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CONTENTS

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PAMUKKALE JOURNAL OF SPORT SCIENCES
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Pamukkale J Sport Sci, 14(2), 98-124, 2023 Research Article

An Investigation of the Sports Awareness of Employees in Sports Management According to Several Variables

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ABSTRACT

This study aims to raise the awareness of public employees in sports administration through various types of training to measure the awareness of public employees working in sports administration regarding sports, as well as to reveal the problems facing sports in Turkey from the perspective of those working in sports administration. The research was carried out with a mixed methods convergent parallel design of the questionnaire variant. The study population consists of employees working in the central and provincial organizations of the Ministry of Youth and Sports, and the sample consists of 581 people working under different titles determined by the convenience sampling method. SPSS 24 and NVIVO 10 package programs were used for data analysis. The findings show that the awareness of those working in sports management is higher among men than women, that for those who have just started their professional life, it is higher than for others, and that those who have been working in sports management for a long time increase their awareness over time. The most critical problems of Turkish sports are stated as lack of infrastructure, lack of merit, lack of sustainable sports policy, discontinuity of studies, insufficient sports awareness education, and insufficient awareness of directing children to sports at an early age.

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INTRODUCTION

Sport, an area as old as the history of humankind, was first seen as a means of entertainment and a struggle against life. However, over time it has gained an economic, political, social, and cultural dimension, and has become an effective tool in the national and international arenas (Loy et al., 1981; Yetim, 2000). Today, sport has become a branch of science that develops individuals in social, cognitive, affective, and physical aspects through games, movement, and competition (Erkal et al., 1998; Yetim, 2000). For some, sport is seen as a game, or a distraction from work. In contrast, for others, it is seen as an occupation, or an entertaining individual or collective pursuit pursued in free time. In addition, people engage in sports to socialize, propaganda, education, culture, and health in different countries and to make it a lifestyle (Yetim, 2000). The most essential condition to achieve this is a good sports management and a sports policy that gives importance to sports. Good sports management depends on managers with high sports knowledge and awareness, who can distinguish this knowledge, and who are aware of sports' social and individual benefits. A good sports policy can only be created by people with these characteristics.

Turkey is one of the few countries where sport is under state control. This situation has made the intervention of political actors in sports inevitable. The influence of political powers has shaped the managerial staff managing sports. Even though there is an intervention in this way, it is expected that people with a high level of sports knowledge, who will contribute positively to the development of sports and who know the social and individual benefits of sports, should be selected as administrators, and employment in public sports administration should be made in this direction (Yetim & Şenel, 2001; Fişek, 1999; Heinemann, 2005). The Constitution of the Republic of Turkey gives the state the duty to improve the physical and mental health of Turkish citizens of all ages, encourage the spread of sports to the masses, and protect successful athletes. The Ministry of Youth and Sports is authorized to fulfill this duty. What is expected from the institution tasked with managing sports is that it should work with experts in the field who have an excellent knowledge of sports and a thorough knowledge and awareness of the social and individual benefits of sports.

The starting point of an individual's development and transformation throughout his/her life is to become aware of himself/herself (Karakuş, 2008). Awareness is a cognitive and affective activity defined as the elevation that an individual feels in his/her emotions in his/her daily life; certain definitions of mindfulness deal with the concept regarding basic cognitive processes. Awareness is defined as a specific, open and receptive form of

consciousness in which stimuli are not evaluated, classified and analyzed (Çatak & Ögel, 2010). In another definition, mindfulness is explained in a three-part model of intention, attention and attitude components. The intention component in the definition refers to the desire to focus on the momentary experience here and now, the attention component refers to the continuous organization of attention to observe momentary experiences, and the attitude component refers to the characteristics of the approach to momentary experiences, such as openness, acceptance and neutrality. According to this model explaining mindfulness, mindfulness causes a number of changes, such as self-regulation, clarification of values, cognitive and behavioral flexibility and exposure through a meta-mechanism called 'reperception' (Shapiro et al., 2005). In summary, mindfulness is the individual's awareness of what and how he/she is experiencing while coming into contact with another individual or with his/her environment with all his/her senses (Acar, 2009).

Sport is a socializing, competitive, solidarity, unifying activity and cultural phenomenon that contributes to the economy, social and cultural development, physical health, personality and character development, solidarity and cohesion in societies, as well as global peace. It aims to gain superiority by fighting within the framework of certain rules, and it is a socializing, competitive, solidarity, unifying activity and cultural phenomenon that people do individually or collectively as a leisure time activity or professionally in a professional sense (Yetim, 2000). Movement is central to physical education, sports, games and life (Mirzeoğlu, 2011). Concepts such as realizing, noticing, and being aware of oneself indicating human cognitive competencies, affective characteristics, and psychomotor skills. Human beings can distinguish what they know, what they think and how they feel when they come into contact with themselves and their environment by using all their sense organs, and they can apply them at any moment of their lives in line with their wishes and needs (source). Awareness in physical education and sports is the time that extends from the past to the future, including cognitive, affective and psychomotor areas, but where the individual's selectivity in the moment of his/her life is realized (Eski, 2010).

Individuals involved in sports as athletes, managers or officials in different branches are expected to have a good awareness of the social and individual benefits of sports, sports education and sports literacy. They are also expected to be aware of the systemic problems in sports. In the literature, there are numerous studies on sports in Turkey from different perspectives. A thesis study conducted in Turkey between 2000 and 2019 showed that studies on athletes, sports managers, university students and sports consumers, respectively, are intensive. However, there are few studies in which sports spectators/fans, academicians,

coaches, managers, physical education teachers, sports center employees, secondary school students, high school students and referees are sampled (Biricik, 2020). Similarly, Yavuz et al. (2018) concluded in their study that most of the theses in the field of sports management were conducted with sector representatives as the study group. Atalay (2017) examined the trends of sports management research and found that the articles' most frequently studied sample groups which were composed of athletes, sports managers and university students. It can be seen that these studies mostly focus on individuals' attitudes and behavior towards sports, opinions on sports, sports participation behavior, sports management and ethical values, problems of sports, the relationship between sports and politics, the functioning of sports management, and individuals' perspectives on sports.

In line with all these determinations, when the literature research is examined, it can be seen that the institutional reforms carried out in the Turkish sports system have been variously studied: critically examined in a multidimensional way (Başar & Yenel, 2021); the relationship between sports and politics is examined (İnce, 2016; Karataş, 2014); the characteristics that should be found in the sports manager are examined (Sunay, 2017); the necessity of raising qualified individuals in the spread of sports to society (Yüce & Sunay, 2019); sports policies and sustainability are examined (Balcı et al., 2018); sports policies (Sivrikaya & Demir, 2019; Eroğlu et al., 2016); attitudes and opinions of individuals towards sports (Adıgüzel, 2020; Diker, 2021; Dinç et al., 2020; Koçak, 2014; Turhan et al., 2021; Yavuz & Yücel, 2019; Yetim & Kalfa, 2019); qualifications of sports managers (Bilgi & Ay, 2019; Eren at al., 2016; Etlik et al., 2019; Gündoğdu & Sunay, 2018; Öksüz, 2018; Sunay & Çaycı, 2008; Şahan & Şirin, 2022; Yetim et al., 2015); opinions and evaluations on sports management (Işıkgöz & Taşkıran, 2015; Özen et al., 2012; Sağır, 2021; Türkmen & Eroğlu, 2018); social and individual benefits of sports (Karataş et al., 2021; Yıldız & Çetin, 2018); sports knowledge and literacy (Demir et al., 2019; Jawad, 2022; Ülker, 2019); findings on sports infrastructure (Karataş et al., 2011; Nacar & Devecioğlu, 2018); opinions regarding sports administrators (Beşler et al., 2022); approaches of sports administrators towards ethical values (Yavuz, 2020; Yıldız, 2016); and sports awareness and consciousness (Kaplan & Akkaya, 2015; Özer & Çolakoğlu, 2017). These studies stand out as research that addresses sports, sports administrators, sports-politics relationship, sports management, problems in sports, and athletes in many aspects. All of these are literature studies directly or indirectly related to sports awareness, sports knowledge, and the social and individual benefits of sports. This study examines the sports awareness of the employees of public institutions and organizations responsible for managing sports, and reveals how it changes according to different variables. It also reflects the determination and

opinions of these employees regarding the problems in sports management. Within the scope of this study, answers to the following questions were sought:

- How does the awareness of employees in sports management towards sport change according to certain variables?
- What are the main problems of sports in Turkey according to employees in sports management?

METHODS

The research has been carried out using a mixed methods convergent parallel design questionnaire to determine awareness of sports and to understand the problems of sports in depth. This model, in its questionnaire variant, is a research approach that combines both quantitative and qualitative data collection methods to provide a comprehensive understanding of a research question or topic. In this design, researchers use surveys or questionnaires to gather quantitative data and collect qualitative data through open-ended questions or interviews. A convergent parallel design involves the simultaneous execution of both quantitative and qualitative aspects during a single phase of the research process. The researcher gives equal importance to both methods, independently analyzes the outcomes of each component, and subsequently combines and interprets the results collectively. The goal is to bring together the strengths of both quantitative and qualitative methods to gain a more holistic perspective on the research issue. In other words, convergent parallel design consists of taking qualitative and qualitative data collection and analysis and comparing or relating the two and then interpreting those (Creswell & Clark, 2018).

Quantitative data collection through surveys or questionnaires helps researchers gather structured and numerical data from a larger sample, allowing for statistical analysis and generalizability. Qualitative data collection, on the other hand, through open-ended questions or interviews, provides in-depth insights into participants' experiences, perceptions, and contextual information that quantitative data might not capture. The two sets of data are collected in parallel and then integrated during the analysis phase, where researchers compare, contrast, and connect findings from both methods to generate a more comprehensive understanding of the research problem (Tashakkori & Teddlie, 2010).

Study Group

The population of the study consisted of 60,931 personnel working in the central and provincial organizations of the Ministry of Youth and Sports, which is the official authority

responsible for sports management in Turkey (Table 1). The sample of the study consisted of 581 people who were determined by the convenience sampling method among the personnel working in different titles in the central and provincial organizations of the Ministry. The convenience sampling method is the inclusion of anyone who wants to be included in the sample. The process of finding subjects continues until the determined sample volume is reached, and it is a method that provides great savings in terms of time and economy (Ural & Kılıç, 2011). Of the distributed data collection tools, 581 (100%) were returned properly completed. Considering the 95% confidence interval and 4.05% margin of error for the research population, the required sample size was calculated as 580. It was seen that the sample group reached was above the 580 participants required for the analysis. It was therefore concluded that the current sample was sufficient to make generalizations for all personnel working in the central and provincial organizations of the Ministry of Youth and Sports (Bartlett et al., 2001; Krejcie & Morgan, 1970).

Table 1
Demographic Data of the Study Group

Demographic Characteristics		Frequency	Percentage
Gender	Female	189	32.5
	Male	392	67.5
Age	25-29	76	13.1
	30-34	140	24.1
	35-39	134	23.1
	40-45	119	20.5
	Over 45	112	19.3
Graduate status	Associate Degree	86	14.8
	Undergraduate	404	69.5
	Master's Degree/PhD	91	15.7
Job Title	Trainer	142	24.4
	Director	117	20.1
	Sports Specialist	74	12.7
	Dormitory Management Staff	73	12.6
	Security Guard	53	9.1
	Technician	21	3.6
	Youth Worker	17	2.9
	Chief	13	2.2
	Cleaning Staff	12	2.1
	Worker	11	1.9
	Officer	11	1.9
	IT Personnel	9	1.5
	Office Personnel	6	1.0
	Physiotherapist	5	.9
	DPCO	4	.7
	Dietician	3	.5
	Assistant Director	3	.5
	Psychologist	3	.5
	Teacher	2	.3
	Researcher	1	.2
	Press Officer	1	.2

Table 2 (Continued)

Demographic Characteristics		Frequency	Percentage
Unit of Employment	Center	246	42.3
	Rural	335	57.7
Relationship with sports	I do not partake in sports	209	36
	Unlicensed Athlete	162	27.9
	Licensed Athlete	210	36.1
	Total	581	

The research was carried out with the approval of Gazi University Ethics Committee numbered 2022/482 and the permission of the Ministry of Youth and Sports of the Republic of Turkey dated 29.04.2022 and numbered 2393643. The participants were accessed by way of the Internet through an easily accessible sampling method. All participants were informed about the possible risks and benefits of the study, and written consent was obtained from them at the beginning of the study. The study was conducted in accordance with the Helsinki Declaration which protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki. In addition, written consent forms were obtained from all participants, who were completely informed about the study.

Data Collection Tools

Personal characteristics, an information form with three open-ended questions and the Sports Awareness Scale (SAS) developed by Uyar and Sunay (2020) were used to collect research data. In the personal information form in the first part of the data collection tool, there are eleven personal information items and three open-ended questions to determine the gender, age, marital status, educational status, professional experience, job title, unit of employment, monthly income, province of residence, relationship with sports, and reason for choosing the profession.

The participants were asked the open-ended questions, 'What is your reason for choosing to work in a unit related to sports? What do you think the saying 'Sports should be managed by those who understand sports' means? What do you think is the most important problem of Turkish sports?', and they were asked to express their opinions briefly. These open-ended questions were analyzed by two researchers who are experts in the field of sports sciences with the literature on the subject being examined, and a list of possible questions was made. In total, four questions emerged. The content and structural appropriateness of the questions were evaluated separately by two experts in the field of sports sciences and one expert in the field of measurement and evaluation, and a consensus was formed on three questions, with one question being removed because it was found to be independent of the subject.

The second part of the data collection tool, the Sport Awareness Scale (SAS) developed by Uyar and Sunay (2020), consists of thirty items and two sub-dimensions. The dimensions of the scale are named 'Sports Knowledge and Distinguishing Knowledge'and 'Social and Individual Benefit'. According to the psychometric properties calculated while developing the scale, Cronbach's α value for the whole scale was 0.937, and Cronbach's α coefficients calculated for each sub-dimension were 0.947 and 0.851, respectively. In addition, the EFA and CFA analyses revealed that the scale had sufficient validity values. The scale is a 5-point Likert scale with a minimum score of thirty and a maximum score of one hundred and fifty. For the current study, the Cronbach's Alpha reliability value for the entire scale was calculated to be 0.987. The statements in the scale consisting of thirty items related to awareness, all of which contained positive statements, are in the form of 'Strongly Agree (5)', 'Agree (4)', 'Moderately Agree (3)', 'Disagree (2)', 'Strongly Disagree (1)' in the five-point Likert type. The higher the score obtained from the scale, the higher the level of sports awareness, and the lower the score obtained from the scale, the lower the level of sports awareness.

Data Collection Process

Permission was obtained from the General Directorate of Education, Research and Coordination of the Ministry of Youth and Sports for the implementation of the data collection tool consisting of the personal information form and the SPSS. In line with this permission, an online survey form was created from the personal information form and scale items. A survey link was created to participate in the online survey. The survey link was shared with all the personnel working in the central and provincial organizations of the Ministry of Youth and Sports, and participation in the survey was requested on a voluntary basis. 581 people participated in the survey. Analyses were carried out with the data of these employees.

Data Analysis

In this study, which was conducted to examine the sports awareness of employees working in sports management in public institutions and organizations according to different variables, both analyses were made according to the quantitative paradigm, and the data obtained from the interview questions were examined by content analysis. The continuous variables in the quantitative part were examined with the Kolmogorov-Smirnov test in terms of normality, and it was seen that the data obtained met this assumption ($p>0.05$). For this reason, the analyses were conducted with parametric difference tests, t-tests and an ANOVA test. The data obtained through interview questions were analyzed by content analysis. SPSS 24 and NVIVO 10 package programs were used for the analysis.

Research Credibility

Credibility or authenticity in qualitative research is based on the skills, experiences, and sensitivities of the researcher, in how he or she uses herself as a knower and as an inquirer (Sparkes & Smith, 2013). To enhance the credibility of our study, data triangulation was employed through interviews and field notes (Braun & Clarke, 2013). Field notes assisted in generating keywords, identifying codes, and naming themes. Considering analyst triangulation, researchers reviewed the findings of the study and discussed the results in regular meetings with interpretations of the data. To enable transferability, direct quotations were used in the results (Lincoln & Guba, 1985; Shenton, 2004).

RESULTS

In this study, the mean scores of sports awareness of employees working in sports management in public institutions and organizations were examined in terms of gender, age, marital status, educational status, professional experience, unit of employment, monthly income, sports relationships, and whether the participants chose a profession they wanted to be in. Table 2 shows the t-test results for the variables of gender, marital status, unit, and whether the participants had chosen a profession they would like to be in.

Table 3
T-Test Results of Participants' Sport Awareness Mean Scores According to Related Variables

Variables		N	$\bar{X}$	SS	SD	t	p
Gender	Female	189	101.86	28.99	439.68	-3.25	.001
	Male	392	110.79	34.93			
Marital status	Married	422	107.52	33.43	579	-.43	.665
	Single	159	108.86	33.27			
Unit of employment	Center	246	106.74	32.46	579	-.71	.479
	Rural	335	108.73	34.03			
Are you in the profession you want to be?	Yes	371	111.02	34.62	579	3.03	.003
	No	210	102.35	30.31			

When Table 2 is examined, it can be seen that the sports awareness of the people working in sports management in public institutions and organizations shows a statistically significant difference according to gender (t(439,68) = -3,25, p<0,05). It was concluded that the sports awareness of male participants ($\bar{X}$ = 110,79) was higher than that of female participants ($\bar{X}$ = 101,86). It can be seen that the participants' sports awareness does not show a statistically significant difference according to whether they are married or single (t(579) = -0,43, p>0,05) or whether they work in the center or province (t(579) = -0,71, p>0,05). Another finding obtained from Table 2 is that there is a statistically significant difference (t(579) = 3,03, p<0,05)

as a result of examining the sport awareness averages of the people working in sport management according to whether they chose a profession they wanted to be in or whether they chose this profession due to circumstances. When the sports awareness averages were examined, it was found that the awareness of those in the profession they wanted to be in ($\bar{X}$ = 110,2) was higher than those in this profession due to circumstances ($\bar{X}$ = 102,35). An ANOVA test analyzed the mean scores of the participants sports awareness in terms of age, educational status, professional experience, monthly income and relationship status with sports. Table 3 shows the descriptive statistics of these variables.

Table 4
Descriptive Statistics of Participants' Sport Awareness Scores According to Age, Education Level, Professional Experience, Monthly Income and Relationship with Sports

Variables		N	$\bar{X}$	SS
Age	25-29	76	114.43	30.299
	30-34	140	111.57	31.06
	35-39	134	107.15	33.04
	40-45	119	105.38	35.60
	Over 45	112	102.38	35.31
Educational status	Associate Degree	86	100.66	37.34
	Licence	404	106.84	33.24
	MSc/Dr	91	119.36	26.83
Professional experience	1-4 years	126	108.45	33.37
	5-9 years	160	108.84	32.37
	10-14 years	124	104.39	34.27
	15-20 years	64	116.13	29.57
	20 years and over	107	104.91	35.44
Monthly income	Less than 5,000₺	46	109.93	25.51
	Between 5,000-10,000 ₺	421	106.92	34.20
	Between 10,000-20,000 ₺	107	110.45	32.58
	Over 20,000 ₺	5	114.00	44.98
Relationship with sports	Licensed Athlete	210	117.32	34.81
	Unlicensed Athlete	162	111.29	34.48
	I do not partake in any sport	209	95.76	26.81

When Table 3 is examined, it can be seen that the mean sport awareness scores of sport management employees aged between 25-29 years are higher than those of older age groups, and the average decreases as the age increases. When analyzed in terms of professional seniority, it was found that the group with the highest sports awareness average was the group with 15-20 years of seniority, and the sport awareness averages of all other seniority employees were close to each other. When the sports awareness averages are analyzed according to the monthly income variable, it can be seen that the awareness of the group with the highest monthly income is also the highest. When the sports awareness averages of the participants according to their relationship with sports are examined, it is found that the awareness

averages of those who are interested in sports with or without a license are higher than those who are not interested in sports at all. An ANOVA test was applied to test the statistical significance of the differences between these averages, and the results are given in Table 4.

Table 5
The ANOVA Results of Sports Awareness of Sport Management Employees in Terms of Age, Educational Status, Professional Experience, Monthly Income and Sport-Related Variables

Variables	Source of variance	Sum of squares	SD	Mean of squares	F	p
Age	Between groups	9,383	4	2,345	2.124	.076
	Within groups	636,060	576	1,104		
	Total	645,443	580			
Educational status	Between groups	16,917	2	8,458	7.779	.000
	Within groups	628,525	578	1,087		
	Total	645,443	580			
Professional experience	Between groups	6,999	4	1,749	1.579	.178
	Within groups	638,443	576	1,108		
	Total	645,443	580			
Monthly income	Between groups	1,476	3	492.006	.441	.724
	Within groups	641,128	575	1,115		
	Total	642,604	578			
Relationship to sports	Between groups	51,309	2	25,654	24.958	.000
	Within groups	594,133	578	1,027		
	Total	645,443	580			

When Table 4 is examined, it can be seen that there is no statistically significant difference between the participants' sports awareness mean scores according to age, professional experience, and monthly income ($F(4,576) = 2,124$, $p>0,05$; $F(4,576) = 1,579$, $p>0,05$; $F(3,575) = 0,441$, $p>0,05$ respectively). However, when the mean sports awareness score of sports management employees was analyzed in terms of educational status, a statistically significant difference was found between the groups $F(2,578) = 7,779$, $p<0,05$). A Scheffe test was performed to find the differentiation of the mean score of sports awareness according to educational status between groups. According to the results obtained, it was concluded that there was a statistically significant difference between master or doctorate graduates and bachelor's and associate degree graduates and that the sports awareness of master/doctorate graduates ($\bar{X} = 119.36$) was higher than that of bachelor graduates ($\bar{X} = 106.84$) and associate degree ($\bar{X} = 100.66$) graduates. Similarly, when the mean sports awareness score was analyzed regarding the participants' relationship with sports, a statistically significant difference was found between the groups $F(2,578) = 24,958$, $p<0,05$). A Scheffe test was performed to find between which groups the differentiation of the mean score of sports awareness according to the relationship with sports was. According to the results

obtained, it was found that the sports awareness of people who are athletes, regardless of whether they are licensed ($\bar{X}$ = 117.32) or unlicensed ($\bar{X}$ = 111.29), is higher than those who do not partake in sports ($\bar{X}$ = 95.76), and there is no statistically significant difference between licensed or unlicensed athletes in terms of sports awareness.

The employees were asked the open-ended question, 'What is your reason for choosing to work in a sports-related unit?'. When the answers given by the participants are analyzed, it can be seen that the keywords love, related, happy, athlete, train, work, active, healthy, and useful come to the fore. Based on these keywords, the participants associated working in a sports-related unit with loving sports, being interested in sports, being interested in sports gives happiness, training athletes, sports being a job, being actively involved in sports, staying healthy by engaging in sports, and finding sports helpful. The content analysis of the answers given by 580 participants for the reasons for working in a sports-related unit is given in Table 5.

Table 6
Reasons, Why People Working in Sports Management Chose, Choose to Work in This Field

Themes	Frequency	Percentage	Sample Case
Internal Causes	387	66,72	K1: I want to stay active and live actively. K33: To be more active and energetic and to be more useful to people K162: Dealing with sports, which is one of the most important parts of my life, and doing what I am happy with and what I love K178: "I like being interested in sports and dealing with sports-related work and transactions. K221: Completely because I like this environment. K381: To live a healthy and happy K403: Everything related to sports gives me life. It gives me incredible happiness and determination to work
External Causes	193	33,28	K18: Due to our duty K23: It developed completely out of my own will K146: Because of my job K240: It was not my own choice, but life conditions K358: Money K373: The conditions of the country made it compulsory to work at the Ministry of Youth and Sports. Unfortunately, in the Republic of Turkey, no one can work in the profession they are trained for
Total	580	100	

When Table 5 is examined, it can be seen that the reasons for choosing to work in sports management in public institutions and organizations are grouped under two main themes

when examined by content analysis. These themes are listed as internal reasons (66.72%) and external reasons (33.28%), from the one with the most content to the one with the most minor content. Most of the participants explained the reason for working in a sports unit with intrinsic reasons and made explanations such as that they love sports, that sports make them happy, and that they have always been involved in sports. For the intrinsic reasons that led the participants to work in a sports unit, they stated the following opinions: "I want to stay active and live actively"; "To be more active and energetic and to be more useful to people"; and "To be happy with sports, which is one of the most important parts of my life, and to do what I love". Those who explained their work in a sports unit with external reasons stated that they chose to work in this unit primarily out of necessity, obligation and because they could not find any other solution. Five hundred eighty participants were asked in an open-ended way what the phrase, 'Sports should be managed by those who understand sports' means to them. When the keywords created from the answers given by the participants are analyzed, it can be seen that the words right, competent, competent, I agree, merit, knowledge is essential, and experience stand out. Based on these keywords, the participants emphasized that sports should be managed by knowledgeable, skillful, and meritorious people who understand and come from within sports. The content analysis of the answers given by 580 participants working in sport management units for the opinions of the participants is given in Table 6.

When 580 participants were asked what the statement, 'Sports should be managed by those who understand sports' means to them, they all agreed with this idea. However, when analyzed by content analysis, the reasons for the participant's participation in the relevant states are different, and, in this context, it can be seen that the opinions are grouped under three themes. These themes are a necessity of experience, the importance of knowledge, and an awareness of needs. More than half of the participants (51.38%) responded that sports should be managed by those who understand sports through the necessity of experience. They emphasized that people with sports experience will understand sports and athletes better when they are managers and the importance of being competent and 'coming from the kitchen'. 33.1% of the participants emphasized the importance of knowledge rather than experience. It was emphasized that the sports manager should know the job, should be educated, and that sports should be seen as a science. 15.52% of the participants justified that sports should be managed by those who understand sports so they can realize their needs. They emphasized this idea with the view that an athlete has a better communication with an athlete.

Table 7
Participants' Views on the Statement 'Sports Should Be Managed by Those Who Understand Sports

Themes	Frequency	Percentage	Sample case
Experience Requirement	298	51.38	K13: No one knows what an athlete goes through except the athlete. This is called experience, and those who know the problems best are those who have experience. Such people can solve the source of the problem. K36: Experience is essential K169: I do not think that a person who has not been an athlete understands the psychology of athletes K178: Someone who does not come from sports cannot manage sports K196: It is important to 'come up through the ranks K212: They are the people who know the sport, who have practiced the sport, and who sweated for the branch. Therefore, this group should be the ones who govern. When it comes to talking, everyone understands sports K254: Managers should be people who have come from within sports and have a background in sports or coaching, and are competent in their job K385: It is appropriate to have people who have a background in sports and who have a good command of the branch they will manage K429: There should be officials with experience in every profession K547: I believe that if there are managers with experience and open horizons, sports and labor will be rewarded
Importance of Knowledge	192	33.10	K52: Having received training K165: It would be better for those who have a lot of sports knowledge K235: The people who manage sports should rise from the ranks and should know the problems at every point and the facts that need to be improved K352: Let those who know the job manage K412: The one who knows a job should do it K445: People who have received training should manage more accurately and more efficiently, or those who understand sports should manage more successful athletes K510: He states that sports are now a serious business and even a science and that the management has to understand this business K572: Giving the job to the competition ensures that the job is done following its purpose. If you do not know how to use a medicine, it turns into poison
Needs Awareness	90	15.52	P74: I can describe him/her as a person who knows sports and athletes and who can recognize their needs P184: I believe that he/she will solve the needs of athletes faster K276: The athlete understands the language of the athlete P327: It means that it is essential for sports administrators to come from within sports and to know the requirements and needs of sports in order to develop sports
Total	580	100	

The participants were asked in an open-ended way what they thought was the most important problem facing Turkish sports. When the keywords created from the answers given by the participants are examined, the following words, lack of infrastructure, lack of merit, lack of importance to sports, tropical, no support, lack of education, lack of facilities, lack of athletes, and lack of coaches, stand out. Based on these keywords, the participants emphasized infrastructure inadequacies, lack of importance given to sports, the existence of favoritism and acceleration in the selection of those who will work in sports management, insufficient support for sports, problems in training athletes, lack of education in sports and lack of coaches. The content analysis of 580 participants' responses to the question is given in Table 7.

