ANATOLIA SPORT RESEARCH

ISSN: 2757-6485

2026 & 7 (2)

Examination of Respiratory Functions and Upper and Lower Extremity Strength Changes in Students Registered in the Faculty of Sports Sciences Through the Central Placement and Aptitude Exams

" Spor Bilimleri Fakültesine Merkezi Yerleştirme ve Yetenek Sınavı ile Kayıt Olan Öğrencilerin Solunum Fonksiyonları ve Alt-Üst Ekstremite Kuvvet Değişimlerinin İncelenmesi"

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ORGINAL ARTICLE

History
Received: 13 May 2026
Accepted: 24 August 2026
Published: 30 August 2026

DOI: http://dx.doi.org/10.29228/anatoliasr.126

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Author Contributions
All authors contributed to the conception and design of the study.

Funding
This research was supported by Kahramanmaras Sutcu Imam University Scientific Research Projects Coordination Unit with project number 2024/4-16M.

Competing Interests
The authors declare that they have no conflicts of interest.

Transparency
The authors confirm that the manuscript is an honest, accurate, and transparent account of the study being reported; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained.

Ethical
This study follows all ethical practices during writing.

Citation
Eroğlu, H., & Koyunlu, A. (2026). Examination of Respiratory Functions and Upper and Lower Extremity Strength Changes in Students Registered in the Faculty of Sports Sciences Through the Central Placement and Aptitude Exams Anatolia Sport Research. 7(2): 195-210.

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ABSTRACT

Aim: To compare the respiratory functions and extremity strength of Sports Science students enrolled via Central Placement (CP) versus those admitted through an Aptitude Exam (AE).
Material and Method: A total of 113 students (divided into male and female CP/AE groups) were included in the study, and three measurements (pre-test, mid-test, and post-test) were administered to the students. Measures included spirometry (FEV1, FVC, etc.), dynamometer strength (back, leg, handgrip), and performance tests (medicine ball throw, 20m speed).
Results: Males: Statistically significant differences were found in the group*time interaction for right and left grip strength, medicine ball throw, 20 m sprint, PEF, and MVV performance values. Women: Statistically significant differences were found in the group*time interaction for left grip strength, medicine ball throw, 20 m sprint, FEV1, FVC, PEF, MVV, VC, and IC performance values ($p < 0.05$).
Conclusion: Students admitted via Aptitude Exams demonstrate superior respiratory and physical strength profiles. This advantage is attributed to their intensive sportive preparation process prior to university, rather than the curriculum itself.

Keywords: Aptitude Exam, Central Placement, Upper and Lower Extremity Strength, Respiratory Functions.

ÖZET

Amaç: Spor Bilimleri bölümüne Merkezi Yerleştirme (MY) yoluyla kayıt olan öğrenciler ile Yetenek Sınavı (YS) yoluyla kayıt olan öğrencilerin solunum fonksiyonlarını ve ekstremite kuvvetlerini karşılaştırmak.
Materyal ve Metod: Çalışmaya toplam 113 öğrenci (erkek ve kadın CP/AE gruplarına ayrılmış) dahil edilmiş, öğrencilere üç ölçüm (ön test, ara test ve son test) yapılmıştır. Ölçümler arasında spirometri (FEV1, FVC, vb.), dinamometre kuvveti (sırt, bacak, el kavrama) ve performans testleri (sağlık topu atma, 20 metre sürat) yer aldı.
Bulgular: Erkekler: Sağ ve sol kavrama kuvveti, sağlık topu fırlatma, 20 m sürat, PEF ve MVV perfromans değerlerinde grup*zaman etkileşiminde istatistiksel olarak anlamlı farklılık tespit edildi. Kadınlar: Sol kavrama kuvveti, sağlık topu fırlatma, 20 m sürat, FEV1, FVC, PEF, MVV, VC, ve IC perflormans değerlerinde grup*zaman etkileşiminde istatistiksel olarak anlamlı farklılık tespit edilmiştir ($p < 0,05$).
Sonuç: Yetenek sınavlarıyla kabul edilen öğrenciler, üstün solunum ve fiziksel güç profilleri sergilemektedir. Bu avantaj, müfredattan ziyade, üniversite öncesindeki yoğun sportif hazırlık sürecine bağlanmaktadır.

Anahtar Kelimeler: Alt-Üst Ekstremite Kuvveti, Merkezi Yerleştirme, Solunum Fonksiyonları, Yetenek Sınavı.

