



ORIGINAL ARTICLE

The Effect of Sports on Sleep in Children

Çocuklarda Sporun Uyku Üzerindeki Etkisi

Osman ULUSAL , Ömer ACAT 

Department of Public Health, Faculty of Medicine, Karamanoğlu Mehmetbey University, Karaman, Türkiye

Correspondence

Osman ULUSAL
Karamanoğlu Mehmetbey University,
Tıp Fakültesi, Halk Sağlığı Anabilim Dalı,
Karaman, Türkiye

E-Mail: osmanulusal@kmu.edu.tr

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ABSTRACT

Aim: This study aimed to investigate the effect of sports on children's sleep by comparing the sleep characteristics of children participating in a summer sports school program across different sports branches before starting the program and after two months of regular sports activity. The findings obtained are important in revealing the contributions of sports to public health and raising awareness about the importance of regular sport.

Methods: This cross-sectional study was conducted in July-August 2024 with the parents of 162 children who completed summer sports school program in the Karatay district. Parents were interviewed face-to-face twice: once before their children started participating in sports (pre-test) and once after two months of regular sports participation (post-test). Data collection tools included sociodemographic information and the "Sleep Disturbance Scale for Children," consisting of 26 items. The collected data were presented using descriptive statistics (mean, standard deviation, frequency, and percentage), and analytical analyses were performed using One-Way ANOVA, Independent T-test, and Spearman's correlation tests. A significance level of $p < 0.05$ was accepted.

Results: Among the 162 children who participated in the study, 59.9% were female and 40.1% were male. When comparing the pre-test and post-test, statistically significant reductions were observed in the total score of the Sleep Disturbance Scale for Children, as well as Disorders of Initiating and Maintaining Sleep, Sleep-Related Breathing Disorders, Disorders of Arousal, Sleep-wake transition disorders, and Excessive sweating during sleep ($p < 0.05$ for all subdomains). The average bedtime significantly shifted from 22.58 ± 1.04 in the pre-test to 22.29 ± 0.52 in the post-test ($p < 0.001$). Regarding time to fall asleep, 49% of the children fell asleep within 15-30 minutes in the pre-test, whereas 58% fell asleep within less than 15 minutes in the post-test ($p < 0.001$). However, no significant difference was found between the total sleep duration in the pre-test and post-test ($p = 0.197$).

Conclusions: This study revealed that while sports do not have a significant effect on total sleep duration in children, they do have positive effects on sleep quality, time to fall asleep, and bedtime. The findings suggest that promoting regular physical activity from early childhood may play a role in improving sleep quality and, by enhancing individual quality of life, may contribute positively to public health.

Keywords: Children, health, physical activity, sleep, sport

ÖZ

Amaç: Bu çalışma, farklı spor branşlarında yaz spor okulu programına katılan çocukların, programa başlamadan önceki ve başladıktan iki ay sonraki uyku özelliklerini karşılaştırarak, sporun çocukların uykusu üzerindeki etkisini araştırmayı amaçlamıştır. Elde edilen bulgular, sporun toplum sağlığına katkılarının ortaya konulması ve düzenli spor yapmanın önemi konusunda farkındalık yaratılması açısından önemlidir.

Gereç ve Yöntemler: Bu kesitsel çalışma, 2024 yılı Temmuz-Ağustos aylarında Karatay ilçesinde yaz spor okullarını tamamlamış 162 çocuğun ebeveynleri ile yürütülmüştür. Ebeveynlere, çocukları spora başlamadan önce (öntest) ve iki ay düzenli spor yaptıktan sonra (sontest) iki kez yüz yüze anket uygulanmıştır. Veri toplama araçları arasında sosyodemografik bilgiler ve 26 sorudan oluşan "Çocuklar İçin Uyku Bozukluğu Ölçeği" yer almıştır. Elde edilen veriler, tanımlayıcı istatistikler (ortalama, standart sapma, frekans ve yüzde) ile sunulmuş; analitik analizler için One-Way ANOVA, Bağımsız (Independent) T-test ve Spearman Korelasyon testleri kullanılmıştır. İstatistiksel anlamlılık düzeyi $p < 0.05$ olarak kabul edilmiştir.