Table 8
Opinions of the participants about what is the most important problem of Turkish sports

Themes	Frequency	Percentage	Sample case
Systemic Problems	395	68.10	K28: Lack of infrastructure K103: Lack of merit K176: Inadequate facility materials K224: Lack of infrastructure and adequate training K296: The fact that our education system and sports fields cannot be integrated K304: Uninformed people governing K346: Sports are managed by individuals, groups, communities, or their demands. It is always based on the management aspect and on not seeing everything. K382: Not giving importance to infrastructure and not supporting talented athletes K413: Overlapping with the education system and not providing the necessary support and discipline to individuals who are or who want to be athletes K437: Not giving the necessary importance to infrastructure, lack of supervision, and organization K456: People without merit and those who do not know how to work come to power K485: Respect for sports ethics and not directing children to sports from a young age, and there are no guiding activities related to sports education. K502: Turkish sport is shown as if it is only about football. K522: Our country has no sports policy. K551: The fact that administrators are unqualified, coaches do not like their jobs, and the lack of viable sports policies in the long term.
Individual Problems	185	31.90	K23: Not updating oneself K195: Not enough training K201: We do not know and love how to lose K254: They are impatient K337: Not being open to development K365: Laziness, indiscipline K421: Not being played regularly and continuously K463: Respect K562: No one cares too much
Total	580	100	

When Table 7 is examined, it can be seen that the opinions of the employees working in sports management in public institutions and organizations on the most important

problems of Turkish sports are gathered under two main themes when analyzed by content analysis. 68,10% of the participants explained the problems in Turkish sports as systemic problems, while 31,90% mentioned individual problems. The participants mentioned a lack of infrastructure, merit problems, facilities and materials, and administrative deficiencies as systemic problems. Regarding another theme, individual problems, 185 participants emphasized individual problems, such as not doing enough work, laziness, and a lack of discipline, as the most important problem of Turkish sports.

DISCUSSION

During this study, in the analysis made according to the gender variable, it was seen that the sports awareness of male participants was higher than that of females. According to the age variable, the sports awareness of the participants in the range of 25-29 years was higher than the other age groups. In terms of the duration of employment (years of seniority), it was seen that those with 15-20 years of seniority had higher awareness than the others. It can be said that the knowledge of newcomers to the profession is more up to date, but their sports awareness is less, and their sports awareness increases over time. In the answers given to the research questions asked to the participants within the scope of the study, the participants emphasized that those who manage sports and those working in sports management should be experienced and have knowledge and experience in the field of sports. They stated that people with merit should manage sports in terms of knowledge and experience. The participants stated that the problems in Turkish sports are a lack of infrastructure, a lack of merit, a lack of sustainable sports policy, a discontinuity of studies, and an insufficient awareness of directing children to sports early in society. It can be seen that there are similar results to these results in the literature.

Karaküçük (1988) states that just as a country's development in other fields can be attributed to managers who have trained themselves in their chosen fields, the knowledge, and skills of sports managers should be sufficient based on that country's success in sports. Gözen and Yenel (2022), in their study examining the views of academics on the effects of the soft power of sports on influencing and transforming societies, emphasized a lack of organizational and structural deficiencies in the Presidential Government System and stated the necessity of addressing the organization and election systems, especially merit, within this structuring. This result overlaps with the findings on merit in this study. Türkmen and Eroğlu (2018), in their study evaluating sports management in Turkey, based on the views of sports administrators, addressed sports management in Turkey from different perspectives.

According to their findings, they emphasized several points: an insufficiency of education; the importance of merit; the existence of uneducated managers with different goals; the appointment of those who do not come from the top of their profession; the existence of day-saving policies; the inadequacy of those who manage sports federations; political pressure in sports; a lack of sports culture; the existence of ill-equipped managers in sports management; the existence of managers with accelerated views; and insufficient representation in the international arena. These results coincide with the results obtained in this study. Gülşen and Dalkıran (2017), in a study comparing the perception levels of sports experts and sport management senior students on the current problems in Turkish sports management, students emphasized that the institutions that manage sports do not give enough priority to those who receive education in sport management and that those in sport management are insufficient to recognize the problems. This result coincides with the results of this study on meritlessness and a lack of a sustainable sports policy. In a study by Başkan et al. (2020), in which the views of the students studying at the Faculty of Sports Sciences on the concept of sports management were examined, the students emphasized the necessity and importance of fair, non-partisan, meritorious managers who protect their athletes and who have the qualifications required by their profession. Eren et al. (2016), in a study in which they investigated the educational status and competencies of managers working in sports clubs, found that as the educational level of sports managers increases, they are more successful in fields of planning, decision-making, communication, and technology and that the fact that they have been involved in sports before contributes positively to their management methods. In a study conducted by Kurtipek et al. (2020) with students in the sports management department, it was pointed out that although interest in sports and the need for sports managers is increasing, the difficulty in being appointed to state staff was emphasized. These findings coincide with the result of the need for meritorious managers in this study and the expectation of having experienced and knowledgeable managers in sports management.

Zorba et al. (2021) examined the sports awareness of adolescents who actively or passively participated in sports as a type of recreational activity in various variables. It was seen that boys' awareness of sports was higher than girls at the point of 'distinguishing sports knowledge and information'; those who actively participated in sports had higher sports awareness in the social and individual benefit dimension than those who participated passively (as spectators), and those who engaged in sports in their families had higher sports awareness in the social and individual benefit dimension than those who did not engage in sports in their families. In his study, Turan (2021) examined the attitudes toward sports

activities and found that the orientation towards sports activities differed according to gender and that the orientation of male participants was higher than that of females. In his study with working women, Yüksel (2014) found that women's roles at home may be an obstacle at the point of orientation to sports activities, that there may be different elements that vary from society to society or from culture to culture in the orientation of women and men to sports, that gender may have an impact on the orientation of both sexes to sports, and that this situation may hurt women's sports awareness. In a study conducted by Yetiş et al. (2022) to investigate the relationship between certain demographic variables and sport awareness levels of students from different departments studying in the faculty of sports sciences, it was found that the sport awareness levels of males were higher than those of females. Although several factors and roles are seen to be effective in sports participation and sports awareness in the literature, in general, the fact that men's sports awareness and sports participation are higher than women's is in line with the results of this study.

Downward et al. (2014) found that a higher level of education can be directly linked to a greater awareness of the benefits and importance of sports and exposure to sports where sport consumption skills are developed. This finding shows that the higher education level of employees working in the units managing sports and coming from within the sports will have a positive impact on the development of sports awareness in society in terms of the importance and benefits of sports, and this is in line with the result of the sports awareness of the employees obtained in our study.

Yücel (2015), in his study to determine the views of provincial directors working in Provincial Directorates of Youth Services and Sports in Turkey on the formation of modern sports awareness, found that modern sports awareness has not been formed in Turkey. In line with this finding, it was emphasized that there is a need for institutionalization, sufficient club activities, more effective local administration, a functional sports policy, and modern sports legislation. In a study conducted by Şahin and İmamoğlu (2011) with academicians and MPs, their interpretation of the views on the role of politics was that politics has a role but should not have a role, government policies should primarily support physical infrastructure investments, and that 'the biggest obstacle in creating a sports policy or program' is a lack of sports awareness. These findings coincide with the results of the present study, which indicate that there is insufficient awareness of sports orientation, a need for a sustainable sports policy, and insufficient infrastructure.

Hallmann et al. (2012) emphasize the importance of adequate sports infrastructure for sports participation, as many sports cannot be practiced without appropriate sports facilities,

and that adequate sports infrastructure is needed to succeed in the government's policy goal of encouraging participation in sports. This finding coincides with the results of this study on a lack of infrastructure. Biddle (2012) argues that promoting infrastructure and access to activity further emphasizes interventions' social and environmental aspects. He emphasizes that infrastructure and access are essential at all stages of behavior, from pre-contemplation to maintenance, as they are more like a framework for becoming and staying active. This finding is in line with the conclusion of this study as to what a sustainable sports policy should be.

Özer and Çolakoğlu (2017), in their study aiming to determine the opinions of sports managers who are responsible for the management and administration of sports on the formation of contemporary sports awareness, found the following: that the financial resources allocated to sports are insufficient; the activities carried out by public institutions and the private sector to spread sports to the society are insufficient; the number of sports facilities is also insufficient; contemporary sports awareness is not formed in society; sports culture and sports education are not given sufficiently in educational institutions; physical education and sports department graduates are not adequately equipped in terms of sports culture and sports education; the effectiveness of school sports is insufficient; mass media should be used more effectively in order to create sports awareness in society; the current sports legislation cannot meet the needs for the modernization and popularization of sports; the efforts of youth and sports clubs for the popularization of sports are insufficient; and that a lack of qualified sports managers and sportsmen is one of the main problems of sports. These findings coincide with the results of this study on a lack of infrastructure, an inadequacy of sports awareness, a lack of sustainable sports policy, and a discontinuity of studies.

Dimeo (2014) emphasizes the importance of a sports policy by stating that a sports policy is both a practice and an academic subject area; at the point of practice, it encompasses decision-making, debate, and day-to-day forms of sport development, while what falls under the academic framework of sport policy relates to governments, often with a public dimension, aiming to achieve non-sporting results and possibly facing the challenges of politics, organizational fallibility and a failure to involve all stakeholders. This conclusion aligns with a lack of sustainable sports policy in this study.

Bergsgard and Norberg (2010) express a lack of sustainable sports policy by emphasizing that despite the expanding pluralism in the field of sport and changes in the political system, there is still no significant change in the patterns of sports policy in the Nordic countries, no significant signs of strengthening the role of parliament vis-à-vis the executive or increased lobbying from sports organizations to parliament.

Costa (2005), in a study conducted with seventeen sport management experts from around the world, stated that the continuing debate on sports management research, practice, theory, and education indicates that the field is growing. Sports management experts also emphasized the need for modern sports policies to ensure adequate and constructive development. Özen et al. (2012) evaluated the views of academicians working in physical education and sports on the current problems in Turkish sports management. They found that the participation of public schools and local administrations in sports in terms of facilities and materials is relatively low, there are insufficient opportunities for sports popularization studies, there is not enough coordination in sports, and employment in sports is not enough. These findings overlap with the results showing a lack of sustainable sports policy and infrastructure in this study.

Güngörmüş and Yılmaz (2007) examined the views of MPs on the problems of Turkish sports and found that the MPs emphasized an insufficiency of facilities that provide sports opportunities for everyone and the need to expand them, the effective use of communication channels such as print and visual media for the promotion and popularization of sports, and the insufficiency of the budget allocated to sports in the general budget. Solmaz et al. (2016), in a study examining the views of MPs on Turkish sports management and the current situation of sports, showed that MPs emphasized that the human resources managing sports within the organization of the Ministry of National Education, Youth, and Sports should be people trained in sports management. Ilgar and Cihan (2019) examined the opinions of faculty members of Faculties of Sports Sciences and schools of physical education and sports on the current problems of Turkish sports. In their study, faculty members stated a lack of communication between institutions, a lack of planning in the construction of sports facilities, inadequacies in the maintenance and repair of existing facilities, and a lack of qualitative competence of club managers as important problems. These findings coincide with those under the titles of merit, lack of infrastructure, and sports awareness in this study. Schmidt-Millard (2003) emphasizes the importance of education in sports by stating that it is up to young teachers to develop an awareness of how all scientific fields in sports are intertwined to know what to do in their profession. This result aligns with the research findings, as it shows that people in sport management should be well-educated.

Limitations

This study is limited to the Ministry of Youth and Sports employees. Due to the convenience sampling method's disadvantages, the results should not be generalized to all

Ministry of Youth and Sports employees. However, it should not be ignored that the results obtained are compatible with most of the studies in the literature. In the future, similar studies can be conducted with a different target audience to be selected with a different sampling method. For example, Sports awareness and fundamental problems of sports can be examined to cover all sports branches. Qualitative and quantitative research can be conducted on sports awareness and problems with sports club managers, employees, and athletes operating in all branches.

CONCLUSION

Based on all these analyses, determinations, and results, it is meant that those who work in the institutions legally and constitutionally responsible for the development and management of sports emphasize the knowledge and experience of those working in sports management and emphasize a preference for meritorious people, showing that the perspective in sports policies and manager preferences should be updated. Attempts to be made with a reformist perspective will contribute positively to ensuring the continuity in sports development. Studies to be carried out with this perspective would be a driving force in eliminating a lack of infrastructure, a lack of merit, a lack of sustainable sports policy, a lack of continuity in sports studies, and a lack of sports awareness in society, which are considered as important problems for sports in underdeveloped and developing countries.

In this regard, we can say the following:

- First and foremost, public institutions providing sports management services should further increase their awareness of sports through in-service training programs, and the reflections of this awareness on the target audience should be observed.
- The existing sports legislation should be revised to anticipate today's and tomorrow's needs, and its effects should be evaluated.
- It should not be ignored that employment in institutions and organizations that have a say in sports management should be based on merit and fairness, which will positively impact sports development in the short and long term.
- Failure to build the necessary infrastructure due to insufficient resources will cause sports and society to be insufficiently brought together and, consequently, the awareness of sports in society to be damaged. Infrastructural inadequacies should be eliminated by needs without wasting public resources.

- Higher education institutions providing sports education should carry out effective studies on sports awareness and sports education.
- Sports awareness programs should be established to raise awareness about sports more effectively in educational institutions of the Ministry of National Education at all levels.

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Authors' contributions

All authors contributed equally to the study's concept, design, and discussion of the results and the manuscript's preparation. All authors were involved in the data collection process. All authors took responsibility for data analysis and interpretation of the data.

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Children's Physical Activity Behaviors During the COVID-19 Pandemic: A Mixed Methods Research

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ABSTRACT

This study aimed to examine the impact of the COVID-19 pandemic on children's physical activity behaviors. Furthermore, children's indoor and outdoor physical activity opportunities and daily habits including screen time and sleep patterns were investigated. A mixed methods approach was used in which survey methodology was combined with semi-structured interviews. The convenience sampling method was used. A sample of parents (n = 205, 165 mothers) of children (5-12 years) participated in the survey. Semi-structured interviews were used to assess changes in children's physical activity behaviors and daily habits (screen time and sleep patterns) in detail. Descriptive statistics (frequencies, standard deviations, and means) and thematic analysis were used for data analysis. The results showed that the COVID-19 pandemic and related restrictions caused a decline in children's physical activity participation, particularly a dramatic decrease in outdoor time. However, outdoor time was associated with better mental health, more active time, and less sedentary behaviors. The screen time also increased and parents had local and temporal solutions to control screen time. Although the sleep hours were sufficient for children, delays occurred in the sleep/wake schedule of children, and sleep-related problems were reported by parents. Based on the study results, professionals could help families to regulate children's daily habits. These findings could also guide efforts to promote outdoor physical activity places to prevent the negative influence of long-term homestay periods for future extreme cases.

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INTRODUCTION

The World Health Organization declared COVID-19 a global pandemic on 11 March 2020 (WHO, 2020). In order to prevent the rapid spread of the disease, the government took several national and local measures, mainly including home confinement, which forced people to stay at home for a long period. Also, the closure of public spaces, parks, sports facilities, and schools was one of the significant precautions taken by a large majority of countries to control the contagion of COVID-19 (Sallis et al., 2020; WHO, 2020).

As a vulnerable group, children were negatively impacted by the COVID-19 pandemic by disrupting their daily habits including movement behaviors, screen time, and sleep patterns, and restricted physical activity (PA) participation mainly due to quarantine measures (McCormack et al., 2020; Oliveira et al., 2022). A longitudinal study conducted in China revealed that sedentary behaviors among Chinese children and adolescents (6-17 years) increased during the COVID-19 pandemic, and the average time spent in PA decreased significantly from 540 min/week to 105 min/week (Xiang et al., 2020). Also, another study conducted in Canada confirmed the previous research's results with children's reduced physical activity participation during the COVID-19 pandemic (Riazi et al., 2021). Similar results were enriched by Ten Velde et al., with decreased movement behaviors during the pandemic among children in the Netherlands (2021). The related literature also found that children were less engaged in outdoor physical activities during the COVID-19 pandemic (Mitra et al., 2020; Nyström et al., 2020).

As a part of daily habits, screen time also changed during the COVID-19 pandemic, and a variety of studies from the literature reported a substantial increase in screen time among children in this period (Kolota & Glabska, 2021; Schmidt et al., 2020). Even though excessive screen time was associated with poor sleep quality (Pacheco et al., 2017), during the COVID-19 pandemic, due to excessive screen time, children experienced sleep-related problems such as insomnia, nightmares, and sleep terrors (Bruni et al., 2022). Sleep bedtime and risetime delays were also other negative consequences of home confinement (Knowland et al., 2022).

The literature provides strong evidence regarding the decrease in physical activity participation of children during the COVID-19 pandemic based on parents' opinions (Clarke et al., 2021; Pelletier et al., 2021). A qualitative study in Canada revealed that the pandemic-related closures limited physical activity opportunities and directly affected children's mental and physical health (Petersen et al., 2021). Moreover, this study pointed out that children tend

to spend more time on screen, engage less in physical activities, and consequently feel less connected to others. Another qualitative study from the USA examined how the shelter-in-place mandates affected children's physical activity behaviors from parents' perspectives and figured out that children faced challenges regarding access to outdoor space and exercise and play equipment (Perez et al., 2021). Similar results were found in mixed methods studies concluding that physical activity level and health-related quality of life, and sports participation drastically decreased (López-Aymes et al., 2021; O'Kane et al., 2021).

Bronfenbrenner's ecological systems theory could best explain the relationship between access to physical activity opportunities and children's physical activity level during the pandemic (Bronfenbrenner, 1979). Bronfenbrenner suggested a model consisting of four main layers, and the developing child is the model's center (Bronfenbrenner, 1979). These four layers are the microsystem, mesosystem, exosystem, and macrosystem, in which the changes directly or indirectly affect the child's development (Bronfenbrenner, 1992). For example, during the pandemic, children experienced a drastic disruption in their daily routines due to social isolation (Spinelli et al., 2020) which also caused depression and anxiety symptoms among children (India, 2020). However, the physical environmental conditions could help children maintain physical activity patterns associated with better mental health and less sedentary behaviors (Mitra et al., 2021).

Given the compatible findings of the current literature and disparities in methodologies, there is a need for more research to provide greater clarity on the influence of the COVID-19 pandemic on children's movement behaviors. To the best of our knowledge, there is no study examining children's physical activity behaviors and daily routines during the COVID-19 pandemic from a holistic view. Thus, this study aimed to examine the pandemic's effect on the physical activity behaviors of children aged 5-12 years. Further, children's daily routines were examined regarding screen time and sleep patterns. To address this issue, three different specific research questions were established:

1. How does the COVID-19 pandemic change the physical activity behaviors of children?
2. How does the COVID-19 pandemic change children's use of outdoor/indoor physical activity opportunities in the neighborhood?
3. Does the COVID-19 pandemic change children's daily habits, including sleep patterns and screen-based behaviors?

METHODS

Research Design

The study applied a mixed methods approach consisting of two phases: a survey and a semi-structured interview. The explanatory sequential design aimed to offer a general frame about the research questions with a survey, followed by the explanation and understanding of survey results with semi-structured interviews (Creswell, 2012).

Study Group

The participants were 205 parents (mothers = 165, fathers = 40) from seven different regions and 30 different cities of Türkiye and mainly reported their residential area as metropolis (n = 165, 80.5 %) with a dominant rate of living in an apartment building as household type (n = 173, 84.4%). The majority of the parents had a bachelor's degree (n = 102, 50.2 %). Participants were eligible to participate in the study if they had a child aged between 5–12 years. Moreover, the other inclusion criteria were children with typical development and living in Türkiye at the time of data collection. If a family had more than one child meeting the study criteria, the parents were instructed to consider only one for the study. The sample selection procedure was a convenience snowball sampling method (Crouse & Lowe, 2018). Table 1 presents the data regarding children's demographic characteristics and education information at the time of data collection.

Table 1
Children's sociodemographic characteristics and education information

Variables	n	%
Gender		
Girl	89	43.4
Boy	116	56.6
Age group		
Early childhood period (5-6 ages)	62	30.3
Primary age group (7-8-9-10 ages)	103	50.2
Secondary school age (11-12 ages)	34	16.6
Non-defined	6	2.9
Does your child attend online education?		
Yes	123	60
No	82	40
Does your child have online physical education and sports courses?		
Yes	86	41.9
No	119	58.1
Total	205	100

Data Collection Tools

Online Physical Activity Survey

The physical activity survey was designed to gather data from the sample to find answers to the research questions (Check & Schutt, 2012). At this stage, the survey development steps were followed (Büyüköztürk, 2005). First, the research problem was identified, and the related literature was reviewed to prepare a set of sample questions. Experts were consulted for the content validity of this exemplary survey. Based on expert opinions, the pilot study was applied and the final version of the survey was formed to apply the primary sample.

The survey consists of 61 questions distributed in the following categories: demographic information of parents and children (33 items regarding age, gender, and residential area), physical activity behaviors specified as leisure time PA and sports club attendance (8 items), outdoor physical activity opportunities (4 items), indoor physical activity opportunities (4 items) and daily habits of children that were described as sleep time and screen time (12 items). The terms 'before the COVID-19 pandemic' and 'during the COVID-19 pandemic' were highlighted in the questions to call participants' attention. All questions were marked as compulsory in the survey platform to prevent data loss. In addition, the phone calls were made with nine participants who had no internet connection. The time needed to fill out the questionnaire was approximately 15 minutes.

Semi-structured Interviews

Parent interviews were designed to address the issues in the questionnaire and explain children's physical activity changes in detail. Based on this purpose, open-ended questions were subsequently asked to the parents to compare children's PA behaviors before and during the COVID-19 pandemic. The interview approach also offers the researchers to go beyond the script and ask further questions to the participant to clarify the unclear points during the interview (Savin-Baden & Howell-Major, 2013).

Two experts from physical activity field were consulted to check to understandability and clarity of the interview questions. Moreover, cognitive interviews were conducted with three parents. Based on expert opinions and cognitive interview feedback, the interview questions were revised and completed. Eight questions in the interview were detailly prepared to investigate physical activity behaviors of children, outdoor and indoor physical activity opportunities, screen-based behaviors and sleep patterns of children, and school support for physical activity. The average time of all interviews was 21 minutes (min = 14, max = 31 minutes). The example interview questions are as follows:

1. What changes did you observe in your child's sleep pattern during the pandemic? How did these changes affect your child's mental health?

2. How much did your child benefit from physical activity opportunities placed in the environment during the pandemic? (Playgrounds, public courts, sports equipment, etc.)

3. What did the school do to support your child's physical activity during the pandemic?

Data Collection Procedure

Approval from the Human Subjects Ethics Committee of Middle East Technical University (046-ODTU-2021) was received for the data collection procedures. Also, the participants' consent was taken, and they were ensured the confidentiality of personal information throughout whole data collection process.

The survey data were collected through an online platform, Google Forms. The online questionnaire was open for one year, beginning on March 12th, 2021, and ending on March 12th, 2022. After collecting quantitative data, the qualitative data were collected through interviews, both face-to-face and video calls. The interview process lasted for one week, between May 31st and June 3rd, 2022.

Data Analysis

Quantitative Analysis

A total of 208 participants completed the online survey and three of them were excluded from data analysis as they did not meet the inclusion criteria of living in Türkiye. The survey responses were analyzed by using Microsoft Office /Excel (2021). The descriptive statistics were presented as tables and figures to reflect the impact of the COVID-19 pandemic on children's physical activity behaviors.

Qualitative Analysis

A thematic analysis was used for the qualitative data which the purpose was to define, analyze and report the themes within the dataset (Braun & Clarke, 2006). First, the interviews were transcribed and anonymized to keep the participants' identities anonymous. Then, the transcripts were conveyed to MAXQDA (2022) to identify the themes. After the leading researchers determined the themes, two experts checked them for accuracy. Then, they were reported as a qualitative analysis of this study. To assess the trustworthiness of the qualitative results and verify the confirmation and modification of the qualitative data, the member checking was used, also known as respondent validation (Birt et al., 2016).

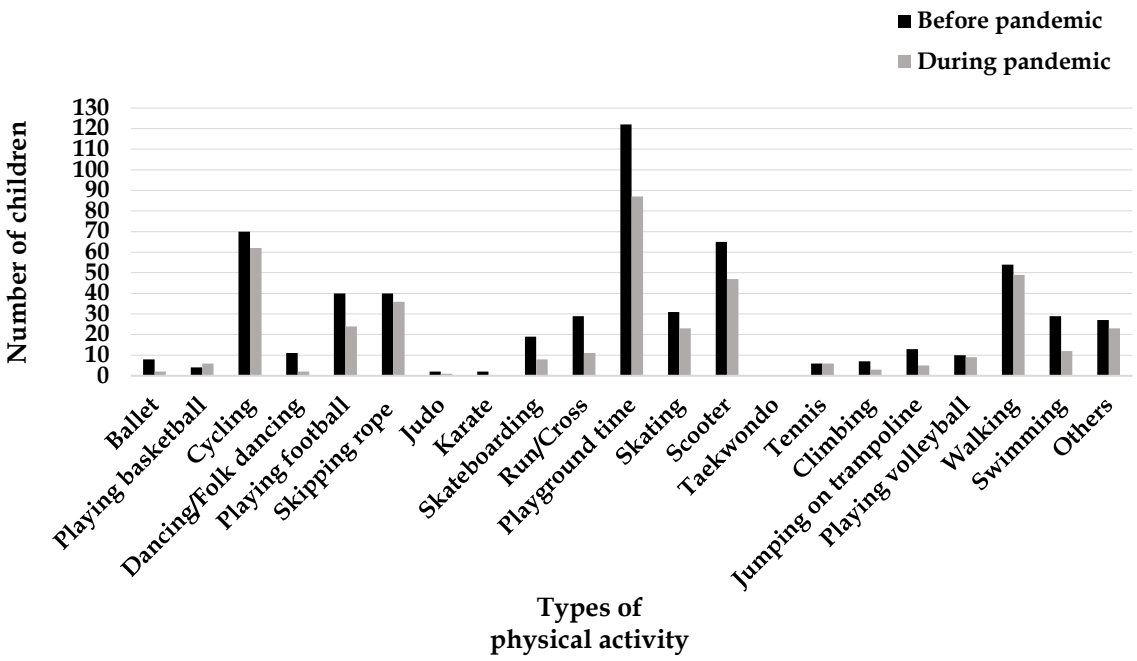
RESULTS

Quantitative Results

Physical Activity Behaviors

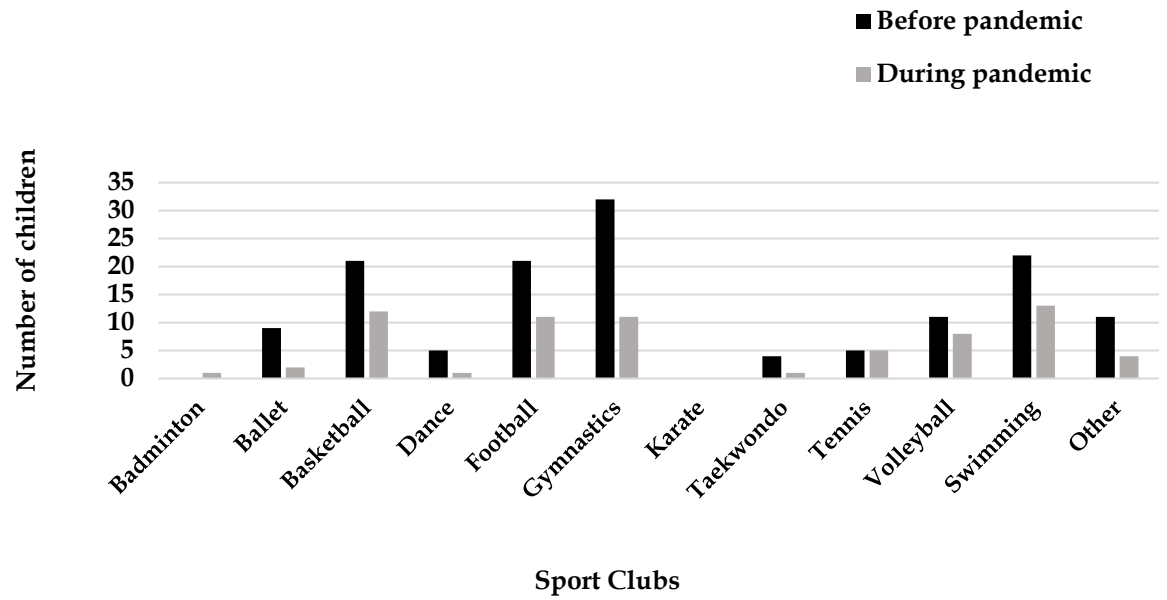
The physical activity behaviors of children during the pandemic were determined by examining their participation in recreational physical activities and sports club attendance. Figure 1 displays the number of children attending recreational physical activities both before and during the COVID-19 pandemic. Compared to the pre-pandemic period, there was a decrease in all types of physical activity specified in the survey during the pandemic except playing basketball category. Only the number of children playing basketball increased from four to six during the COVID-19 pandemic.