INTRODUCTION

The phenomenon of exercising for a healthy life is becoming widespread with the advancement of the level of awareness in the society. Considering that university youth, as individuals studying at the highest level of our education system, are in a different position from other youth, their level of awareness and living standards are higher than other youth segments, university students were selected as the universe of the research. Physical education is a set of movements performed to protect and improve the health of individuals, complementing general education and playing an integral part of it in the development of the entire personality based on the principle of the integrity of the organism (Öztürk Kuter & Kuter, 2012). Furthermore, physical education can contribute to health, strength, and happiness, as well as socialization, cultural development, and citizenship education, while also facilitating academic advancement (Aras & Asma, 2020). Sport is a socializing, integrating, mind-and-body-developing, competitive, cooperative, and cultural phenomenon that develops the abilities an individual acquires by transforming their natural environment into a human environment, under specific rules, with or without equipment, individually or collectively, within leisure time or by making it a profession (Karataş et al., 2021; Kılıç & Arslan, 2018).

In recent times, the increase in education and the resulting need for qualified personnel across all fields have also created a necessity in the field of physical education and sports. Higher education institutions are considered to be the best environments for individuals to learn about physical education and sports, including understanding the human organism, exercise planning, organizational management, and many other aspects of sports, at the highest level. Within higher education institutions, some schools continue to train future teachers, coaches, and administrators as Faculty of Sports Sciences (SBF) and others as Schools of Physical Education and Sports (BESYO), and the need for qualified personnel in the field of sports is met through these institutions (Parlakkılıç, 2017). Previously, student admissions to higher education institutions in the field of sports were determined through aptitude tests that were separately scheduled for each university (Altın et al., 2022; Kamuk, 2019; Öcal, 2022). Aptitude tests have historically been conducted to determine the physical and psychological capabilities of candidates (Altın, 2026). These tests also assess candidates' physical abilities, motor skills, and athletic backgrounds (Altın et al., 2022). However, some universities have not conducted tests that include these characteristics, instead using centralized placement exams that only test cognitive abilities (Parasız et al., 2021). In subsequent periods, higher education institutions that admitted students through central placement observed that the expectations of the admitted students were not met and that shortcomings emerged in the implementation phase of the courses included in the curricula (Parasız & Halıcı, 2022; Parasız et al., 2021). Many universities have attempted to reintroduce aptitude tests for student admissions due to the disruptions that occurred. Many authorities have debated this issue, and ultimately, many universities have decided to admit all their students based on aptitude tests (Parasız & Şahin, 2024). Finally, as a result of the decision taken by the Council of Higher Education (YÖK), it has been decided that student admissions to Sports Management Departments throughout the country will be conducted through centrally administered exams in 2026. These exams, conducted separately by each university, have led to inadequate examination procedures and evaluations in areas with limited resources, resulting in biased practices and a lack of trust among candidates (Konca & Onarlıoğlu, 2023; Şahin et al., 2023; Temel et al., 2023). In 2024, within the framework of the decision taken by the Council of Higher Education (YÖK) and the relevant ministries, the examination for students to be admitted to the Faculty of Social Sciences and the Faculty of Physical Education and Sports was changed to a Special Aptitude Test (ÖZYES) that will be applied uniformly throughout the country with specified criteria. Applications and exams for this nationwide exam in Turkey are planned to be administered

simultaneously (Tüzer & Demirel, 2024). The materials used, the rules applied, and the standard selection criteria in these exams, which have been implemented in a uniform manner, have enabled the objective evaluation and placement of candidates under equal conditions (Engin, 2025).

Respiratory function is a crucial characteristic that needs to be developed in order to achieve high-level performance, especially in endurance sports (Bahçecioğlu & Yapıcıoğlu, 2024). The respiratory system is crucial in sports activities because it meets the increased oxygen demand during exercise and removes waste products from the body (Dominelli & Sheel, 2024). Improving the respiratory system through exercise and an active lifestyle reduces the risk of developing certain health problems with age (Dominelli & Molgat-Seon, 2022). The positive effects of exercise on the respiratory system are more pronounced during youth, while the effectiveness of exercise decreases in old age (Budde & Skloot, 2022). Especially during adolescence, improvements in respiratory system function achieved through endurance training form the basis for maintaining a healthy respiratory system later in life and contribute to a higher quality of life (Dempsey et al., 2020).

