a sociological perspective. The universe of the research consisted of Istanbul, and the sample consisted of 491 athletes, 106 women and 385 men, in different sports clubs in Istanbul. Personal information form and "Effective Communication Scale in Team Sports" developed by Sullivan and Feltz, translated into Turkish by "Hambleton and Jones" (1994) and adapted for Turkish athletes by "Alkan" (2009) were used as data collection tools in the research. SPSS 25.0 package program was used to analyze the data. It was examined whether the data showed normal distribution and Kolmogorov-Smirnov normality test was applied. T-Test was applied for pairwise comparisons, Anova test for three or more comparisons and correlation test for relationship, and the findings were evaluated according to $p<0.05$ significance value. As a result, while there was no difference between the communication levels of the athletes in team sports and the variables of age and education, there were significant differences between the variables of gender and branch ($p<0.05$). It has been determined that there is a positive relationship between the effective communication levels of the athletes in team sports and "acceptance and positive conflict" and "discrimination and negative conflict".

Keywords: Sports Sociology, Team Sports, Communication

Introduction

The fact that sport is a cultural and social phenomenon creates a close relationship between sport and sociology. In this context, sports sociology evaluates sports as a cultural and social phenomenon and uses sociological theories to understand the role, function and meaning of sports in social life.

The fact that sports take an important place in social life and has a great impact on society allows this phenomenon to be understood especially in terms of functional theory and conflict theory. In the light of this information, social system, social cohesion and harmony, social gender, communication etc. concepts come to the fore. This common relationship has formed a phenomenon called communication depending on the need (Çetinkaya, 2011). Although the most commonly used communication tool among people is speech, laughter, gestures, facial expressions, bodily expressions, and silence are other tools that serve to convey the concepts (Lazar 2001). Oskay (2011) states that communication is a human-specific phenomenon that changes according to the way the person maintains his existence.

In addition, Ansel and Orlick, in their study on coach and athlete communication, emphasized the importance of coaches showing positive behavioral characteristics such as being honest, positive, constructive and sympathetic, and giving importance to the team's opinion in decisions to be made (Erkan, 2002). Güngör (2011), on the other hand, emphasizes that communication is a basic premise to be a social whole and moreover to create the organizational structure of the society.

Communication, organizing the process of people collectively constructing social reality, conveying knowledge, ideas, emotions, skills, symbols; the process of sharing that information to build knowledge about respondents and to reach mutual understanding with each other; and likewise, it is understood that all information and ideas are of the same value or should be explained, sharing and ensuring mutual influence (Dökmen, 2005). From this point of view, it can be expected that the participants (athletes, trainers, parents, managers, etc.) in sports teams have an effective communication process.

It can be said that communication in sports teams is also important in achieving success and delivering the desired performance. In the sports environment, both the athlete and the trainer can be mutually dependent on each other. From the athlete's perspective, this mutual commitment defines the need to leverage the trainer's competence, knowledge and experience; and coach, he needs to transfer his own competence and skill to performance and success through his athlete. Therefore, athletes and coaches develop a professional relationship or partnership between themselves and dual performance, they need time for a common need to achieve success and the obligation to cooperate (Antonnini Philippe & Seiler, 2006). From this point of view, communication provides a suitable environment for establishing positive relationships and experiencing a positive coach-athlete relationship. (Altıntaş et al., 2012).

In this respect, sociology offers a theoretical perspective in terms of understanding the phenomenon of sports. "Communication", which is one of the social interaction processes of people who come together in sports environments based on competition and struggle, is extremely important. In team sports, achieving success, achieving the desired goals and ensuring that the performance is stable are among the most important goals. This is achieved through effective communication. In this context, the aim of this study is to examine the phenomenon of effective communication in team sports from a sociological perspective according to some variables.

Material and Method

The research was carried out using the general scanning model. Scanning model is "the scanning arrangements made on the whole universe or a group, sample or sample to be taken from it in order to make a general judgment about the universe in a universe consisting of many elements" (Karasar, 2017).

Research Group

While the study population of the research consists of athletes playing in different amateur sports clubs in Istanbul in 2021-2022, the sample consists of 491 volunteer athletes in total, 106 women and 385 men, in different sports clubs in Istanbul.

Data Collection Tools

Personal Information Form: In the personal information form, there are questions that will enable access to information about the participants' age, gender, education and sports branch, and their status.

Effective Communication Scale in Team Sports: The scale used in the research was developed by Sullivan and Feltz and translated into Turkish by "Hambleton and Jones" (1994). An adaptation for Turkish athletes was made by "Alkan" (2009). The scale has 15 items, 9 items are "acceptance and positive conflict", 6 items are "discrimination and negative conflict", the sub-dimensions of the scale are Cronbach's Alpha values; .86, Discrimination; It was found to be .84.

Data Analysis

The collected data were analyzed in the SPSS 25.00 package program. It was examined whether the data showed normal distribution and the Kolmogorov-Smirnov normality test was applied. As analysis methods; Independent Sample T-Test was used for independent groups, Anova test for multiple comparisons, and correlation test for relationship.

Findings

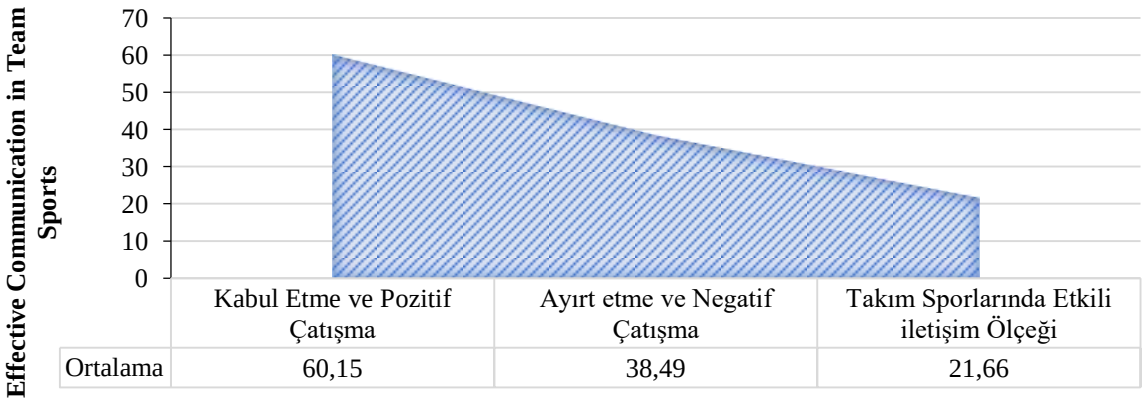
Table 1. Descriptive Statistics Regarding Effective Communication Branch Variable in Team Sports

Dimension	Branch Status	N	X	Ss
Acceptance and Positive Conflict	Football[a]	193	39,20	4,026
	Volleyball[b]	107	37,69	4,333
	Basketball[c]	95	37,85	4,570
	Handball[d]	54	38,03	4,551
	Field Hockey[e]	25	40,00	2,309
	American Football[f]	17	38,23	3,767
Discrimination and Negative Conflict	Football[a]	193	22,51	5,339
	Volleyball[b]	107	20,86	5,552
	Basketball[c]	95	21,35	5,475
	Handball[d]	54	22,44	5,954
	Field Hockey[e]	25	19,12	3,789
	American Football[f]	17	20,11	4,371
Effective Communication in Team Sports	Football[a]	193	61,71	8,552
	Volleyball[b]	107	58,56	9,139
	Basketball[c]	95	59,21	9,380

Handball[d]	54	60,48	10,15
Field Hockey[e]	25	59,12	5,659
American Football[f]	17	58,35	6,909

When Table 1 is examined, when the averages for the branches of the athletes are examined, the scores of the athletes engaged in field hockey (40.00) in the sub-dimension of "acceptance and positive conflict", the scores of the football players (22,51) in the dimension of "discrimination and negative conflict" and in team sports. In communication, it was determined that football players (21,66) had higher scores.

Table 2. Average Values of Effective Communication and Its Sub-Dimensions in Team Sports



When Table 2 is examined, it was seen that the athletes' scores for acceptance and positive conflict sub-dimension (60.15), discrimination and negative conflict (38.49) and effective communication in team sports (21.66) were higher.

Table 3. T-Test Analysis Results on Effective Communication Status in Team Sports by Gender Variable

	Gender	N	X	Ss	T	P
Acceptance and Positive Conflict	Female	106	40,29	3,248	5,067	**,000***
	Male	385	37,99	4,344		
Discrimination and Negative Conflict	Female	106	21,88	4,838	,467	,641
	Male	385	21,60	5,607		
Effective Communication in Team Sports	Female	106	62,17	7,109	2,646	**,008***
	Male	385	59,60	9,301		

Table 3, according to a significant difference was found between the genders in the sub-dimensions of effective communication and acceptance and positive conflict in team sports ($p<0.05$). There was no difference in discrimination and negative conflict dimensions. Considering the mean scores, both women (62.17±7.109) and men (59.60±9.301) have very similar levels of self-efficacy in effective communication.

Table 4. Anova Analysis Results on Effective Communication Status in Team Sports by Age Variable

Dimension	Age Group	N	X	Ss	F	P
Acceptance and Positive Conflict	15-19[a]	103	38,69	2,008	,203	,894
	20-24[b]	144	38,28	5,721		
	25-29[c]	147	38,54	3,673		
	30 and Over[d]	97	38,49	4,233		
Discrimination and Negative Conflict	15-19[a]	103	21,97	4,495	,198	,898
	20-24[b]	144	21,43	6,362		
	25-29[c]	147	21,66	5,118		
	30 and Over[d]	97	21,70	5,447		
Effective Communication in Team Sports	15-19[a]	103	60,66	5,834	,232	,874
	20-24[b]	144	59,71	11,38		
	25-29[c]	147	60,21	8,012		
	30 and Over[d]	97	60,19	8,919		

In Table 4, when the age status of the athletes was examined in terms of variables, it was found that there was no statistically significant difference in effective communication and its sub-dimensions.

Table 5. Anova Analysis Results on Effective Communication Status in Team Sports by Education Variable

Dimension	Educational Status	N	X	Ss	F	P
Acceptance and Positive Conflict	Secondary Education[a]	98	38,60	1,988	,145	,865
	Lycee[b]	245	38,38	5,167		
	University[c]	148	38,58	3,585		
Discrimination and Negative Conflict	Secondary Education[a]	98	21,58	4,278	,088	,916
	Lycee[b]	245	21,60	6,041		
	University[c]	148	21,82	5,119		
Effective Communication in Team Sports	Secondary Education[a]	98	60,18	5,496	,100	,905
	Lycee[b]	245	59,99	10,49		
	University[c]	148	60,41	7,929		

In Table 5, when the educational status of the athletes was examined in terms of variables, it was determined that there was no significant difference in their effective communication status and in the two sub-dimensions.

Table 6. Anova Analysis Results on Effective Communication Status in Team Sports by Branch Variable

Dimension	Branch Status	N	X	Ss	F	P	Significant Difference
Acceptance and Positive Conflict	Football[a]	193	39,20	4,026	3,117	**,009***	**a-b**
	Volleyball[b]	107	37,69	4,333			
	Basketball[c]	95	37,85	4,570			
	Handball[d]	54	38,03	4,551			
	Field Hockey[e]	25	40,00	2,309			
	American Football[f]	17	38,23	3,767			
Discrimination and	Football[a]	193	22,51	5,339	3,104	**,009***	**a-e**
	Volleyball[b]	107	20,86	5,552			

Negative Conflict	Basketball[c]	95	21,35	5,475			
	Handball[d]	54	22,44	5,954			
	Field Hockey[e]	25	19,12	3,789			
	American Football[f]	17	20,11	4,371			
Effective Communication in Team Sports	Football[a]	193	61,71	8,552	2,323	**,042***	**a-b**
	Volleyball[b]	107	58,56	9,139			
	Basketball[c]	95	59,21	9,380			
	Handball[d]	54	60,48	10,15			
	Field Hockey[e]	25	59,12	5,659			
	American Football[f]	17	58,35	6,909			

When Table 6' was examined according to the branch status variable of the athletes, a statistically significant difference was found in the effective communication, "acceptance and positive conflict" sub-dimension and "discrimination and negative conflict dimension" in team sports ($p<0.05$). It has been observed that this difference is between football and volleyball players in the "acceptance and positive conflict dimension", football and field hockey in the "discrimination and negative conflict dimension" in team sports, and between football and volleyball branches in effective communication.