Bulgular: Çalışmaya katılan 162 çocuğun %59,9'u kız, %40,1'i erkektir. Öntest ve sontest karşılaştırıldığında, Çocuklar İçin Uyku Bozukluğu Ölçeği toplam puanı ile Uykuya Dalma ve Sürdürme Bozuklukları, Uykuya İlişkili Solunum Bozuklukları, Uyanıklık Bozuklukları, Uyku-Uyanıklık Geçiş Bozuklukları ve Uykuda Aşırı Terleme alt boyutlarında istatistiksel olarak anlamlı azalmalar gözlemlenmiştir (tüm alt boyutlar için $p < 0,05$). Ortalama yatış saati, öntestte 22.58 ± 1.04 iken, sontestte anlamlı düzeyde azalarak 22.29 ± 0.52 'ye gerilemiştir ($p < 0,001$). Uykuya dalma süresi açısından değerlendirildiğinde, öntestte çocukların %49'u 15-30 dakika içinde uykuya dalarlarken, sontestte çocukların %58'i 15 dakikadan daha kısa sürede uykuya dalmıştır ($p < 0,001$). Ancak, öntest ve sontest arasında toplam uyku süresi açısından anlamlı bir fark bulunmamıştır ($p = 0,197$).

Sonuçlar: Bu çalışma, sporun çocuklarda toplam uyku süresi üzerinde anlamlı bir etkisinin olmadığını; ancak uyku kalitesi, uykuya dalma süresi ve uykuya yatış saati üzerinde olumlu etkiler sağladığını ortaya koymuştur. Bulgular, düzenli fiziksel aktivitenin erken çocukluk döneminden itibaren teşvik edilmesinin, uyku kalitesini artırmada rol oynayabileceğini; bireysel yaşam kalitesini yükselterek halk sağlığına olumlu katkılar sağlayabileceğini göstermektedir.

Anahtar Kelimeler: Çocuk, fiziksel aktivite, sağlık, spor, uyku

Introduction

Childhood is a period marked by rapid mental, emotional, and physical development [1]. Sleep plays a critical role in the child's overall health, growth, and especially emotional development during these rapid developmental phases [2].

Physical activity and sleep are particularly crucial in the development of sedentary individuals [3]. Physical activity contributes to weight management, enhances physical fitness, and reduces the risk of cardiovascular diseases [4]. Sleep, as a fundamental physiological necessity alongside water and food, plays a vital role in regulating metabolic processes, physical performance, emotional regulation, memory, and learning [5, 6]. Emphasizing both physical activity and sleep is essential for optimizing physiological potential, preventing mental and physical disorders, promoting physical, biological, and social well-being, and sustaining long-term health [7].

Many individuals struggle with sleep problems such as insomnia, difficulty falling asleep, sleep fragmentation, excessive sleeping, somnambulism, sleep apnea, and restless legs syndrome. One effective strategy to improve sleep quality and reduce the risk of sleep disorders is physical activity.

Physical activity can enhance sleep quality as a low-cost and easily applicable method without the need for medication. In this respect, it is considered an alternative approach in the treatment of sleep disorders [8]. The human body differs physiologically and psychologically at each stage of life. Therefore, the intensity of physical activity plays a significant role in improving sleep quality across different age groups. To enhance sleep quality in children, sports games, outdoor activities, and low-intensity physical exercises are recommended [9]. It has been observed that physical activity programs have a subjectively positive effect on sleep quality among children and adolescents aged 10–19 years [10].

Studies have shown that engaging in at least 30 minutes of daily exercise improves sleep quality. It has been observed that individuals suffering from insomnia experienced a reduction in their symptoms after exercising for 30 minutes, three times a week, over a period of eight weeks. Regular physical activity has been reported to shorten the time to fall asleep and enhance overall sleep quality [11]. In children and adolescents, the health benefits of regularly performed organized sports activities are greater than those of school-based physical activities [12, 13].

Essentially, sport constitutes a systematic and discipline-based framework centered on goal attainment and achievement. Children who internalize this discipline often transfer the same level of structure and organization to other domains of their lives. Experts highlight that disciplined and methodical effort contributes to improved academic performance and accordingly advocate for sports education as a fundamental approach [14].