Figure 1
The comparison of children's recreational physical activities



As a physical activity participation, children's sports club attendance was asked in the questionnaire. Figure 2 displays the number of children who attend sport club before and during pandemic. While the number of children who went to the gymnastics club was 32 before the pandemic, this number decreased to 11 during the pandemic. Similarly, there were decreases in other sports branches as follows: ballet (from 9 to 2), basketball (from 21 to 11), and swimming (from 22 to 13).

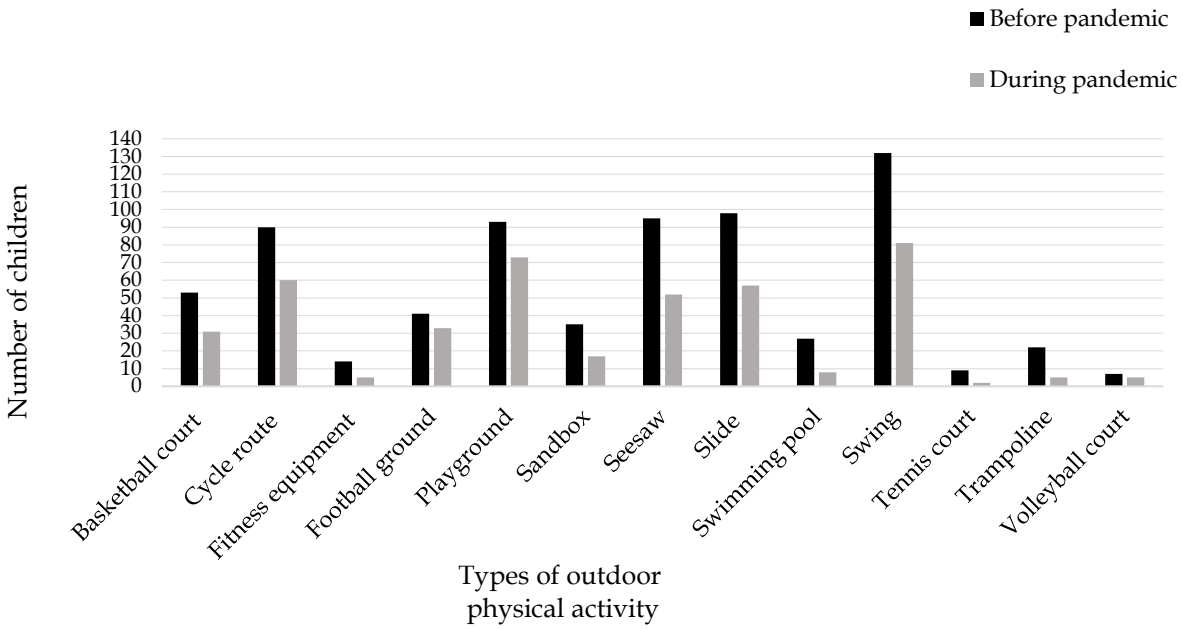
Figure 2
Children's sports club information



Outdoor Physical Activity Opportunities

The outdoor physical activity opportunities were displayed in figure 3, in which there were decreases in all outdoor PA categories. The number of children who benefited from outdoor facilities decreased in the following categories: cycle route (from 90 to 60), sandbox (from 35 to 17), seesaw (from 95 to 52), swing (from 132 to 81), and trampoline (from 22 to 5).

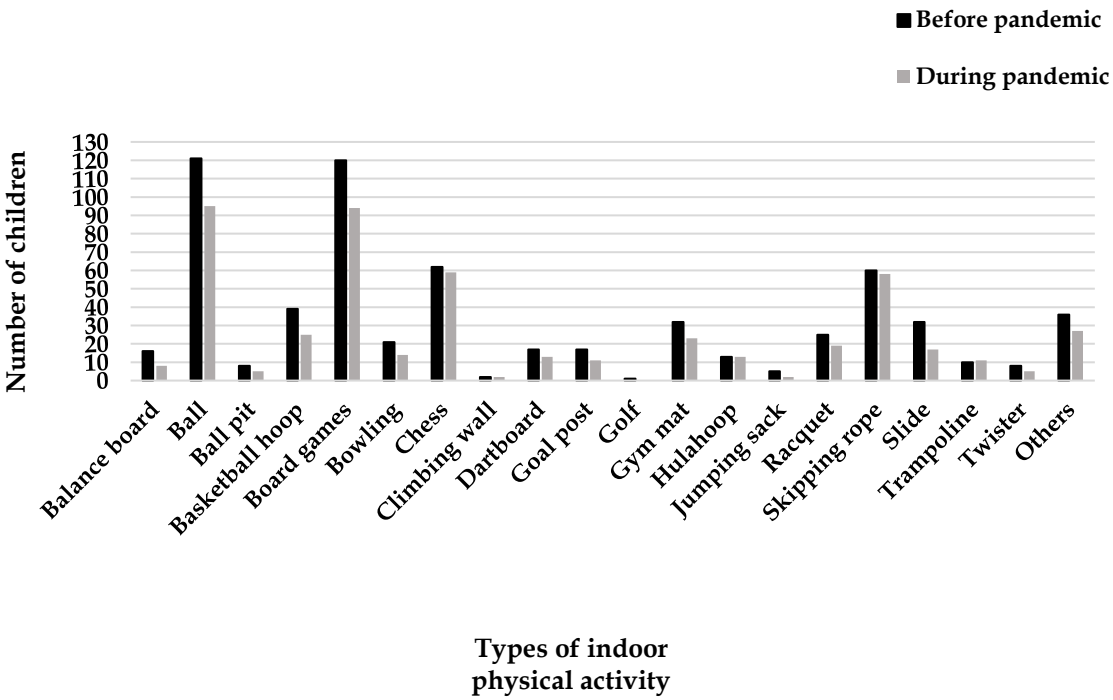
Figure 3
Children's use of outdoor physical activity opportunities



Indoor Physical Activity Opportunities

The number of children participating indoor activities before and during the pandemic is shown in figure 4. There were decreases in all indoor physical activity categories except for the children attending climbing wall activities and playing with a hula-hoop. The most significant gap between pre-pandemic and during the pandemic occurred in the following indoor PA categories: ball (from 121 to 95), board games (from 120 to 94), and slide (from 32 to 17).

Figure 4
Children's use of indoor physical activity opportunities



Daily Habits (Screen Time, Sleep Time)

Descriptive statistics of screen time and children' sleep patterns were illustrated in Table 2 based on the quantitative data of 205 children. To describe children's screen-based behaviors, the time spent in front TV, the total hours played in computer games, and the time used of telephone/tablet were displayed in the detail Table 1. The most dramatic change has been in the number of children watching TV for 6-8 hours. This number, which was 0 before the pandemic, increased to 4 in the pandemic. Except for the lowest category, 0-2, the duration of children playing computer games increased in the remaining three categories. Similar results were found for telephone/tablet use, with the highest increase in categories 6-8 and 8+. The sleep hours of children before and during the pandemic are also presented comparatively in Table 2.

Table 2
A comparison of children's screen and sleep time

Variables	Before pandemic		During pandemic	
Hours	**n**	**%**	**n**	**%**
TV hours				
0-2	107	52.2	81	39.5
2-4	81	39.5	97	47.3
4-6	17	8.3	23	11.2
6-8	0	0.0	4	2.0
Non defined	0	0.0	0	0.0
Computer games				
0-2	166	81.0	139	67.8
2-4	27	13.2	48	23.4
4-6	8	3.8	12	5.9
6-8	4	2.0	6	2.9
Non defined	0	0.0	0	0.0
Telephone/Tablet				
0-2	147	71.7	114	55.6
2-4	46	22.4	64	31.2
4-6	12	5.9	13	6.3
6-8	0	0.0	9	4.4
8+	0	0.0	1	0.5
Non defined	0	0.0	4	2.0
Sleeping hours				
7-9	63	30.7	69	33.7
9-11	115	56.1	112	54.6
11-13	22	10.7	16	7.8
13+	1	0.5	1	0.5
Non defined	4	2.0	7	3.4
Total	205	100	205	100

Qualitative Results

The volunteer eight parents from the primary sample participated in the interviews. More mothers (n = 7) were included than the father. Table 3 displays the main and sub-themes of the qualitative dataset.

Table 3
Themes and Sub-themes

Themes	Sub-themes
Physical activity challenges during the COVID-19 pandemic	Access to outdoor physical activity facilities Creating space for movement in the house Parental solutions to physical activity obstacles Children's demands School support for physical activity
Screen-based behaviors of children during the COVID-19 pandemic	Parental control on screen time Positive & negative impact of the screen context Screen devices usage during the COVID-19 pandemic

Table 3 (Continued)

Themes	Sub-themes
Screen-based behaviors of children during the COVID-19 pandemic	Parental control on screen time Positive & negative impact of the screen context Screen devices usage during the COVID-19 pandemic
Sleep patterns during the COVID-19 pandemic	Sleep duration Sleep pattern Sleep quality
Behavioral and health consequences of the COVID-19 pandemic	Fear of infection Lack of social interaction Negative impact of the pandemic on physical health Emotional intensity in children

1. Physical activity challenges during the COVID-19 pandemic

The interview results presented an overall decrease in children's physical activity levels. Parents reported how much they were affected by the long-term home confinement period. The quarantine measures forcing families to stay at home, limiting their access to outdoor space, and the closure of structured and unstructured outdoor facilities adversely affected both families and children, resulting in decreased physical activity participation of children. However, all parents were not influenced by the pandemic restrictions in the same way. Families living in a detached house could offer more ways for children to engage in outdoor activities than others. The interviews also clarified that if children had enough outdoor time, they had better mental well-being.

Another challenging situation for families was the lack of suitable space for movement at home and the inability of children to discharge their energy sufficiently. Children's demands for active play directed families to solve this problem by arranging the furniture in the house to create space and turning the attic into a playground. Moreover, some parents mentioned purchasing new materials for their children in to increase their engagement in physical activities and spend quality time. Balls, Legos, skateboard, puzzles, and coloring books were supporting materials supplied to the children during the pandemic.

The other issue discussed in the interviews was how much the schools integrated sportive activities into the online curriculum and how the teachers managed the online physical education and sports courses. Except for one parent who stated that there was no physical education and sports lessons in online education, the rest of them stated that the school provided physical education and sports lessons, albeit a little. Because it was difficult to control children from the screen and keep the focus on the course, these courses generally

included easy-to-apply activities such as stretching activities, games with simple instructions, and dances with music.

Despite the challenges and uncontrollable issues during the lockdown, parents expressed the attempts to support children's independent mobility as they were aware of the importance of PA for children's development. They engaged in physical activities with their children, including jumping rope, walking around the neighborhood, and riding a bike. In addition, parents were happy to have more family time and had the opportunity to spend more time with their children. For example, parents turned home confinement into an advantage to help their children gain new skills such as playing chess. This unexpected and favorable outcome was the only positive side of the pandemic mentioned in the interviews.

2. Screen-based behaviors of children during the COVID-19 pandemic

A consensus statement stated by many parents was the development of screen addiction and excessive screen time. One of the main arguments for increased screen time was the obligatory use of phones, tablets, and computers in distance education, Moreover, restricting children's access to recreational activities also led them to spend more time on screens. The increased screen time influenced children's behaviors; some children exhibited more vicious, aggressive, and combative behaviors than ever before. Apart from quarantine measures and online education, adverse weather conditions also increased screen time. In the interviews, many parents stated that they allowed their children to use technological devices because they avoid taking their children out, especially during the winter season.

In addition to excessive screen time, screen content also changed during the pandemic resulting in negative impacts on children's behaviors. Some parents stated that inappropriate content manipulated children to act differently from their age especially after watching makeup videos or some popular dance groups. Moreover, some online games presented scary pop-up commercials. Some requested children for their photos, locations, and videos, which was a total violation of remarkable life and needed to be controlled by authorities, as claimed by many parents.

As a typical result of quarantine measures, children lost the excellent opportunity to socialize during breathing times during school periods and interact with their peers and play games. Therefore, they tend to become socialize through online applications and meet their friends in a virtual environment, directly affecting screen time.

Since families were aware of such consequences and banning screen use ultimately would not be a solution in this process, they needed to regulate screen time in constructive

ways. While some parents controlled screen time by setting alarms, others tried to support their children with other activities to keep them away from the screen.

Besides the negative effects of the screen, some parents talked about the positive effects. For example, one mother kept her child from technological devices except for online education due the child's eye disease and directed her to dance. Thus, she improved her dancing skills. Another example was that a seven years old girl watched cartoons with appropriate content and gained exemplary behaviors such as respect for elders.

3. Sleep patterns of children during the COVID-19 pandemic

In the interviews, many parents stated that their children had sleep problems during the pandemic. As stated by many parents, children who sleep regularly and get enough sleep during the school period had to struggle with sleep problems during the pandemic. Also, children who were inactive at home for a long time had difficulty falling asleep because they did not discharge their energy sufficiently, disturbing their sleep quality.

As shared by many parents, the delay in bedtime and relatedly wake time caused children to become unproductive for the rest of the day. Thus, children had difficulty in concentrating on lessons due to the slowdown in their cognitive functions. For example, the single father in the study stated that his daughter was sleepy and could not fully listen to the lessons because she often attended the lessons in her bed. Further to the academic success, the children's diet was deteriorated, and the number of meals a day decreased from three to two. Although a decrease in sleep quality was something that many children experienced during the home confinement, some parents stated that their children did not experience sleep-related problems, and the sleep routines were the same as before the pandemic.

Despite the different impacts of the pandemic on children's sleep patterns, the most prominent issue among parents was that children's sleep duration was appropriate for their age. Most parents were sure their children were sleeping enough during the pandemic by taking extra precautions. For example, a mother said that she restricted screen use before sleep and made her child do activities that would make him more tired.

4. Emotional and health consequences of the COVID-19 pandemic

The dominant feeling among parents was the fear of infection which directly limited the children's behaviors and daily routines. Because of the anxiety of getting infected, all parents set rigid rules, including wearing masks, using antibacterial wipes, and keeping distance from others in outdoor settings. Parents' persistent and slightly oppressive attitudes made children anxious about getting used to everyday life even after the pandemic rules were

softened. For example, eight-year-old girl's mother explained her daughter's concerns about touching the surfaces in the playground and did not want to get in contact with others.

Children experienced fatigue even after low intense physical activities such as bicycling or walking. Parents explained that the lack and loss of physical activity changes mainly due to the closure of schools. As phrased by the father of the eight-year-old girl, she could walk to school even for a short distance before the pandemic, but she lost this opportunity during the pandemic. Besides physical tiredness, the weight gain was also impressed as an adverse health outcome of the pandemic by parents. Because of increased sedentary behaviors and the lack of physical activity participation, children tend to gain weight during the pandemic.

It was a mutual point stated by families that the longer the children stay at home and the less peer communication, the more aggressive behaviors they exhibit. Additionally, children had to cope with strong and intense emotions such as boredom, obstinacy, and pettishness which forced families to help their children to cope with these challenging emotions.

DISCUSSION

The purpose of this study was to examine the impact of the COVID-19 pandemic on physical activity and daily routines of children aged 5-12. The main findings included the decline in children's physical activity participation generally due to quarantine measures. Similar results to those found by Moore et al. reporting lower physical activity levels in children and drastic changes in children's outdoor play (2021). This study concluded that outdoor time was a significant determinant of children's physical activity engagement and performing less sedentary behaviors. The study's findings provided evidence of the relationship between the house type and the mental well-being of children. This is in line with the study of Hazlehurst et al., supporting the strong relationship between outdoor access and the mental health of children with clear evidence (2022). The other finding of this study was the decrease in sports club participation which hindered children's physical activity participation (Ng et al., 2020). To maintain a healthy lifestyle for children, sports clubs could continue their functions by carrying safety rules (Constantini et al., 2021). The parents' interviews emphasized the decrease in recreational activity participation by arguing the lack of recreational activity opportunities and pandemic-related safety issues (Mutz & Gerke, 2021). The limited access to physical activity places allowed families to find creative solutions to meet children's movement needs. Engaging in home-based activities, spending more time

with children and supplying different types of materials to their children were the temporal but efficient solutions during the pandemic (Lee et al., 2021). The parents' interviews also argued insufficient school support for physical activity and its quality during online courses. The effectuality of online physical education courses could be studied by policymakers (Apriyanto & Adi, 2021). The study findings, in general, could be discussed in terms of Bronfenbrenner's ecological systems theory arguing the interaction between the child and the environment., the study findings highlighted the influence of a child's closest environmental opportunities on his/her development as also clarified in the literature (Haleemunnissa et al., 2021).

The study indicated the details about indoor time with a decrease in children's indoor play/physical activity opportunities. Despite the increased indoor time, children's physical activity did not increase, possibly due to course load. Because of limited activity options, children spent more time participating in indoor activities such as reading books, painting and artworks, and playing with toys. These results are corroborated by those previously found by Barron et al. (2021), arguing the change in home-based play behaviors of children due to the lockdowns. Moreover, the quarantine measures forced children to stay at home for a long time, and the absence of social relations could cause deficiencies in children's social skills that should be considered by health professionals (Araújo et al., 2021). Because the indoor time increased during the pandemic, the interaction among family members and the children gained importance regarding their attitudes, treatment methods, and crisis management skills in the microsystem of Bronfenbrenner's ecological systems theory (Haleemunnissa et al., 2021). These results could have short- and long-term implications for public health professions suggesting contemplating over the strict pandemic measures and producing practicable solutions such as designing educative PA programs (Kutlay et al., 2018). The governments could use media effectively by publishing public messages to facilitate children to become more active in daily life and to break up extended sitting periods (Guan et al., 2020). Parents were also recommended to stimulate their children to gain new hobbies like dancing or taking responsibility for a pet to increase physical activity (Moore et al., 2021).

The study results presented the excessive screen time among children during the pandemic, as stated by many studies in the literature (Pietrobelli et al., 2020; Xiang et al., 2020). Although pandemic-related restrictions such as the closure of schools necessitate screen use for long hours (Liu et al., 2020), the amount of screen exposure could be a potential risk for detrimental effects on children's mental health (Twenge et al., 2019).

The study highlighted a general worsening in children's sleep quality during the pandemic. Although there were no vital disruptions in sleep quality, some children experienced sleep-related problems as figured out by other studies in the literature (Guerrero et al., 2020; Zhao et al., 2022). Poor sleep habits were reported by parents as such sleep latency due to prolonged screen time, which is consistent with previous studies (Hysing et al., 2013; Gellis et al., 2014; Schlieber & Han, 2021). Moreover, the literature provides strong evidence of the severe impact of home confinement on children's sleep patterns were including a significant delay in the sleep/wake schedule of children of all age groups and an increase in sleep disturbances (Bruni et al., 2022; Zhao et al., 2022).

The limitations of this study should be acknowledged. First, the sample size is small and limited to young children. The relatively small sample size produces claims about the generalization of the findings. In this sense, it is suggested to increase sample size for future studies. Second, a methodological limitation of this study is the use of subjective measurement. Subjective assessment tools could create bias and misperceptions which could cause misinterpretation of the dataset. Although the survey results were confirmed and triangulated by interview results, it would be desirable for future studies to adopt objective measurement tools to assess the study variables to prevent misunderstandings.

Future studies are recommended to conduct qualitative studies with children to analyze their experiences during the lockdown periods deeply. The impact of socioeconomic status and children's physical activity level could be studied to identify the needs of different populations. Moreover, the long-term effects of the pandemic could be a subject matter of future studies regarding children's general health conditions and adaptations to daily life. Policy makers should be aware of the importance of environmental settings on children's movement behaviors, so city planning should be based on such needs for future studies. Finally, teachers are recommended to include more physical activities into the daily routines of children in case of future extreme cases.

CONCLUSION

This study provides evidence for the decreased physical activity level of children during the COVID-19 pandemic, which mainly demonstrated the decline in outdoor play and changes in movement behaviors. Additionally, the pandemic-related restrictions negatively influenced sleep and screen behaviors. Using the Bronfenbrenner Ecological Theory as the focus of this study, it was possible to conclude that children's overall physical activity level was affected by factors beginning from the inner layer of Bronfenbrenner's ecological systems

theory. Physical environment, family settings, school facilities, and close relatives play an essential role in the development of the child at the microsystem level. At the mesosystem level, the interaction among microsystems was discussed regarding indirect relationship between the children's development and school administrators, the local organizations, and social services. At the exosystem level, the mass media could be supportive of promoting health-related behaviors and supporting more activity for children during pandemic crises. The outer layer of Bronfenbrenner's ecological systems theory, the macrosystem, and the public health emergency responses to the COVID-19 pandemic affected children's lifestyles by imposing mandatory home closures. To alleviate the impact of a pandemic on children's development, the study findings would be a guide to inform public health professionals, parents, and school administrators to become aware of the importance of PA, play, and outdoor facilities to create dealing strategies in case of future crises.

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Authors' contributions

Both authors contributed conception and design of the study; the first author collected, analyzed, and interpretation of the data; the first and second authors contributed to drafting the article, its critical revisions, and reviewing the results, then both of them approved the final version of the manuscript.

Conflict of interest declaration

The authors declare that they have no conflict of interest**.**

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Examination of Scientific Production on Badminton: A Content Analysis

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ABSTRACT

The aim of this research is the examination of scientific production on badminton. The data were obtained from studies published in the British Medical Journal, Eric, ULAKBIM National Databases, WOS, Google Scholar, ProQuest, and YÖK National Theses Center databases between 1939 and 2020. A total of 856 publications, including 624 articles, 134 proceedings papers, 71 M.Sc. theses, and 27 Ph.D. dissertations, were included in the research. The data obtained from these studies was analyzed using content analysis. Most publications were produced between 2016 and 2020. 751 publications in English and 105 in Turkish. It was observed that the distribution of the number of productions and the number of authors were close to each other. 134 proceedings papers (90 full-texts, 44 abstracts) were identified. Of the studies, 670 were quantitative, 105 were qualitative, 54 were mixed design, and 27 were reviews. Experimental design was used the most, and historical design was used the least. Stratified and simple random sampling methods were mainly used. Most studies were conducted with athletes, and the least with instructors (coaches and teachers). Most studies were conducted on exercise and sports physiology and the least on physical education, games, and recreation. The studies focused on physiological, anthropometric, and motoric measurements as the main themes. As a result; it has been determined that scientific productions on badminton are mostly studies on exercise and sports physiology in which physiological, anthropometric and motoric measurements are taken by conducting experimental studies on athletes selected by simple random sampling.

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INTRODUCTION

Badminton is one of the most popular sports nowadays. Badminton is an Olympic sport that can be played at any age and in any environment, giving pleasure to those who play and watch, and that stands out with its technique and aesthetics. Playing the ball without touching the ground, requiring good reflex and conditioning, and providing positive physical, mental, social, health, and psychological development to the person also increase interest in this sport (Bebetos & Antoniou, 2003; Callow et al., 2001; Grice, 2003).

According to data from the Badminton World Federation (BWF), approximately 220 million people play badminton worldwide (Wörner & Safran, 2022). Bringing badminton to the service of more people, which appeals to so many people and makes positive contributions to the lives of individuals of all ages, is essential in terms of raising healthy individuals and accordingly, creating healthy societies. In addition, the fact that badminton is an Olympic sport appealing to people of all ages and being played by more and more people every day has revealed the need for more extensive studies.

In the literature, it is seen that the first scientific studies on badminton were mainly conducted on training sciences, physical education, and sports pedagogy (French & Stalter, 1949; Lockhart & McPherson, 1949; Phillips, 1943, 1946; Rutledge, 1955; Scott, 1941). These studies, mostly published in scientific articles, proceedings papers or theses, have developed a multidisciplinary structure and have become widespread. This situation necessitates the classification and in-depth analysis of the studies on the subject. In particular, classifying and dividing the research into themes helps to determine the structure and evolution of the field and increase its effectiveness. Furthermore, this information is essential in giving ideas for new scientific studies to be carried out by determining the subjects and areas of research (Atılgan, 2020).

When the literature was examined, two content analyses on badminton came across (Blanca-Torres et al., 2020; Doğar et al., 2021). Blanca-Torres et al. (2020) analyzed 122 articles on badminton published in the Web of Science (WOS) database between 2007-2017. The articles were evaluated according to years, author countries, institutions, number of authors, journals, number of citations, sample sizes, disciplines, topics, and methodological aspects. Doğar et al. (2021) examined the articles and theses published on badminton sport in Türkiye. The general status, number of authors, journals, publication languages, distribution by years, research models, sample sizes, sample characteristics, topics, and main themes of these productions were examined.

It is seen that the scope of research on badminton is limited to Turkey and WOS database. For this reason, it is thought that there is a need to conduct research in different databases and by seeking answers to different research questions. Therefore, this study aims to scan and systematically analyze the scientific production on badminton.

To achieve this aim, answers to the following research questions were sought:

RQ-1: What is their distribution according to the type of publication?

RQ-2: How is the distribution by years?

RQ-3: How is their distribution according to the language of writing?

RQ-4: What is the distribution of articles and proceedings papers according to the number of authors?

RQ-5: What is the distribution of the proceedings papers according to the text type?

RQ-6: What is their distribution according to their method?

RQ-7: How is their distribution according to the pattern?

RQ-8: What is their distribution according to the sampling method?

RQ-9: What is their distribution according to the data collection tool?

RQ-10: What is their distribution according to the number of samples?

RQ-11: What is their distribution according to sample characteristics?

RQ-12: How is the distribution according to the subjects?

RQ-13: What is their distribution according to their main themes?

METHODS

Research Scope

The scope of the research consists of scientific studies published on badminton between 1939 and 2020. In the databases examined, it was determined that the first production was published in 1939. Therefore, the beginning of the period is taken as 1939. Accordingly, the criteria for inclusion in the study are as follows:

- the studies were published between 1939 and 2020
- published in British Medical Journal, Eric, Ulakbim National Databases, WOS, Google Scholar, YÖK National Theses Center and ProQuest databases
- having scientific articles, proceedings papers and postgraduate theses
- answering research questions
- writing languages are Turkish or English.

The exclusion criteria are:

- studies published before 1939 or after 2020

- not responding to at least one of the research questions
- writing languages other than Turkish or English.

Searching Strategy

In this study, the search process was carried out between September 2020 and December 2020. This study examined British Medical Journal, Eric, Ulakbim National Databases, WOS, Google Scholar, YÖK National Theses Center, and ProQuest databases. These databases were searched using the keyword "badminton." In the search, in order to identify articles and proceedings papers, the databases were limited to articles and proceedings papers. The searches were limited to studies with the word "badminton" in the entire text.

Data Entry Form

In content analysis, no system in which categories are suitable for every research. For this reason, researchers may need to create and standardize the categories in which they will seek answers to the questions. Therefore, in this study, the categories were created by the researchers as a result of the literature review (Blanca-Torres et al., 2020; Büyükergün, 2020; Doğar et al., 2021; Palazon et al., 2015; Patra et al., 2006; Prieto et al., 2015; Villarejo et al., 2010). These created categories were presented to the opinion of three experts working in the faculty of sports sciences who had done content analysis before. As a result of these evaluations, necessary arrangements were made and the data entry form was created (Appendix A). In the created form, the studies were examined in terms of publication types, years, writing languages, number of authors, methods, patterns, sampling methods, sample numbers, data collection tools, sample characteristics, topics, main themes, and text types of the proceeding's papers.