Strength is a very important physical attribute in both athletes and sedentary individuals. Any decrease in strength can lead to potential injuries and decreased performance (Krespi et al., 2019). It has been stated that possible weakness or imbalances in strength can cause injury to different body parts (Söderman et al., 2001). Furthermore, strength is highly effective in the flawless use of many different physical attributes, and improved muscle strength leads to increased physical performance (Seyhan et al., 2021). Lower extremity muscle strength positively affects physical performance and provides individuals with an advantage, especially in situations where physical abilities are required (Topal et al., 2023). Athletes and recreational athletes need upper extremity strength to perform physical activities correctly and completely (Singla et al., 2018). Especially in certain branches and activities, developing upper extremity muscle strength through proper and planned training provides an advantage for achieving success and maximizing performance (Köse & Helvacı, 2024).

Students enrolling in SBF and BESYO schools need to possess certain physical and psychological characteristics to ensure their full participation in practical courses, especially those conducted throughout the academic year. Regular practice is needed to develop these skills to a certain level. The level of training, physical activity, and preparation that individuals undergo during the preschool years forms a foundation for their success at school. Studies that specifically identify the physical characteristics of individuals preparing for sports departments in higher education institutions are limited. Previous studies have focused on comparing these individuals psychologically and socially. Reference studies that particularly highlight physical and physiological characteristics would be pioneering for individuals preparing for sports science departments and coaches working in this field. Studies comparing the respiratory functions and certain athletic performance elements of students using the central placement and ÖZYES exams included in our study are quite rare. Furthermore, no studies have been found that examine the effects of applied courses these individuals take in higher education institutions on these parameters. For this reason, we believe that our study can serve as a basis for future studies. In light of this information, the aim of this study is to examine the changes to respiratory functions and upper and lower extremity strength of the students who enrolled in the Faculty of Sports Sciences with the central placement and aptitude exams.

MATERIAL AND METHOD

Research Group

All subjects participating in our study were informed about the study plan and purpose. No nutrition program or training plan was applied to the subjects. To be included in the study, it was stipulated that students enrolled through central placement must have registered with the Faculty of Sports Sciences in the aforementioned manner, and students enrolled through a special talent exam must have taken the ÖZYES exam. Students who did not meet these criteria, did not participate in the measurement sessions conducted during the semester, or had health problems that prevented them from participating were excluded from the study. The study initially started with a total of 120 students; during the process, 7 students who did not meet the study criteria were excluded, and the study was completed with a total of 113 students. While the students who participated in our study (male n=30, female n=20) enrolled in the faculty of sports sciences with central placement followed weekly 19 hours of theoretical and 4-hour applied courses in the first semester and 18 hours of theoretical and 6-hour applied courses in the second semester of their curriculum (KSÜ, 2025a), the students of the Department of Coaching Education (Male n=44, Female n=19) enrolled in the Faculty of Sports Sciences with an aptitude exam followed weekly 15 hours of theoretical and 5-hour applied courses in the first semester and 14 hours of theoretical 6-hour applied courses in the second semester of their curriculum (KSÜ, 2025b). In order to determine the demographic characteristics of the students, age, height, weight and body mass index variables were measured and recorded.

Measurements

Determining Body Weight and Heigh: It was measured with an electronic scale with an accuracy of ±0.1 kg and the height was determined using a metal height gauge with an accuracy of ± 0.1 cm fixed to the digital scale (Güder et al, 2022). Measurements were made according to standard techniques without shoes, with shorts and t-shirts on the athletes (Karadenizli & Yavaş, 2024).

Determining Body Mass Index (BMI); value obtained by dividing the body weight (kg) of the individual by the square of their height (in m) (BMI=kg/m2) (Çimen, 2023).

Determining Respiratory Function; A pocket-sized, portable, disposable and open-circuit (MIR Spirodoc, Rome, Italy) respiratory function measuring device using single-sided weights was used to determine the respiratory functions of the athletes participating in the study. The device used is a portable device with open-loop pyrometry, RS232 interface protocol, sensitivity (wavelength, nm) of 3% or 50 mL and 5% or 200 mL/s, flow range from 1/s to 16, flow resistance (graphs) < 1 cm H2O/L/s; it does not require calibration according to the individual's needs when used on different people. It has a feature that eliminates the need for any calibration when used on different individuals. During respiratory parameter measurements, the instantaneous measurement values are detected and automatically coded by the device and recorded in the device's memory as respiratory function values (Maharjan et al., 2026; Nekhanevych ve Baklanov, 2026).