Studies conducted on various populations have failed to establish a clear relationship between physical activity and sleep quality. For instance, a study involving adults found no statistically

significant association between adequate physical activity and sufficient sleep quality [15]. Conversely, research on geriatric individuals reported a weak negative correlation between physical activity and sleep quality [16]. Additionally, a study among primary school students found no relationship between their physical activity levels and sleep problems [17]. In contrast to these findings, a study conducted with middle-aged women demonstrated that physical activity significantly improved sleep quality in this group [18].

The differing results observed in these studies may be attributed to variables such as age, gender, socio-cultural characteristics, environmental factors, as well as the timing, duration, and intensity of physical activity. Although the relationship between physical activity and sleep quality remains inconclusive, various mechanisms have been proposed to explain this association.

Physical activity not only enhances self-confidence but also reduces symptoms of depression [19], regulates circadian rhythms [20], supports weight loss, increases the diameter of the upper airway, activates the upper airway by triggering melatonin release [21], and raises body temperature [22].

In this study, the effect of sports on children's sleep was investigated by comparing the sleep patterns of sedentary children enrolled in various sports programs at sports schools before and two months after initiating sports participation. The findings are expected to make a significant contribution to the literature regarding the impact of sport on sleep.

Materials and Methods

Type of Study

The research is a longitudinal study.

Location and Characteristics of the Study

The research was conducted at the summer sports schools of Karatay District Municipality, located in the center of Konya.

Population and Sample of the Study

The study population consists of 3,000 children who have enrolled in various sports programs at the Karatay District Municipality Summer Sports Schools. Using G-power version 3.1.9.7, the smallest sample size was found to be 147 in calculations with a confidence interval of 95% and an error rate of 5%. Our study was conducted with the parents of 162 children. The stratified random sampling method was utilized in the selection of the sample.

Inclusion criteria for participants

Being the parent of a child enrolled in the summer sports school in Karatay district (Konya), the child must have attended the summer sports school continuously for 2 months, and the parents must agree to participate in the study.

Exclusion criteria for participants

Children without parental consent, children who attended the sports school irregularly or did not

complete the program, and parents who did not agree to participate in the study.

Data collection techniques and tools

The parents were administered a face-to-face questionnaire twice: once before their children began participating in sports (pre-test) and once after two months of regular participation in sports (post-test). The data collection tools included a "Personal Information Form" and the "Sleep Disorder Scale for Children".

The Personal Information Form

This form, developed by the researchers from the literature, consists of 9 questions covering the individual's identifying characteristics.

The Sleep Disorder Scale for Children

Developed by Dr. Bruni et al. in 1996, its validity and reliability in Turkish were studied by Ağadayı et al. (2020) [23]. The scale consists of 26 items and 6 subscales: Disorders of Initiating and Maintaining Sleep (DIMS), Sleep-related Breathing Disorders (SRBD), Disorders of Arousal (DA), Sleep-wake Transition Disorders (SWTD), Excessive Daytime Sleepiness (EDS), and Excessive Sweating during Sleep (ESS). In the Turkish validity study, the Cronbach's Alpha value of the scale was found to be 0.79 [23]. In our study, the Cronbach's alpha values were determined as 0.806 and 0.809 in the first and last surveys, respectively.

Data Collection

The data for the research were collected through face-to-face interviews. Before the study, a pre-test was conducted with 10 participants sharing the same characteristics as the sample to test the clarity of the questionnaire.

The ethical dimension of the research

Before commencing the research, ethical approval (dated July 4, 2024, No. 08-2024/08) was obtained from the Chair of the Local Scientific Medical Research Ethics Committee of Karamanoğlu Mehmetbey University Faculty of Medicine. Permission was granted by the authors who conducted the validity and reliability studies of the scale used in the study. Approval was also obtained from the Karatay District Municipality, where the summer sports schools are located. Consent was obtained from the children's parents before completing the questionnaire. The study was conducted in accordance with the principles of the Helsinki Declaration.

Statistical Analysis

All data obtained in the study were analyzed using the SPSS 25.0 software package. The normality of continuous variables was assessed visually using q-q plot graphs and also evaluated in accordance with parametric assumptions using skewness and kurtosis values. For continuous data showing a normal distribution, a paired samples t-test was applied to compare pre- and post-sport measurements. To examine the change in sleep duration over time according to sports disciplines, a two-way repeated measures ANOVA was performed with repeated measurements. In this analysis, the factors of "time" (pre- and post-sport) and "branch" (sport type) were considered. Additionally, the Marginal Homogeneity test was applied to evaluate the pre- and post-sport changes in sleep duration and sleep onset latency,

which were categorized as categorical variables. In all analyses, the statistical significance level was set at $p < 0.05$.