Table 7. Team Correlation Analysis Results Regarding Effective Communication and Its Sub-Dimensions in Sports

		1	**2**	**3**
Acceptance and Positive Conflict	P	1	,696	,899
	r		**,000**	**,000**
Discrimination and Negative Conflict	p		1	,940
	r			**,000**
Effective Communication in Team Sports	p		,	1
	r			

Table 7 shows the correlation analysis results of the athletes participating in the research regarding effective communication in team sports and its sub-dimensions. According to the findings; A positive relationship was observed between the athletes' "acceptance positive conflict" dimension and "discrimination and negative conflict" dimension and effective communication in team sports.

Discussion and Conclusion

In this study, the effective communication levels of the participating athletes in team sports in terms of sociological perspective were examined according to different variables. As a result of the findings obtained, there were significant differences between the genders and branches of the individuals engaged in team sports. No significance was found in the education and age variables. A positive and significant relationship was observed in the "acceptance and positive conflict" sub-dimension, "discrimination and negative conflict" dimensions, which are included in effective communication in team sports. When the literature on the subject is examined, effective communication studies are found.

In our study, while significant differences were found between gender variable and effective communication, acceptance and positive conflict in team sports, no difference was observed between discrimination and negative conflict. In a study conducted by Kılcıgil et al. (2009), it was investigated whether there was a difference between the communication skills of the

Physical Education and Sports Department students. It was found that female students had significantly higher communication skills than male students. In the study of the effect of communication skills on team and individual athletes conducted by Ulukan, H. (2012), it was determined that there was no significant difference between the gender variable and communication skills. These studies support our study. When the age status of the athletes was examined in terms of variables, it was determined that there was no statistically significant difference in the sub-dimensions of effective communication, "acceptance and positive conflict" and "discrimination and negative conflict". In the study conducted by Görür (2001) that there is a significant difference in the perceptions of communication skills in favor of the older age group adolescents, it differs from the finding of our study. However, there are studies in the literature that include results that negatively affect communication skills as age increases (Hacıoğlu 2017; Bayrak & Nacar, 2015; Dalkılıç 2011).

When the educational status of the athletes was examined in terms of variables, it was determined that there was no significant difference in their effective communication status and in the two sub-dimensions. When the literature is examined, studies on educational status and effective communication are seen (Korkut, 2005). In the study conducted by Abakay and Kuru (2011), it was determined that as the educational status of professional and amateur male football players increased, the level of communication with the coach also increased. On the other hand, in the study conducted by Ulukan, H. (2012), it was found that the communication skills of athletes who have parents with high education levels are high. When the athletes' branch status was examined according to the variable, a statistically significant difference was found in the effective communication in team sports, "acceptance and positive conflict" sub-dimension and "discrimination and negative conflict" dimension. Unlike this study, in the study conducted by Ulukan, H. (2012), it was determined that there was no significant difference between the branch variable and the communication skills of the athletes. According to the results of the correlation analysis regarding the effective communication and sub-dimensions of the athletes participating in the research in team sports; It has been determined that there is a positive relationship between the "acceptance positive conflict" dimension of the athletes and the "discrimination and negative conflict" dimension and effective communication in team sports. In the studies of Cuningham and Eys (2007), the relationship between intra-team communication and role confusion in team sports was examined. It was found that as the level of communication increased, the role confusion within the team decreased. It has been seen that the high level of communication is an important tool in minimizing the problems among the athletes. In addition, increasing team unity and facilitating learning are important in sports (Baser, 1985).

As a result, it has been seen that communication from a sociological perspective is important for the success of the team and for the conflicts of intra-team communication. In the light of this information and as a result of social resources, researches can be made for different studies. It can be used in individual and team sports without determining whether communication is affected positively or negatively. In the light of the obtained results, various programs can be applied to improve communication within the team.

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Effects of the Goal Parameters of the Football Teams Coming in the First Four and Last Three Places in the Bundesliga 2020-2021 Season on the League Ranking

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Abstract
This study aims to investigate the effects of the goal parameters of the football teams coming in the first four and last three places in the German Bundesliga league 2020-2021 season on the league table.
The teams competing in the 2020-2021 season of the Bundesliga and coming in the first four places, Bayern München, Red Bull Leipzig, Borussia Dortmund, and Wolfsburg, and in the last three places, Köln, Werder Bremen, and Schalke were analyzed in the study. Goals, the number of goal attempts, shots, shots on goal, passes, successful passes, key passes, successful key passes, and dribbling included in the analysis. The study data were obtained from the InStat data analysis software. The ANOVA model was utilized to investigate the difference in these parameters among the teams.
Based on the study results, a statistically significant difference has been observed in the variables of goals, the number of goal attempts, shots, shots on goal, passes, successful passes, key passes, successful key passes, and dribbling ($p<0.05$).
Conclusively, considering the league positions of the teams included in the study, the numbers of goal attempts, shots, shots on goal, successful passes, and key passes affect ranking. Therefore, it is advised that teams give importance to training sessions to increase their dribbling and pass quality in their tactical training programs to become successful.

Keywords: Football, Match Analysis, Germany Bundesliga

Introduction

To be successful in football depends on a complex structure; the readiness, football-specific technical development, and tactical perceptive of football players are at the forefront in this sport in which countless internal and external factors play a role (Souza et al., 2019a). One part of this structure is technical teams of elite clubs analyzing both their teams and their rival teams via expansive data (Santos et al., 2017). Game analysis is extremely important for sportive success (Sarmento, 2014) and plays a crucial role in increasing performance and making better tactical decisions on part of coaches and players (Agras et al., 2016). Football is a sport in which favorite clubs are not the sole winners; this stems from being dependent more on analysis and tactical discipline rather than physical or technical conditions. Based on these factors, increasing the win rate of a club is dependent on the diversity of analysis in today's football. Coaches can gain an advantage over their rivals with correct and diverse analyses. Teams today prepare for their games with tactical training by analyzing the last few games of the rival club (Kurak, 2018). While teams are trained with the help of technology, analyzing the rival properly will be a critical factor in gaining an edge. The absolute duty of the technical team and analyzers of a club should be enabling the coach to make decisions by getting him/her to understand the pluses and minuses of their teams and rivals, and increasing the team's performance (Herold et al., 2021). Winning and losing in football are hidden in very fine details; presenting the team with fine details, obtained with analytic methods, such as possession, running distance, and pass rates in game-based meetings affect how successful the team is on the pitch (Perl, 2017). However, the indispensable factor for teams to win is of course their goals and goal-specific activities. Succeeding in scoring or developing multiple scoring organizations and plans is a key factor in winning and progressing further with the team. Reep et al. (1968) put forth that 80% of the goals are scored after three or fewer touches. Taking advantage of the positions can also affect teams' rankings. In the literature, differences are observed in terms of some performance parameters among teams with different positions in league standings. In a study comparing the first ten and last ten teams in the 2012-2013 season standings of the English Premier League, the first ten teams were found to have higher average crosses, shots, and shots on goal than the last ten teams (Araya et al., 2013). In a study conducted in the Turkish Football First League (Gürkan and Kırkaya, 2021), it was concluded that the teams that completed the league in the top ranks had higher averages of goals, total shots, and shot on target. In a study conducted in the Turkish football super league in the 2016-2017 season (Gürkan et al., 2019), it was found that the goal averages per match of the teams that completed the league in the top 9 places (1-9) were higher than the averages of goals per match of the teams that completed the league in the last 9 places (10-18). conclusion has been reached.

The objective of this study is to analyze the effects of the goal parameters of the football teams coming in the first four and last three places in the German Bundesliga league 2020-2021 season on the league table.

Material and Method

Participants

The 2020-2021 season of the Bundesliga was played by 18 teams and the data from the first four teams in the final league table earning the right to compete in the Champions League, namely Bayern München, Red Bull Leipzig, Borussia Dortmund, and Wolfsburg in order, and the last three teams in the league table relegating to the second division and competing in play-outs, namely Köln, Werder Bremen, and Schalke were used in the study. A total of 238 matches have been analyzed.

Data collecting

The study data were obtained through the InStat (Moscow) analysis software. The InStat index is an objective indicator of players' performance within a game based on numeric data. The InStat index of a player is calculated by marking the position-specific prominent characteristic of the numeric data of the player's performance exclusive to each game. The necessary permission for the use of the data was obtained from the InStat software company.

Statistical Analysis

The statistical analysis of this study was conducted with the SPSS 25.0 package software. As a result of the Shapiro-Wilk test done to determine which test would be suitable for the data set, the significance level of the data per the test of normality results was found to be bigger than 0.05 and the data were determined to show normal distribution, and parametric tests were deemed suitable for the analysis. Descriptive statistic calculations were carried out and the ANOVA method was used to determine the differences among the teams in terms of their goal parameters. Upon finding a difference, the Tamhane T2 test was utilized to determine between which teams this difference occurred. The significance level was accepted as $p<0.05$ in the study analysis.

Analyzed Parameters

238 games in total played by these clubs throughout the season were reviewed, and their goals, numbers of goals, shots, shots on goals, passes, successful passes, key passes, successful key passes, and dribbling statistics were analyzed to review their goal parameters.

Results

Based on the data obtained from 238 games in this study the objective of which is to reveal the differences among the goal parameters of the teams finishing the 2020-2021 season of the Bundesliga in the first four places, namely Bayern München, Red Bull Leipzig, Borussia Dortmund, and Wolfsburg in order, and the teams finishing the season in the last three places, namely Köln, Werder Bremen, and Schalke, and investigate the effects of these differences on the league standings, the numbers of goals and goal attempts of the teams and the differences among the teams are given in Table 1.

Table 1: The anova results based on the goal and goal attempt numbers of the bundesliga teams

Parameter	Team	N	$\bar{X}$	SS	F	*p*	Tamhane
Goal	(1) B. München	34	2,9	1,7	14,5	0,000*	1>2,4,5,6,7 2>7 3,4>5,6,7
	(2) Leipzig	34	1,7	1,10			
	(3) B. Dortmund	34	2,2	1,12			
	(4) Wolfsburg	34	1,8	1,20			
	(5) Köln	34	0,97	0,93			
	(6) W. Bremen	34	1,05	0,95			
	(7) Schalke	34	0,73	1,05			
Number of Goal Attempts	(1) B. München	34	9,44	3,76	30,794	0,000*	1,3>4,5,6,7 2,4>5,6,7
	(2) Leipzig	34	7,94	3,22			
	(3) B. Dortmund	34	8,67	2,99			
	(4) Wolfsburg	34	6,18	2,50			
	(5) Köln	34	3,76	1,93			
	(6) W. Bremen	34	3,79	1,85			
	(7) Schalke	34	3,29	2,05			

$P<0.05$*

As a result of the ANOVA test done based on the Table 1 analysis results, a statistically significant difference can be seen in the goal and number of goal attempts parameters ($p<0.05$). Based on the Tamhane test results done to determine differences, it was concluded for the goal parameter variable that the goal percentage of Bayern München was higher than those of Leipzig, Wolfsburg, Köln, Werder Bremen, and Schalke, the goal percentage of Leipzig was higher than that of Schalke, and the goal percentages of Borussia Dortmund and Wolfsburg were higher than those of Köln, Werder Bremen, and Schalke. As for the number of goal attempts variable, it was found that the numbers of goal attempts by Bayern München and Borussia Dortmund were higher than those by Wolfsburg, Köln, Werder Bremen, and Schalke, and the numbers of goal attempts by Leipzig and Wolfsburg were higher than those by Köln, Werder Bremen, and Schalke.

The distribution of the number of shots and shots on goal based on the teams, which are among the goal parameters of the teams included in the study, and the ANOVA test results determining their differences are given in Table 2.