Validity and Reliability

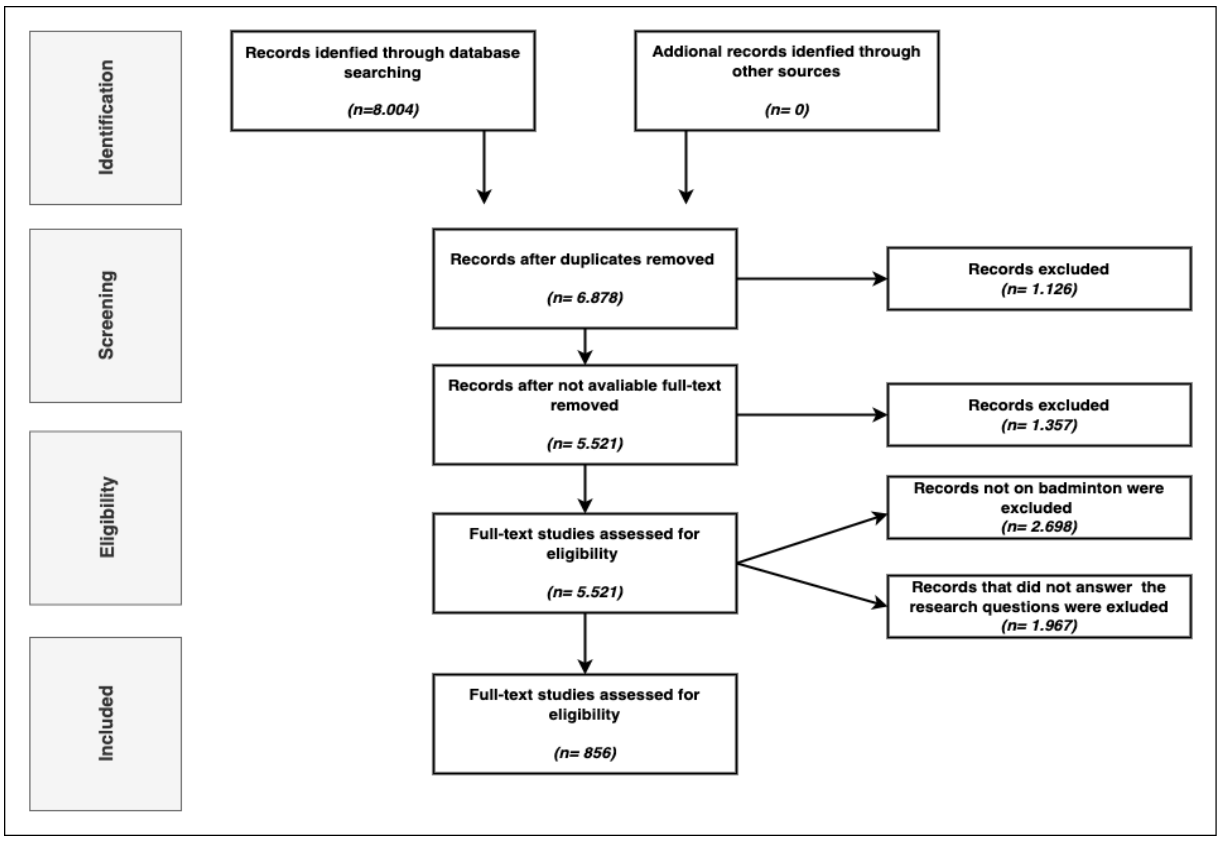
Before the screening process started; the researchers prepared the keywords, inclusion and exclusion criteria, and data entry form. Two researchers independently searched the databases and processed them into the data entry form. The forms created independently by the researchers were compared, and the final form was processed by achieving consensus on the differently coded data. For the validity of the study, the data collection and analysis processes are described in detail.

Data Collection

The search was conducted following the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2009). After the

limitations specified in the screening strategy were made, 8.004 publications with 'badminton' in their title, abstract, and keywords were reached. First of all, 1.126 duplicate studies in different databases were extracted. Subsequently, 1.357 studies were removed, whose full text is not available. Afterward, 2.698 studies that were not specifically about badminton were also excluded. Finally, 1.967 studies that did not answer the research questions were excluded. As a result of these processes, 856 studies were included in the study (Figure 1).

Figure 1
Search Results and the Selection Procedure



Data Analysis

Content analysis was used to analyze the data. Content analysis identifies the presence of words, sentences, concepts, phrases, or characters in one or more texts and represents them numerically (Elo & Kyngäs, 2008). Content analysis was used in this research as it is analyzes written, verbal, or visual communication messages that include both qualitative and quantitative approaches. For a clearer understanding of the data, the SPSS 23 Package Program was used and the results were presented in tables with frequencies (f) and percentages (%).

RESULTS

The findings obtained by examining, evaluating, and classifying scientific articles, proceedings papers, and postgraduate theses on badminton are presented in the tables 1 to 13 below.

Table 1
Distribution of Studies By Publication Types

Publication Types	f	%
Articles	624	72.9
Proceedings Papers	134	15.7
M.Sc. Theses	71	8.3
Ph.D. Dissertations	27	3.2
Total	**856**	**100**

Note: M.Sc.: Master of Science, Ph.D.: Philosophie Doctor

According to Table 1, most of the studies are composed of articles, followed by proceedings papers, M.Sc. theses, and Ph.D. dissertations, respectively.

Table 2
Distribution of Studies by Years

Years	f	%
1939-1950	3	0.4
1951-1960	5	0.6
1961-1970	1	0.1
1971-1980	14	1.6
1981-1990	28	3.3
1991-2000	46	5.4
2001-2005	42	4.9
2006-2010	121	14.1
2011-2015	180	21
2016-2020	416	48.6
Total	**856**	**100**

According to Table 2, three publications were made in 1939–1950, five publications in 1951–1960, one publication in 1961–1970, 14 publications in 1971–1980, 28 publications in 1981–1990, 46 publications in 1991–2000, 42 in 2001–2005, 121 publications were made in the years 2006–2010, 180 publications in the years 2011–2015, and 416 publications were made in the years 2016–2020.

It is seen that the most publications are between the years 2016-2020, and the least number of publications was made between 1961-1970. According to this, it is seen that there were irregular and few publications between 1939-1970 and then there was a continuous increase between 1971-2020.

Table 3
Distribution of Studies by Written Language

Language	f	%
Turkish	105	12.3
English	751	87.7
Total	**856**	**100**

According to Table 3, it is seen that 751 studies are in English, and 105 publications are in Turkish.

Table 4
Distribution of Articles and Proceedings Papers by a Number of Authors

Number of Authors	f	%
1	104	13.7
2	172	22.7
3	184	24.3
4	125	16.5
Five and above	173	22.8
Total	**758**	**100**

According to Table 4, articles and proceedings papers were published with a maximum of three authors. This is followed by studies with five or more authors, four authors, three authors, two authors and one respectively.

Table 5
Distribution of Proceedings Papers by Text Types

Type	f	%
Full Text	90	67.2
Abstract Text	44	32.8
Total	**134**	**100**

According to Table 5, there are 134 proceedings papers, 90 of which are full texts and 44 are abstracts.

Table 6
Distribution of Studies by Methods

Context	Data Collection Methods	Method	f	%
Research Study	**Quantitative**	Experimental	388	45.3
		Non-experimental	282	32.9
	Qualitative	Qualitative	105	12.3
	Mixed	Mixed	54	6.3
Literature Search		Review	27	3.2
		Total	**856**	**100**

According to Table 6, the studies were mainly carried out using quantitative experimental methods. This is followed by quantitative non-experimental, qualitative, respectively mixed-method and review studies.

Table 7
Distribution of Studies by Pattern

Design	f	%
Fully Experimental	204	23.8
Semi-Experimental	71	8.3
Pre-Experimental	113	13.2
Descriptive	55	6.4
Causal Comparison	101	11.8
Correlation	39	4.6
Scanning	87	10.2
Ethnography	3	0.4
Phenomenology	52	6.1
Case study	28	3.3
Historical Analysis	1	0.1
Action Research	21	2.5
Discovery Pattern	37	4.3
Descriptive Pattern	12	1.4
Parallel Pattern	5	0.6
Review	27	3.2
Total	**856**	**100**

According to Table 7, studies are primarily in complete experimental design. This is followed by pre-experimental, causal comparison, screening, and quasi-experimental designs. The least used patterns are historical analysis, ethnography, and parallel design.

Table 8
Distribution of Studies by Sampling Method

Sampling Type	Sampling Method	f	%
Probabilistic Sampling	Simple Random Sampling	266	31.1
	Systematic Sampling	29	3.4
	Stratified Random Sampling	382	44.6
	Cluster Sampling	26	3
Nonprobability Sampling	Monographic Sampling	2	0.2
	Convenience Sampling	2	0.2
	Purposive Sampling	57	6.7
	Others	92	10.7
	Total	**856**	**100**

According to Table 8, the stratified sampling method was used the most. This is accompanied by simple random, purposive sampling, systematic random, and cluster sampling methods, respectively.

Table 9
Distribution of Studies by the Number of Samples

Number of Samples	f	%
1 – 30	386	45.1
31 – 50	126	14.7
51 – 100	98	11.4
101 – 150	32	3.7
151 – 200	12	1.4
201 and above	69	8.1
Unspecified	133	15.5
Total	**856**	**100**

According to Table 9, a maximum of 1-30 people (386-45.1%) were used as samples in the studies. This is not specified in the order, followed by 31-50, 51-100, 101-150, 151-200, 201, and above people, respectively.

Table 10
Distribution of Studies by Data Collection Tools

Data collection tool	f	%
Observations	141	16.5
Interviews	29	3.4
Survey – Scales	92	10.7
Documents	83	9.7
Physical/Physiological Measurement Tools	441	51.5
Others	70	8.2
Total	**856**	**100**

According to Table 10, the physical/physiological measurement data collection tools were used the most in the studies. Observation, questionnaire-scale, document, interview, and other data collection tools are used respectively.

Table 11
Distribution of Studies by Sample Characteristics

Sample Characteristics	f	%
International Level Athletes	181	21.1
Club Level Athletes	272	31.8
Amateur Level Athletes	40	4.7
Primary School Students	18	2.1
Secondary School Students	23	2.7
High School Students	25	2.9
University Students	111	13
Disabled Individuals	19	2.2
Instructors (Trainers/Teachers)	14	1.6
Others	153	17.9
Total	**856**	**100**

According to Table 11, most of the club-level athletes were taken as samples in the studies. This is accompanied by international-level athletes, university students, amateur-level athletes, high school students, secondary school students, disabled individuals, and primary school students, respectively. It is seen that the instructors are the least taken as a sample.

Table 12
Distribution of Studies by Subject

Topic	f	%
Physical Education and Games	5	0.6
Physical Education and Sports Pedagogy	83	9.7
Exercise and Sports Physiology	145	16.9
Exercise and Sports Psychology	91	10.6
Physical Education and Sports for the Disabled	11	1.3
Physical Fitness	102	11.9
Biomechanics	105	12.3
Motor Behavior	79	9.2
Nutrition in Exercise and Sports	19	2.2
Recreation	5	0.6
Sports Medicine	99	11.6
Sports History	7	0.8
Sports Management	11	1.3
Others	94	11
Total	**856**	**100**

According to Table 12, most studies were conducted on exercise and sports physiology. This is followed by biomechanics, physical fitness, sports medicine, exercise and sports psychology, physical education and sports pedagogy, motor behavior, exercise and nutrition in sports, physical education and sports for disabled people, sports management, history of sports, recreation and physical education and game.

Table 13
Distribution of Studies by Main Themes

Main Theme	f	%
Teaching Methods and Techniques	77	9
Psycho-social Studies	92	10.7
Evaluating the Effects of Training on Performance	112	13.1
Physiological, Anthropometric, and Motoric Measurement	160	18.7
The Relationship between Exercise and Nutrition	18	2.1
Sports Injuries and Rehabilitation	91	10.6
Game Equipments	55	6.4
Motion Analysis	86	10
Match Analysis	77	9
Others	88	10.3
Total	**856**	**100**

According to Table 13, studies are mostly on physiological, anthropometric, and motoric measurements. This is succeeded by the main themes of evaluating the effects of training on performance, psycho-social studies, sports injuries and rehabilitation, movement analysis, teaching methods and techniques, match analysis, game equipment, and the relationship between exercise and nutrition.

DISCUSSION

This research is aimed to shed light on new scientific studies by systematically reviewing them on badminton and determining which subjects and which areas they focus on. For this purpose, 624 articles, 134 proceedings papers, 71 M.Sc. theses, and 27 Ph.D. dissertations were included in the research. It was determined that most of the studies consisted of articles accompanied by proceedings papers, M.Sc. theses, and Ph.D. dissertations, respectively. When the literature is considered, it is understood that it parallels with the research results. For example, Villarejo et al. (2010) concluded that 122 (84%) of the 136 studies they analyzed on rugby were published as articles. Yılmaz (2019) examined the sports science studies (articles and postgraduate theses) for the hearing impaired in Turkey and found that 31 of 60 were articles. Çiftçi (2014) reviewed postgraduate theses and articles on swimming and concluded that 45 of 83 studies were articles. Accordingly, it is understood that articles are mostly preferred in studies related to badminton, and less space is given in postgraduate theses.

According to the years, it was determined that the most work was done between 2016 and 2020, and the least work was done between 1961 and 1970. Blanca-Torres et al. (2020) reviewed the studies on badminton published in the WOS database between 2007 and 2017. It was observed that these studies, which were examined, gradually increased after 2011. It is seen that there is a notable increase in the last years of the time interval analyzed similarly in other studies (Büyükergün, 2020; Çetinkaya, 2011; Prieto et al., 2015). In this case, it shows that the analysis studies on badminton and other analysis studies are numerically similar in terms of years. In other words, it can be said that scientific studies in the field of sports have increased remarkably since 2000. This situation is parallel with the results of the study. Therefore, it is possible to accept this point reached numerically as an indicator of the importance given to badminton and sports sciences. In addition, this rapid increase in publications can be evaluated in light of the cyclical relationship between science and technology. In other words, while the developments in science and technology increase the number of publications, the increase in the number of publications provides the development in science and technology.

Badminton is also in this cycle and interacts with many fields (such as health, engineering, management, education, history, and psychology). It can be said that this has increased the number of studies on badminton.

It has been determined that the writing languages of the studies are mostly English. In parallel with the research results, Villarejo et al. (2010) determined that 135 of the 136 studies on rugby indexed on the ISI Web of Knowledge platform between 1998 and 2007 were in English. The fact that scientific journals indexed in international academic databases are primarily published in English confirms this situation (Patra et al., 2006). The publication of studies on badminton and similar subjects, mainly in English, shows that English is predominantly preferred in scientific studies. It can also be said that the world accepts English as the language of science.

It has been determined that articles and proceedings papers are made with a maximum of three authors and at least one author. Atalay (2017) considered the trend of research in sports management in Turkey and concluded that the articles mainly had two and three authors. Prieto et al. (2015) examined the studies on handball in the WOS database between 1900 and 2012 and published in MEDLINE databases between 1950 and 2012. As a result of the research, they found that while the number of authors was 2.63 percent in the 1961 period, it increased to 3.81 percent in the 1961–2012 period. According to this result, it can be said that the studies on badminton were carried out by the researchers in cooperation. In addition, it can be said that new studies have been carried out by bringing together researchers from different fields, and therefore studies with more than one author have been made. Moreover, it is thought that research is complex, so researchers need to work together.

It has been discovered that the proceedings papers are mostly in full text. When the literature on the subject was searched, no studies examined the text types of the proceedings papers. According to the research results, it is seen that in the databases examined, the proceedings papers are mostly published as full text and summary text, and there are no poster proceedings papers.

Quantitative methods were mostly used. When the literature is inspected, it is understood that it shows parallelism with the results of the research. Dumangöz (2022) examined research articles on tennis and emotions and found that 60% of them used quantitative methods. Biricik (2020) examined the theses in the field of sports management in Turkey and found that quantitative researches are in the majority. Elmas et al. (2018) examined the theses made in social areas in sports and found that 83.4% of them used quantitative methods. Yavuz et al. (2018) examined academic studies in the field of sports management

and found that the quantitative approach was used in 70% of them. However, it is known that the quantitative method is dominant in sports sciences. Parallel to this, it is an expected result that studies on badminton are mainly carried out with quantitative methods. The emergence of such a result can be evaluated as more effective and useful research using quantitative methods. In addition, the fact that badminton is practice-oriented by its nature may have brought about this result.

When the literature is examined, it is seen that mixed-methods research is used less in both badminton and other sports sciences (Dumangöz, 2022; Biricik, 2020; Yavuz et al., 2018). Regarding this, Roest et al. (2013) stated that the mixed method is used in a small number of studies in the field of sports sciences and that its construction is weak. This situation can be evaluated as the researchers did not dominate the mixed design and therefore did not use it.

It has been ascertained that mostly full experimental research is used in the studies. Moreover, it was determined that other experimental designs were more numerous. Accordingly, it can be said that researchers aim to achieve success in matches by improving athlete performance, and therefore they give more space to experimental studies. In addition, more use of experimental methods in sports sciences can also be said to aim to reach sample groups more quickly, take fewer samples, and save labor and time in data collection and analysis processes (Biricik, 2020). Furthermore, the fact that experimental studies provide a proven cause-and-effect relationship and yield prospective results may have led researchers to conduct experimental studies (Thompson & Panacek, 2006).

The least historical analysis pattern was used. It can be said that this is due to the fact that historical information does not change over time, and therefore, the thought of not writing the same information over and over again. In other words, it can be said that the lack of historical analysis studies stems from the thought that these studies will not contribute to the field.

It has been confirmed that the probability sampling method is the predominant one in the studies. When the literature is reviewed, it is seen that mostly random and purposive sampling methods are used in parallel with the research results (Babur et al., 2016; Biçer, 2017; Kurt & Erdoğan, 2015; Selçuk et al., 2014; Yüksel et al., 2016). In addition, in this study, it was determined that the number of studies using the stratified sampling method was high. The reason for this may be to reduce the sample standard error by making more economical research in a short time (Miles & Huberman, 1996). In this regard, Yıldırım and Şimşek (2011) stated that a limited number of appropriately selected samples can carry the characteristics of the universe, and the findings can be reflected in general.

While participants ranging from 1 to 50 people were mostly used in the studies, participants ranging from 101 to 200 people were used less. In parallel, Palazon et al. (2015) found that a sample size of 1–100 is mostly used in the analysis of football-related studies. According to these results, as the number of samples increases, the number of studies decreases. It can be said that this situation stems from the thought that as the number of participants decreases, the data can be collected in a shorter time and analyzed more effectively and accurately.

It was concluded that data collection tools used in physical/physiological measurements were used in approximately half of the studies. Atalay (2017) found that 39 of 56 articles were published as questionnaires in his research on sports management in the ULAKBİM national database. Biricik (2020) examined the published postgraduate theses on sports management and found that 261 of 341 theses were made using a questionnaire/scale data collection tool. It can be said that the reason why the results of the research differ from some studies in the literature is due to the fact that the studies are not based on practice and are generally aimed at measuring the emotions and thoughts of individuals. Contrary to these results in the literature, Williams and Wragg (2004) stated that the studies in the field of sports are mostly carried out experimentally. Based on this statement, it can be considered that the large number of data collection tools used in physical/physiological measurements in badminton is due to the fact that experimental studies are predominantly carried out.

Interview data collection tools were the least used in the study. Collecting data by interview allows the researcher to obtain deeper information from data collection tools such as questionnaires/scales (Kızıltepe, 2017). However, the fact that the interview takes time, increases the cost, is difficult to analyze, and has problems in ensuring validity and reliability may have caused this tool to be less preferred.

In the studies, it was seen that mostly club, international-level athletes, and university students were used as samples. In parallel with the results of the research, it was determined that the studies on sports management in Biricik (2020), published postgraduate theses on sports management, and Atalay (2017) on sports management in the national database of ULAKBİM were mostly conducted on athletes. Dumangöz (2022), examining research articles on tennis and emotions, found that researches were mostly concentrated on athletes. Palazon et al. (2015) analyzed the studies on football and found that the studies were mostly done on professional and amateur athletes. Blanca-Torres et al. (2020) analyzed the studies on badminton published in the WOS database and found that they were mostly done on international and national competitive athletes. Considering that the main purpose of sports

is the development of athletes, this is an expected result. The overuse of university students as a sample may be due to the fact that researchers are generally academics at universities and that they can reach students there most easily.

As a sample, instructors, individuals with disabilities, and primary school students were used the least. It is known that education given at a young age is important in order to reach the upper levels. However, the small sample size of primary, secondary, and high school students can be interpreted as insufficient emphasis on infrastructure in research. In addition, the small number of studies on disabled individuals and coaches indicates that researchers focus on high-level athletes.

It has been ascertained that studies are mostly carried out on exercise and sports physiology, biomechanics, and physical fitness. Prieto et al. (2015) concluded that research on handball was mostly conducted on physiology, psychology, anthropometrics, biomechanics and sports medicine. According to these findings, it is understood that researches for performance improvement in badminton are intense and the health of the athlete is kept in the foreground. Since badminton is played in a narrow field, it is important to apply the basic techniques correctly and effectively. For this reason, it can be said that researches on biomechanics are in the majority. It has been ascertained that there are few studies on physical education and game, recreation, and sports history. According to this result, it can be said that the researchers ignore the fact that badminton is a game tool and a recreational activity.

It was discovered that the most studies were carried out on the theme of physiological, anthropometric, and motoric measurements. However, it was determined that the themes were close to each other numerically. Therefore, it can be said that the studies focus on physiological, anthropometric and motoric measurements, which are among the criteria for talent selection and physical fitness. In addition, it may have been thought that physical and physiological changes would contribute more to athlete performance.

The lack of studies dealing with the relationship between exercise and nutrition is considered as an important deficiency. Because evaluating exercise and nutrition together directly affects the performance of the athletes before, during and after the training and in the competition (Ekin & Düz, 2021).

CONCLUSION

In the light of the findings, there is a lack of studies in which disabled people, instructors, primary and secondary school students are taken as a sample. In addition, new scientific studies on recreation, physical education and games will contribute to the field. As a

result, it has been determined that scientific productions on badminton are mostly studies on exercise and sports physiology in which physiological, anthropometric and motoric measurements are taken by conducting experimental studies on athletes selected by simple random sampling. The recommendations of this research are as follows:

- The scope of the research can be expanded and different databases can be added.
- Studies with more Turkish spelling can be conducted.
- More proceedings papers can be presented at congresses.
- More Ph.D. theses on badminton can be done.
- More reviews and mixed design studies can be conducted.
- Research can be designed using parallel and explanatory designs.
- Research can be conducted using non-probability sampling methods.
- Studies with a sample size of 100 or more can be designed.
- Studies can be designed by collecting data through interviews.
- In newly designed studies, disabled people, instructors, primary and secondary school students can be sampled.
- Studies can be conducted on recreation, physical education and games.
- Studies on the relationship between exercise and nutrition can be conducted.

Limitations

The limitations of this research are as follows:

- publications defined in British Medical Journal, Eric, Ulakbim National Databases, WOS, Google Scholar, YÖK National Theses Center and ProQuest databases
- the examined publications are articles, proceedings papers and postgraduate theses
- studies between 1939-2020
- studies written in Turkish and English
- studies whose full text has been reached
- results reached with the keyword 'Badminton'
- limited to studies that answer research questions

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Author contributions

All authors carried out the research design together. The first author was involved in the data collection, data analysis and writing process. The second author took responsibility for interpretation of the data, the supervision and critical reviewing of the original draft, as well as the approval of the final draft. All authors contributed to the discussion of the results and the manuscript's preparation

Declaration of conflict interest

The authors declare that they have no conflict of interest.

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Appendix A

Data Entry Form

A- Background of the Research	
Publication Type:	Article ( ) Proceedings Papers ( ) Ph.D. Dissertations ( ) M.Sc. Theses ( )
Year:	
Number of Authors	1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 and above ( )
B- Classification of the Study	
Language:	Turkish ( ) English ( ) Other( )
Proceedings Papers Type:	Full Text ( ) Abstract Text ( ) Poster ( )
C- Research Method	
Quantitative:	Experimental ( ) Non-Experimental ( )
Qualitative ( ) Mixed ( ) Review ( ) Meta-Analysis ( )	
D- Research Design	
Experimental:	Full Experimental ( ) Semi-Experimental ( ) Pre-Experimental ( )
Non-Experimental:	Descriptive ( ) Scale Development ( ) Correlation ( ) Scanning ( ) Causal Comparison ( )
Qualitative:	Action Research ( ) Theory Building (Embedded Theory) ( ) Concept Analysis ( ) Case Study ( ) Historical Analysis ( ) Phenomenology ( ) Narrative ( ) Ethnography ( )
Mixed:	Parallel ( ) Explanatory ( ) Exploratory ( ) Nested ( )
Literature Search:	Review ( ) Meta-Analysis ( )
E- Sampling Method	
Probabilistic Sampling:	Simple Coincidence ( ) Systematic Coincidence ( ) Stratified Random ( ) Cluster ( )
Nonprobability Sampling:	Monographic ( ) Convenience ( ) Purposive ( ) Snowball ( )
Other	
F- Data Collection Tool	
Observation ( ) Interview ( ) Survey/Scale ( ) Document ( ) Physical/Physiological Measurement Tools ( ) Other( )	
G- Number of Samples	
1-30 ( ) 31-50 ( ) 51-100 ( ) 101-150 ( ) 151-200 ( ) 201 and above ( ) Unspecified ( )	
H- Sample Characteristics	
International Level Athlete ( ) Club Level Athlete ( ) Amateur Level Athlete ( ) Primary School Student ( ) Secondary School Student ( ) High School Student ( ) University Student ( ) Disabled Individuals ( ) Instructors (Coachs/Teachers) ( ) Other ( )	
I- Subject	
Exercise and Sports Physiology ( ) Physical Education and Sports Pedagogy ( ) Physical Education and Game ( ) Exercise and Sports Psychology ( ) Physical Fitness ( ) Nutrition in Exercise and Sports ( ) Motor Behavior ( ) Sports and Health ( ) Recreation ( ) Sports Management ( ) Sports History ( ) Biomechanics ( ) Other ( ) Physical Education and Sports for the Disabled ( )	
J- Main Theme	
Physiological, Anthropometric and Motoric Measurement ( ) Psycho-social Studies ( ) Effects of Training on Performance ( ) Game Equipment ( ) Teaching Methods and Techniques ( ) Motion Analysis ( ) The Relationship between Exercise and Nutrition ( ) Match Analysis ( ) Comparison with Other Sports ( ) Other ( )	

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Pamukkale J Sport Sci, 14(2), 167-191, 2023 Research Article

Generalist Early Education and Specialist Physical Education Teachers' Views on the Scope of Early Childhood Physical Education

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ABSTRACT

On a national ministerial announcement concerning employing specialist Physical Education (PE) teachers to teach PE in early childhood education (as opposed to generalist early education teachers), this research sought to investigate teachers' views on this issue. Taking Lawson's (1983) theory of occupational socialization as a sensitizing framework, we examined whether teachers' specialization and experiences of participation in PE influenced their perspectives on early childhood PE teaching. Twenty in-service teachers, male and female, working in public education as generalist early childhood teachers (n = 10) and specialist physical education teachers (n = 10) participated in the study. Semi-structured interviews and the thematic analysis technique were used to generate data. The results showed that irrespective of their specialization, teachers' positive acculturation experiences in PE and sports influenced their attitudes towards early childhood PE. However, all participants assigned a functional-practical value to PE rather than an educational one. This finding was attributed to broader socio-cultural influences concerning the scope of school PE in early education. Both generalist and specialist teachers perceived their professional roles and responsibilities as distinct. They advocated for establishing interdisciplinary professional training programs as a prerequisite for employing PE specialists in early childhood education. Even though teachers' specialization shapes their scientific assumptions and understandings, personal acculturation and professional socialization experiences seem influential in determining their daily practices at school. The emerging early childhood PE literature could open up a myriad of opportunities for research in this field, always keeping in mind that the learning needs and interests of young children stay in the foreground.