Results

When the demographic characteristics of the 162 children participating in the study were examined, it was found that their average age was 9.06 ± 2.42 years (min: 5.00-max: 15.00), and 59.9% were girls and 40.1% were boys. 22.2% of the participants played volleyball, 15.4% participated in swimming, and 15.4% participated in gymnastics. The questionnaires were mostly completed by mothers (85.2%). When looking at the educational status of the parents, 43.8% were found to have a university degree or higher. A large portion of the families (68.5%) stated that their income was sufficient to cover their expenses. It was found that 84.6% of the participating children had their own rooms, and 45.1% went to bed between 22:31 and 23:59 (Table 1).

Table 1. Sociodemographic characteristics

		SS*Std Deviation	Min-Max
Child's age		9.06±2.42	5-15
		n	%
Gender of Your Child	Girl	97	59.9
	Boy	65	40.1
Branch (Sport)	Volleyball	36	22.2
	Swimming	25	15.4
	Basketball	12	7.4
	Football	17	10.5
	Gymnastics	25	15.4
	Tennis	19	11.7
	Taekwondo	19	11.7
	Karate	9	5.6
	Survey Respondent	Mother	138
Father		24	14.8
Educational Level of the Respondent	Not Literate	1	0.6
	Primary School	19	11.7
	Middle School	22	13.6
	High School	49	30.3
	University or Higher	71	43.8
Monthly Income	Income is less than expenses	23	14.2
	Income equals expenses	111	68.5
	Income is more than expenses	28	17.3
Do you own your home?	Yes	94	58.0
	No	68	42.0
Does your child have their own room?	Yes	137	84.6
	No	25	15.4
Bedtime	21:30 and earlier	15	9.2
	Between 21:31-22:30	40	24.7
	Between 22:31-23:59	73	45.1
	00:00 and later	34	21.0

The total score and subscale scores of the Sleep

Disorder Scale for Children (Ağadayı et al., 2020) were compared with pre-test and post-test measurements. According to the Paired Samples Test results, significant decreases were observed in the total sleep disorder score and in the subscales DIMS, SRBD, DA, SWTD, and ESS post-test ($p < 0.05$ for all). This finding suggests that sport improves children's sleep quality and reduces sleep disorder symptoms. In particular, a more pronounced decline was observed post-test in the DIMS, SWTD, and ESS subscales. However, no significant difference was observed between pre-test and post-test in the EDS subscale ($p = 0.086$), suggesting that this dimension may be less sensitive to sport (Table 2).

Table 2. Comparison of scores obtained from the scale pre-test and post-test

		n	Mean±Std. Deviation	p*
DIMS	Pre-test	162	13.24±4.20	<0.001
	Post-test	162	11.15±2.96	
SRBD	Pre-test	162	3.85±1.41	<0.001
	Post-test	162	3.46±0.86	
DA	Pre-test	162	3.57±1.09	0.025
	Post-test	162	3.37±1.07	
SWTD	Pre-test	162	9.08±2.91	<0.001
	Post-test	162	7.94±2.32	
EDS	Pre-test	162	6.98±2.32	0.086
	Post-test	162	6.60±1.90	
ESS	Pre-test	162	3.44±1.84	<0.001
	Post-test	162	2.94±1.59	
SDSC (Total)	Pre-test	162	40.15±9.05	<0.001
	Post-test	162	35.47±7.06	

* Paired Samples Test. DIMS: Disorders of Initiating and Maintaining Sleep, SRBD: Sleep-related breathing disorders, DA: Disorders of Arousal, SWTD: Sleep-wake transition disorders, EDS: Excessive Daytime Sleepiness, ESS: Excessive sweating during sleep, SDSC: Sleep Disorder Scale for Children.

When comparing pre-test and post-test bedtimes by branch, it was observed that children participating in volleyball, taekwondo, and tennis had significantly earlier bedtimes post-test ($p < 0.001$, $p = 0.024$, and $p = 0.001$, respectively). In contrast, no statistically significant difference was found between pre-test and post-test bedtimes in basketball, swimming, gymnastics, soccer, and karate ($p = 0.189$; $p = 0.073$; $p = 0.073$; $p = 0.097$; $p = 0.681$, respectively) (Table 3). These findings suggest that certain sports may have a more pronounced effect on children's bedtimes.