Table 2: Anova test results based on the number of shots and shots on goal of the bundesliga teams

Parameter	Team	N	$\bar{X}$	SS	F	*p*	Tamhane
Shots	(1) B. München	34	16,67	5,32	18,93	0,00*	1,2,3,4>5,6,7
	(2) Leipzig	34	14,88	4,97			
	(3) B. Dortmund	34	14,00	3,79			
	(4) Wolfsburg	34	13,60	3,70			
	(5) Köln	34	9,67	3,95			
	(6) W. Bremen	34	9,79	3,77			
	(7) Schalke	34	8,14	3,97			
Shots on Goal	(1) B. München	34	7,61	3,42	21,07	0,00*	1,2,3,4>5,6,7
	(2) Leipzig	34	6,11	2,57			
	(3) B.Dortmund	34	5,97	2,51			
	(4) Wolfsburg	34	5,51	2,09			
	(5) Köln	34	2,91	1,74			
	(6) W. Bremen	34	3,58	1,74			
	(7) Schalke	34	2,73	1,94			

P<0.05*

As a result of the ANOVA test done based on the Table 2 analysis results, a statistically significant difference can be seen in the numbers of shots, and shots on goal ($p<0.05$). Based on the Tamhane test results done to determine differences, it was concluded for the numbers of shots, shots on goal, and passes that Bayern München, Leipzig, and Borussia Dortmund had higher points averages than Wolfsburg, Köln, Werder Bremen, and Schalke.

The numbers of passes, successful passes, key passes, ad successful key passes of Bayern München, Red Bull Leipzig, Borussia Dortmund, Wolfsburg, Köln, Werder Bremen, and Schalke, and the differences among the teams are shown in Table 3.

Table 3: The anova test results based on the numbers of passes, successful passes, key passes, and successful key passes of the bundesliga teams

Parameters	Team	N	$\bar{X}$	SS	F	p	Tamhane
Passes	(1) B. München	34	640,11	74,33	34,07	0,00*	1,2,3>4,5,6,7
	(2) Leipzig	34	628,52	107,46			
	(3) B. Dortmund	34	656,70	128,43			
	(4) Wolfsburg	34	508,84	81,87			
	(5) Köln	34	457,85	86,42			
	(6) W. Bremen	34	453,73	110,45			
	(7) Schalke	34	429,02	92,53			
Successful	(1) B. München	34	86,17	2,61	21,02	0,000*	1,2,3>4,5,6,7

Passes	(2) Leipzig	34	85,11	3,52			
	(3) B. Dortmund	34	86,70	3,85			
	(4) Wolfsburg	34	80,51	3,41			
	(5) Köln	34	80,79	3,56			
	(6) W. Bremen	34	80,44	5,07			
	(7) Schalke	34	80,76	3,36			
Key Passes	(1) B. München	34	12,47	5,53	24,20	0,000*	1,2,3,4>5,6,7
	(2) Leipzig	34	10,55	4,15			
	(3) B. Dortmund	34	11,73	5,08			
	(4) Wolfsburg	34	9,42	5,60			
	(5) Köln	34	4,38	2,44			
	(6) W. Bremen	34	5,20	2,59			
	(7) Schalke	34	4,20	3,02			
Successful Key Passes	(1) B. München	34	6,29	3,47	21,99	0,000*	1,2,3>4,5,6,7
	(2) Leipzig	34	5,02	2,72			
	(3) B. Dortmund	34	6,20	2,96			
	(4) Wolfsburg	34	4,30	2,75			
	(5) Köln	34	2,05	1,51			
	(6) W. Bremen	34	2,11	1,49			
	(7) Schalke	34	1,73	1,54			
	(7) Schalke	34	43,44	7,22			

P<0.05*

As can be seen in Table 3, a statistically significant difference is observed in the successful pass, key pass, and successful key pass of the teams (p<0.05). Based on the Tamhane test results done to determine differences, it was concluded for the successful pass, key pass, and successful key pass parameters that Bayern München, Leipzig, and Borussia Dortmund had higher points averages than Wolfsburg, Köln, Werder Bremen, and Schalke. As for the parameters of steals in rival territory, Bayern München, Leipzig, and Borussia Dortmund had higher points averages than Schalke.

The dribbling rate distribution based on the teams, and the ANOVA test results determining their differences are presented in Table 4.

Table 4: The anova test results based on the dribbling parameters of the bundesliga teams

Parameter	Team	N	$\bar{X}$	SS	F	p	Tamhane
Dribbling	(1) B. München	34	30,79	12,29	11,358	0,00*	1>2,4,5,6 2>6 3>4,5,6 7>6
	(2) Leipzig	34	23,79	6,78			
	(3) B. Dortmund	34	29,26	9,07			
	(4) Wolfsburg	34	22,60	7,12			
	(5) Köln	34	22,85	6,14			
	(6) W. Bremen	34	17,11	4,86			
	(7) Schalke	34	28,23	9,09			

p<0.05*

As a result of the ANOVA test results seen in Table 4, there is a statistically significant difference in the dribbling variables of the teams (p<0.05). Based on the Tamhane test results conducted to determine differences, it was concluded for the dribbling parameter that Bayern München had a higher point average than Leipzig, Wolfsburg, Köln, and Werder Bremen. As for the steal on rival territory parameter, it was found that Bayern München, Leipzig, and Borussia Dortmund had higher point averages than Schalke; Leipzig had a higher point average than Werder Bremen; Borussia Dortmund had a higher point average than Wolfsburg, Köln, and Werder Bremen; and Schalke had a higher point average than Werder Bremen. For the parameter of team press percentage, it was

determined that Bayern München had a higher point average than Köln, Werder Bremen, and Schalke; and Leipzig, Dortmund, and Wolfsburg had higher point averages than Werder Bremen and Schalke.

Discussion

The increasing game rate and workload during matches and training sessions make it mandatory that football be analyzed in detail (Soylu, 2021). Some technical, tactical, and psychological concepts such as game perception can be improved during the game with video analysis methods (Souza et al., 2019b). Efforts have been made to explain the complicated aspect of football in previous football analyses; in this respect, studies have been conducted such as team quality, home and away game analyses, and the match results of successful teams (Taylor et al., 2008; Sarmento, 2014). Physical characteristics, tactical details, game rate, individual technical capacities, and detailed analysis data, increasing lately in the Bundesliga, have aroused curiosity in researchers to analyze the Bundesliga.

238 Bundesliga matches played in the 2020-2021 season were analyzed in this study. The data analyzed as the goal parameters were determined as the goal, goal attempt, shot, shot on goal, pass, successful pass, key pass, successful key pass, and dribbling numbers of the teams. Based on the analysis results, a statistically significant difference was observed in goal attempts, shots, shots on goal, passes, successful passes, key passes, successful key passes, and dribbling among the teams' goal parameters ($p<0.05$). Mitrotasios et al. statistically put forth that the shots on goal of winning teams in UEFA Euro 2012 were higher in number than those of losing teams. Based on their results of analyzing the success factors in the 2014 and 2018 World Cup matches, Lepschy et al. (2021a) put forth that shots in counter-attacks, goal percentages, and the number of crosses from wings are among the factors that affect success. In another success analysis study, Lepschy et al. (2021b) analyze 918 Bundesliga games, based on which they conclude that total shots, shots on goal, the number of goals, and shots in counter-attacks all play a crucial role in success. In their analysis of the first nine and last nine teams of the Turkish Super League, having a similar characteristic to our study's subject matter, Gürkan and Gumusdag (2018) find a statistically significant difference between the performance parameters of the first nine and the last nine teams (the number of goals, total passes, successful passes, ball possession, etc.). In another similar study, in their analysis of the first ten and the last ten teams of the English Premier League, Araya et al. (2013) state that the first ten teams had more shots and scored from the box more. Sgro et al. (2015) state that in Euro 2012, the winning teams' goal average was 2.17 while the losing teams' was 0.58. Castellano et al. (2012) inform that in the 2002, 2006, and 2010 World Cup championships, the winning teams had higher goal, shot, and shot on goal averages and ball possession percentages than the losing teams. Investments in football and progressive statistical methods enable increased performance. The competitive aspect of football has enabled the game to develop; therefore, new variations have been created, the game momentum has increased, physical developments have been experienced, and goal expectations have gone up. Some teams prefer long passes, while others prefer short ones during a game (Njororai, 2013). The developing aspect of the game makes it difficult for coaches as well, who prefer offense and defense-based analysis methods. In another study done on analysis methods, Lago-Penas et al. (2010) analyze the game statistics of the teams that won, had draws, and lost. As a result of this study analyzing 380 games, it has been statistically determined that the winning teams had more shots, crosses, and shots on goal. In a study (Gürkan et al., 2020) conducted on 721 matches in a total of 5 seasons (2014/2015- 2019/2020) in the UEFA Champions League, it was concluded that the teams that left the matches with a win had higher goals, shots and averages. Kartal and Ergin (2019), 2018 World In a study where they analyzed the success of the French National Team, which won the Cup; France team's total shooting average is 11.00, successful shooting average is 4.14 have reached their conclusion. In the 2016 European Football

Championship (Gürkan and Müniroğlu, 2018), it was concluded that the teams leaving the competitions with a win had higher total shooting and positive shooting averages.

The most played and watched sport in amateur and professional levels, football has a league in almost every country. The big five European leagues, the Champions League and Europa League organized by UEFA, the European Cup, and the World Cup are the most beloved organizations and the most desired leagues by professional football players; therefore, competition intensity is high in these leagues. One of the important aspects brought along by this sense of competition is correct analysis methods for success. In studies done on this subject, having more shots in the penalty area, scoring more within the box, having more goal attempts, and having more ball possession and shots have been concluded to be the key factor for teams' success (Kapidzic et al., 2010; Broich et al., 2014). In their study analyzing the first and the last three teams in the last eight seasons of La Liga, Souza et al. (2019b) state that the first three teams had higher pass numbers, and shot and pass on-target percentages.

The analysis results of a study reviewing football teams' performance show that shots on goal, the total number of crosses into the box, goal percentages per game, the number of goals scored during a running game, and goals scored based on the duration are among performance criteria (Ecemiş et al., 2021; Njororai, 2013). Revealing these criteria to affect success, this study also has parallels with and similarities to studies in the literature.

Conclusion

The increasing competition in football affects the ranking and condition of teams. Pursuing varieties for success, teams try to obtain it through analysis methods. Correct analysis studies may affect standings. Analyses compared to previous studies should be implemented in teams through training. The results obtained from this study show that teams should have more goal attempts, shots, successful shots, successful passes, and key passes to go higher up in league tables. It is believed that coaches can carry their teams higher in league rankings by doing training sessions centered on increasing dribbling and pass qualities.

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Foam Rolling in Team Sports

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Abstract

In the main part of the training, different protocols are used for the warm-up sessions for the basic biomotor characteristics that are desired to be exercised (Lee et al., 2018). The person transfers his/her body weight onto the foam roller (FR) to loosen the different parts of the soft tissue and prevent restrictions. FR is known to help improve muscle length-tension relationships and provide a better warm-up (Healey et al., 2013).

Within the scope of our research, ‘’PubMed, GoogleScholar, Web of Science, Scopus, YökTez, and Elsevier’’ databases were used. By including the studies done in the last five years in our research, 5 different keywords were used for national and international databases in the literature review. Studies were examined using the keywords ‘’self-myofascial release, range of motion, team sports, dynamic stretching, massage’’. In our research, as a result of the literature review, four team sports were categorized as ‘’volleyball, football, handball, and basketball’’.The aim of this review is the studies conducted between 2017-2022. The aim of this study is to examine the effect of FR applications on performance parameters in team sports.As a result, it was determined that the application of FR in addition to the warm-up session affected various performance parameters, increased the range of motion in the upper and lower extremity muscles, and positively affected the sportive performance at this point.