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INTRODUCTION

Early childhood education promotes children's learning and social integration, positively impacting their cognitive and psychomotor development (Casey & Goodyear, 2015). A significant number of studies in the field examine young children's of motor competence and physical fitness or their participation in various forms of physical activity (Barnett et al., 2016; Dowda et al., 2009; Goodway et al., 2010; Vale et al., 2010; Venetsanou et al., 2015). Studies of this kind align with concerns about children's psychomotor development and health (McEvilly et al., 2013) and suggest practices that may combat obesity and lifestyle diseases (Herskind, 2010). However, researchers in early childhood Physical Education (PE) recognize the connectedness of mind, body, and spirit and advocate for adopting, holistic approaches to child development and learning (Gallahue & Cleland-Donnelly, 2003; Gresham, 1998; Yovanka & Winsler, 2006). In this regard, school PE has been suggested as one of the most appropriate contexts for young children's holistic development (McEvilly, 2014, 2015), especially when teachers know how to design and deliver purposefully planned instruction that takes children's voices and capabilities for agency into account (McEvilly et al., 2013).

Research in early childhood PE shows that the design and implementation of quality programs for young children is a challenging endeavor since it requires specialized knowledge and positive attitudes from the teacher. The teacher plays a crucial role in shaping the teaching and learning environment (Tannehill & MacPhail, 2014). The early childhood teacher is a critical person in the classroom (Gehris et al., 2015). Apart from his/her caring relationship with toddlers (Miller & Almon, 2009), the early childhood teacher should be able to present PE content in developmentally appropriate ways (Tsangaridou et al., 2022) so that toddlers experience freedom and happiness. For this purpose, the development of early childhood teachers' PE content knowledge has been suggested as a prerequisite for quality PE instruction (Casey & Goodyear, 2015; Tsangaridou, 2017; Tsangaridou & Genethliou, 2016). Until today, in most countries, early childhood PE is taught by generalist classroom teachers and not by PE specialists (Tsangaridou, 2017). This may be an issue of concern since while generalist classroom teachers may have studied PE during their undergraduate years, PE specialists have usually completed a four-year PE bachelor program. In this sense, generalist teachers may have acquired the expertise to teach PE, while PE specialists are more expert in delivering their instruction according to contextual parameters and regarding prioritized key learning areas (Truelove et al., 2019; Walton-Fisette et al., 2018). Research shows that subject specialization is related to teachers' sense of professionalism, increasing their efficiency and capabilities to

teach in a context-appropriate manner (Loughran et al., 2012). PE specialist teachers possess subject-specific content knowledge, teach longer lessons and use state-of-the-art PE teaching practices, and thus are more efficient in delivering quality PE instruction, compared to non-specialist teachers (DeCorby et al., 2005; Faulkner et al., 2008; Spence et al., 2004). Further, they are more committed to promoting effective PE lesson design and encouraging an "active school" climate (Fox & Harris, 2003) than their non-specialist colleagues. These qualities are essential in promoting young children's holistic development through PE (Kamberidou et al., 2019).

Research in the field of PE points out that teachers' early acculturation experiences in school PE and/or sports may influence the views and practices that they will adopt later as specialists (Richards et al., 2019). Teachers' biography and experiences within PE contexts sometimes seem more influential than coursework within university programs (Flory, 2016). Similarly, the influences that teachers may receive from the local community, parents, or colleagues regarding the subject of school PE (Gordon et al., 2016; McCullick et al., 2012); as well as associated professional learning opportunities during their studies or years of service in education (Dania, 2021; Dania & Tannehill, 2021), will ultimately shape the quality of their teaching. Some evidence indicates that PE teachers may experience subject marginalization (Lux & McCullick, 2011) or inter role conflict about assuming their expected dual roles as teachers and coaches (Richards & Templin, 2012). These occupational socialization experiences may relate to biases and/or values concerning the scope of PE in education (Richards et al., 2019). Thus, if teachers do not reflect on their perspectives via their personal or occupational socialization experiences, they may deliver lessons that either hold considerable control over children's behaviors (e.g., overly structured classroom activities) or legitimize their lack of instructional skills by referring to children's relentless persistence for play as a barrier to their lesson planning (Flory et al., 2014; McEvilly et al., 2013).

According to Lawson's occupational socialization theory (1983a), teachers are exposed to the social, psychological, and political dynamics of what it means to be a PE teacher during their years of education and socialization in different PE and sports settings. These experiences shape the practices and actions they will adopt afterward as professionals in school contexts. As defined by Lawson, occupational socialization consists of three discrete phases: (a) *acculturation*, which reflects childhood and adolescence experiences of participation in PE and sports contexts (e.g., through 'apprenticeship of observation' of family, friends, teachers, and coaches), (b) *professional socialization*, that happens when pre-service teachers enroll in teacher education programs (e.g., influences from university curricula), and (c) *organizational*

socialization, which occurs as part of the job and throughout teachers' working situations and context (e.g., influences from colleagues and the local community) (Lawson, 1983b, 1986). Experiences accumulated during these phases have a long-lasting impact on teachers' views about the scope and content of their teaching (Richards et al., 2014). Such experiences may reaffirm and/or challenge teachers' existing subjective theories (Richards et al., 2014), and undergraduate studies usually do very little to influence the way teachers will actualize their own PE curriculum at school (Adamakis & Dania, 2020; Kyridis et al., 2015).

The salient issues that influenced the current study were the value of teaching PE in early childhood settings and the way that teachers' socialization experiences may influence their pedagogy and practices in these settings. Numerous studies exist regarding specialist PE teachers' occupational socialization experiences (Richards et al., 2014; Prior & Curtner-Smith, 2019; Romar & Frisk, 2017) and generalist teachers' practices and perspectives concerning the values of PE in early childhood (Marinsek & Kovac, 2019; Sevimli-Celik, 2021; Tsangaridou & Genethliou, 2016; Tsangaridou et al., 2021). However, very little is known about the differences between specialist and generalist teachers' perspectives on the value of early childhood PE. Much less is also known about how teachers' occupational socialization experiences and subject specialization may influence the teaching of PE in early childhood settings. Consistent with the growing knowledge and interest in early childhood education (McEvilly et al., 2015), all educators of young children must have the skills and attitudinal perspectives related to the effective delivery of PE instruction (e.g., understanding young children's development, having the desired level of teaching competencies for implementing quality PE). Thus, understanding teachers' views and perspectives about early years PE is essential for improving and suggesting quality PE programs and practices.

Purpose of the Study

This study aimed to explore generalist early childhood and specialist physical education teachers' views concerning PE in early childhood settings. Focusing on teachers' perspectives, we used Lawson's (1983a, 1983b) theory as a sensitizing framework to analyze whether and how teachers' specialization and occupational socialization experiences influenced how they positioned themselves on the issue of early childhood PE teaching. Specifically, our research questions were:

(a) *Do teachers' occupational socialization experiences, in and through PE and sport, influence their views on early childhood PE teaching?*

(b) *Does the teacher's specialization influence the above views*?

METHODS

Study Group

A total of 20 in-service male and female teachers (N = 10 generalist early childhood teachers, N = 10 specialist physical education teachers) aged 36 to 51 years old, participated in the study. The research carried within this study was approved by our university's Bioethics and Research Ethics Committee (No 1284/19-05-2021). A purposive, homogeneous sampling strategy was used (Denzin & Lincoln, 2017), and individuals with shared characteristics were selected in each subgroup of teachers. By the time of the study, all participants had more than seven years of teaching experience. According to the country's teacher education curriculum, generalist early education teachers had completed a four-year bachelor program in early education (240 ECTS credits) and specialist physical education teachers a four-year bachelor program in physical education (240 ECTS credits). As part of their undergraduate studies, generalist early childhood teachers could attend elective courses relevant to PE (e.g., developmental psychology, music and movement for young children) and were qualified by the country's Ministry of Education to teach PE in early childhood settings (Gregoriadis et al., 2016). On the other hand, specialist PE teachers could attend elective courses relevant to early education (e.g., developmental psychology, creative movement in early education) and were qualified by the country's Ministry of Education to teach as specialists both in primary and secondary education (Dania & Griffin, 2021). Participants were eligible to participate in the study if they (1) were working either full-time or part-time in public education; (2) had more than five years of teaching experience in public primary or private early education settings (only for specialist PE teachers, since according to the country's teacher education curriculum, specialist PE teachers were not hired to teach PE in public early education settings); (3) were teaching at least one class of PE a week with games or movement learning activities (only for generalist early education teachers); (4) were willing to take part in an interview; and (5) agreed to have their interview recorded. Participant recruitment was completed until theoretical saturation was achieved (Patton, 2014).

Data Collection Tools

Physical Education in the early childhood curriculum in our country is taught by generalist early childhood teachers, who are not required to have a specific degree in PE to teach this subject (Official Gazette, 2003). Their PE knowledge is based on knowledge acquired during their bachelor studies (usually up to 9 university credits) within university classes or modules focusing on movement and rhythm or game-play activities. On the other hand, PE

specialists (i.e., teachers that have majored in PE at a bachelor level) have received specialized undergraduate education and training to teach at a primary and secondary level. However, until this study, they were not hired or specifically prepared to teach in early childhood education. Thus, what they may know or be able to do concerning early childhood PE depends much on their experiences as PE specialists in primary schools (grades A and B) or in private pre-primary schools and settings (e.g., working with children as young as three years old in after school programs).

According to the country's early childhood education curriculum, a teacher is expected to be able to plan and implement lessons that fall within the following developmental areas: language, mathematics, environmental education, creativity and expression, and digital skills. Experiential teaching strategies and project-based learning activities are suggested to be used across all areas (Riga, 2017). PE is included within the creativity and expression area of the national curriculum, with a focus on the following learning outcomes (a) body awareness in time and space, (b) body language as a means of communication-expression, (c) play, sport, and game skills, and (d) health education and safety. National ministerial documents have focused on PE as a context within which children can develop fundamental motor skills, learn how to interact effectively within unstructured or free play activities or develop skills that will facilitate their holistic upbringing (Early Years Foundation Stage Framework and Teaching Guidelines, 2011a, 2011b; Greek Integrated Curriculum Educational Preschool Program, 2002; Kindergarten Curriculum, 2011; Official Gazette, 2003). To achieve the above goals, many activities have been suggested, including structured or gameplay, balance and body control exercises, object handling activities, basic motor skill activities, rhythm and movement exercises, dancing and improvisation, sporting and local tradition events, etc.

In the above context, early childhood teachers are free to choose the activities of their preference and design PE instruction in a way that equally promotes the curriculum learning outcomes. As a response to research showing the positive impact of specialist PE teaching on young children's holistic development and total health, many ministerial documents and announcements have periodically stressed the need to employ specialist PE teachers in early childhood education in our country. This was the case in our study when in 2021, the Minister of Education announced the employment of specialists for teaching PE in early childhood education. The Minister commented on the need to modernize early childhood curricula and announced the government's initiatives towards employing specialist teachers in early education in the fields of English Language and Physical Education teaching. National early childhood teacher federations reacted negatively to the ministerial announcement, arguing

that specialist teaching would provide fragmented learning experiences to toddlers and thus create barriers to their holistic development. By the time of the present study, the ministerial announcement has been applied only to English Language teaching in early education in our country, and regulations or implementation methods concerning specialist PE teaching have not yet been defined. As such, early childhood PE in the country, in the year 2023, continues to be taught by generalist early childhood teachers. This issue was an underlying reason for conducting this study and particularly comparing the views of generalist and specialist teachers' views regarding the scope and value of PE in early childhood education.

Research Design

To generate data for our study, semi-structured interviews were conducted with all participants, who were encouraged to talk openly about various components of PE teaching or their experiences in programs, courses, and training related to PE and sport. Based on the communicative interaction with participants in the first two interviews, a semi-structured interview guide was formulated, in line with the stages of Lawson's occupational socialization theory (1983a, 1983b) and the content of the ministerial announcement. The interview guide was used to ensure consistency across participants. It was considered necessary to focus on the aspects of the phenomenon under study, allowing for flexibility in participants' responses without limiting the researchers' perspectives (Patton, 2014). Initially, three broad categories of questions were developed (with 5-6 questions per category) related to teachers' acculturation, and professional and organizational socialization experiences in and through PE and sport. In consultation with an expert researcher from the field of sport pedagogy and PE teaching, all interview questions were afterward phrased to explore the views of generalist and PE specialist teachers' experiences/memories of participation in PE and extracurricular sports programs. Questions were related to teachers' experiences during their school years (e.g., *How would you describe the PE class during your school years?*), to experiences/memories of courses related to PE during their bachelor studies and their employment as undergraduate students (e.g., *what PE courses or seminars for preschool children did you attend during your studies?*), and to the practices they adopted in their professional development (e.g., *when you were appointed or hired, how would you describe the influences, the help or lack of help from managers/supervisors, colleagues, or the parents of the children, when you wanted to do something with PE/when you wanted to teach PE in small classrooms?*). In total, twelve questions were included in the semi-structured interview. Interviews were conducted individually from July 2022 to August 2022 at each participant's site and generally covered 30 min to an hour (DiCicco-Bloom

& Crabtree, 2006). All interviews were audio-recorded and transcribed verbatim from October 2022 to December 2022. Detailed notes were also kept during each interview as a means to clarify, explain, or further elaborate what was discussed during each interview (Patton, 2014).

Data Analysis

The thematic analysis technique was used for data analysis. Specific identifiers (pseudonyms) were assigned to participants, using these to label their interview records (e.g., PE teachers were given the identifiers *PE1, PE2, PE3*, etc., and early childhood teachers the identifiers *EC1, EC2, EC3*, etc.). Interview transcripts were analyzed according to teachers' specialization (generalist early childhood [EC] versus specialist physical education [PE] teachers). Data were analyzed in two phases (by the first and the second author, respectively) using individual-case and cross-case analysis (Yin, 2013). Both authors read the interview scripts carefully to identify mutual themes and/or concepts and formulate common categories afterward (Patton, 2002). Both researchers used conceptual inputs from the literature, and data were examined both inductively and deductively through thematic analysis (Braun & Clark, 2006) with reference to the notions of the study's sensitizing theoretical framework. The analytical process involved six steps: familiarizing with the data set, generating initial codes, searching for themes, reviewing themes, defining, and naming themes, and producing the report (Braun & Clark, 2006). Data analysis started with generalist teachers and continued with specialist PE teachers. Finally, a cross-case analysis was conducted to reveal similarities and/or differences in participants' views on the data categories.

To maintain trustworthiness, the study procedure was explained thoroughly to participants at the beginning of the study (Lincoln & Guba, 1986). All stages of the research process were documented based on relevant confidentiality criteria (Denzin & Lincoln, 2017). The triangulation of data involved member checks conducted to test preliminary findings and interpretations against raw data, thick descriptions within and between cases, field notes, and a reflective journal kept by the first author (Nowell et al., 2017).

RESULTS

Data analysis was conducted across two main axes: (a) scope of early childhood PE and (b) the implementation methods of the ministerial announcement.

Concerning participants' views on the scope of early childhood PE three themes were produced:

1. *General notion of school PE*. This theme summarizes participants' school experiences in PE, as well as their experiences through their involvement-participation in extracurricular sports.
2. *Undergraduate pursuits of professional learning*. This theme captures the type and form of knowledge and skills in PE that the participants gained during their undergraduate studies and their apprenticeship/internship learning experiences.
3. *Social influences on professional development*. This theme highlights the influence of social parameters/variables that contributed to establishing and consolidating the skills and attitudes of the participants as regards early childhood PE teaching.

Regarding participants' views on the implementation methods of the ministerial announcement, two themes were produced:

1. *Recognition of Distinct roles*. This theme defines the boundaries set by the participants concerning the responsibilities and roles of generalist and specialist teachers in early childhood settings.
2. *Early Childhood physical education programs***.** This theme highlights participants' views on the structure of early childhood PE along with the need for interdisciplinary professional development programs.

All themes are presented below per separate axis and accompanying excerpts from the interviews.

Scope of Early Childhood Physical Education

General Notion of Physical Education

Reflecting on their school experiences, almost all participants described PE as enjoyable. Most of them associated PE with unstructured game activities or dance delivered by generalist teachers in primary education or as organized sports delivered by specialist PE teachers in secondary education. These memories seemed to be reinforced by participants' positive experiences of involvement in after-school sport during their childhood and adolescence. Family and/or community influences contributed to the formation of sports awareness from a very early age, and this was more evident for PE teachers. This also seemed to reinforce PE teachers' negative comments concerning the lack of a caring attitude on the part of their high school PE teachers. The following quotes are typical:

> "*...back then there were no specialist PE teachers in primary schools and the generalist teachers would take us out every now and then and we would do like...different body exercises...*" (EC2)

"*...we liked it very much [PE] and every time we had a new PE teacher, we hoped that things would change… but it was still the same routine/regime... the new teacher did not care about us at all...*" (PE4)

"*...I come from a sport family, my dad was a PE teacher, so I have been around the courts from a very young age....*" (PE9)

"*...I played volleyball for years... basketball, track and field and much younger I did ballet…I love traditional dance...*" (EC9)

Undergraduate pursuits of professional learning

All participants reported that there were no distinct courses focusing on early childhood PE in their university curricula during their bachelor studies. Early childhood teachers noted that courses that were more relevant to PE were the ones that focused on music and movement education, and drama. On the other hand, PE teachers reported that they took music and movement courses at an undergraduate level:

"*...as far as I remember, there was no distinct PE course at the university. The only similar course I can remember, let's say, with physical education, anyway, is the music and movement course that we had, ... we combined movement with music, and we did a lot of improvisation there...*" (EC8)

"*...one could say that the music and movement course that we had was the most relevant...[with PE]..*" (PE1)

The absence of relevant university courses or pedagogical content knowledge concerning the teaching of early childhood PE is evident in their statements, especially when they describe its content and scope:

"*...PE is movement. In early childhood, we try to use a lot of activities that involve movement because they attract the children's interest, and their attention is not lost...*" (PE8)

"*...I'm not a PE specialist, and I don't know how to do it [PE class] well either...but what I do want is for kids to have a good time even if I'm doing it wrong....*" (EC9)

"*...[PE in early education] are the games that we use in first and second grade...I would try to make the game simple, especially if children don't understand how to play...*" (PE8)

Social influences on professional development

As reported within the interviews, early childhood teachers were working with one-year contracts. They thus were changing school environments more frequently, as opposed to PE teachers who had a permanent employment status but only in primary school settings. For

all, a teacher's employment status may create barriers to his/her ability to formulate a developmentally appropriate PE curriculum:

> "*...as a newly appointed teacher, I travelled all around the country... I followed the formal early childhood curriculum and tried to collaborate with colleagues...*" (EC2)
>
> "*...when I was appointed in primary education, it was expected that the PE teacher would be responsible for all grades...so I taught in the first and second grade even without adequate pedagogical knowledge...*" (PE2)

Especially for early childhood teachers, factors such as the school culture, or the prevailing social perceptions and stereotypes about early childhood PE appeared to be presented as obstacles in delivering PE instruction. As they reported:

> "*...a lot of times the school climate was negative (principals and some others) …you were told that you can't do it [teach PE] …so you let it go [did not teach PE], to avoid any problems...*" (EC7)
>
> "*...I'm not saying they don't want their kids to move, but you can see that they're generally cautious. Parents don't want their children to get dirty, they don't want them to get even a scratch, ... they consider them too young...*" (EC2)

Implementation of the Ministerial Announcement

Recognition of Distinct Roles

While all participants agreed that the early childhood teacher is a reference person for infants, they pointed out that each specialization is unique, in terms of allowing teachers to be experts in their area. Thus, they all agreed that in the case that specialist PE teachers were employed to work in early education settings, they would need to cooperate and collaborate (in the form of co-teaching) with the generalist early education teacher. They mentioned the following:

> "*...the younger children, as young as four-years old, let's say, can't follow,.....they get confused, and when they don't understand, they stop trying and sit on the side by themselves. So we, the early childhood teachers, should be there to help the PE specialists...*" (EC8)
>
> "*...we have to cooperate-collaborate…this cooperation needs to focus on the characteristics of young children that I, as a PE specialist do not know. I am not aware of the particularities of children at that age...*" (PE10)

Early childhood teachers seemed to doubt the knowledge and skills that PE teachers had to teach at a pre-primary level. Further, they expressed concerns about early-childhood

teachers' employment and access to economic resources in case PE teachers were employed with permanent working contracts. This was not the case for PE teachers, who looked for such an opportunity, since their employment in early childhood education would open new working positions for their sector:

> "*...I think that the PE teacher – apart from his/her subject-matter knowledge – should also know the principles and practices of early childhood teaching, as we do...*" (EC6)
>
> "*...I can't even think that many early childhood teachers who work with short-term contracts will be unemployed as a result of PE teacher's employment in pre-primary schools...*" (EC7)
>
> "*...I think it is very positive for our sector… many PE colleagues who are not working will be employed...*" (PE1)

Early Childhood Physical Education Programs

Specialist PE teachers advocated for 45-minute PE lessons daily, while generalist early childhood teachers suggested 20-25 minutes and not necessarily every day. PE teachers' position was based on arguments concerning the positive effects of PE on children's healthy development. In contrast, early childhood teachers based their argument on the developmental characteristics of children at this age (e.g., attention that is distracted easily). What was indicative was that early childhood teachers used pedagogical terms to support their claims, while PE teachers used a sport-oriented terminology for the same purpose:

> "*...the PE teacher needs to have anatomical content knowledge and also be able to use principles of neuro-muscular coordination when teaching young children...*" (PE6)
>
> *"…with proper pedagogical training…I think we could collaborate and work together…as far as each one of us knows what to do [according to the early childhood curriculum) and how to do it [pedagogically]…"* (EC1)

DISCUSSION

The present study explored generalist early childhood and specialist physical education teachers' perspectives concerning the scope of PE teaching in early childhood education. Using Lawson's (1983a, 1983b) theory as a sensitizing framework, we examined whether teachers' specialization and experiences of participation in PE and sports environments influence their perspectives on early childhood PE teaching. The results showed that irrespective of their specialization, all teachers held similar views concerning the scope of early childhood PE as a context for practicing physical/motor activities that had a functional value (e.g., to help children to develop motor skills, healthy attitudes, etc.). This notion was

based on the experiences they had accumulated from PE and sports contexts as early as their school years. All teachers' professional learning pursuits during undergraduate studies, as well as their social influences as newly qualified teachers in various educational fields, did not seem to influence this perception drastically. Both generalist and specialist teachers acknowledged their roles and responsibilities as equally essential but distinct. Thus, they advocated for interdisciplinary training in case PE specialists would be employed as full-time teachers in early childhood settings. These findings are discussed further in the following paragraphs in relation to the study's main research questions.

Almost all participants recalled pleasant experiences from their years of involvement with school PE, describing PE as a less structured and enjoyable than other subjects. Some of them mentioned that during their years in secondary education, their experiences were not so positive, a fact that they mainly attributed to the lack of interest or the sporting-oriented styles of some specialist PE teachers. These findings are in line with relevant literature, according to which PE teachers are reported to add a recreational character to their lessons so that students feel comfortable while participating (Lodewyk & Pybus, 2012; Rikard & Banville, 2006). This seems to be the case with PE, since when lesson goals are developed according to student interests, an active school climate is established (Fox & Harris, 2003), and participation is perceived as a pleasant experience with an educational value (Balish et al., 2014; Crane & Temple, 2015).

Both generalist and specialist PE teachers described school PE as a setting for practicing skills and playing games, and this impression seemed to be related to their acculturation biographies (Flory, 2016) within different PE contexts. Research shows that this is a socially widespread notion of PE, equating the content of PE lessons with sports activities and skills that are taught in a fragmented, thus recreational way (Quennerstedt, 2013; Richards et al., 2019; Tinning, 2012; Ucus, 2015). Notably, participants who had been involved in sports as young athletes or had parents with positive sports attitudes seemed to have maintained this perception later, during their undergraduate studies and/or as preservice teachers. Studies show that teachers' positive acculturation and professional learning experiences in and through sports relate to their concerns about PE lesson quality (McKenzie & Kahan, 2008; McKenzie et al., 1999). Similarly, positive influences from parents or significant others reinforce concerns about the quality of PE (Gordon et al, 2016; McCullick et al., 2012). Considering the peripheral role that PE has within the school curriculum (Gaudreault et al., 2016; Richards, 2015), or the subject marginalization, many teachers may experience (Lux & McCullick, 2011), we argue that it would be a worthwhile undertaking to provide training

programs for parents, so that the educational value of PE can be supported by children's families, as early as pre-primary education.

During their bachelor studies, participants continued to view PE as a recreational context. However, they started to focus on its teaching in a subject-specific manner and emphasized different outcome goals and lesson activities. According to Forgasz and Leder (2008), adopting a 'practitioner' identity is a characteristic feature among teachers of different specializations. It was apparent that generalist early childhood teachers approached PE with a focus on teaching music-movement activities, drama, and games to develop children's creativity and expression. Such a focus related to generalist teachers' limited knowledge of PE teaching principles and strategies and is a finding also supported in relative studies (Tsangaridou & Genethliou, 2016; Tsangaridou et al., 2021). On the other hand, specialist PE teachers exhibited higher levels of knowledge and confidence to design simplified motor skills and physical activity content for young students. In line with relative research, specialists teach PE classes with higher levels of physical activity compared to generalist teachers (Truelove et al., 2019; Walton-Fisette et al., 2018).

What all participants reported, though, was an absence of early childhood PE modules during their bachelor studies. As they all claimed, their bachelor courses were delivered without a clear sense of purpose or a pedagogical consideration of the scope of early childhood PE. Within early childhood research, there is an ongoing discussion among experts about what should be the scope of learning regarding PE (Kirk & Haerens, 2014). This discussion strongly reflects the influence of developmental psychology in early childhood literature (McEvilly et al., 2013; Ponitz et al., 2009). According to the principles of developmental psychology, learning in early childhood is studied as an individual endeavor without reference to the formative role of socio-economic and cultural influences. This is also the case with the early childhood PE curriculum, which approaches children's development through a frequent reference to 'ages and stages' (McEvilly et al., 2013). Such an approach evokes images of what children are expected to have learned depending on their age and labels motor skill deficiencies with children's 'abnormal' development or performance.

Given the importance of social and emotional parameters to young students' holistic development (Wright et al., 2021), there have been many efforts in late years to reformulate the focus of university curricula for this age group. These efforts are supported by researchers who argue that learning should be viewed more socio-ecologically, incorporating pedagogical strategies that strengthen relationships between children, parents, caregivers, and teachers

(McEvilly et al., 2015). Such strategies also open new perspectives in teaching early childhood PE, focusing on the needs of students concurrently with societal needs and principles.

Our findings indicate that generalist and specialist teachers had formed a more empirical understanding of early childhood PE, based more on their love for physical activity and sport and less on their teaching skills or pedagogical content knowledge. Teachers who had developed positive acculturation experiences for sports as young children felt confident to teach PE even without relevant (pedagogical) content knowledge. A similar study by Humphries and Ashy (2006) shows that a teacher's love for PE was the strongest predictor of his/her effectiveness. However, all participants felt that including early childhood PE modules within their university curricula was imperative. Such a reform would undoubtedly require formal academic learning and professional training. Relative research points out that continuing education and professional learning are prerequisites for empowering and supporting teachers in teaching PE (Parker & Patton, 2017; Tannehill et al., 2021). Moreover, the establishment of learning communities and counseling programs seem to bring positive results in this direction (Dania & Ovens, 2021; Dania & Tannehill, 2021; Lave, 1993; Lave & Wenger, 1991; Oliver et al., 2018).

Apart from university influences, school infrastructures, as well as social parameters (e.g., relationships with parents and colleagues), seemed to act as barriers concerning teachers' views on the scope of early childhood PE. Irrespective of their specialization, they all suggested that a well-organized and supportive school environment is a prerequisite for quality PE teaching at a pre-primary level, something also reported in similar studies (Tsangaridou, 2012). Indeed, relevant research shows that socially established perceptions about the purpose and necessity of PE can act as barriers to its implementation (Gaudreault et al., 2016; Richards, 2015). Conversely, community collaboration and collective effort are needed for quality lesson design and implementation (DuFour & Fullan, 2013; Garet et al., 2001). Thus, awareness-raising activities concerning the educational value of PE are warranted before early childhood PE curricula are established.