Table 3: Distribution of bedtimes pre-test and post-test activities by branch.

	Branch (Sport)	n	Pre-test	Post-test	p
			Mean±Std. Deviation	Mean±Std. Deviation	
Bedtime	Basketball	12	22.25±0.49	22.08±0.38	0.189
	Volleyball	36	23.19±1.16	22.24±0.54	<0.001
	Swimming	25	22.49±0.58	22.34±0.47	0.073
	Gymnastics	25	22.34±0.52	22.14±0.52	0.073
	Football	17	23.00±0.43	22.37±0.48	0.097
	Taekwondo	19	22.44±0.59	22.25±0.57	0.024
	Karate	9	23.00±0.40	22.56±0.28	0.681
	Tennis	19	23.30±1.19	22.52±0.56	0.001
	Total		162	22.58±1.04	22.29±0.52

In the multivariate test, the assumption of equality of covariances was not met ($p = 0.036$). A significant difference was observed between the two measurement times of sleep onset, with the second measurement occurring at an earlier time ($p < 0.001$). Although the Sport*Branch interaction indicated a difference in bedtime ($p = 0.011$), post hoc comparisons revealed that the primary effect was attributable to Sport, as no pairwise differences were statistically significant (all $p > 0.05$) (Table 4, Figure 1).

Table 4: Effect of Sport (Pre-test/Post-test) and Sport Branch on Bedtime.

Effect		Value	F	Hy- pOTH- eSIS df	Error df	Sig. [§]	Partial Eta Squared
Sport(Pre- test/Post- test)	Pillai's Trace	0.184	34,833	1.000	154.000	0.000	0.184
Sport(Pre- test/Post- test)* Branch	Pillai's Trace	0.110	2,731	7.000	154.000	0.011	0.110

§ İki Faktörlü ANOVA Multivariate Tests

Although there is a general difference between pre-test and post-test bedtime depending on the type of sport, graphical analyses show that the variations between sports types are similar and that the main variation stems from the effect of time spent on sports. It has been found that sports contribute to children going to bed earlier across all sports types, but this effect does not show a significant difference between sports types (Figure 1).

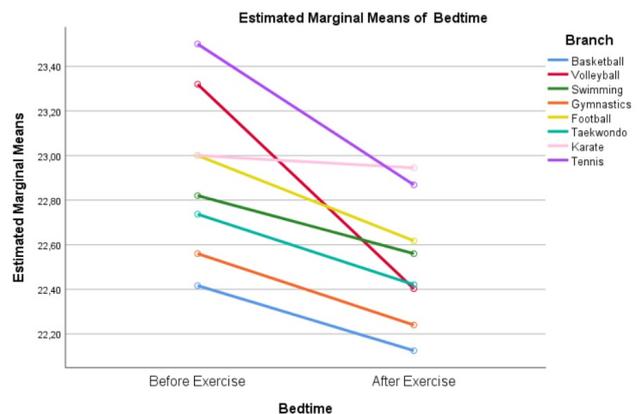


Figure 1. Bedtime Pre-test and Post-test Across Sport Branches.

It was observed that the time it took for children to fall asleep after going to bed decreased significantly post-test ($p < 0.001$). Pre-test, the most common time to fall asleep was 15–30 minutes (49%), while post-test, the most common time was less than 15 minutes (58%) (Table 5). This finding shows that sports contribute to children falling asleep more quickly.

When the total sleep duration of children was examined categorically, no statistically significant difference was found between pre-test and post-test ($p = 0.197$). The most common sleep duration observed pre-test was 8–9 hours (46.9%), and a similar distribution was observed post-test. This finding suggests that sport does not have a direct effect on total sleep duration, but may instead influence the time of

falling asleep and sleep quality (Table 6).

Table 5: Time taken to fall asleep pre-test and post-test.