Keywords: self-myofascial release, range of motion, team sports, dynamic stretching, massage

Öz

Antrenmanların ana bölümünde çalıştırılmak istenilen temel biyomotor özelliklere yönelik ısınma seansları için farklı protokoller kullanılmaktadır (Lee ve ark., 2018). Kişi, vücut ağırlığını ilgili yumuşak dokunun farklı bölgelerini gevşetmek ve kısıtlılıkları engellemek amacıyla köpük silindirin üzerine aktarır. Köpük silindiri yuvarlama işleminin kas uzunluğu–gerginlik ilişkilerini düzeltmeye yardımcı olup daha iyi bir ısınma sağladığı bilinmektedir. (Healey ve ark., 2013).

Araştırmamız kapsamında 'PubMed, GoogleScholar, Web of Science, Scopus, YökTez, ve Elsevier' veri tabanları kullanılmıştır. Araştırmamıza son beş yıl içerisinde yapılan çalışmalar dahil edilerek literatür taramasında ulusal ve uluslararası veri tabanları için 5 farklı anahtar kelime kullanılmış, tarama yapılırken ulusal veri tabanları için 'Fasya, ısınma periyodu, esneklik, köpük rulo uygulaması ve takım sporları', yabancı veri tabanları için ise 'self-myofascial release, range of motion, team sports, dinamic stretching, massage' anahtar kelimeleri kullanılarak çalışmalar incelemeye alınmıştır. Araştırmamızda litaretür taraması sonucunda 'voleybol, futbol, hentbol ve basketbol' olarak dört takım sporu kategorize edilmiştir.Çalışmamızın amacı 2017-2022 yılları arasında yapılmış olan çalışmalarda; foam roller uygulamalarının takım sporlarında, performans parametreleri üzerine olan etkisinin incelenmesidir.Sonuç olarak, ısınma seansına ek olarak FR uygulamasının çeşitli performans parametrelerini etkilediği, üst ve alt ekstremite kaslarındaki hareket açıklığını arttırdığı ve bu noktada sportif performansı olumlu yönde etkilediği belirlenmiştir.

Anahtar Kelimeler: foamroller (fr), myofasiyal gevşetme teknikleri, esneklik, eklem hareket açıklığı, takım sporları

Introduction

Stretching exercises are thought to improve physical performance, prevent injuries and increase flexibility (Bradley, Olsen, & Portas 2007). Exercises for the protection and development of flexibility and related joint range of motion are very important for both musculoskeletal health and the general physical fitness of the individual (Bradley et al., 2007). One of the physical techniques acting on the tissue, ¨Myofascial (myo-connective tissue) release¨ (Manheim, 2008), has been used in many disability situations until today, and has become widespread in the physical therapy and manipulative treatment circles by Barnes (1997) (Barnes, 1997).

Today, it is also defined as the "myofascial release" technique. In technical terms, myofascial release is expressed as a gradual stretch (stretch) applied by a therapist to soft tissues, which is used to remove the restrictions in soft tissues with varying application angle, strength, and duration for the feedback phase in the muscles of the applied person (Manheim, 2008).

Myo-fascial relaxation (MG) through Foam Roller (FR) is a form of massage practiced (physical, occupational, athletic) and encouraged by therapists together with functional movement and sports professionals. FR is used as a warm-up, recovery, and maintenance technique targeting soft tissue to improve joint range of motion (EHG) and optimize muscle function (Macdonald et al. 2013).

Our research aims to examine the effect of myofascial release techniques applied with Foam Roller on team sports in studies conducted within the scope of the literature.

Material and Method

Within the scope of our research, ‘’PubMed, GoogleScholar, Web of Science, Scopus, YökTez, and Elsevier’’ databases were used. By including the studies done in the last five years in our research, 5 different keywords were used for national and international databases in the literature review. Studies were examined using the keywords ‘’self-myofascial release, range of motion, team sports, dynamic stretching, massage’’. In our research, as a result of the literature review, four team sports were categorized as ‘’volleyball, football, handball, and basketball’’.

Findings

Table 1. Literature Review of Foam Roller Applications on Footballers Between 2017-2022

Article	Results
The Effect of Myofascial Relaxation Technique on the Speed and Accuracy of the Ball in Young Football Players (Yazıcı, 2018)	According to the research results, it has been determined that the SMR application, which is applied in addition to the warm-up protocol, creates a significant difference in terms of ball speed, which is one of the determining game performance criteria in young male football players.

Comparison of Acute Effects of Dynamic Stretching and Myofascial Release on Lower Extremity Temperature, Flexibility, Balance, and Agility in Recreational Male Football Players (Seçer & Özer, 2021)	According to the research results, lower extremity warmth, flexibility, and agility of dynamic stretching alone; dynamic stretching and SMR methods were found to increase lower extremity temperature, flexibility, balance, and agility. In line with these results, it was thought that it should be taken into account during the warm-up protocols.
Acute Effect of Self-Myofascial Relaxation Exercises Using Foam Roller on Flexibility and Lower Extremity Strength (Yitik & Ateş, 2018)	According to the research results, it has been determined that 30-second SMR exercises applied to the lower extremities have no effect on vertical jump and flexibility performance, longer rolling times and different performance parameters should also be tested.
Acute Effects of Different Warm-Up Protocols on Squat Force Values: Comparison of Myofascial Relaxation Method and Force-Based Warm-Up Methods (Edis et al., 2021)	According to the results of the research, it has been determined that the use of such warm-up sessions before the measurements to be made with the heel lift applications used to eliminate the distortions in the collapse phase of the movement in the 1TM squat strength measurements of the amateur footballers will help to obtain more effective test results.
Investigation of the Effects of Foam Roller and Kinesiotape Applications on Performance Parameters, Pain, and Fatigue (Karabağ, 2022)	According to the research results, it has been determined that FR application is more effective than KT application in improving flexibility, agility and fatigue parameters, and it is important for athletic trainers and coaches to prefer FR application in addition to dynamic warm-up in order to prevent time loss in training and to get more efficiency from training.
An Investigation of the Effects of Self-Applied Myofascial Relaxation Movements on Acute Flexibility, Strength and Balance in Volleyball and Football Players (Alim, 2021)	According to the research results, it has been determined that FR equipment increases the flexibility of the latissimus dorsi muscle and the range of motion of the shoulder joint for football players and volleyball players in applications for use in training or competitions. In volleyball players, it was determined that the upper extremity strength increased after the roles, and it contributed positively to these characteristics.
Foam Rolling During a Simulated Half-Time Attenuates Subsequent Soccer- Specific Performance Decrements (Kaya et al., 2021)	According to the research results, it has been determined that FR application significantly reduces the sprint time in football players and has a positive effect on performance.
The Effects of Foam Roll on Perceptual and Performance Recovery During a Futsal Tournament (Rahimi et al., 2020)	According to the research results, it has been determined that FR improves physical performance in futsal tournaments and increases the level of lactad.
The Effects of Foam Rolling on Maximum Sprint	According to the research results, there was no

Performance and Range of Motion (Miller, 2017)	significant difference in sprint times after FR exercises. However, it has been determined that FR applications can be important in athletes who need acute range of motion without a later decrease in performance and can show an effective result in terms of performance criteria.
The Acute Effects of Foam Rolling on Ankle and Knee Range of Motion, Hamstring Flexibility, Agility, and Vertical Jump Height (Henning et al., 2019)	According to research results, it has been determined that FR exercises increase ankle and knee joint flexibility.
Effects of Foam Rolling on Ankle Joint ROM and Hamstring Flexibility (Brengesjö et al., 2017)	According to the research results, no difference was found between the control group and the training group. It has been determined that the studies on the tissue around the muscle should be increased.
Acute Effects of Dynamic and Fifa+11 Warm-Up Methods on Flexibility, Vertical Jumping and Agility Performances of Football Players (Güler, 2019)	According to the research results, it has been determined that the dynamic and FIFA 11+ warm-up protocols have a positive effect on vertical jump and body surface temperature.
The Effects of Dynamic and Static Stretching Exercises Applied in the Warm-Up Session on Performance (Polat et al., 2019)	According to the research results, Dynamic stretching movements applied in warm-up sessions for 6 weeks revealed that compared to static stretching movements, it had a more positive effect on speed and direction changing runs, while the results of SS type had more positive effects on joint range of motion.
The Effects of 8-Week Static Stretching Training on Jumping Performance in Football Players (Yaşlı & Müniroğlu, 2019)	According to the research results, it has been determined that chronic stretching trainings have a positive effect on jump strength in amateur football players.
Acute Effects of Different Warm-Up Protocols on Athlete Performance (Topçu, 2017)	According to the research results, statistically significant regression in anaerobic power and speed tests and significant improvement in flexibility were detected in football players who were applied stretching exercise protocol. When the results of the research findings are examined, it is thought that warm-ups with plyometric and suspension exercises will be more beneficial in sports that require jumping and speed, and warm-ups that include stretching exercises in sports that require flexibility.
Investigation of the Effects of Special Exercises Included in the Programs of a Football Team on Flexibility Values at the End of the Training Process (Cabacı & Taşkıran, 2021)	According to the research results, it has been determined that flexibility exercises applied in football players between the ages of 18-25 have improved the flexibility value.
Investigation of the Effect of Self-Myofascial Release Techniques Applied to Plantar Fascia on	According to the research results, it was observed in this study that there was a statistically significant

Hamstring Flexibility in Young Football Players (Torun et al., 2021)	increase in flexibility value after SMR application ($p<0.05$) and self-myofascial release applications applied before warm-up exercises increased acute flexibility performance.
Acute Effects of Applied Local Vibration During Foam Roller Exercises on Lower Extremity Explosive Strength and Flexibility Performance (Sağıroğlu,2017)	According to the research results, it was determined that vibrating FR exercises created a statistically significant difference in both vertical jump and flexibility performance.
The Effects of Vibration Foam Roller Applied to Hamstring on the Quadriceps Electromyography Activity and Hamstring Flexibility (Lim et ve ark., 2019)	According to the results of the research, it has been determined that vibrating FR exercises have a positive effect on hamstring muscle flexibility and cause EMG activation in antagonist muscles.
Effects of Foam Roller Application on Hamstring Muscle Performance (Dönmez, 2019)	According to the research results, It has been determined that the foam roller application is acutely effective in performing higher repetitions from SMR than TD for all sets, and this effect will reduce fatigue for long sets and the foam roller will contribute to the strength development in the long term by keeping the motor unit participation higher in the sets.
Acute Effects of Different Stretching Methods Applied by Footballers in Warm-Up on Vertical Jump, Speed and Agility Performance (Gürses & Akgül, 2019)	According to the research results, It has been determined that the stretching activities applied by amateur football players for 10-12 minutes during warm-up do not have an acute effect on their short-term high-intensity performance.
Acute Effect of Foam Roller Applıed At Dıfferent Frequency Levels On Flexıbılıty In Amputee Players (Günaydın, 2021)	According to the research results, It has been determined that the FR application applied at different frequency levels is an effective method to increase the normal joint movement and the frequency increase does not have an effect on flexibility.
The Acute Effects of Combined Foam Rolling and Static Stretching Program on Hip Flexion and Jumping Ability in Soccer Players (Kyranoudis ve ark., 2019)	According to the research results, It has been determined that short-term static stretching does not adversely affect joint range of motion and jumping performance, and training using static stretching and FR improves.
Effects Of Foam Rollingas A Recovery Tool In Professional Soccer Players(Rey et al., 2017)	According to the research results, It was found that FR had a greater effect on agility and recovery in perceived muscle soreness compared to the passive recovery group 24 hours after training.

Influence of Dynamic Stretching and Foam Rolling on Vertical Jump (Kopec et al., 2017)	According to the research results, It was determined that FR exercises applied to hamstring and quadriceps muscles together with DS were effective on vertical jump parameter. But no significant was detected.
Acute And Chronic Effects of Foam Rolling vs Eccentric Exercise On ROM and Force Output Of The Plantar Flexors (Aune et al., 2019)	According to the research results, It has been determined that eccentric exercises applied together with FR improve and improve ROM. While eccentric exercises showed an increase in both acute and chronic ROM for dorsiflexion, foam roller exercises were found to cause only acute improvement. As a result, it was determined that eccentric exercises were more effective than foam roller exercises.
Acute Outcomes of Myofascial Decompression (Cupping Therapy) Compared to Self-Myofascial Release on Hamstring Pathology After A Single Treatment (Warren et al., 2020)	According to the research results, SMR has been found to be beneficial in increasing hamstring length.