As regards the structure of a typical PE lesson in early childhood settings, teachers in this study expressed views that aligned with their subject specialization and teaching philosophy. These findings are in agreement with the results of a meta-analysis which supported that specialist PE teachers are more concerned than generalists for health and physical activity outcomes and thus design lesson activities with such a focus (Truelove et al., 2019). However, both generalist and specialist teachers acknowledged the strong attachment and bonding that a preschooler develops with the early childhood teacher. For this reason,

they stressed the need for interdisciplinary collaboration, in case specialist PE teachers would be hired in early childhood settings. The necessity of establishing training programs where both generalists and specialists could accumulate multiple opportunities for professional development and collaboration is also suggested in the literature (Carson et al., 2013; Jess & McEvilly, 2015).

However, generalist early childhood teachers in our study were the ones who expressed concerns about the process of employing full-time PE specialists in early childhood settings. Their primary concern was that their already unstable employment conditions and economic insecurity (most early childhood teachers in this study have been working with temporary employment contracts for years) would be further threatened. We believe that this was an expected finding since educators' experience anxiety when they feel that their fundamental employment rights are being 'destabilized' (Bajaj, 2011). Thus, we strongly believe that the delivery of ministerial announcements should be matched by the right support from educational policy, in terms of specifically defining professional standards and working rights for teachers of all specializations (Gibson et al., 2020; Sperka & Enright, 2018).

Several limitations must be acknowledged in this study. First, the majority of study participants were female, a fact that is mainly the case, especially with generalist early childhood teachers in our country. Additional efforts could have been made to recruit more male participants. Concerning specialist PE teachers, the majority came from the same geographical region, an issue which may have affected the research findings. Thus, a larger group of participants from different geographical regions could have provided an alternative view of our issue. Finally, since interviews were the main sources of data collection, maybe a social desirability bias could have affected our findings. The conduction of classroom observations or interviews with school principals and/or parents could have provided a different picture.

CONLUSION

This study argues that teachers' acculturation and professional socialization experiences within PE and sport settings influence their views concerning the scope of PE in early childhood education. Irrespective of their specialization, teachers' positive involvement with PE and sports in their school years helped establish positive views concerning the necessity of PE, as a distinct subject, in early childhood education. However, all participants appointed a functional rather than an educational value to PE (e.g., PE as gameplay and/or structured sports activities), something which was directly or indirectly linked both to their

university experiences and to wider socio-cultural influences. Generalist early childhood teachers referred to PE more via their role as pedagogues with whom children share secure attachments, while PE specialist teachers referred to PE more via their sporting specialization and physical activity orientation. All participants emphasized the need for collaborative professional learning as a prerequisite for employing PE specialists in early education settings.

It becomes evident, therefore, that teachers' specialization affects their daily practices, specifically regarding their teaching philosophies and scientific assumptions. However, personal acculturation and professional socialization experiences may increase or sustain teachers' efforts and capacity to teach PE. As such, collaborative training and professional development opportunities are essential and could help ensure that the unique demands of quality PE teaching in early childhood education are met.

PRACTICAL IMPLICATIONS

A growing number of studies make a compelling case concerning the need to update early childhood university modules so that future teachers experience PE as a context within which one becomes physically fit while being nurtured as a socially, cognitively, and emotionally healthy person (McEvilly, 2014, 2015). Towards this direction, contemporary principles of quality PE teaching propose the adoption of bio-pedagogical approaches, according to which students' participation in PE is experienced as a process of communicating, understanding, and interacting through, with, and via movement (Dania et al, 2022). Therefore, it would be interesting for future studies to further analyze the circumstances under which PE could be introduced as a distinct subject into the early childhood education curriculum, taught collaboratively by generalist and specialist teachers trained to implement bio-pedagogical approaches. The design of teacher professional development programs, and university modules that combine interdisciplinary research and practice could also be examined. The emerging early childhood PE literature could open a myriad of opportunities for research in this field, always keeping in mind that teachers' rights are protected, and the learning needs of young children stay in the foreground.

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Authors' contributions

All authors revised the manuscript and contributed to the interpretation of the results. All authors have read and approved the final version of the manuscript. A consensus was reached on the order of authors.

Declaration of conflict interest

The authors declare that there is no conflict of interest.

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Do Oculomotor Exercises Improve Balance, Dynamic Visual Acuity and Performance in Female Volleyball Players? A Randomized Controlled Clinical Trial

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ABSTRACT

Athletes must develop not only their physical and motor capabilities but also their visual and perceptual-cognitive skills to support their performance. This study investigated the effects of oculomotor exercises (OMEs) on elite female volleyball players' dynamic visual acuity (DVA), balance, and vertical jump performance (VJP). Fifty-two female volleyball players were allocated to two groups: the intervention group (IG, n=26) that received OMEs twice a day, six days a week for four weeks in addition to their daily training, and the control group (CG, n=26) that, only continued their daily training. All participants were assessed with the Flamingo Balance Test (FBT), Y Balance Test (YBT), Clinical DVA Test, and Vertical Jump Test (VJT) before and after the study. After the study, FBT, DVA, and YBT posteromedial values in IG improved significantly, but VJP did not change. The results for CG showed no improvements. After the study only FBT score differences were found between the groups. OMEs in volleyball players can help to improve balance by improving DVA and balance. Future research should investigate the effects of volleyball-specific visual training on improving performance skills.

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INTRODUCTION

Visual skill in sports encompasses a wide range of abilities, from basic ball tracking to the capacity to anticipate an opponent's next move, and it plays a significant part in practically all sports and sports-specific skills (Hrysomallis, 2011). Increased dynamic visual acuity (DVA), balance, and postural control are crucial since changing postures often, especially in fast-ball sports, demands re-analyzing the visual information gained from the new position (Agostini et al., 2013). DVA is the capacity to assess the spatial features of a moving object when the head is fixed and of an immobile object when the head is moving (Palidis et al., 2017).

Volleyball is a dynamic sport involving quick adjustments in reactionary actions, including direction, deception, stopping, and perception. Motor abilities such as reaction time (RT), hand-eye coordination, strength, speed, and endurance are anticipated to be at a high level to adjust to these changes (İbiş et al., 2015). Ocular mobility must operate properly while defending to react appropriately and in time to the opposing team's attack. Constant eye movement is required to follow the ball across the playing field (Piras et al., 2010). According to studies (Piras et al., 2010; Trecroci et al., 2021), professional volleyball players have better visual skills than non-athletes. They focus more on the setter's hands and the initial pass trajectory, ignoring the ball trajectory. Instead, the non-athletes follow the entire path of the ball (Piras et al., 2010). According to research on the visual abilities of volleyball players at various levels, advanced players performed visually better than beginners and intermediate players (Jafarzadehpur et al., 2007).

Athletes need to develop their physical and motor skills and their visual and perceptual-cognitive abilities to enhance performance improvement (Formenti et al., 2022; Hadlow et al., 2018; Knudson & Kluka, 1997). Few studies have examined the impact of non-sport-specific visual skills training on athletes' performance and whether visual skills may be improved via regular practice in athletes (Knudson & Kluka, 1997; Morimoto et al., 2011). Components of oculomotor exercises (OMEs), a visual exercise, include fixation, saccadic movements, smooth pursuit, and optokinetic and vestibular movements. Such primary and slower tracking movements of the eyes are important and necessary in many sports (Rodrigues et al., 2015). As far as we know, no study examines the effectiveness of these visual exercises in volleyball. In this study, we examined the impact of OMEs on the DVA, balance, and vertical jump performance

(VJP) of volleyball players. The hypothesis is that practicing visual skills may improve volleyball players' DVA, balance, and VJP.

METHODS

Study Design

The current study is a randomized clinical trial. The study was ethically approved by the Istanbul Medipol University Non-Interventional Ethics Committee on 16.04.2020 with file number 10840098-604.01.01-E.14171 (ClinicalTrials.gov Identifier: NCT04852549). Written informed consent was obtained from all participants.

Study Group

The study included 52 elite female volleyball players who were 16 to 26 years old, competed in the same league, and continuously played the sport for at least three years. All participants had healthy vision and hearing and were checked by a doctor at the beginning of the season. The subjects had no recent history of upper or lower extremity injuries, drug use that would have affected neuromuscular function, or acute or particular pain that might have interfered with the study process. Participants with neuropathy, diabetic foot, vision issues like dizziness and refractive errors, and a history of ankle fractures and sprains during the previous six months were not included in this study. The flow diagram of the study is shown in Figure 1.

The sample size was calculated to be 52 elite volleyball players (26 per group) with the G*Power 3.0.10 program, using the mean and standard deviation of DVA percent change scores in two groups based on the research conducted by Morimoto et al. (2011) considering the significance level of 0.05, and a power of 80%. The participants were randomly allocated to groups in a 1:1 ratio; the intervention group (n=26) and the control group (n=26). An electronic random table created by a person unrelated to the study was used to prepare the contents of the opaque, sealed envelopes used for randomization.

The intervention group received OMEs in addition to their daily training routines twice daily in the morning and evening, six days per week for four weeks (Minoonejad et al., 2019; Morimoto et al., 2011). They performed the evening exercises under the supervision of a physiotherapist, and all exercises were seated in a group before their daily training in the sports club. They were instructed to perform the exercises in the mornings at home. The participants received a pamphlet with the exercises (Figure 2), also demonstrated before. Their compliance was checked over the phone via a WhatsApp group message; they were

prompted to perform the exercises, asked if they had done so, and noted. The control group continued their routine training for four weeks.

Figure 1
Flow diagram of participants

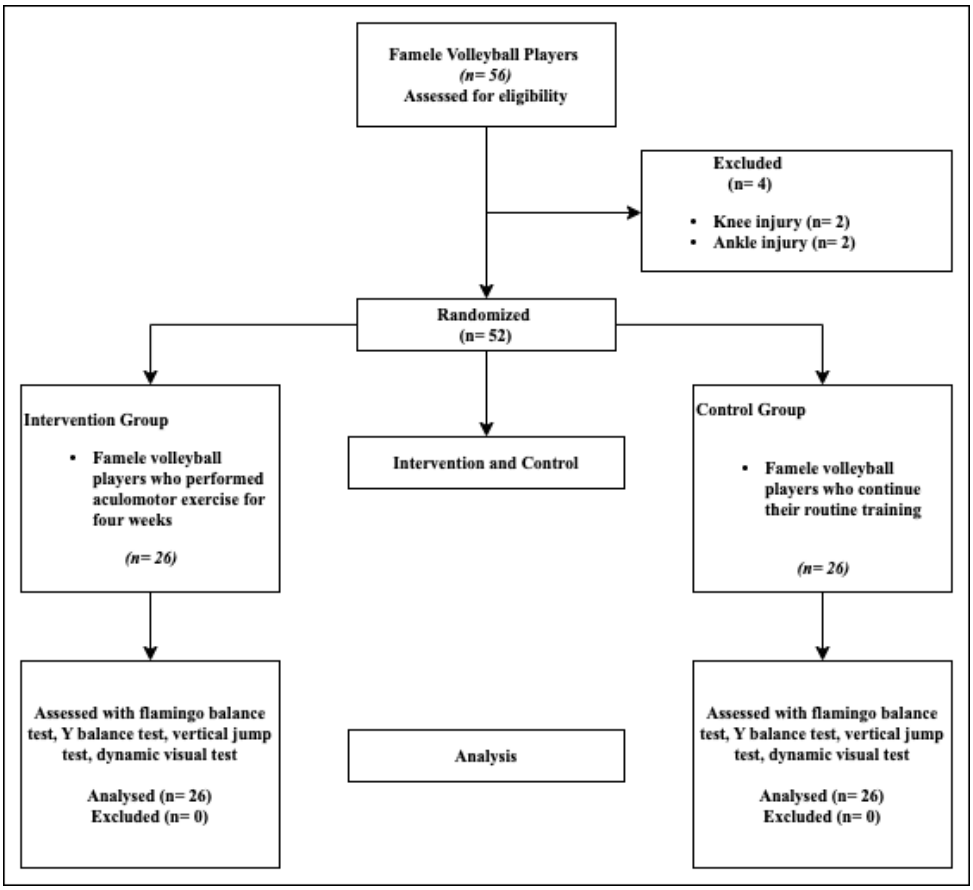
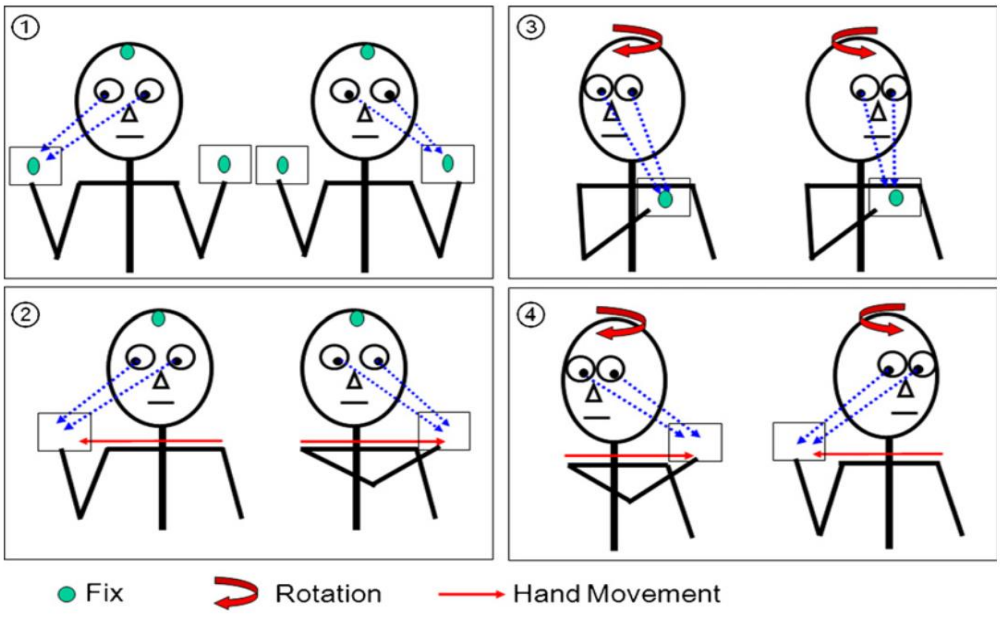


Figure 2
Oculomotor exercises and gaze stability exercise illustrations



Data Collection Tool

Age, height, weight, body mass index, volleyball age, training frequency per week, and daily training time of the participants were recorded. The same physiotherapist who was blind to groups conducted all assessments before and after the study.

The Flamingo Balance Test (FBT) was used to evaluate participants' static balance. The test was conducted with a wooden beam that was 50 cm long, 5 cm high, and 3 cm wide. Participants raised their upper extremities on the same side while attempting to stand and balance on their dominant leg while barefoot on the beam. The same side hand grasped the ankle of the other flexed leg. The number of failures to maintain the position for one minute was recorded (Panjan & Sarabon, 2010).

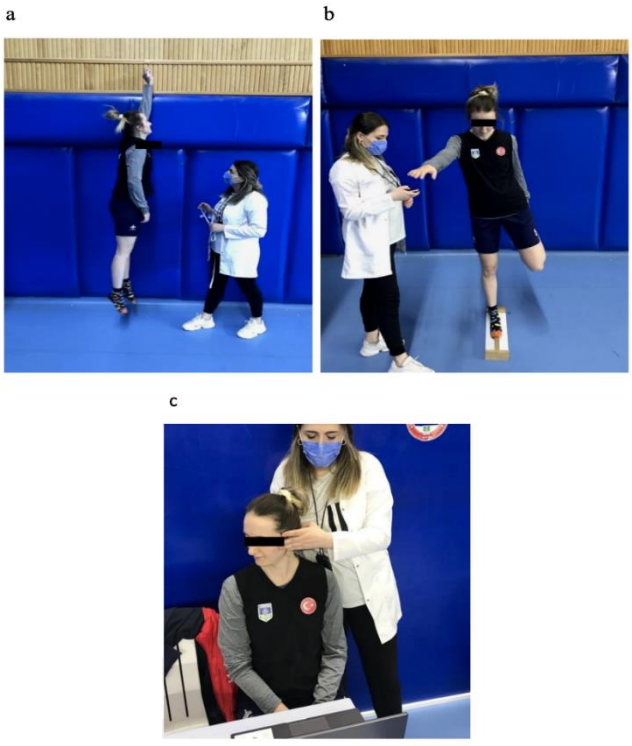
The dynamic balance of participants was assessed with the Y Balance Test (YBT). Three measuring tapes were attached on the ground at 120-degree angles for anterior, posteromedial, and posterolateral YBT reach directions. Participants were instructed to stand barefoot on their dominant leg in the center of this YBT visual guide. For each YBT direction, they were instructed to extend their free limb as far as possible and tap the ground with the tip of their great toe. The test requires the participants to balance themselves, keep their hands on their hips, keep their standing feets' heels flat on the ground, touch the ground gently with their reach foot, and then return to the beginning position. The test was repeated three times for each direction along the taped outline on the ground with a 30-second break between each repetition. The average reach of trials was recorded in cm and used for analysis (Nelson et al., 2021; Plisky et al., 2006) (Figure 3).

Participants' VJP was assessed with the Vertical Jump Test (VJT), which measures the distance between the highest point reached during a vertical jump and the standing reach. The participants kept their feet on the ground while standing with their dominant side against the wall. To measure the standing reach, they extended their arms as far as possible and marked the wall with chalk on their fingertips. Then they jumped as high as they could vertically and left a chalk mark on the wall where their arms were extended at their highest point. The difference between the two markings was recorded in cm. The test was conducted three times with 60 seconds break between each trial, and the best jump was used for analysis (Marques et al., 2019; Sudhakar et al., 2018) (Figure 3).

The Clinical DVA Test (DVAT) was conducted on a laptop computer. The patient was seated in a chair, and a computer monitor was placed 70 cm away. A stimulus consisting of a string of 5 white numbers selected from a set of 0, 1, 2, 3, 4, 5, 6, 7, 8, or 9 was prepared on a black background using the Microsoft PowerPoint program. The 5-item number sequence was

changed for each trial. The size of the number sequences prepared with the Tahoma font was changed from 12 to 20 points in 2-point increments (Herdman et al., 1998; Hillman et al., 1999; Roberts et al., 2006). Each participant received 10 slide trials, with the text size varying at random for each trial and each font size being repeated twice. In order to calculate the DVA, the participant was asked to perform the voluntary head rotation movement task in the horizontal plane. A 2.0 Hz auditory cue was presented with a metronome to perform voluntary head movement at a specified frequency (Roberts et al., 2006). The participant was instructed to rotate their head voluntarily at the same frequency as the auditory cue and at an angle of approximately 70° (Minoonejad et al., 2019; Morimoto et al., 2011). Each of the five numbers displayed in a trial was requested for a verbal report from the participant. In order to report the stimulus, the participant had 5 seconds before a new trial with a different set of numbers displayed. The average test time per patient was approximately 3 minutes. The number of accurate responses determined the person's dynamic vision score. Each trial's accurate response counts were collected, and the accuracy percentage for each font size was calculated. Each correct trial item accounted for 2% of the overall accuracy percentage. Before the test, it was proven that all participants could read the smallest font, 12 points, without moving their heads at a distance of 70 cm (Figure 3; Herdman et al., 1998; Roberts et al., 2006).

Figure 3
Demonstration of applying (a) Y Balance Test, (b) Vertical Jump Test, (c) The Clinical DVA Test



Exercises

The OMEs that were previously described by Herdman et al. (1998) were used. The exercises were (1) saccadic eye movement: The participant holds two colored objects in each hand on the right and left sides and moves the eyes horizontally between two fixed targets while maintaining a steady head position. The participant is asked to look at the object in the right hand and count to 10 while keeping his head in the middle position without rotating, then repeat the exercise on the left side. (2) smooth pursuit: The participant moves a colored object with the right hand horizontally, keeping the head stable in the midline position without rotating, and follows the object with the eyes. The participant is asked to keep their eyes on the object as it moves it in both directions on the horizontal plane. (3) adaptation X1: The participant fixes the eyes on the steady object and rotates the head horizontally from side to side. The participant is instructed to rotate the head horizontally while holding the object in the right hand, on the left side of the body, with the eyes locked on the object. (4) adaptation X2: The participant maintains eye contact with the target while moving the head and the target horizontally in opposition (Figure 2). The participant is instructed to fix their gaze on the colored object in their right hand while simultaneously moving their head and object in opposing directions (Minoonejad et al., 2019; Morimoto et al., 2011). The participant held the target in their palm, around 30 cm from their eyes. During the exercises, participants were encouraged to move the target or their head as quickly as possible while keeping a focused gaze on the target. During the first week, participants performed all exercises in a sitting position for ten minutes each in the morning and the evening. With a 5 second break between each exercise, four exercises were performed in a single set. Two sets per week increased the number of sets for the remaining three weeks. Each set was followed by a 10-second rest period (Minoonejad et al., 2019; Morimoto et al., 2011) (Figure 2).

Data Analysis

IBM SPSS (Statistical Package for Social Sciences) Statistics 22 package program was used to evaluate the data. The Shapiro-Wilk test was used to determine the normality distribution. Data analysis was determined using the in-group "Wilcoxon Test" and the intergroup "Mann-Whitney U Test." Statistical significance was set at $p < 0.05$ for all analyses. The effect sizes were assessed with "Cohen's d" to investigate the clinical significance of the changes caused by the intervention and post-treatment data results between the intervention and control groups. Effect size (d) was interpreted as weak if the value of "d" ≤0.5, medium if 0.51-0.79, large if 0.8, and very large if more than 1 (Cohen, 1992).

RESULTS

As seen in Table 1, the intervention group's FBT, DVAT, and YBT posteromedial values significantly increased following OMEs intervention in addition to their daily training ($p<0.05$). The VJT scores of the participants in the intervention group did not change significantly ($p>0.05$, Table 2). In the control group, who only continued their daily training, DVA values decreased significantly ($p<0.05$) at the end of the fourth week. At the same time, other parameters did not change significantly ($p>0.05$, Table 2). Only the FBT results between the groups following treatment showed a statistically significant difference ($p<0.05$).

Table 1.
Comparison of Participant's Characteristics at Baseline

Characteristic	IG (n = 26) Mean±SD	CG (n = 26) Mean±SD	*P*-value
Demographic features			
Age (year)	18.58 ± 2.99	18.46 ± 2.10	0.660
Height (cm)	175.42 ± 6.99	175.77± 7.65	0.866
Weight (kg)	62.08 ± 7.07	63.58 ± 7.64	0.466
Volleyball Age (year)	8.46 ± 4.17	7.65 ± 2.36	0.782
Daily training time (hour)	2,04 ± 0,48	2,02 ± 0,43	0.779
Training frequency per week (n)	5,12 ± 0,99	5,08 ± 1,01	0.900
Outcome measures			
FBT (n)	3.61 ± 2.71	4.96 ± 4.19	0.370
DVA (%)	81.46 ± 19.48	83.61 ± 11.11	0.707
YBT Anterior (cm)	84.39 ± 9.00	82.50 ± 8.59	0.280
YBT Posteromedial (cm)	89.26 ± 9.88	90.62 ± 10.63	0.280
YBT Posterolateral (cm)	96.58 ± 11.04	98.32 ± 8.66	0.510
VJT (cm)	34.00 ± 4.73	31.93 ± 3.88	0.161

Note. IG, Intervention Group; CG, Control Group; SD, Standard deviation; X, Average; *Mann Whitney U; FBT, Flamingo Balance Test; YBT, Y Balance Test; VJT, Vertical Jump Test; DVA, Dynamic Visual Acuity; Statistical significance limit $p<0.05$.

Table 2
Within and Between Group Differences for Outcome Measures

Outcome Measures	Group	Baseline Mean ± SD	Post-treatment Mean ± SD	Difference from post-treatment to baseline Mean ± SD	*P*-value within group	*P*-value between-group at post-treatment	E.S. (d)
FBT (n)	IG (n = 26)	3,61 ± 2,71	2.46 ± 2.40	-1.15 ± 1.08	**<0.001****	**0.007***	1.064
	CG (n = 26)	4.96 ± 4.19	5.00 ± 4.05	0.03 ± .60	0.739		0.064
YBT	IG (n = 26)	84.39 ± 9.00	85.16 ± 8.58	0.77 ± 3.74	0.125	0.191	0.205
Anterior (cm)	CG (n = 26)	82.50 ± 8.59	82.44 ± 8.80	-0.06 ± 1.05	0.567		0.058
YBT	IG (n = 26)	89.26 ± 9.88	91.36 ± 9.25	2.10 ± 3.50	**0.001****	0.993	0.645
Posteromedial (cm)	CG (n = 26)	90.62 ± 10.63	90.25 ± 10.65	-0.37 ± 1.40	0.198		0.256
YBT	IG (n = 26)	96.58 ± 11.04	96.45 ± 9.61	-0.13 ± 3.80	0.125	0.510	0.034
Posterolateral (cm)	CG (n = 26)	98.32 ± 8.66	98.26 ± 8.40	-0.05 ± 1.84	0.731		0.029

Table 2 (Continued)

Outcome Measures	Group	Baseline Mean ± SD	Post-treatment Mean ± SD	Difference from post-treatment to baseline Mean ± SD	*P*-value within group	*P*-value between-group at post-treatment	E.S. (d)
VJT (cm)	IG (n = 26)	34.00 ± 4.73	34.13 ± 4.52	0.14 ± 1.40	0.889	0.309	0.098
	CG (n = 26)	31.93 ± 3.88	32.65 ± 3.89	0.87 ± 0.65	0.420		1.338
DVA (%)	IG (n = 26)	81.46 ± 19,48	85.53 ± 16.38	4.07 ± 4.68	**<0.001****	**0.044***	0.869
	CG (n = 26)	83.61 ± 11.11	81.84 ± 11.50	-1,76 ± 2.38	**0.001****		0.739

Note. IG, Intervention Group; CG, Control Group; SD, Standard deviation; E.S., Effect Size; FBT, Flamingo Balance Test; YBT, Y Balance Test; VJT, Vertical Jump Test; DVA, Dynamic Visual Acuity; Statistical significance limit p<0.05; *p<0.05; **p<0.001.

DISCUSSION

This study demonstrated that using OMEs for four weeks can help elite volleyball players develop skills like balance and DVA, but no differences were found in VJT. It has been shown that DVA, as determined by the clinical visual acuity test, can be improved in healthy individuals and female basketball players after a 4-week OMEs intervention (Minoonejad et al., 2019; Morimoto et al., 2011). Many sports, such as volleyball, where players must constantly track the ball with their eyes and maintain ocular mobility, depend on vision competence (Piras et al., 2010). With OMEs for four weeks, DVA in female volleyball players improved in the current study. Our findings suggest that including OMEs in volleyball players' daily training may help them improve their visual skills.

The integration of somatosensory, visual and vestibular inputs achieves postural stability. Disruption of sensory integration can lead to balance problems and increase the likelihood of injury in athletes (Hammami et al., 2014). The vestibular system, part of sensory integration, helps maintain visual fixation on an object during head and body movements and works with the visual system to maintain postural balance (Dewan et al., 2023). Postural stability may not be maintained when there is decreased and incorrect information in one of the vestibular and visual systems (Abekawa et al., 2022). Studies have reported that vestibular rehabilitation components such as contrast sensitivity and dynamic visual acuity are determinants of postural sway (Lord & Menz, 2000).

The literature has reported that the visual system plays a fundamental role in various athletic activities and sport-specific balance skills for athletes (Hrysomallis, 2011; Hammami et al., 2014; Koide et al., 2019). In studies conducted with different athletes, it has been shown that visual skills are practical on both static and dynamic balance (Hammami et al., 2014; Koide et al., 2019). In our study, we assessed the dynamic balance of the participants with YBT and

the static balance with FBT, which are easy to apply and often used in many sports branches and volleyball players (Daneshjoo et al., 2012; Çınar-Medeni et al., 2016).