	Post-test (falling asleep)					Total n (%)	p*
	<15 min	15-30 min	30-45 min	45-60 min	>60 min		
Pre-test (falling asleep)	<15 min	39	14	0	0	53 (33)	<0.001
	15-30 min	46	28	3	1	80 (49)	
	30-45 min	8	10	1	0	19 (12)	
	45-60 min	1	2	1	0	4 (2)	
	>60 min	0	3	2	0	6 (4)	
Total	n (%)	94 (58)	57 (35)	7 (4)	1 (1)	3 (2)	162(100)

*Marginal Homogeneity Test

Table 6: Total sleep duration pre-test and post-test.

	Post-test (sleep duration)				Total n (%)	p*	
	9-11 hours	8-9 hours	7-8 hours	5-7 hours			
Pre-test	9-11 hours	41	16	10	0	67 (41.4)	0.197
	8-9 hours	22	39	15	0	76 (46.9)	
	7-8 hours	3	8	6	1	18 (11.1)	
	5-7 hours	0	1	0	0	1 (0.6)	
Total	n (%)	66 (40.7)	64 (39.6)	31 (19.1)	1 (0.6)	162	

Discussion

The relationship between sport and sleep during childhood is critically important for children's physical and cognitive development. This study evaluated the effects of regular sports activities on sleep quality, bedtime, sleep onset latency, and total sleep duration in children.

The mean total score on the Sleep Disorder Scale for Children (SDSC) for children aged 5–15 who participated in our study was 40.15 ± 9.05 pre-test. Considering that the possible score range on the scale is between 26 and 130, it is observed that, compared to previous studies, the participating children generally experienced a relatively lower level of sleep disorder. Indeed, a study conducted by Şimşek & Polat (2023) with middle school students reported that the students experienced sleep disorders at a moderate level, with an average score of 52.65 ± 11.23 [17]. Similarly, in a study conducted by Bildirici et al. (2023) with 406 children aged 5–17, the average score obtained by the children on the SDSC was reported as 46.3 ± 23.5 [24]. On the other hand, in a study conducted by Uysal & Çalişır (2024) with children aged 7–14, it was found that 72.9% of the children experienced high levels of sleep problems [25]. The differences between these studies may be attributed to numerous factors, including parental perception, demographic and socioeconomic characteristics of the sample group, cultural and geographical factors, and envi-

ronmental conditions.

Epidemiological findings show that regular physical activity improves sleep quality and reduces daytime sleepiness [26]. Studies conducted with children and adolescents in particular have shown that regular physical exercise improves sleep quality and reduces sleep disorders [27, 28]. Similarly, moderate physical activity has been shown to reduce sleep complaints and improve sleep quality in children, adolescents, and the general population [29, 30, 31]. Additionally, exercise has been shown to have positive effects on objective sleep measures in all age groups [32]. In this context, the children who participated in our study were reassessed using the SDSC after participating in regular sport in different sports for two months. Comparisons made between pre-test and post-test revealed a significant decrease in the total SDSC score and in Disorders of Initiating and Maintaining Sleep, Sleep-related breathing disorders, Disorders of Arousal, Sleep-wake transition disorders, and Excessive sweating during sleep ($p < 0.05$ for all dimensions). The mean total SDSC score, which was 40.15 ± 9.05 pre-test, decreased to 35.47 ± 7.06 post-test, and this difference was found to be statistically significant ($p < 0.001$). These findings indicate that two months of regular sports improves children's sleep quality and reduces sleep disorder symptoms. However, no significant difference was found between pre-test and post-test in the Excessive Daytime Sleepiness ($p = 0.086$). This suggests that the subscale may be less sensitive to sport (Table 2). On the other hand, findings that contradict the results of our study have also been reported in the literature. Some studies have suggested that starting sports at an early age may be a potential risk factor for sleep disorders [33]. Additionally, there are studies reporting that the duration or intensity of physical activity has no significant effect on sleep quality and sleep problems [17, 34]. Studies on elite athletes have shown that intensive training programs can lead to a high incidence of sleep disorders, including prolonged sleep onset, sleep fragmentation, non-restorative sleep, and excessive daytime fatigue [35].