In the last five years, in the studies made by the football players of the experimental group and using foam roller; It was determined that myofascial release exercises applied in addition to the warm-up protocol made a significant difference in terms of performance criteria on the infrastructure and amateur league football players, but the 30-second self-myofascial release technique (SMR) applied to the lower extremities did not have a decisive effect on vertical jump and flexibility performance. In line with these results, it was thought that longer rolling times and performance parameters should be tested. However, only the lower extremity temperature, flexibility, and agility of dynamic stretching; It has been determined that myofascial release methods in addition to dynamic stretching affect balance performance in addition to all parameters. When other literature studies are examined, myofascial relaxation methods applied in addition to the warm-up protocol in the football branch make a significant difference in terms of ball speed, which is one of the determining game performance criteria in male football players, and myofascial relaxation methods applied together with dynamic stretching increase lower extremity temperature, flexibility, balance and agility, and fatigue. It has been determined that it is more effective than the KinesioBand application in improving the parameters. In other studies in the literature, it has been emphasized that FR exercise application before strength measurements can have a positive effect on the results and that foam roller application increases flexibility, especially on the hamstring muscle in football players.

Table 2. Literature Review of Foam Roller Applications on Volleyball Players Between 2017-2022

Article	Results
The Effect of Neuromuscular Exercises and Graston Myofascial Relaxation Technique on Vertical Jumping (Agile, 2021)	According to the research results It has been determined that plyometric and neuromuscular exercises supported by the graston technique have a positive effect on vertical jump, flexibility, and balance parameters.
The Effect of Static Stretching, Dynamic Stretching and Stretching with Foam Roller on Performance in Amateur Volleyball Players (Çakmak, 2021)	According to the research results, DS and FR, and SMR were found to be effective for vertical jump and lower extremity leg strength.
Acute Effects of Static Stretching Applications on Vertical Jumping Agility and Speed Performance of Volleyball Players (Demir, 2018)	It has been determined that static stretching exercises affect speed and agility performance negatively, and active and squat vertical jump performance positively.
Acute Effect of Self-Administered Myofascial Relaxation Exercise Time on Vertical Jump Performance and Flexibility in Well Trained Female Volleyball Players (Ali, 2019)	According to the research results, it was determined that both 30 and 60 second duration FR exercises had similar effects and did not have a negative effect on flexibility and vertical jump performance when compared to the control group. For this reason, FR exercises can be used by athletes as an alternative warm-up tool before training or competitions.
Acute Effects of Foam Roller Exercises in addition to Dynamic Stretching Exercises in the Warm-Up Protocol on Countermovement Jump and Squat Jump Performance in Regional League Female Volleyball Players (Beyleroğlu et al., 2021)	According to the research results, it has been determined that FR application in female volleyball players has a positive effect by increasing the results of SJ and CMJ. When the findings of the research are examined, it is thought that it may be beneficial to include FR practice in addition to the stretching exercises performed during the warm-up periods before the training and competition.
The Effect of Acutely Applied Different Stretching Exercises on Vertical Jump Performance in Female Volleyball Players (Durukan & Göktepe, 2020)	According to the research results, A significant difference was found in the jumping performances of female volleyball players after static, dynamic, and PNF stretching exercises. ($p>0.05$)
The Effectiveness of Ergon Instrument-Assisted	According to the results of the research, it was determined

Soft Tissue Mobilization, Foam Rolling, and Athletic Elastic Taping İn İmproving Volleyball Players' Shoulder Range Of Motion and Throwing Performance: A Pilot Study on Elite Athletes (Maniatakis et al., 2020)	that both IASTM and FR applications improved passive shoulder joint range of motion and positively affected shooting performance compared to kinesio taping (KB) technique.
Deep Tissue Massage And Flexibility İn The Structural Components Of The Superficial Back Line Of Professional Volleyball Players: A Pilot Study (Steuer, M. et al., 2019)	According to the research results, it has been determined that deep tissue massage increases the flexibility of the superficial back line and causes a positive increase in the range of motion in the hips and knees.
The Acute Effect Vıbratıng Foam Rollers Have On The Lower Extremıtıes' Abılıty To Produce Power (Klingenberg, 2017)	When the results of the research were examined, it was determined that the vibrating FR application applied with DS did not make a significant difference on the vertical jump height of female volleyball players.
The Combined Effect of Static Stretching and FoamRolling With or Without Vibration on the Range of Motion, Muscle Performance, and Tissue Hardnessof the Knee Extensor (Nakamura et al., 2022)	According to the research results, it has been determined that applied FR exercises reduce tissue stiffness and significantly increase knee flexion range. When the findings were examined, it was determined that it did not have an effect on the changes detected to be supported by vibrating FR in addition to SS in increasing the range of motion.

When the studies carried out between 2017-2022 are examined; Due to the fact that volleyball is one of the determining performance criteria of FR exercises performed on volleyball players and that the branch of volleyball is a sport based on explosive power; It has been determined that it is effective on the vertical jump performance and lower extremity leg strength, which is significantly necessary, but affects the speed and agility performance in a negative way. In another study, it was determined that the vibrating FR application applied with dynamic stretching (DS) did not make a significant difference in the vertical jump height in female volleyball players, the FR exercises applied reduced the tissue stiffness and significantly increased the knee flexion range. At this point, it can be thought that the types of foam roller do not make a difference in terms of performance, the important point is the application variables, and at this point, trainers and athletes should create a purposeful type of exercise. When the variables such as pressure, set, and duration in the Foam Roller exercise application are examined and the results of the studies are examined; It was determined that both 30 and 60-second duration FR exercises had similar effects and did not have a negative effect on flexibility and vertical jump performance when compared to the control group. The results of the studies in the literature show similarities with each other. For this reason, foam roller exercises are recommended to be used by athletes and trainers as an alternative warm-up tool before training or competitions. When the studies in the literature including the foam roller application for the upper extremity are examined, it is seen that both IASTM and foam roller applications improve the passive shoulder joint range of motion and positively affect the shooting performance, increase the flexibility of the superficial back line, and increase the range of motion in the hips and knees positively compared to the KB technique. included in the results.

Table 3. Literature Review of Foam Roller Applications on Basketball Players Between 2017-2022

Article	Results
Comparison of Some Motoric Characteristics of Male Basketball and Handball Players (Koç et al., 2011)	According to the research results, it has been determined that some motoric features of basketball players and handball players, who are similar in terms of their characteristics, are similar. It was thought that the similarity of motoric features in the study was due to the fact that the athletes were in the same age group and participated in a similar training program
The Effects of Foam Roller Application on Joint Range of Motion, Flexibility and Lower Extremity Explosive Power in Female Basketball Players (Çolak et al., 2018)	It has been determined that the FR application in female basketball players has a positive effect by increasing the ROM and flexibility results. It is thought that it may be beneficial to include FR practice in addition to the stretching exercises performed during the warm-up periods before training and competition.
Acute Effects of Different Stretching Exercise Protocols on Some Anaerobic Motoric Tests (Aydin et al., 2019)	According to the research results, it has been determined that different stretching exercise protocols have different effects in terms of related motor performance parameters. Beforehand, DS applications were suggested to trainers and athletes in order to get more efficiency from 10m, 20m and 30m linear running performance.
The Impact of Self-Myofascial Trigger Point Release on Fatigue Management and Performance in Female College Basketball Players (Hanna et al., 2022)	According to the research results, it has been determined that the applied FR applications are effective to eliminate the performance barriers related to fatigue and reduce the risk of disability.
Assessment of The Effects of Foam rolling on The Pain Threshold in Professional Basketball Players (Cabak & Mielczarek, 2022)	According to the research results, it was determined that SMR exercises applied immediately after basketball training created significant differences in the trapezius muscle and the levator scapula on the left side, and there was a 60% reduction in muscle stiffness with an 85% improvement in post-training regeneration.
The Effects of Self-Myofascial Release Compared to Dynamic Warm-Up on Muscle Performance (Sinclair & Niles, 2019)	According to the research results, it has been determined that DS exercises are more effective than FR exercises in muscle activity and vertical jump performance.
The Effect Of Vibrating Foam Roller Exercise On Bilateral Ankle Proprioception In Basketball Players	According to the research results, it has been determined that the FR exercises applied can improve

(Liu et al., 2020)	the non-dominant left ankle proprioceptive performance and contribute to the sportive performance at this point.
Comparison of The Effects of Static Stretching on Range of Motion and Jump Height Between Quadriceps, Hamstrings and Triceps Surae in Collegiate Basketball Players (Takeuchi & Tsukuda, 2019)	According to the research results, while there was no change in vertical jump height after static stretching exercises (SS) applied on the quadriceps and hamstring muscles, it was determined that it decreased after the SS of the triceps surae.
The Acute Effect of Different Specific Warm-Up Intensity on One Repeat Maximum Squat Performance on Basketball Players (Eken, 2021)	According to the research results, it was determined that there was an increase in 1RM squat performance after the high-intensity specific warm-up period applied.
Exploring the Impact of Different Durations of Foam Rolling as a Recovery Technique following Intense Exercise in College-aged Males (Saker,2022)	According to the research results, it has been determined that FR exercises applied with 60 and 120 seconds immediately after exercise are not significantly effective in the recovery of muscle pain.
Impact of 10 Minute Interval Roller Massage on Performance and Active Range of Motion (Hodgson et al., 2019)	According to the research results, it was determined that static stretching exercises applied with FR improved knee flexion and hip flexion range of motion, but relatively did not affect neuromuscular performance.
Acute Effects of Tecar Therapy on Skin Temperature, Ankle Mobility and Hyperalgesia in Myofascial Pain Syndrome in Professional Basketball Players: A Pilot Study (Yeste-Fabregat et al., 2021)	According to the research results, it has been determined that FR exercises applied can cause changes in the absolute temperature of diathermy and medial gastrocnemius muscle.
Combined Effects of Self-Myofascial Release and Dynamic Stretching on Range of Motion, Jump, Sprint, and Agility Performance (Richman et al., 2018)	According to the research results, it has been determined that FR and SMR exercises applied after the warm-up session and before dynamic stretching improve sprint and agility performance in basketball players. More research is needed to determine the extent to which variables (pressure, time, sets, etc.) involved in SMR implementation affect performance outcomes and to develop the most beneficial combinations and timing of SMR, DS, and SS.
Influence of Foam Rolling on Recovery from Exercise-Induced Muscle Damage (D'amico & Gillis, 2017)	According to the research results, it has been found that FR reduces pain perception, increases hip abduction range of motion (ROM), and hamstring muscle length compared to non-FR-control (CON) after sprint-induced exercise-induced muscle damage (EIMD).
Effects Of Chains Squat Training with Different Chain Load Ratio on The Explosive Strength of	According to the research results, it is recommended to use 20% chains squat training (CST) or 30% CST

Young Basketball Players' Lower Limbs (Jiang & Xu, 2022)	in the special preparation phase and pre-competition phase to encourage the conversion of general strength to special strength as well as the development of lower extremity explosive strength.
Comparison of the Effect of Passive and Active Recovery, and Self-Myofascial Release Exercises on Lactate Removal and Total Quality of Recovery (Özsu et al., 2018)	According to the research results, a significantly higher improvement in total healing capacity (TQR) was detected with SMR compared to active recovery (AR) and passive recovery (PR).

When the studies carried out between 2017-2022 are examined; 10m It has been determined that performing dynamic stretching exercises beforehand, to get more efficiency from the 20m and 30m linear running performance, can contribute positively and effectively reduce the risk of injury to eliminate the performance barriers related to fatigue. When the results of other studies in the literature are examined, FR applications are dominant in basketball players compared to the lower extremities and have a positive effect on the upper extremity temperature, SMR exercises applied immediately after basketball training create significant differences in the trapezius muscle and the levator scapula on the left side, and with an 85% improvement in post-training regeneration. It has been found to cause a 60% reduction in muscle stiffness. In another study, it was determined that dynamic stretching exercises were more effective than FR exercises in muscle activity and vertical jump performance. There are many studies on dynamic and static stretching in the literature. However, a clear result could not be reached due to the differences in the experimental groups and methods. When this result was evaluated according to team sports, it was determined that FR exercises applied to basketball players improved sprint and agility performance and caused increases in shooting speed compared to volleyball and football branches. It has been determined that FR exercises have an effect on increasing hamstring muscle length in basketball players (football).