In previous studies, OMEs applied for four weeks improved postural stability in healthy young adults (Morimoto et al., 2011) and positively affected stability limits in female basketball players (Minoonejad et al., 2019). As an underlying mechanism, it has been reported that the OMEs can provide visual and vestibular stimulation and improve the function of the vestibular system and postural stability depending on the neural adaptation in the cerebellum (Minoonejad et al., 2019; Morimoto et al., 2011). To our knowledge, this is the first study that investigates the OMEs' effect on balance in volleyball players. Our findings indicate that OMEs can improve the static and dynamic balance skills of elite female volleyball players, as measured by FBT and YBT. The compatibility of the results of our study with previous studies suggested that it may be beneficial to include OMEs in training programs to improve balance skills, which is an important performance parameter in volleyball athletes.

Sports such as basketball, football, and volleyball require a multisensory integration, including exteroceptive, proprioceptive, and vestibular, due to time-dependent requirements during competition (Asslender & Robert, 2014). In sports, multisensory integration often contributes to strength development, helping to adjust the timing, direction, and magnitude of the ground reaction force applied across the lower extremity (Louder et al., 2019). To position the body in space for vertical jumping, landing, sprinting, and cutting performance action, multiple sensory integrations, including the visual system, must be activated (Louder et al., 2019). It was stated that the visual system is a crucial input channel for multi-sensory integration and that it can be strengthened through visual training to help with sensorimotor control of deep jump performance (Kroll et al., 2020; Zeinalzadeh et al., 2018).

Minoonejad et al. investigated the effect of OMEs training applied to female basketball players for four weeks only on postural stability (Minoonejad et al., 2019). It has been reported that explosive muscle strength is one of the determinants of performance in many individual and team sports (Marcovic, 2007). Researchers have frequently used the vertical jump as a valid and reliable test for assessing the explosive power of the athlete's lower limbs to determine their training performance and abilities (Marcovic, 2007). In our study, there was no improvement in the vertical jump height of female volleyball players with the 4-week OMEs we applied to female volleyball players. Professional baseball players' visual skills were related to their batting performance, and traditional vision training improved batting performance in college baseball players (Laby et al., 1996; Clark et al., 2012). Formenti et al. showed that the assessment of volleyball-specific skills and cognitive functions, including

visual tasks, are essential in distinguishing players from different levels of competition (Formenti et al., 2022). Kroll et al. found that female volleyball players' deep jump performance assessed with the force platform improved when they underwent stroboscopic vision training (Kroll et al., 2020). Zhou et al. demonstrated that although structured and non-sport-specific vision training improved cognitive performance, it did not impact volleyball players' sport-specific skills (Zhou et al., 2020). OMEs are not specific to volleyball, which may be why they did not enhance volleyball players' vertical jump abilities in our study. Future research should investigate the effects of volleyball-specific visual training on improving performance skills. Our study's limitations include the short training duration, lack of evaluation of long-term effects, lack of volleyball-specific visual exercises, and lack of technology-based assessment of balancing skills.

CONCLUSION

This study demonstrated that OMEs in volleyball players can enhance balance and DVA. Visual skill training can be included in volleyball players' daily routine training. Future studies must investigate the effects of sports-specific visual skill training on improving performance in volleyball players. There is a need for the use of testing methodologies consistent with the use of the field, in which volleyball-specific visual tracking is evaluated about field performance. We recommend that future researchers choose sports-specific tests, such as a drill for volleyball players to track the ball across a field.

Author contributions

The first author collected data, the first and second authors contributed to the study design. All authors analyzed the data, revised the manuscript and contributed to the interpretation of the results. The second author contributed to validation of the methodology of this study, the supervision and critical reviewing of the original draft. All authors have read and approved the final version of the manuscript.

Declaration of conflict interest

No potential conflict of interest was reported by the authors.

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Pamukkale J Sport Sci, 14(2), 206-219, 2023 Research Article

Effects of Game-Based Training Approach on Physical Abilities in Male Youth Volleyball Players

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ABSTRACT

The study aimed to determine the effects of a game-based training approach on the physical abilities of male youth volleyball players. A two-way mixed design was used. Forty young male volleyball players (age: 15.49±1.36 years old; height: 175.50±0.02 cm; weight: 65.50±1.32 kg; experience: 3.39±1.27 years old) participated in this study. Participants were randomly assigned into two equal study groups, a Traditional Training Group (TTG; n = 20) and a Game-based Training Group (GTG; n = 20). TTG uses a traditional training program in which coaches coach athletes, give individual feedback, and perform technique-focused workouts. GTG follows a 12-week simple volleyball game-based training program. Before and after 12 weeks of training, both groups measured their agility, endurance, power, and speed. A two-way mixed design (2 × 2) ANOVA was used to compare the differences between subjects and repeated measure variables. All coefficients are considered significant at $p \leq .05$. As a result, significant differences were found within-subject and between groups in male youth volleyball players' physical abilities. In conclusion, the 12-week game-based training approach effectively improved the physical performances of male youth volleyball players. To support this notion, an additional study is necessary.

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INTRODUCTION

Athletes worldwide constantly strive for excellence in their respective sports (Durand-Bush & Salmela, 2002). Therefore, coach-led standardized training facilitates and enhances the development of athletes capable of meeting the demands of the competitive environment (Hodges & Franks, 2002). However, sport is a global phenomenon developed through an impact on the moral culture of societies performed for competition, recreation, self-enjoyment, skill development, and improvement of the lives of socially vulnerable people (Super et al., 2014). Furthermore, sport is a highly structured human activity, emphasizing physical exertion, skill development, and social interaction (Bilohur & Andriukaitiene, 2020).

Volleyball is a popular sport involving short, focused, and repetitive movements (Gabbett et al., 2007). However, physical ability with a unique combination of technical, tactical, and psychological attributes is a factor in success as a volleyball player (Gabbett, 2008). Furthermore, volleyball players are more likely to succeed if they have strong upper- and lower-body muscles and good hamstring flexibility (Hedrick, 2008). Players perform short bursts of high-intensity activity followed by low-intensity exercises such as jumping, diving, and lateral movements (Purkhús et al., 2016).

Around the world, different training methods are used depending on the country, the coach, and the situation. Young athletes often have difficulty maintaining traditional exercise routines due to a lack of enjoyment and experience with this type of exercise (Wall & Côté, 2007). In addition, conventional coaching methods are focused on developing technical skills and do not accurately reflect real-world gameplay (Ford et al., 2010). This approach is treated as necessary for players to improve their sporting skills and tactical knowledge (Serra-Olivares et al., 2015). However, advances in coaching, especially team coaching, have brought rewards and enjoyment to teams and athletes (Harrison et al., 2015).

Recently, game-based training approaches have been proposed to contextualize learning through games and game-like interactive activities for successful team sports (Light, 2004). Those using game-based training have been shown to improve physical performance in athletes (Hall & Smith, 2006). Performance is thought to be higher when exercise stimulation is matched to the metabolic and technical demands of the actual game (Gabbett, 2008). Additionally, game-based training helps volleyball players make decisions and improve their physiological needs (Gabbett et al., 2008).

Game-based training is often viewed as an ideal environment for players to develop physical prowess, skills, team building, and playing style (Pritchard et al., 2008). A previous

study has shown that game-based training activities are reflected in higher trait homogeneity among elite athletes (Sheppard et al., 2009). The rationale for the game-based approach is therefore based on the assumption that game tasks are not only technical skill applications but also problem-solving grounds (Rosa et al., 2010). Recently, game-based training approaches have been developed that combine skill and conditioning elements cooperatively (Broek et al., 2011). Moreover, previous studies have shown that game-based training can improve physical performance, technical skills, and tactical awareness in sports teams (Trajković et al., 2012).

Moreover, game-based coaching methods require a switch from coach facilitator to facilitate opportunities for player interaction and reflection (Cushion, 2013). As a result, game-based coaching has recently received attention as a new way to improve an athlete's physical performance (Harvey & Jarrett, 2014). According to various kinds of literature on traditional and game-based volleyball-specific training, we hypothesized that a 12-week game-based training program significantly affected agility, endurance, power, and speed. Therefore, this study aimed to determine the impact of a game-based training approach on the physical performance of young male volleyball players.

METHODS

Research Design

A two-way mixed design (2 × 2) was used to compare the differences between data sets that included intersubject and repeat measure variables. It is considered a parametric test and is only suitable for parametric data. Thus, a researcher not only looks at potential differences between two or more separate groups of participants but also evaluates changes individual members of each group over time.

Study Group

Forty male youth volleyball players (age 15.49±1.36 years; height 175.50±.02 cm; weight 65.50±1.32 kg; playing experience 3.39±1.27 years) participated in this study (Table 1). Study participation was voluntary. All participants were selected from the two project volleyball players in Awi zone, Amhara region, Ethiopia. Participants were randomly formed into two equal study groups, a Traditional Training Group (TTG; n = 20) and a Game-based Training Group (GTG; n = 20). Randomization ensures groups are the same age, playing experience, and performance (Merton et al., 2003).

The study included male youth volleyball players aged 15–17 years and those who trained for five consecutive years from 2018–2022. Athletes who had no musculoskeletal injury

for ≥ 6 months and participated in > 95% of training sessions were included. Also, players under the age of 15 were excluded. All participants were informed about the possible risks and benefits of the study. Since the participants are under 18, written consent forms were obtained from the athlete's parents or legal guardians at the beginning of the study. The ethical principles of the Helsinki Declaration conducted the study. In line with this, the study was approved by the local institutional review board or the research ethics review committee of the sports academy of Bahir Dar University (Protocol No. SAD-1148/22).

Table 1
Demographic Characteristics of the Subjects

Variables	TTG (n = 20) Mean±SD	GTG (n = 20) Mean±SD
Age (Years)	15.46±1.29	15.52±1.42
Height (Cm)	175±0.01	176±0.03
Weight (Kg)	65.00±1.30	66.00±1.34
Experience (Years)	3.23±1.24	3.54±1.29

Abbreviations: Cm = centimeter, GTG = game-based training group, Kg = kilogram, n = number of subjects, SD = standard deviation, TTG = traditional training group.

Training Program

In this study, a 12-week game-based and traditional training program was administered by qualified volleyball coaches during preseason (2022-23) in Table 2. All participants completed 120-minute exercise programs three times a week. The training goal was to incorporate volleyball drills and skills while increasing the intensity of sport-specific training. To this end, a game-based training approach was chosen based on previous experience and pilot studies proposed by previous authors (Gabbett, 2008). The TTG used traditional training methods in which coaches coached athletes, provided individualized feedback, and performed technique-oriented drills while the GTG played a simple volleyball game. Both groups emphasized a didactic approach to age-appropriate exercise, with differences in training content, method, and format (Hakman et al., 2017).

The TTG (n = 20) practiced a 20-minute adequate warm-up (10-minute walk and jog, arm circles, high reaches, toe touches, side bends, hand claps, knee raises, hip swirls, 5-minute static and dynamic stretching, 5-minute accelerated running, shaping, and balance exercises (each exercise had ten repetitions). The main training session was 80 minutes of technical skill and tactical development of volleyball elements (each exercise repeated ten times).

Under the guidance of a coach, players practice running, shaping activities with and without the ball, drills performed individually, focusing on skill improvement, and learning volleyball techniques by working in pairs against a wall or partner in a closed or non-

competitive atmosphere. All skills were taught in block practice before proceeding to the next skill (Gabbett, 2008). Lastly, a cool down with a 20-minute walk, side stretch, toes touch, butterfly stretch, quad stretch, and calf stretch (each exercise had ten repetitions).

The GTG (n = 20) practiced a 20-minute adequate warm-up (10-minute walk and jog, arm circles, high reaches, toe touches, side bends, hand claps, knee raises, hip swirls, 5-minute static and dynamic stretching, 5-minute accelerated running, shaping, and balance exercises (each exercise had ten repetitions). The main training session was 80 minutes of volleyball drills with ball practice and game use (each exercise had ten repetitions). It consists of 10-minute small group single-element drills such as serves, passes, and sets for low-intensity activities and 10-minute combination drills such as blocks, spikes, and digging for high-intensity. In addition, it involves 30-minute small field games (2 vs. 2, 3 vs. 3, and 4 vs. 4) where the volleyball field is divided into two smaller courts (9 x 4.5 m) with 5-minute breaks. This is a modified version due to a high-intensity match (60-80%) and 30-minute volleyball competitive matches (6 vs. 6). When a team reaches 15 points, the players rotate and take a 2-minute break after each rotation. Lastly, a cool down with a 20-minute walk, side stretch, toes touch, butterfly stretch, quad stretch, and calf stretch (each exercise had ten repetitions).

Table 2
Twelve-Week Game-Based Training Program during the 2022-2023 Seasons

Goal: 12-Weeks Game-Based Training Program (March-May)						
Days: (Monday, Wednesday, and Friday)						
Exercises	**Groups**		**Rules**			
	TTG (n = 20)	**GTG (n = 20)**	**F**	**I**	**T**	**R**
Warm-up	General: walking, jogging, running, and stretching. Specific: drills with ball.	General: walking, jogging, running, and stretching. Specific: drills with ball.	10x	Low	20′	2′
Main-part	Traditional training Drills against a wall. Drills with a partner. Drills without competition. Skills taught in a block.	Game-based training Competition drill (6 vs. 6). Small-sided game drill (2 vs. 2, 3 vs. 3, 4 vs. 4) Technique drills.	10x	High	80′	5′
Cool-down	Walking, slow jogging, and stretching the muscle groups.	Walking, slow jogging, and stretching the muscle groups.	10x	Low	20′	No

Abbreviations: F = frequency, GTG = game-based training group, I = intensity, n = number of subjects, R = rest, T = time, TTG = traditional training group.

Data Collection Tools

Standard fitness tests such as agility (T-test), endurance (30-second jump test), power (vertical jump), and speed (30-meter sprint test) were chosen for this study. Researchers spoke

to five volleyball and fitness experts to get information about the specificity and applicability of each test. Each test was fine-tuned to ensure relevant, informative, controllable, and accessible data collection (Currell & Jeukendrup, 2008).

Agility Test

Volleyball players need to accelerate, decelerate, and change position quickly. Subject agility was assessed using the T-test (Hoffman, 2006). The T-test was set to an inverted T with four cones (4.57 and 9.14 meters) apart. A volleyball player should always keep their body forward and direct them to run as fast as to touch each cone with their hand. The player's agility performance was measured within 0.01 seconds. The fastest value in two trials measures a player's agility performance.

Endurance Test

The 30-second jump test assesses endurance. The player jumps with both feet, lands with both feet, then jumps back to overcome the obstacle. The first movement triggers sync. Depending on the level of competition, a volleyball match can last up to 90 minutes. Players require sufficient endurance to recover from strenuous activity (Viitasalo, 1987). Endurance is assessed by the player's total number of successful jumps in 30 seconds and the best time of two successful jumps.

Power Test

Volleyball players require high levels of muscle power to perform spike, block, and jump tasks commonly performed during the game. Muscle power was therefore estimated using the metric bar measured with an accuracy of 1 cm (Osborne, 2002). It was calculated as the distance between the highest points reached while standing and the highest point reached during the vertical jump. Players were asked to stand on the ground and extend their hands to mark the standing height. After squatting, each subject was instructed to jump up and touch the highest point on the scale. The highest score of the two trials determined the player's power performance.

Speed Test

Volleyball players require the ability to move quickly to position themselves to receive a pass, block, or shot from an opponent. The running speed of players was evaluated with a 30-meter sprint effort. This speed test requires the participant to sprint as fast as 30 meters. The correct sprint test version was explained and demonstrated to all participants (Castro-Piñero et al., 2010). Players were instructed to run as quickly as possible along the 30-meter distance from a standing start. To measure the exact time of participants, a mechanical

stopwatch with an accuracy of ± 1.0 seconds per 30 minutes was used. An accurate 30-meter run time with the fastest value obtained from two trials was measured for the analysis.

Data Collection Procedure

The researcher provided brief information about the data collection for the participants before each test. All participants performed a special warm-up guided by a volleyball coach, which consisted of walking and jogging. Each participant was measured for agility, endurance, power, and speed performances before and after 12 weeks of game-based volleyball training. To guarantee the consistency of the test, measurements were taken in the morning from the same participants under the same environmental circumstances with the same researchers. All participants were given trials before testing to familiarize themselves with the test protocol. Verbal encouragement was used throughout all tests to achieve maximum effort.

Data Analysis

Descriptive statistics such as mean and standard deviation (SD) were used in data analysis. The normality of the distribution was tested using the Shapiro-Wilk test. The homogeneity of variance was verified with Levene's test. Training effects were analyzed using a two-way (2 groups x 2 times) mixed ANOVA. The effect size (ES) was calculated using Cohen's (d) within each group and tested as follows: <0.2 = trivial; 0.2–0.6 = small; 0.6–1.2 = moderate; 1.2–2.0 = large; >2.0 = very large; and >4.0 = extremely large (Hopkins et al., 2009). Data analysis was performed with IBM SPSS (Statistical Package for Social Science) Statistics Version 26 for Windows in Armonk, New York, USA. All coefficients were considered significant at $p \leq .05$.

RESULTS

Table 3 presents descriptive statistics and Mixed ANOVA results for agility, endurance, power, and speed variables in GTG and TTG.

Table 3
Descriptive Statistics and the Mixed ANOVA Results

Variables	G	n	PT Mean±SD	POT Mean±SD	MD	ES (d)	Time, Group, and Interaction Effects
Agility	TTG	20	10.75±0.02	10.73±0.02	0.02	1.00	T: (F = 282.83, P = .00, η^2p = .88)
	GTG	20	10.74±0.02	10.33±0.02	0.41	20.50	G: (F = 24.59, P = .00, η^2p = .39)
	Total	40	10.745±0.04	10.53±0.04	0.22	10.75	I: (F = 18.28, P = .00, η^2p = .33)
Endurance	TTG	20	48.00±2.18	46.00±2.18	2.00	0.92	T: (F = 2.23, P = .05, η^2p = .14)
	GTG	20	47.00±2.18	50.00±1.49	3.00	1.61	G: (F = 5.74, P = .02, η^2p = .13)
	Total	40	47.50±4.36	48.00±3.67	0.50	0.12	I: (F = 4.37, P = .04, η^2p = .10)

Table 3 (Continued)

Variables	G	n	PT Mean±SD	POT Mean±SD	MD	ES (d)	Time, Group, and Interaction Effects
Power	TTG	20	48.00±2.18	46.00±2.18	2.00	0.92	T: (F = 4.32, P = .05, η^2p = .10)
	GTG	20	47.00±2.18	52.00±1.49	5.00	2.68	G: (F = 14.25, P = .001, η^2p = .27)
	Total	40	47.50±4.36	49.00±3.67	1.50	0.37	I: (F = 10.31, P = .003, η^2p = .21)
Speed	TTG	20	4.52±0.02	4.50±0.02	0.02	1.00	T: (F = .14, P = .004, η^2p = .72)
	GTG	20	4.50±0.02	4.42±0.02	0.08	4.00	G: (F = .37, P = .01, η^2p = .55)
	Total	40	4.51±0.04	4.46±0.04	0.05	1.25	I: (F = 1.30, P = .03, η^2p = .26)

Abbreviations: *ES (d) = Effect size, F = F test-statistic, G = Group, GTG = game-based training group, I = Interaction, MD = Mean difference, n = number of subjects, P = P test-statistic, POT = Post-test, PT = Pre-test, SD = Standard Deviation, T = Time, TTG = traditional training group, η2p = Partial eta squared. *p ≤ .05.*

As shown in Table 3, the mean agility was lesser for TTG (MD = 0.02, ES (d) = 1.00) than for GTG (MD = 0.41, ES (d) = 20.50). There was a statistically significant difference among subjects concerning agility (F = 282.83, p < .001, partial η2 = .88). There was also a statistically significant difference between groups on agility performance (F = 24.59, p < .001, partial η2 = .39). Moreover, there was a significant interaction effect between game-based training and agility (F = 18.28, p < .001, partial η2 = .33).

As shown in Table 3, the mean endurance was lesser for TTG (MD = 2.00, ES (d) = 0.92) than for GTG (MD = 3.00, ES (d) = 1.61). There was a statistically significant difference among subjects concerning endurance (F = 2.23, p = .05, partial η2 = .14). There was also a statistically significant difference between groups on endurance (F = 5.74, p = .02, partial η2 = .13). Moreover, there was a significant interaction effect between game-based training and endurance (F = 4.37, p = .04, partial η2 = .10).

As shown in Table 3, the mean power was lesser for TTG (MD = 2.00, ES (d) = 0.92) than for GTG (MD = 5.00, ES (d) = 2.68). There was a statistically significant difference within subjects concerning power (F = 4.32, p = .05, partial η2 = .10). There was also a statistically significant difference between-group on power (F = 14.25, p = .001, partial η2 = .27). Moreover, there was a significant interaction effect between game-based training and power performance (F = 10.31, p = .003, partial η2 = .21).

As shown in Table 3, the mean speed was lesser for TTG (MD = .02, ES (d) = 1.00) than for GTG (MD = .08, ES (d) = 4.00). There was a statistically significant difference among subjects concerning speed (F = .14, p = .004, partial η2 = .72). There was also a statistically significant difference between-group on speed (F = .37, p = .01, partial η2 = .55). Moreover, there was a significant interaction effect between game-based training and speed (F = 1.30, p = .03, partial η2 = .26).

DISCUSSION

This study examined how a 12-week game-focused coaching program affects the physical performance of young male volleyball players. Gabbett and Georgieff (2006) explore the feasibility of a game-based approach to training the physical performance of young male volleyball players. Additionally, Gabbett (2008) concluded that game-based coaching improves game skills and agility in volleyball players. In addition, Purkhus et al. (2016) and Idrizovic et al. (2018) concluded that an effective game-based coaching program can improve the overall range of motion, lateral movement, and speed.

Game-based coaching programs have been particularly effective in altering various intermittent endurance markers because of the large-scale game. As a result, Buchheit et al. (2008) confirmed that the game-based coaching strategy was created to enhance volleyball players' endurance capabilities. Most importantly, players can benefit from this fun and engaging coaching method for understanding the volleyball game (Billaut et al., 2012). Coaches who utilized game-based training had higher physical capabilities and excellent heart rate measures than traditional skill practice (Miller et al., 2016; Nathan, 2017).

In support of the study, a game-based coaching approach is enhances power performances, increased efficiency and stability in game situations (Hill-Haas et al., 2007). Therefore, game-based training improves physical fitness, technical ability, and overall quality improvement in volleyball players (Gabbett et al., 2009). However, volleyball players require considerable leg power to perform hundreds of jumps to perform spikes and blocks during games and competitions (Sheppard et al., 2009).

Moreover, game-based coaching strategies appear to be an effective way to improve athletic performance in volleyball players (Trajković et al., 2012). However, increasing vertical jump success in volleyball matches requires explosive leg power (Martinez, 2017). As a result, game-based coaching methods are more physically demanding and may lead to performance adjustments (Kinnerk et al., 2018). Furthermore, Trajković et al. (2020) discovered that two months of volleyball practice reduced some risk factors and enhanced power.

Speed performance was significantly enhanced by the game-based coaching approach (Hill-Haas et al., 2007). In support of this, Gabbett (2008) concluded that a game-based coaching approach improves the playing abilities of young volleyball players. Furthermore, game-based training strategies have significantly impacted speed performance in volleyball players (Rodriguez-Ruiz et al., 2011; Chaouachi et al., 2014). Overall, volleyball players showed sufficient improvement in physical abilities during game-based coaching approaches

(Harvey & Jarrett, 2014). However, game-based training promotes a productive and meaningful training environment (Batez et al., 2021). Moreover, exposing athletes to an environment that resembles the tactical situations encounter in-game activities prepares them for competition (Ramos et al., 2021).

Limitations

The lack of a literature review on game-based training programs in youth male volleyball players makes it challenging to compare our findings with those of other studies. Results were also influenced by each participant's intelligence level, lifestyle, and dietary habits. However, similar tests and scoring systems are applied during research and development.

CONCLUSION

Based on the results of this study, we can conclude that game-based training appears to be an effective way to improve the physical abilities of young male volleyball players. There was a significant change in agility, endurance, power, and speed ability after 12 weeks of the game-based coaching program. Many coaches do not use the method described in this article because they fear not enough stimulation that game-based coaching can have in volleyball. However, more research is needed to determine whether physical ability improvement can be achieved after a similar training period.

PRACTICAL IMPLICATIONS

The researchers hope results will facilitate the assessment of athletes' physical performance by coaches, instructors, and other volleyball professionals. In addition, players who participated in game-based coaching methods also improved their overall game skills. Because this is promising research, sports scientists are encouraged to conduct research applying game-based training techniques to other sports.

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Authors' contributions

All authors contributed to this study together. The first author contributed to the conceptualization, methodology, design of the study, data collection, and writing process. The second (middle) author contributed to the validation of the methodology with review and editing of the original draft. The third (last) author contributed to this study by supervising

the overall work, critical reviewing of the original draft, as well as the approval of the final draft.

Declaration of conflict interest

No potential conflict of interest was reported by the author(s).

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Pamukkale J Sport Sci, 14(2), 220-233, 2023 Research Article

Amplification of Upper Extremity Power, Balance and Shoulder Stability in Soccer Goalkeepers With FIFA 11+ Shoulder Injury Prevention Programme

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ABSTRACT

To enhance players' performance and prevent injuries, warm-up exercises are often employed in soccer. The study's objective was to determine how the upper extremity strength, balance, and shoulder stability of soccer goalkeepers are impacted by replacing traditional warm-up routines with FIFA 11+ Shoulder Injury Prevention programme. In this quasi-experimental study, 36 soccer goalkeepers from Delhi NCR region were recruited based on inclusion criteria. 18 subjects (age: 18.94 ±3.08; BMI: 20.39 ± 2.29) belonging to the control group continued their customary warm up routine and the other 18 subjects (age: 19.39 ± 1.94; BMI: 20.10 ± 2.03) of the experimental group underwent FIFA 11 + Shoulder Injury Prevention Program for a duration of 8 weeks with a frequency of 3 times per week. IBM SPSS Statistics 26 was used to analyse the data. The baseline data for both the groups was found similar ($p>0.05$) at the beginning of the study. Both groups reported a statistically significant ($p<0.05$) increase in upper extremity power, balance, and shoulder stability post 8 weeks. Large effect sizes were obtained when post-intervention values of all parameters were compared between the 2 groups (Cohen's $d>1$). Also, the experimental group significantly outperformed the control group. It is concluded that, when compared to the conventional warm-up routine, the FIFA 11+ Shoulder Injury Prevention Programme is more effective at improving upper extremity performance, dynamic balance, and dynamic stability in male soccer goalkeepers over an 8-week period. This study also suggests that soccer goalkeepers should incorporate this into their normal warm-up routines.

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INTRODUCTION

With 200 million players globally, soccer is currently one of the most popular sports. Soccer can be considered as a high-intensity, intermittent, non-constant activity. It's a challenging sport with many manoeuvres like tackles, leaps, changes in direction, and speed, which put a lot of stress on the neuromuscular systems (Al Attar et al., 2021). Although participating in sports has many health benefits, playing a physically demanding sport like soccer is always associated with a risk of injury. However, studies aimed at promoting football participation have frequently prioritised talent and tactics than physical traits like stamina and speed (Ejnisman et al., 2016). In professional football, injury prevention is essential because of the consequences of lost performance, financial losses, and players' long-term health (Swart & Olivier, 2021). The measurement of static flexibility, dynamic flexibility, physical fitness, joint mobility, balance, proprioception, muscular endurance, and peak strength are the "five" most popular injury risk screening tests performed by national soccer teams (McCall et al., 2015).

Football goalkeepers are frequently forgotten when determining certain essential performance requirements.1–3 The most important performance requirements for goalkeepers must be determined on their own merit rather than in comparison to other players or positions in order to build better training plans that more closely represent their needs (West, 2018). Both in men's and women's football, goalkeepers appear to have longer careers, and Martínez-Lagunas et al. hypothesise this may be because of the less demanding position they play during a game (Martínez-Lagunas et al., 2014). At both an elite and non-elite level, goalkeepers do perform mostly critical and high-intensity tasks. Where these exercises are successful, they have the power to alter the course of a match by reviving and reawakening a team's competitive spirit (Sainz De Baranda et al., 2008). Goalkeeper assessments should take into account the fundamental abilities needed to produce different saves, as well as the ability to recognise changing game dynamics and react appropriately (Shamardin & Khorkavyy,2015).