In our study, it was determined that regular sports activities brought forward children's bedtime and shortened the time it took them to fall asleep. The average bedtime for children pre-test was 22.58 ± 1.04 , while post-test, this time decreased to 22.29 ± 0.52 ($p < 0.001$). In terms of time to fall asleep, 49% of children most frequently fell asleep within 15–30 minutes pre-test, while 58% fell asleep in less than 15 minutes post-test ($p < 0.001$). This effect was particularly pronounced in children involved in volleyball, taekwondo, and tennis ($p < 0.001$, $p = 0.024$, and $p = 0.001$, respectively). The findings are consistent with previous studies demonstrating the positive effects of sport on sleep quality. For example, Morita et al. (2017) reported that acute exercise in the morning improved nighttime sleep quality in individuals who had difficulty falling asleep [36]. Similarly, a meta-analysis conducted by Kredlow et al. (2015) reported that physical activity accelerates sleep onset and improves overall sleep quality [32]. However, some studies have shown that the effects of exercise on sleep are more complex and

may vary depending on factors such as the type, duration, and timing of exercise. For example, Driver & Taylor (2000) stated that high-intensity and prolonged strenuous exercise can disrupt sleep structure, leading to a decrease in REM sleep, an increase in wakefulness, and, in particular, exercise performed in the evening can delay sleep onset [37]. Additionally, studies on elite athletes have shown that excessive training can have negative effects, such as difficulty falling asleep and impaired sleep quality; individual athletes may experience more difficulties falling asleep compared to team athletes [38, 39]. In our study, it was observed that taekwondo and tennis, which are individual sports, had a more pronounced effect in facilitating falling asleep. Additionally, the observation of a similar effect in volleyball, a team sport, suggests that falling asleep more quickly may be related to training intensity and timing.

No statistically significant difference was found between the total sleep duration pre-test and post-test ($p=0.197$). The most common sleep duration pre-test was 8–9 hours (46.9%), and a similar distribution was observed post-test. Although there are studies in the literature reporting that physical activity can increase sleep duration [40], there are also studies that, in parallel with our study, show that regular exercise improves sleep quality but has no significant effect on total sleep duration [41].

These findings indicate that the effect of sports on sleep is multidimensional and may vary depending on individual differences. The discrepancies in the literature stem from numerous factors that have a decisive impact on this relationship, including the type, duration, intensity, and time of day of exercise, as well as the individual's overall health status, age, psychological state, and lifestyle. Furthermore, the variety of measurement methods and differences in research designs also increase the complexity of the relationship between sports and sleep and lead to differences in findings. Considering this network of multiple interactions, it is not possible to evaluate the effects of sports on sleep duration and quality in a one-dimensional, fixed, or generalizable manner.

In this context, the study also has some limitations regarding the children's individual health conditions. No clinical assessment or systematic questioning was conducted regarding the psychiatric illness histories of the participating children. Similarly, the information obtained about the children's chronic physical illnesses is based solely on statements provided by parents during registration for the summer sports camp. Although parents stated that their children did not have any chronic health problems, these statements were not verified by medical documents, and no clinical screening process was implemented. This situation constitutes a significant methodological limitation that may affect the generalizability of the results by limiting the objectivity of the data. In particular, the presence of undiagnosed psychiatric or neurodevelopmental disorders may affect children's sleep patterns and their response to sports, and this limitation must be taken into account when interpreting the findings.

All these findings reveal that the relationship between sports and sleep is dynamic and unique to each individual; therefore, they emphasize the need for further research in this field. In order to establish the effects of sports on sleep more definitively and scientifically, there is a need for research involving large sample groups, using multivariate analysis, and conducted through interdisciplinary collaboration. Studies examining the effects of sports programs tailored to individuals' physical, psychological, and developmental characteristics on sleep quality will make significant contributions to the knowledge base in this field.

Conclusion and Recommendations

In general, the findings of our study show that sport has no direct effect on total sleep duration; however, it has a significant positive effect on sleep quality, bedtime, and time to fall asleep. These positive effects have the potential to improve individuals' overall quality of life and are also of considerable importance in terms of public health.

In this context, fostering the habit of regular sport from an early age and making sports an integral part of one's lifestyle is of critical importance for both short-term and long-term health outcomes. Promoting sports across society should be considered a protective and developmental public health strategy in many areas, including reducing sleep problems, preventing obesity and chronic diseases, and supporting mental health.

In conclusion, understanding the impact of sports on sleep is not only crucial for individual health and quality of life but also serves as a guide for future studies in the fields of sports science, psychology, sleep medicine, and public health.

Conflict of Interest

None declared by the authors.

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