Table 4. Literature Review of Foam Roller Applications on Handball Players Between 2017-2022

Article	Results
Investigation of the Effect of Training Periodization of Elite Male Handball Players on Some Motoric and Physiological Parameters (Dağseven, 2019)	According to the research results, It is thought that starting with the classical training method and choosing the combined training method towards the end of the preparatory season will be more beneficial for the development of the athletes
The Effects of Self-Induced Multi-Bar Massage Rolling on Physical Performance in Collegiate Level Athletes (Popovic, 2019)	According to the research results, 5, 10 and 15 minutes self-performed myofascial relaxation exercises had a positive effect on balance performance, but no difference was found on athletic performance on anaerobic and aerobic capacities. (Popovic, 2019)
The Effect of Foam Rolling And Dynamic Stretch On Some Physical Abilities Of Female Handball Players (Zaky et al., 2021)	According to the research results, A significant difference was found between dynamic stretching exercises and shoulder extension.
Effects of Dry Needling in Teres Major Muscle in Elite Handball Athletes. A Randomised Controlled	According to the research results, It has been determined that in handball players with shoulder

Trial (Ceballos-Laita et al., 2021)	pain, shooting speed and internal rotation have a positive effect on joint range of motion and to improve pain intensity.
Effects of Foam Rolling on Range of Motion, Peak Torque, Muscle Activation and The Hamstrings to Quadriceps Strenght Ratios (Madoni, 2017)	According to the research results, compared to the control group, foam roller exercises were found to cause greater changes in hamstring range of motion without creating a deficit in peak torque or muscle activation.
Effects of Traditional Stretching Versus Self-Myofascial Release Warm-up on Physical Performance in Well-Trained Female Athletes (Kurt et al., 2022)	According to the research results, It has been determined that self-myofascial relaxation techniques applied together with dynamic stretching to handball players increase in flexibility and strength parameters better than static stretching alone. It is recommended that trainers and players use myofascial relaxation techniques in conjunction with dynamic stretching practices to sharply improve muscle strength, strength and flexibility.
The Effect of Rehabilitative Exercises Accompanying Reflexology Massage İn The Treatment of Shoulder İnjury For Young Handball Players (Shymaa & Ali, 2022)	According to the research results, in order to reduce the feeling of pain in handball players, it has been determined that static muscle strength exercises and various flexibility exercises should be used for the affected limb in the program where reflexology point massage is used before each rehabilitation unit.

During the literature review, the studies conducted between 2017 and 2022 were included in our research. Due to the limited number of studies covering the keywords ''handball and self-myofascial release techniques'' in the last five years, the literature review was completed using similar keywords (massage, handball and myofascial release techniques, handball, and flexibility). It has been stated in the studies that FR exercises applied to increase the shooting speed and internal rotation joint range of motion in handball players, it is more effective in strength parameters than static stretching when done together with dynamic stretching and causes an increase in balance parameters. Few studies on the field have been found in the literature. This indicates the need for further research.

Discussion and Conclusion

If the connective tissue called myofascial surrounding the muscles is damaged or if it is not active or triggered, it affects the strength, strength, and endurance negatively by restricting the range of motion of the joints (Sullivan et al, 2013). The friction caused by the rolling motion during foam roller operation increases the temperature in the fascial areas. Foam roller rolling causes the temperature in the cell to increase and the cell fluids become more fluid with the increase in temperature. The fluidization of the cell fluid minimizes the limitation of movement, supports the range of motion and contributes to maintaining the sudden running speed (Wolf & Caucasian, 2018).

In physical activity, the muscle must have a certain elasticity. This poses a risk if it lacks elasticity and has hardened. In case of stiffness of certain muscles, injuries that vary according to sports branches occur. For example, tendonitis and patellofemoral problems in the stiffness of the hamstring group, Achilles tendinitis (inflammation of the tendons that attach the muscles to the bones) in the triceps surae; In the case of iliotibial band stiffness, iliotibial band

creep syndrome may develop. Here, the stiffness of these muscles both increases the risk of injury and decreases the performance, as elasticity, which is one of the elements that determine the joint range of motion, is lost (Özdemir, 2004).

Okamoto et al., (2014) stated in their study that foam roller application reduces arterial stiffness (stiffness) and improves vascular endothelial functions. The development of vascular endothelial functions causes the release of nitric oxide (NO), a vasoactive (vessel-constricting-expanding) substance, which results in an increase in the performance of the myofascial system by transmitting more blood and O2 to the muscle from the enlarged vessel wall (Okamoto et al., 2014).

Every day in the world of sports, athletes continue their activities under various risks. While some of these risks affect the performance of the athletes negatively, some of them cause sports injuries (Kirişci, 2011). Ermis et al. (2019) found hand and ankle injuries at 35.4% and knee injuries at 19.7% in team sports (Ermiş et al., 2019). In another study, it was reported that the most injured body area was the wrists (Tik-Pui Fong et al., 2007).

Kose et al. (2020) in their study, injuries in 4 sports branches (volleyball, handball, basketball, football) occurred in the ankle 34.5% (n=76), knee 20.9% (n=46), and wrist 14.5%, respectively. (n=32) (Kose et al., 2020).

Today, warm-up protocols are performed by many professionals in preparation for any physical activity to increase muscle performance and prevent sports injuries; It has become an important part of physical activities performed (Rahnama, 2012). Range of motion has been defined as the priority in terms of disability prevention (Trakis et al., 2008).

Although the range of motion can be seen as the factor that most affects the risk of injury, many athletes may have difficulty in gaining this feature at later ages because they cannot gain this feature during adolescence. It can be said that the range of motion of the joint increases with SMR (Yoshimura et al., 2019).

Cakir et al. (2019) found that static stretching and graston relaxation techniques increased the flexibility of the latissium dorsi muscle. Although the static stretching application increases flexibility by creating a decrease in tone on the muscle, it has been determined that the application of the graston technique will be a more advantageous approach for the athlete in terms of muscular flexibility and muscular performance, since it also carries the risk of muscle degeneration and local fatigue (Çakır & Karadenizli, 2019).

In a study by MacDonald et al. (2013), it was stated that SMR applied after exercise-induced muscle damage increased muscular activation more than the control group, improved the active and passive ROM value, and decreased the perception of muscular pain (MacDonald et al., 2013).

Mahdis et al. (2022), it was found that SMR increased the range of motion and improved dynamic balance in the knee joint without having a significant effect on postural sway (Mahdis et al. 2022).

In a study conducted by Popovic (2019) on handball, basketball, and volleyball players, 5, 10 and 15 minutes self-performed myofascial relaxation exercises had a positive effect on balance performance, but no difference was found on anaerobic and aerobic capacities when examined in terms of athletic performance (Popovic, 2019).

As a result, it has been determined that the application of FR in addition to the warm-up session affects various performance parameters, increases the range of motion in the upper and lower extremity muscles, and at this point, it has a positive effect on the sportive performance. In light of the information, we observed from the literature review, FR applications are more commonly used in individual sports branches compared to team sports. We think that this is due to the inequality of the number of coaches and athletes in team sports, but that the athletes who are a part of a team should prefer FR applications to increase their performance.

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Swimming in The Olympics

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Abstract

Swimming has been a part of the Olympic program since the first modern Olympic Games. This research aims to examine the record developments of swimming in all Olympic games from the first modern Olympic Games to the present ones. Within the scope of this purpose, in our research, all degrees in the distances we have determined from the first modern Olympic Games (1896, Athens) to the last (2020, Tokyo) Olympic Games were scanned using 'PubMed, GoogleScholar, Scopus, YökTez' databases in the literature and the data obtained was input Microsoft Excel and analyzed by graphics. As a result of the study, when the development process of the records in the graphics was examined, it was determined that there were sudden breaks in the graphics. Although there are many factors that cause these breaks, the most significant factors affecting the records are taken into consideration.

Keywords: Olympic games, Swimming, Record, Performance.

Olimpiyatlarda Yüzme

Öz

Yüzme branşı modern ilk olimpiyat oyunlarından itibaren olimpiyat programının bir parçası olmuştur. Bu araştırmanın amacı ilk modern olimpiyat oyunlarından günümüze kadar gerçekleşen tüm olimpiyat oyunlarında yüzme branşındaki rekor gelişimlerini incelemektir. Bu amaç kapsamında araştırmamızda, ilk modern olimpiyat oyunlarından (1896, Atina) son gerçekleşen (2020, Tokyo) olimpiyat oyunlarına kadar belirlemiş olduğumuz mesafelerdeki tüm dereceler literatürde 'PubMed, GoogleScholar, Scopus, YökTez' veri tabanları kullanılarak taranmış olup elde edilen veriler Microsoft Excel'e girilmiş ve grafiğe dökülerek incelenmiştir. Çalışmanın sonucunda grafiklerdeki rekorların gelişim süreci incelendiğinde grafiklerde ani kırılmalar olduğu tespit edilmiştir. Bu kırılmalara neden olan birçok faktör olmakla birlikte rekorlara etki eden en belirgin faktörler değerlendirmeye alınmıştır.

Anahtar Kelimeler: Olimpiyat oyunları, Yüzme, Rekor, Performans.

Introduction

Swimming is a popular sport, the second largest by the number of athletes in the Olympic Games (Hołub et al., 2021). This discipline started it's journey in swimming in the middle of the 19th century, with the establishment of the world's first swimming organization in London in 1837. In 1844, a group of Indians brought to England from North America outperformed their competitors in all the races in London with different swimming techniques. In 1860, an English named Arthur Trudgeon who had been to South America, showed the techniques of swimming that he learned from Indians to European swimmers and ongoing European style of swimming by scissoring underwater has been crossed out. These styles are La coupe, La marinier, Over arm side stroke, Trudgeon and Backstroke breaststroke. (Bozdoğan, 1988)

Swimming has been a part of the Olympic program since the first modern Olympic Games in 1896. Until the London 1908 Games, Olympic swimming events took place in open water. The post-WWII era brought better technology, facilities, and improved training techniques, resulting in significantly shorter times compared to first wave-fighting competitions. Initially, both male and female swimmers wore swimsuits that increased resistance and slowed them down, but as the sport progressed, the swimsuit became more hydrodynamic. Racing swimsuits began to be made of materials such as lycra that reduced friction and consequently reduced lap times. While only men participated in the Olympic swimming events in the first years, female competitors were only included in the competition in this branch at the 1912 Olympic Games in Stockholm. Women initially competed in only two events, the 100m freestyle and the 4×100m freestyle relay, and the experimental debuts brought some unique events to these old games.

Competitive pools also experienced a great change during this period, which led to the transition from outdoor tournaments to indoor tournaments. The introduction of drainage in Olympic swimming pools marked lanes, and guidelines for pool depths in 1924 contributed to a better overall competitive standard in the years that followed, this exciting period of development helped to pave the way for elite swimmers. (Olympics, the History of Olympic Swimming, https://olympics.com/en/news/the-history-of-olympic-swimming, accessed 3 Oct 2022).

The aim of this research is to examine the record developments in swimming in all Olympic Games from the first modern Olympic Games to the present and to convey the factors affecting the records.

Material and Method

Within the scope of our research, from the first modern Olympic Games (1896, Athens) to the last (2020, Tokyo) Olympic Games, in both genders free swimming competitions (50m, 200m, 400m), backstroke, breaststroke and butterfly style competitions (100m, 200m) and finally in individual medley competitions (200m, 400m) record scores were searched in the literature using 'PubMed, GoogleScholar, Scopus, YökTez' databases. 5 different keywords were used for national and international databases while searching, the keywords 'olimpiyat oyunları, yüzme, rekor, performance were used for national databases and 'olympic games, swimming, record, performance' keywords were used for foreign databases. The data were input Microsoft Excel and analyzed by graphics.