Goalkeepers are distinguished by their ability to stop, reach, and throw the ball with their hands while landing on the ground with their upper extremities extended. It follows that they are more likely than field players to sustain injuries to their upper extremities. In fact, a previous study found that goalkeepers were five times more likely to sustain upper extremity injuries than field players were, and that their injuries also had more severe outcomes. As a result of upper extremity injuries, which accounted for 18% of custodian injuries, keepers were forced to take more days off from play or missed more games and practises than field players (Al Attar et al., 2021).

As a result of upper extremity injuries, which accounted for 18% of custodian injuries, keepers were forced to take more days off from play or missed more games and practises than field players (Ekstrand et al., 2013). One of the most frequent sports-related overuse injuries, particularly among overhead athletes, is disabled throwing shoulder (DTS). According to a prior study, 32% of young baseball pitchers were found to have DTS. The most prevalent diseases and overuse injuries associated with DTS, which mostly impact the joints, tendons, muscles, and ligaments, are well documented. Throwers who sustain injuries report shoulder and elbow pain, discomfort, and weariness, which could impair their ability to throw. Scapular dyskinesis, rotator cuff weakness, glenohumeral range of motion deficit, loss of glenohumeral internal rotation, and other risk factors for DTS have all been documented (Nagamoto et al., 2022).

In order to improve their performance and avoid injuries, football players frequently practice warm-up exercises. Warming up before exercise has been well studied and is widely believed to improve performance (McCall et al., 2015). Warm-ups are thought to improve athletic performance by increasing neuronal excitability, breaking down a viscous barrier to muscular movement, and stimulating blood flow to muscles. Injury prevention programme FIFA 11+ Shoulder (FIFA 11+S) aims to reduce upper extremity injuries using similar methods (Andrade et al., 2015).

To significantly decrease the total injury rate among soccer players, FIFA 11+ was developed as an injury prevention programme (Al Attar et al., 2021). The FIFA 11+S programme uses workouts that encourage eccentric rotator strength, neuro-muscular control, core stability, and agility to reduce upper extremity injuries in football goalkeepers (Al Attar et al., 2021). The FIFA 11+ shoulder programme is divided into three parts: part I has basic warm-up exercises, part II contains workouts to strengthen the finger muscles, wrist, elbow and shoulder, elbow, wrist, III contains more advanced warm-up and muscle control drills (part III). Prior to training, it takes 20 to 25 minutes to finish the FIFA 11+S. The goal of each exercise is to improve balance, eccentric rotator strength, neuromuscular control, and agility (Ejnisman et al., 2016).

Literature exists regarding FIFA 11+ Shoulder Injury Prevention Program's efficacy in reducing upper limb injuries in soccer goalkeepers; its effect on soccer goalkeepers' athletic performance has not been studied yet. Also, globally the awareness level of the FIFA 11+S program among goalkeepers and coaches is poor (Al Attar et al., 2022). The goal of this study is to ascertain how goalkeeper performance is impacted by the FIFA 11 + Shoulder Injury Prevention Curriculum.

METHODS

Study Design

This study is a quasi-experimental study (pre-post design). The Clinical Trial Registry-India number for this study was obtained prospectively (CTRI/2022/07/044134). The Institutional Ethics Committee, Indian Spinal Injuries Centre granted the ethical approval for this study prospectively (Reference No: ISIC/RP/2022/018, Date: 2/03/2022). Informed consent was obtained from all the participants before the study. The study was carried out in accordance with the Helsinki Declaration (2013) and the National Ethical Guidelines for Biomedical & Health Research Involving Human Participants published by Indian Council of Medical Research in 2017.

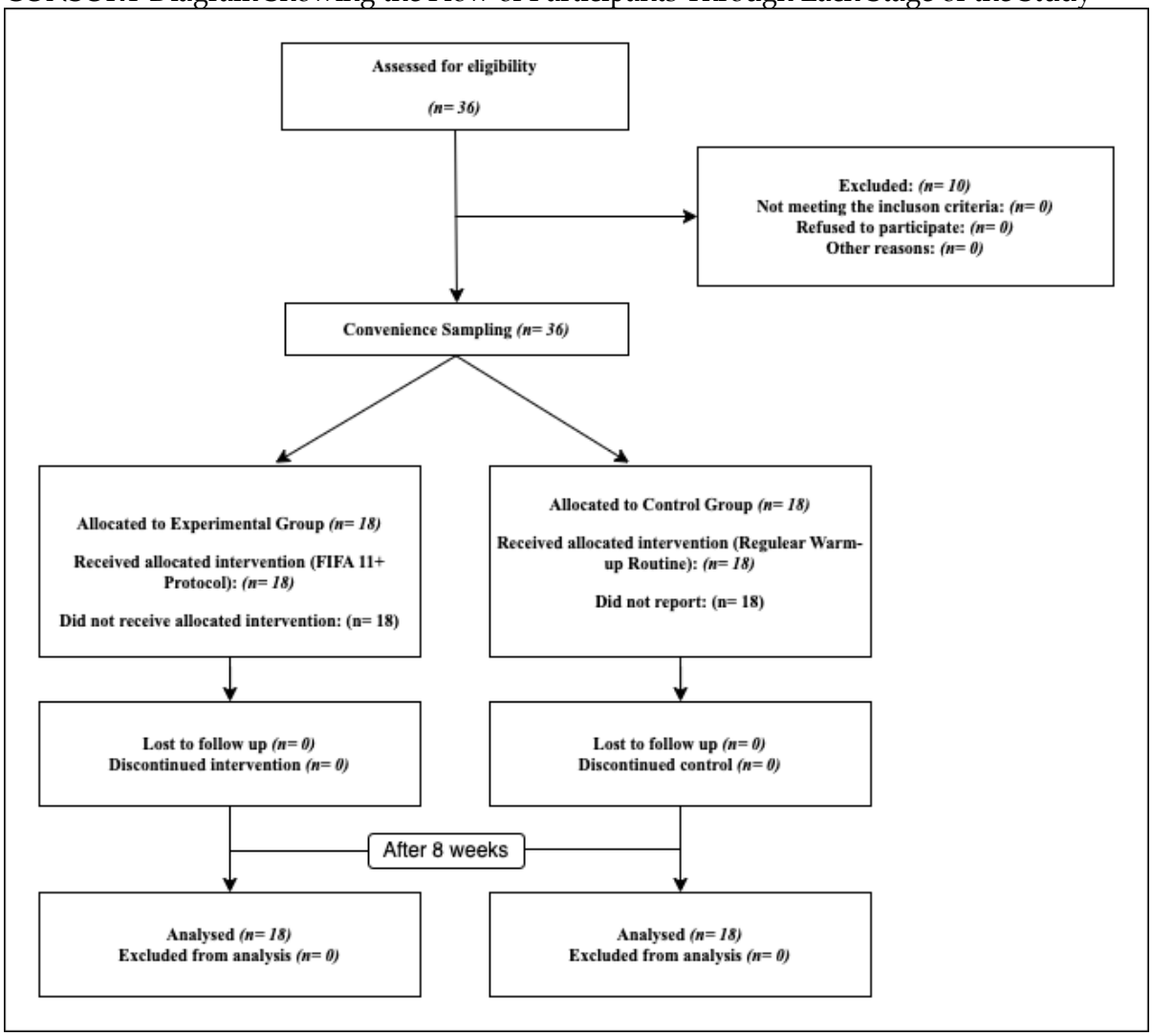
Study Group

36 soccer goalkeepers were recruited from Baichung Bhutia Football Club, Thyagraj Stadium, Village Soccer Academy, Hindustan Football Club, and Delhi Football Club, Delhi for March, 2022- May, 2022 on the basis of the inclusion and exclusion criteria in the study's pre-post experimental design. Criteria for inclusion: Age group is 18 to 35 years old, previous football experience must be at least three years old, and weekly exercise should average at least three training sessions, including games (Al Attar et al., 2021; Andrade et al., 2015; Ejnisman et al., 2016). Athletes who had any major shoulder surgery or an upper extremity bone fracture in the previous year should not participate in any other rehabilitation or injury prevention programmes. Exclusion criteria consisted of any medical history of injury in the upper limb that required medical attention in the last six months. The study protocol flowchart is shown in Figure 1. The goalkeepers were conveniently divided into two groups- the experimental and the control group.

Data Collection Tools

Before every training session, participants assigned to the control group (Group 1, n = 18) were asked to keep up their customary warm-up practice. Training involved 25 minutes of technical and tactical exercises, increasing mobility, activation, and stability exercises, and cardiovascular exercises with or without football. The experimental group participants were told to stop their usual warm-up exercises and start FIFA 11+ Shoulder Injury Prevention Programme (Table 1) which took 20 to 25 minutes to complete. These exercises were introduced to the football goalkeeper's training regimen and were done three times a week for eight weeks.

Figure 1
CONSORT Diagram Showing the Flow of Participants Through Each Stage of the Study



Exercises from Part I, which included running at a moderate pace for 5 minutes, throwing the ball with a partner in the chest line, and hand spinning movements, were performed as a general warm-up. The duration of this session was 7 minutes. To increase strength and local muscle endurance, Part II exercises should be done for nine to ten minutes with high repetitions (three sets of 15-20 repetitions) and moderate resistance (light tubing strength or 2-3 kg). These exercises include push-ups, biceps curls, wrist curls, external/internal rotation of the shoulders in the scapular plane, etc. Workout modifications should be made based on the athlete's tolerance.

In part III, performance of five or six sets of 15-20 repetitions in a time limit of no more than nine to ten minutes was scheduled. The purpose of these exercises is to improve local muscular endurance. This section consists of jumping and tossing the ball over the head, tossing

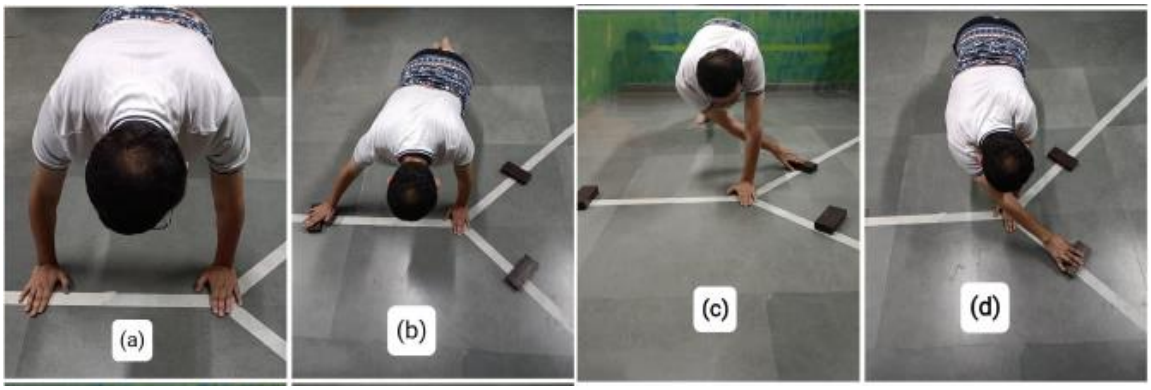
the ball with an arm over the head, walking on hands, jumping with your hands on the mini trampoline, external rotation plyometric with flexed elbow at 90°, and external rotation plyometric with flexed and abducted arm at 90°.

Table 1
Protocol of FIFA 11+ Shoulder Injury Prevention Program (Al Attar et al., 2021)

EXERCISES	DURATION
PART 1: Warm-up exercises 1. Run relaxed walking or running. 2. Throw the ball in the chest line 3. Spinning movements with the hands.	7 mins
PART 2: Strength and Balance of The Shoulder, Elbow, Wrist, And Finger Muscles 4. External rotation 5. Internal rotation 6. Scaption 7. Push-up-plus 8. Inferior and mid trapezius 9. Biceps 10. Wrist flexors 11. Wrist extensors 12. Finger flexors 13. Finger extensors	9-10 mins 3 sets of 15 reps
PART 3: Core Stability and Muscle Control with Advanced Exercises 14. Jump and throw the ball over the head 15. Throw the ball over the head with an arm 16. Throw the ball to the sides 17. Jump with your hands on the mini-trampoline 18. Walking on hands 19. Plyometric external rotation	9-10 mins 5-6 sets of 15-20 repetition

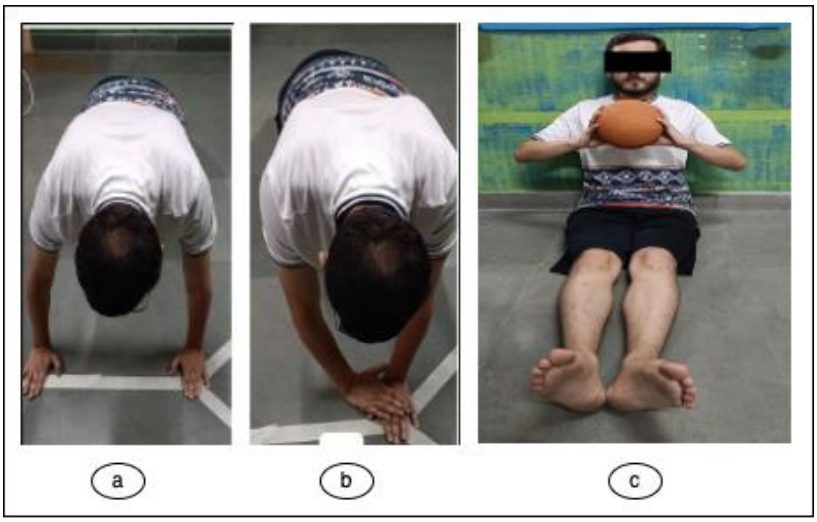
Three outcomes were measured prior to beginning of the training and post completion of the intervention at eight weeks. The dynamic stability of the shoulder was evaluated using the modified Upper Quarter Y Balance Test (Figure 2). The Seated Medicine Ball Throw (Figures 3a & 3b), a functional screening test that uses an open kinetic chain was used to measure bilateral upper body power and strength. Closed Kinetic Chain Upper Extremity Stability Test was also utilized to measure bilateral upper body power along with strength (Figure 3c).

Figure 2
Modified Upper Quarter Y-Balance Test- Direction of Reach is Named Relative to Stationary Upper Extremity



Note. a- starting position, b- medial reach direction, c- inferolateral reach direction, d- superolateral reach direction

Figure 3
(a) CKUEST Starting Position, (b) CKUEST End Position (c) Seated Medicine Ball Throw Measurement



Data Analysis

IBM SPSS Statistics 26 was used to analyse the data. The Shapiro-Wilk test was used to verify that the baseline data in both groups were normal. An independent t-test was used to evaluate the baseline measurements of both groups to see whether they are comparable. Following the intervention, changes in the criterion measures were compared within the group using paired t test and between groups using independent t-test. The significance threshold was set at $p< 0.05$. Effect sizes were calculated using *cohen's d.*

RESULTS

The descriptive data of the study's subjects are shown in Table 2. The data for both the control and the experimental group was found to be normally distributed using the Shapiro

Wilk test. The pre- intervention data of the control and the experimental group was similar at baseline ($p>0.05$). Data analysis among the groups in the current study showed that for both the control and the experimental groups, there occurred a significant improvement in dynamic balance ($p<0.05$), which was substantially stronger in the dominant leg than in the non-dominant extremity (Table 3 and 4). According to data analysis of power within the group, both groups' upper extremity power improved statistically significantly ($p<0.05$).

The closed kinetic chain upper extremity stability test (CKCUEST) showed significant improvement in the data analysis of dynamic stability of the upper limb within the groups ($p<0.05$), which is significantly greater in the dominant limb than contralateral limb for both groups. Additionally, when mean differences (Post-Pre values) were compared between the experimental and control groups, between group analysis showed a significant difference in the closed kinetic chain upper extremity stability test (CKCUEST) ($p<0.05$), dynamic balance ($p<0.05$), and power ($p<0.05$) in the upper extremity.

Table 2
Anthropometric Data of Soccer Players (Goalkeepers)

Parameters	Experimental Group (n=18)	Control Group (n=18)
AGE (in years)	19.39 ± 1.94	18.94 ±3.08
HEIGHT (in centimeters)	175.94 ±5.90	174.39 ± 5.71
WEIGHT (in kilograms)	62.39 ± 8.23	62.11 ± 8.73
BMI (kilograms/meter^2)	20.10 ± 2.03	20.39 ± 2.29
Training Years	4.56 ± 1.63	4.78 ± 1.63
Training Volume (hours/week)	16.28± 1.18	16.11 ± 1.97

Table 3
Comparison of Parameters within the Control Group

Outcome Measures	PRE		POST		t	p value
	MEAN	SD	MEAN	SD		
CKUEST (R)	24.52	2.08	28.41	2.12	17.75	**<0.01***
CKUEST (L)	23.94	2.39	27.55	2.20	10.84	**<0.01***
SMBT (cm)	526.89	46.60	558.44	59.25	5.51	**<0.01***
Y-M (R) (cm)	91.19	9.38	101.50	9.07	14.16	**<0.01***
Y-M (L) (cm)	89.20	9.84	100.80	9.65	20.07	**<0.01***
Y-IL(R) (cm)	73.69	11.56	83.81	11.75	28.01	**<0.01***
Y-IL(L) (cm)	70.78	11.42	80.20	11.51	17.10	**<0.01***
Y-SL(R) (cm)	57.76	9.33	66.74	9.90	17.78	**<0.01***
Y-SL(L) (cm)	56.28	11.29	64.98	10.80	15.92	**<0.01***
YCOM(R) (cm)	82.25	5.58	93.16	5.58	28.91	**<0.01***
YCOM(L) (cm)	79.91	7.65	90.93	7.32	28.84	**<0.01***

Note. CKUEST: Closed Kinetic Chain Upper Extremity Stability Test; SMBT: Seated Medicine Ball Throw; Y-M = Y balance Test Medial reach Direction; Y-IL= Y Balance Test inferolateral reach direction; Y-SL= Y Balance Test superolateral reach direction; YCOM: Y Balance Test Composite; R= Right Shoulder; L= Left Shoulder
* denotes significant p-value at 0.05 level

Table 4
Comparison of Parameters within the Experimental Group

Outcome Measures	PRE		POST		t	p value
	MEAN	SD	MEAN	SD		
CKUEST(R)	25.94	1.80	33.07	2.34	28.69	**<0.01***
CKUEST(L)	24.76	1.80	31.78	2.05	26.47	**<0.01***
SMBT (cm)	534.38	47.65	638.28	55.54	17.25	**<0.01***
Y-M (R) (cm)	94.58	9.22	118.94	7.31	24.43	**<0.01***
Y-M (L) (cm)	93.19	9.66	116.14	7.68	19.52	**<0.01***
Y-IL(R) (cm)	73.18	6.73	92.59	7.76	15.60	**<0.01***
Y-IL(L) (cm)	70.61	7.28	90.30	7.48	15.90	**<0.01***
Y-SL(R) (cm)	55.06	6.07	73.11	6.57	18.1	**<0.01***
Y-SL(L) (cm)	53.11	6.69	70.12	6.92	21.08	**<0.01***
YCOM(R) (cm)	80.97	6.69	103.43	5.84	31.30	**<0.01***
YCOM(L) (cm)	78.80	6.97	100.50	6.41	32.09	**<0.01***

Note. CKUEST: Closed Kinetic Chain Upper Extremity Stability Test; SMBT: Seated Medicine Ball Throw; Y-M = Y balance Test Medial reach direction; Y-IL= Y Balance Test infero-lateral reach direction; Y-SL= Y Balance Test supero-lateral reach direction; YCOM: Y Balance Test Composite; R= Right Shoulder; L= Left Shoulder
* denotes significant p-value at 0.05 level

Table 5
Comparison of Change Scores between Control and Experimental Group

VARIABLES	CONTROL		EXPERIMENTAL		Cohen's d	t	p-value
	MEAN	SD	MEAN	SD			
CKUEST (R)	3.89	0.93	7.13	1.05	11.11093	-9.78	**<0.01***
CKUEST (L)	3.31	1.41	7.02	1.23	7.807631	-8.01	**<0.01***
SMBT (cm)	31.56	24.31	103.89	25.56	5.430418	-8.70	**<0.01***
Y-M (R) (cm)	10.31	3.09	24.36	4.23	9.35985	-11.37	**<0.01***
Y-M (L) (cm)	11.59	2.45	22.96	4.99	8.789528	-8.67	**<0.01***
Y-IL(R) (cm)	10.13	1.50	19.41	5.28	7.610925	-7.16	**<0.01***
Y-IL(L) (cm)	9.43	2.34	19.69	5.25	7.164714	-7.57	**<0.01***
Y-SL(R) (cm)	8.98	2.14	18.05	4.20	8.109478	-8.17	**<0.01***
Y-SL(L) (cm)	8.70	2.31	17.02	3.43	8.795797	-8.53	**<0.01***
YCOM(R) (cm)	10.91	1.60	22.46	3.05	13.70197	-14.25	**<0.01***
YCOM(L) (cm)	11.02	1.62	21.70	2.87	14.04066	-13.75	**<0.01***

Note. CKUEST: Closed Kinetic Chain Upper Extremity Stability Test; SMBT: Seated Medicine Ball Throw; Y-M = Y balance Test Medial reach Direction; Y-IL= Y Balance Test infero-lateral reach direction; Y-SL= Y Balance Test supero-lateral reach direction; YCOM: Y Balance Test Composite; R= Right Shoulder; L= Left Shoulder
* denotes significant p-value at 0.05 level

DISCUSSION

The goal of the present study was to establish effects of FIFA 11 + Shoulder Injury Prevention Program's on shoulder performance variables, if any. This study reports significant enhancement of bilateral upper limb power, strength and dynamic balance in both the experimental and the control groups. Though there were significant improvements in all outcome variables with use of FIFA protocol in experimental group and with use of customary

warm up routine in the control group, yet the mean differences in all the variables were found to be higher in the experimental group than the control group post 8 weeks of adhering to the respective protocols. Previous studies have reported the impact of FIFA protocol in helping reduce the injury incidence in soccer players.

The Closed Kinetic Chain Upper Extremity Stability Test (CKCUEST) and Upper Quarter Y Balance Test in the current investigation showed statistically significant enhancement ($p<0.05$) in both groups. The closed kinetic chain upper extremity stability test (CKCUEST) and Upper Quarter Y Balance Test also showed a significant improvement in the dominant limb than the non-dominant limb. Replacing the customary warmup routine of soccer goalkeepers with FIFA 11+ Shoulder Injury Prevention Program in the experimental group led to improvement in the outcome variables i.e., the physical performance tests to a greater extent than in the control group. This improvement in physical performance tests is a result of a concomitant improvement in the shoulder musculature strength. This can be corroborated by the results of the study conducted by Guirelli et al. (2021) in which they reported that in both male and female individuals, there occurred a positive correlation between the strength of the scapular, shoulder, and spine muscles and tests of physical performance of the upper limbs namely Closed chain upper extremity stability test (CKUEST) and Upper Quarter Y Balance Test, demonstrating that increasing the strength of these stabilisers improves physical performance in the corresponding tests and directions.

The current study's explanation for the gain in dynamic balance is that one of the elements of the Shoulder Injury Prevention Program FIFA 11+ is core strengthening which further helps in the improvement of shoulder performance variables in soccer goalkeepers. Imai et al. (2014), found similar findings and concluded that trunk stabilisation exercises have an immediate impact on dynamic balance and exhibit a very high correlation in the posterolateral and posteromedial direction, providing evidence in support of this claim (Imai et al., 2014). Furthermore, Ahmed et al. (2022) found a substantial positive link between dynamic balance and core stability in both the limbs, dominant and non-dominant (Ahmed et al., 2022).

The ability to execute tasks safely by soccer goalkeepers requires a certain level of physical endurance, balance, and power as well as enough neuromuscular coordination, joint flexibility, and training to minimise the risk of injuries. This warm up protocol places a strong emphasis on developing muscle groups like the shoulder rotator cuff (Ejnisman et al., 2016). Serratus anterior and lower and middle trapezius are additional key muscles to focus on in order to prevent scapular dyskinesis. The superior trapezius and these muscles' strength work

together to maintain the proper scapulohumeral rhythm. In addition to closed kinetic chain workouts included in FIFA 11+ protocol that replicate falls and movements on the ground, open kinetic chain exercises with ball-throwing motions are also featured. In both scenarios, core activation is necessary to transfer and dissipate energy in the kinetic chain as well as to maintain the proper muscle activation sequence. Additionally, activities that include the diagonal are advised to build muscle. The rotator cuff, scapular waist, and deltoid muscles are all engaged during a diagonal motion that alternates between a flexor pattern (acceleration) and an extension pattern (deceleration). The intra-articular power couples' coactivation may be enhanced by this motion. The workouts in the FIFA 11+S programme are designed to develop the muscles in the shoulder, elbow, wrist, and finger as well as to train core stability (Al Attar et al., 2021).

The improvement in Y balance test score was reported in our study. Saberian Amirkolaei et al. (2019) found that eight weeks of Swiss ball training boosts the Functional Movement Screening (FMS) and Y scores of the lower and upper limbs in their investigation of the impact of Swiss ball training on the integration of functional movements and balance in adolescent badminton players. They consequently believed that the improvement in reach scores following this training was crucial in helping badminton players avoid injuries. They employed exercises like the plank, press-up, and others that, in terms of function and muscle activation, are quite comparable to a number of drills of 11+ shoulder exercises, which may have contributed to the improvement of the Y balance scores in the current study.

The neuromuscular and plyometric exercises used in the 11 + S programme are responsible for the research participants' considerable improvement in stability. The neuromuscular workouts increase the nervous system's capacity to generate a quick and pleasurable muscle stimulus pattern, which improves dynamic joint stability, lowers joint forces, and releases movement patterns (Granacher et al, 2018).

As one of the most widely used techniques for measuring power, the sitting medicine ball throw (SMBT) was performed in this study to assess the changes in strength of the upper extremities. SMBT is a reliable instrument for evaluating upper body explosiveness in the athletic population (Beckham et al., 2019). The increased power in the current study is likely the result of stronger muscles. These exercises can enhance agility, eccentric rotator strength, muscle coordination, strength, and neuromuscular activation. They might have a big impact on improvements in upper extremity strength and balance.

On the other hand, the findings of our study are not in tandem with the study done by Kyranoudis et al. (2020) who found that pre-warm-up activities do not improve

performance in the ranges of hip flexion and countermovement jumps with arm swings over a standard soccer warm-up (Kyranoudis et al., 2020). The reason for this mismatch can be due to different regions studied in both the studies.

The FIFA 11+ S protocol was far more effective than standard warm-up routines at improving upper limb performance, as evidenced by the fact that mean differences were larger in the experimental group in comparison to the control group and large effect sizes have been obtained when post-intervention values of all parameters were compared (Cohen's d >1) (Table 5). Therefore, FIFA 11 + Shoulder Injury Prevention Program is more effective in enhancing the performance variables of upper limb i.e. stability, dynamic balance and power than the customary warm up routines followed by soccer goalkeepers of Delhi-NCR region.

There is, however, a paucity of data describing how the warm-up regimen affects the dynamic stability of the upper extremities. We recommend that more research be done in order to assess and determine the impact of the FIFA 11+ S programme on dynamic stability in football goalkeepers belonging to different regions and performing different customary warm-up routines.

This study has some limitations namely, study duration was less and intensity can be varied to see better effects. Secondly, the study has evaluated only male soccer goalkeepers.

CONCLUSION

The present study draws the conclusion that, when compared to the conventional warm-up routine, the FIFA 11+ Shoulder Injury Prevention programme is more effective at improving upper extremity performance, dynamic balance, and dynamic stability in male soccer goalkeepers over an 8-week period. This study also suggests that soccer goalkeepers should incorporate the FIFA 11+ Shoulder Injury Prevention programme into their normal warm-up routines. Future research is necessary to identify the age variance among groups and gender-specific differences. Along with its effects on other performance indicators, FIFA 11+ S is also suggested for goalkeepers who play in other overhead sports and who wear protective gear, such as hockey.

The present study will enhance the effects produced by FIFA 11+ Shoulder Injury Prevention Program on upper extremity performance. The study will help in globalising the FIFA 11+ Shoulder Injury Prevention Program as a regular warm-up program done by soccer goalkeepers.

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Author contributions

All authors contributed in study design, statistical analysis and manuscript preparation.

Declaration of conflict interest

Authors declare no conflict of interest.

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