Findings

In a 124-year period from the first modern Olympics in freestyle competitions to the present, the development of record performance was taken as a basis in terms of distance, while 3 different events (50m, 200m, 400m) as anaerobic and aerobic were included. In addition to the butterfly, backstroke, and breaststroke techniques, to examine the effects of developments affecting performance such as turning, starting, finishing, changing, and developing FINA guidelines, technique, and tactics in individual medley competitions, 100m and 200m distances in butterfly, backstroke, breaststroke techniques are used in individual medley events. (200m, 400m) distances were examined.

Table 1. Freestyle 50m, 200m, and 400m record development table for male swimmers in the modern Olympic Games

Year	Men 50m	Men 200m	Men 400m
1896	-	-	-
1900	-	2:25.02	-
1904	-	2:44.02	6:16.02
1908	-	-	5:42.02
1912	-	-	5:24.04
1920	-	-	5:26.08
1924	-	-	5:04.02
1928	-	-	5:01.06
1932	-	-	4:48.04
1936	-	-	4:44.05
1948	-	-	4:41.04
1952	-	-	4:30.07
1956	-	-	4:27.03
1960	-	-	4:18.03
1964	-	-	4:12.02
1968	-	1:55.02	4:09.09
1972	-	1:52.78	4:02.27
1976	-	1:50.29	3:51.93
1980	-	1:49.81	3:51.31
1984	-	1:47.44	3:51.23
1988	22.14	1:47.25	3:46.95
1992	21.91	1:46.70	3:45.00
1996	22.13	1:47.63	3:47.97
2000	21.98	1:45.35	3:40.59
2004	21.93	1:44.71	3:03.10
2008	21.30	1:42.96	3:41.86
2012	21.11	1:42.82	3:48.92
2016	21.40	1:44.65	3:41.55
2020	21.0	1:44.22	3:43.36

In the swimming branch, 50m free sprint competitions were included in the Olympics in 1988, unlike other swimming distances. The 200m freestyle competition took place in the Olympics experimentally in 1900 and 1904, and it continues to maintain its place in the 1968 Seoul Olympic Games and afterwards. Compared to other swimming distances, 400m freestyle swimming competitions have been in the Olympics uninterruptedly since the 1904 Olympic Games. When table 1 is examined, a continuous improvement is observed in the freestyle swimming competitions, but since the first and the last (50m, 200m, 400m) freestyle

competition, (1.14, 40.08, 2:32.66) second improvement in athletic performance has been detected, respectively.

Table 2. Freestyle 50m, 200m, and 400m record development table for female swimmers in the modern Olympic Games

Year	50m	200m	400m
1896	-	-	-
1900	-	-	-
1904	-	-	-
1908	-	-	-
1912	-	-	-
1920	-	-	-
1924	-	-	06:02:00
1928	-	-	5:42.08
1932	-	-	5:28.05
1936	-	-	5:26.04
1948	-	-	5:17.08
1952	-	-	5:12.01
1956	-	-	4:56.04
1960	-	-	4.50.06
1964	-	-	4:43.03
1968	-	2:10.05	4:31.08
1972	-	2:03.56	4:19.04
1976	-	1:59.26	4:09.89
1980	-	1:58.33	4:08.76
1984	-	1:59.23	4:07.10
1988	25.49	1:57.65	4:03.85
1992	24.79	1:57.90	4:07.18
1996	24.87	1:58.16	4:07.25
2000	24.32	1:58.24	4:05.80
2004	24.58	1:58.03	4:05.34
2008	24.06	1:58.82	4:03.22
2012	24.05	1:53.61	4:01.45
2016	24.07	1:53.73	3:56.46
2020	23.81	1:53.50	3:56.69

Female swimmers started to take place in the Olympics 20 years after male swimmers at the 1912 Stockholm Olympic Games. Female swimmers started to compete in the 1988 Seoul Olympics in partnership with male swimmers in the 50m freestyle event. When table 2 is examined, 1.68, 16.55, 2:05.31 second improvement in athletic performance has been observed among female athletes since the first and last 50m, 200m, and 400m freestyle competitions. When the record progress of female and male athletes in the modern Olympic Games is compared based on the time to complete the distance, male swimmers showed 0.54 milliseconds less improvement than females in 50 meters competitions. In the 200m distance, male athletes improved by 23.53 seconds more than female athletes. In the 400m freestyle competition, male athletes showed 27.35 seconds more improvement than female athletes.

Table 3. Backstroke technique (100m, 200m) record development table for male and female swimmers in the modern Olympic Games

Year	Men 100m	Men 200m	Women 100m	Women 200m
1896	-	-	-	-
1900	-	2:47.00	-	-
1904	1:16.08	-	-	-
1908	1:24.06	-	-	-
1912	1:21.02	-	-	-
1920	1:15.02	-	-	-
1924	1:13.02	-	1:23.02	-
1928	1:08.02	-	1:22.00	-
1932	1:08.06	-	1:19.04	-
1936	1:05.09	-	1:18.09	-
1948	1:06.04	-	1:14.04	-
1952	1:05.04	-	1:14.03	-
1956	1:02.02	-	1:12.09	-
1960	1:01.09	-	1:09.03	-
1964	-	2:10.03	1:07.07	-
1968	58.07	2:09.06	1:05.05	2:24.08
1972	56.58	2:02.82	1:05.78	2:19.19
1976	55.49	1:59.19	1:01.83	2:13.43
1980	56.33	2:01.93	1:00.86	2:11.77
1984	55.79	2:00.23	1:02.55	2:02.38
1988	55.05	1:59.37	1:09.89	2:09.29
1992	53.98	1:58.47	1:00.68	2:07.06
1996	54.10	1:58.54	1:01.19	2:07.83
2000	53.72	1:56.76	1:00.21	2:08.16
2004	54.06	1:54.95	1:00.37	2:09.19
2008	52.54	1:53.94	58.96	2:05.24
2012	52.16	1:53.41	58.33	2:04.06
2016	51.97	1:53.62	58.45	2:05.99
2020	51.98	1:53.27	57.47	2:04.68

The first backstroke technique competition in the modern Olympic games was experimentally held in the 200m distance (1900, Paris) for male swimmers. Male athletes (1904, St. Louis) and female athletes (1924, Paris) have been competing in the 100m backstroke event since 1924. In the swimming branch, the 200m backstroke technique competition was reintroduced to the Olympic Games, and the 100m backstrokes technical competition was not included in the Olympics in the same year (1964, Tokyo). Unlike the men, female swimmers competed in the 200m backstroke events in the year (1968, Mexico) after 1 Olympics after the male swimmers competed in the 200m backstroke event. In backstroke and butterfly swimming techniques, the 200m race distance was included later in the Olympics compared to other techniques. When Table 3 is analyzed, 25.55 and 19.04 seconds of improvement have been observed for female swimmers since the first and last 100m and 200m backstroke competition, respectively, and 24.01, 53.73 seconds of improvement in athletic performance since the first and last 100m and 200m backstroke competitions for male swimmers, respectively. detected. When the record progress of male and female athletes in the modern Olympic games is compared based on the time to complete the distance, female athletes showed 1.54 seconds more improvement in athletic performance in the 100m backstroke competition, while male swimmers showed 34.69 seconds more improvement than female swimmers in the 200m backstroke distance.

Table 4. Butterfly technique 100m, and 200m record development table for male and female swimmers in the modern Olympic Games

Year	Men 100m	Men 200m	Women 100m	Women 200m
1896	-	-	-	-
1900	-	-	-	-
1904	-	-	-	-
1908	-	-	-	-
1912	-	-	-	-
1920	-	-	-	-
1924	-	-	-	-
1928	-	-	-	-
1932	-	-	-	-
1936	-	-	-	-
1948	-	-	-	-
1952	-	-	-	-
1956	-	2:19.03	1:11.02	-
1960	-	2:12.08	1:09.05	-
1964	-	2:06.06	1:04.07	-
1968	55.09	2:08.07	1:05.05	2:24.07
1972	54.27	2:00.70	1:03.34	2:15.57
1976	54.35	1:59.23	1:01.13	2:11.41
1980	54.92	1:59.76	1:00.42	2:10.44
1984	53.08	1:57.04	59.26	2:06.90
1988	53.00	1:56.94	59.00	2:09.51
1992	53.32	1:56.26	58.62	2:08.67
1996	52.27	1:56.51	59.13	2:07.76
2000	52.00	1:55.35	56.61	2:05.88
2004	51.25	1:54.04	57.72	2:06.05
2008	50.58	1:52.03	56.73	2:04.18
2012	51.21	1:52.96	55.98	2:04.06
2016	50.39	1:53.36	55.48	2:04.85
2020	49.45	1:51.25	55.59	2:03.86

It was only in the 1950s that the breaststroke diverged from the butterfly technique. (Hołub et al., 2021). The first competitions in the butterfly technique took place in the 1956 Olympic Games, while the women competed in the 100m butterfly competition in the 1956 Olympics, the male athletes competed in the 200m butterfly competitions. Swimmers of both sexes jointly competed in both race distances (100m, 200m) in the 1968 Olympic Games. When Table 4 is examined, an improvement of 15.43 seconds for the 100 m and 20.21 seconds for the 200 m has been observed in the athletic performance since the first and last butterfly swimming competitions for female swimmers. Likewise, it was determined that the athletic performance improvement in male swimmers was 5.64 seconds for the 100 m and 27.78 seconds for the 200 m. When the record progress of male and female athletes in the modern Olympic games is compared based on the time to complete the distance, female athletes showed more improvement 9.79sec in the 100m butterfly swimming competition, and male swimmers showed more improvement 7.57sec in the 200m butterfly distance races.

Table 5. Breaststroke technical 100m, and 200m record development table for male and female swimmers in the modern Olympic Games

Year	Men 100m	Men 200m	Women 100m	Women 200m
1896	-	-	-	-

1900	-	-	-	-
1904	-	-	-	-
1908	-	3:09.02	-	-
1912	-	3:01.08	-	-
1920	-	3:04.04	-	-
1924	-	2:56.06	-	3:33.02
1928	-	2:48.08	-	3:12.06
1932	-	2:45.04	-	3:06.23
1936	-	2:41.05	-	3:04.02
1948	-	2:39.03	-	2:57.02
1952	-	2:34.04	-	2:51.07
1956	-	2:34.07	-	2:53.01
1960	-	2:37.04	-	2:49.05
1964	-	2:27.08	-	2:04.46
1968	1:07.07	2:12.22	1:15.08	2:44.04
1972	1:04.94	2:02.82	1:13.58	2:41.71
1976	1:03.11	2:15.11	1:11.16	2:33.35
1980	1:03.44	2:15.85	1:10.22	2:29.54
1984	1:01.65	2:13.34	1:09.88	2:30.38
1988	1:02.04	2:13.52	1:07.95	2:26.71
1992	1:01.50	2:10.16	1:08.00	2:26.65
1996	1:00.65	2:12.57	1:07.73	2:25.41
2000	1:00.46	2:10.87	1:07.05	2:24.35
2004	1:00.08	2:09.44	1:06.64	2:23.37
2008	58.91	2:07.64	1:05.17	2:20.22
2012	58.46	2:07.28	1:05.47	2:19.59
2016	57.13	2:07.46	1:04.93	2:20.30
2020	57.37	2:06.38	1:04.95	2:18.95

The breaststroke is the first swimming technique the others evolved from. When Table 4 is examined, an improvement of 10.13 seconds for the 100m and 74.07 seconds for the 200m improvement in athletic performance has been observed in female swimmers since the breaststroke swimming competition. Likewise, it was determined that improvement in swimming competition in male swimmers was 9.07 seconds for the 100m and 62.64 seconds for the 200m. Male athletes started competing in breaststroke technical competitions at the 1908 (London) Olympic Games 12 years after Athens. It is observed that female athletes take part in breaststroke competitions from the first stroke they throw in the Olympics (1924) swimming. When the record progress of female and male athletes in the modern Olympic Games is compared based on the time to complete the distance, female athletes showed more improvement (1.06 seconds) in the 100m breaststroke swimming competition.

Table 6. The record development table in the individual medley competition of 200m, and 400m for male and female swimmers in the modern Olympic Games.

Year	Men 200m	Men 400m	Women 200m	Women 400m
1896	-	-	-	-
1900	-	-	-	-
1904	-	-	-	-
1908	-	-	-	-
1912	-	-	-	-
1920	-	-	-	-
1924	-	-	-	-

1928	-	-	-	-
1932	-	-	-	-
1936	-	-	-	-
1948	-	-	-	-
1952	-	-	-	-
1956	-	-	-	-
1960	-	-	-	-
1964	-	4:45.04	-	5:18.07
1968	2:12.02	4:48.00	2:24.07	5:08.05
1972	2:07.17	4:31.98	2:23.07	5:02.97
1976	-	4:23.68	-	4:42.77
1980	-	4:22.89	-	4:36.29
1984	2:01.42	4:17.41	2:12.64	4:39.24
1988	2:01.17	4:14.75	2:12.59	4:37.76
1992	2:00.76	4:14.23	2:11.65	4:36.54
1996	1:59.91	4:14.90	2:13.93	4:39.18
2000	1:58.98	4:11.76	2:10.68	4:33.59
2004	1:57.14	4:08.26	2:11.14	4:34.83
2008	1:54.23	4:03.84	2:08.45	4:29.45
2012	1:54.27	4:05.18	2:07.57	4:28.43
2016	1:55.66	4:06.05	2:06.58	4:26.36
2020	1:55.00	4:09.42	2:08.52	4:32.08

Individual medley competitions were included in the 1964 Olympic Games, 8 years after the butterfly technique competitions. Swimmers of both sexes competed jointly at the 1964 Olympic Games in the 400m race distance. Right after the 400m, freestyle events were included in the Olympics, the 1968 Olympics included the 200m individual medley event, including joint women's and men's swimmers. In the 1976 and 1980 Olympics, male and female athletes did not participate in the 200m individual medley distance competitions. When Table 6 is examined, there has been a 15.55 and 45.99 second improvement in athletic performance since the first and last 200m and 400m individual medley swimming competition for female swimmers, 17.02 and 35.62 seconds for male swimmers since the first and last 200m and 400m individual medley swimming events, respectively, detected. When the record progress of male and female athletes in the modern Olympic games is compared based on the time to complete the distance, male athletes showed 1.47 seconds more improvement in the 200m individual medley competition, while female athletes in the 400m individual medley distance showed 10.37 seconds more improvement in athletic performance than male athletes.

Discussion and Conclusion

The developments in athletic performance in swimming, since the first years of the modern Olympic games, are reflected in the record tables. The development process of athletic performance, and new developments as a result of research in training science and other disciplines indirectly affect training and athletes. Getting to the top during the Olympic Games is a huge challenge for swimmers, coaches, and scientists (Issurin et al., 2008). Any reliable and valid information is of great importance for athletes and their support (Issurin et al. 2008). Swimming research has increased since the inception of the 'International Swimming Symposium in Biomechanics and Medicine series in the 1970s. Since then, studies on swimming typically include physiology and biomechanics analysis (Pelayo & Alberty, 2011; Ungerechts & Keskinen, 2018). In recent years, competitive swimming research has

primarily focused on biomechanics (40% of publications in the Biomechanics and Medicine in Swimming, and less focused on swimming physiology (21% of publications). BMS series and exercise training studies cover 9% of BMS studies (Aspenes & Karlsen, n.d.).

Olympic and world records are regularly broken in competitive swimming. The literature states that the performance increase in elite swimmers is multifactorial (Barbosa, Bragada, Reis, Marinho & Silva, 2010). Planning and implementing an appropriate racing strategy is one of these key factors and is considered crucial to success in competitive swimming (Arellano, Brown, Cappaert & Nelson, 1994).

Changes that will affect the parameters such as the start, turn, and underwater in the swimming branch also have an impact on the records. In sprints, the start and turns make up a significant part of the time and distance, for example, in a 100m sprint, the swimmer may spend a total of 40m at the start (Cossor & Mason, 2001). However, it can be argued that the last 5 m of each lap may also be considered part of the race's clean swimming section and that this length will not exceed 30m. In middle and long-distance races, adding small improvements on each turn can significantly improve the final race time. For example, in the 800m freestyle competition, the swimmer does 15 laps. If this swimmer improves by just 0.1 seconds per lap, this represents an overall improvement of 1.5 seconds in the final race time (Morais et al., 2019). Since 2008 FINA has suggested that the rear of the platform surface has an adjustable sloping foot and has accepted the proposal to introduce a new starting block (OSB11, Corgémont) characterized by the addition of a footrest. The new starting block (2008, Beijing) takes part in competitions since the Olympic Games. The starter can make up about a quarter of the sprint race time. As one of the necessary technologies in swimming, an effective start is extremely important for success. (Yang, 2018)

In the history of Olympic swimming, there has been a process in which athletes can make three starts without being disqualified at the starting stage. This rule was changed in 1990 to allow two starts. The last rule change for the start took place in 2001 and the statement ‘The swimmer who starts before the signal will be disqualified’ was made. There have been minimal changes over the years in free technique and individual medley competitions. In breaststroke technical competitions in the 1990s, some breaststrokers were seen using the butterfly stroke at the start, in the turns, and sometimes throughout the race. As a result, rule recommendations were submitted to FINA on allowing butterfly strokes in the breaststroke technique, with the submitted rule recommendations for the 2005 edition of the published rules to initially allow a single butterfly stroke. Since the 2005 edition of the Rules, directive changes have been made to allow a single butterfly stroke at the start and during the first arm stroke on each turn. It is still valid today. In the early years of the modern Olympics, there were no restrictions on how far swimmers could go underwater from the point where they first touched the water in the starting section, but the 15m surface requirement was included in the 1998 FINA rules for the first time by some elite athletes after swimming the full distance underwater. Changes have been made to the turning rules in butterfly-style competitions to allow for more freedom, but there has been no real change to the butterfly stroke or strokes. In a study by Morais et al. (2019) the effect of the starting and turning performances of elite sprinters on the total race performance was investigated. It has been determined that the first

15m (starting) time constitutes 11-12% of the total race performance, while the effect of the return time on the total swimming degree is 19-20%. Starting and turning parameters make up 31-32% of the total race time in swimming (approximately one-third of a 100-meter race time) (Morais et al., 2019). The evaluation of competitive swimming performances is a guide for trainers and sports scientists with advanced video analysis together with advances in technology. Improvements in performance evaluation are positively reflected in the record table. Video analyzes provide the best and most comprehensive evaluation of the athlete's swimming techniques, starting, underwater, starting, turning, and finishing performances. Swimming analysts, on the other hand, provide athletes and coaches with expert information to help them make decisions and can predict performances and target times over different time periods. Increasingly, analysts are seen as part of the swim team, supporting athletes and providing quality advice to assist coaches in making decisions (Barbosa et al., 2021). Competitive swimming performances are broken down into three main elements: start, return and clean swimming, and the last 5 to 5 of the race. The finishing speed of 20m is considered the fourth element. In 1988, Japan partitioned these technical elements to analyze the Olympic trials and analyzed stroke rate, stroke length, and mid-pool swimming speed at the Seoul Olympic Games. The competitive analysis started before 1980, but performance analysis became international at the European Championships held in Bonn in 1989. (Morais et al., 2019)

The 2020 Tokyo Olympics took place in 2021 due to the COVID-19 pandemic. The literature (2020, Tokyo) has examined the record developments differently from the previous Olympic Games. In the study of Demarie et al. in 2022, swimmers' swimming time trends were analyzed by comparing Tokyo and Rio Olympics and with mathematically predicted results. The study analyzed whether swimmers regained lost performance in the following season, taking into account the difference between the gold medalist and the final finalist, and the differences between men and women. The results showed that nearly all swimmers had better times at the Tokyo Olympics compared to Rio. Analysis of performance trends highlighted that performance progress does not proceed in a linear fashion, and this is best predicted by more recent results. Women's progress was higher than men's, and the gap between the first and last finalists was constantly decreasing, except for the Tokyo Olympics. As a result, the unprecedented Tokyo Olympic Games and qualification year did not seem to impair the performance of all Olympic swimmers, suggesting that stakeholder support and the athlete's coping ability can maintain continued performance (Demarie et al., 2022).

The world record in freestyle swimming in the 1960s and 70s in different studies examining the record developments in the Olympic Games in determined swimming styles and years, similar to our study; It has shown a rapid development as 0.010 m/s in women and 0.015 m/s in men. However, during the 1980s and 90s, a limit was reached in swimming world records and a plateau in performance occurred (Buhl et al., 2013). A study by Holub et al. reveals an increasing trend toward improving performance in the results of men and women in the 100m breaststroke technical swimming competition. The only exception was a 0.30% decline in men's results at the 1980 Moscow Olympics and a 0.27% decline in women's results 12 years later in Barcelona. The most significant progress was made by men in 1972 (Munich) and

1976 (Montreal), and by women in 1976 (Montreal) and 1980 (Moscow); 3.63% and 2.61% and 3.48%, and 2.68%, respectively. They noted that the last few editions of the Olympics had made significant progress in men: 1.51 seconds (2.47%) in Beijing in 2008 and 1.65 seconds (0.96%) for women in London 4 years later (Holub et al., 2021). They noted that since the 200m butterfly race started in 1980 (Moscow) and 1988 (Seoul), performances have improved for men and women, respectively. The most significant improvement in athletic performance for women was in Munich (1972) and Montreal (1976) (6.58% vs. 4.00%) and for men in Rome (1960) and Munich (1972) (6.42% vs. 5.14, respectively) (Hołub et al., 2021). Bringing a different perspective to record development, König et al. reported in a study they conducted in 2014 that there are a wide variety of different athletic collectives studied in different time periods. For example, there was research on Olympic freestyle champions from 1896 to 1980 (Schulz and Curnow 1988), elite freestyle swimmers from 1980 to 2009 (Berthelot et al., 2012), and the top ten US freestyle masters. Elite Swiss freestyle swimmers from 1993 to 2002 (Fairbrother, 2007) and from 1994 to 2012 (Rüst et al., 2014). These different time periods may have had an impact on the outcome of the results while swimming performance has consistently increased everywhere (König et al., 2014) while the human species has evolved over time with changes in body dimensions such as body size, body mass, and slenderness (Charles and Bejan, 2009). In swimming events, swimmers use equipment such as swimsuits, bonnets, and goggles during the competition. Swimming trunks have changed in terms of their features and structure since the first modern Olympic Games, and the equipment used during the competition has an impact on the records. There was much speculation that the full body, polyurethane, and the technical swimsuit were the reason for the remarkable improvement in world records. Technical swimsuits were seen as the main reason for the increase in performance. All of the athletes who broke the world record in the FINA championship wore full-body technical swimsuits. These technical suits were able to improve swimming and improve body compression while reducing friction. Further analysis led FINA to introduce new rules on January 1, 2010, limiting the types of technical swimwear that can be worn by athletes. No long-term world records have been broken since that time (O'Connor & Vozenilek, n.d.).As a result, when the development of the swimming branch in the modern Olympic Games is examined; Since the increase in the number of studies on swimming, it can be said that record developments have a positive effect on the trainers, athletes, and training techniques. It has been seen that FINA's rule changes in different swimming competitions in parameters such as start, and turn underwater, which will directly affect the lap time and total swimming degree, have affected the record developments in the first half of the modern Olympic Games. It is thought that the development of equipment specific to the swimming branch, which will be used during the competition, which is more ergonomic and reduces the lap time by minimizing friction, affects the record development and times. The literature states that the 'start' stage constitutes 4/1 (or 3/1) of the total (sprint) swimming degree. It has been observed that the new starting block had an effect on the record development in the Olympics and the following Olympics, where the new starting block was used since the 2008 Beijing Olympics. With the internationalization of performance analyzes and the development of technology since 1989, it is seen that the examination of video analyses by swimming analysts has an effect on athletic performance and record development.

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