Determining Lower Extremity Strength Values: Lower extremity strength values of the subjects, a Takei digital back-leg dynamometer was used to determine the back strength. After a 5-minute warm-up, subjects performed this measurement by placing their feet on the dynamometer stand with their knees straight, arms extended, back straight, and torso slightly leaning forward, and then vertically

pulling the dynamometer bar upwards to its maximum extent. This measurement was repeated three times and the highest value was recorded. Measurements were taken using the Takei brand back and leg dynamometer to determine the leg strength of the subjects. Following 5-minute warm-up, subjects placed their feet on the dynamometer stand with their knees bent, they grasped the dynamometer bar with their hands, their arms being extended, backs straight, and torsos slightly leaning forward, and pulled it vertically upwards to the maximum extent possible using their legs to take the measurement. This traction was repeated three times and the highest value was recorded (Hincal et al., 2026).

Determining Upper Extremity Strength Values. To determine the upper extremity strength values of the subjects, hand grip strength was measured using a hand dynamometer (Takei brand). After a 5-minute warm-up, while the subject stood, measurements were taken separately for the right and left hands with the arm at a 45-degree angle to the body, without bending or touching the body, and with the wrist straight. Each individual was given two attempts for different hands, with a one-minute rest between the two measurements. The highest value from the two measurements was recorded in kg as the right and left hand grip strength value for statistical analysis (Ertürk et al., 2022).

Medicine Ball Launch Measurements: Another method of determining upper extremity strength, were taken. The subject sat in a sitting position with their back, shoulders, and head against the wall. A 3 kg medicine ball was handed to women and a 5 kg one to men, held with both hands with the upper extremity at 90° abduction and elbows in flexion. In this position, the medicine ball was thrown as far as possible without the back, shoulders and head losing contact with wall. Four shots were performed with maximal effort by giving one-minute rest intervals between shots and average values were taken (Çetin et al., 2026).

Determining 20-meter Sprint Performance: A 20-meter speed test was conducted to determine the speed performance of the participants. An athletics track was used to determine the speed performance. Photocell gates were placed at the start and finish points of the test, and individuals were instructed to stand next to the photocell starting gate at the starting point, aiming for a high start. They were asked to start when they were ready, and after passing through the photocell exit gate, the test measurement result displayed on the photocell screen was used for evaluation. This test was performed twice according to the principle of complete rest, and the best score was recorded (Gücük & Aydoğmuş, 2023).

Data Collection Procedures

Since participation in the test was voluntary, participants were able to terminate the test at any time and were supported with verbal motivation throughout the test. Individuals were verbally informed about the procedures for taking the test, the test administration boards, and motivational notifications regarding the test situation. All test measurements were administered to all individuals at the same time of day, under similar weather conditions, and in a similar manner. The three measurements were taken in the same order (determination of upper and lower extremity strength, determination of respiratory function, determination of speed performance) and according to the same standards: the first measurement at the beginning of the fall semester, the second at the end of the 14-week term, and the third at the end of the 14-week term of the spring semester.

Statistical Analysis

Excel program (Microsoft Office, version 2007, Microsoft Corp., Redmond, WA, USA) was used to classify the data obtained at the end of the study and to calculate the percentage differences, and SPSS

22.0 statistical package program (SPSS for Windows, version 22.0, SPSS Inc., Chicago, Illinois, USA) was used for statistical evaluation. Frequency, maximum and minimum values, mean and standard deviation were used statistically for descriptive values. Before starting statistical procedures, Shapiro-Wilk test was used for normality testing and Levene test was used for homogeneity testing. Skewness and kurtosis values were checked for data sets that did not show normal distribution, and data sets within ±2 were considered to have normal distribution (Demir, 2022). The Mauchly Sphericity Test was used to test the assumption of sphericity. Sphericity Assumed was used for measurements where the sphericity assumption was met, and Greenhouse Geisser correction was used for measurements where the sphericity assumption was not met. 2 (group) x 3 (time) mixed-design (group x time) two-way repeated measures of ANOVA analysis of variance was performed with 95% confidence interval. Post hoc test was performed using Bonferroni correction when necessary. Eta square (η^2) was calculated to determine the effect levels of variables on respiratory parameters and athletic performances in all subjects. The eta square (η^2) value statistic is a measure of the interaction power of the relationship between dependent variables and independent variables (Büyüköztürk, 2014). Eta square (η^2) can take values between 0.00 and 1.00. The magnitude of the effects was measured using a partial eta square (η^2). The effect value was accepted as: η^2=0.01 small effect, η^2=0.06 medium effect and η^2=0.14 large effect (Hopkins et al.; Özçakmak & Çebi, 2017; Pallant, 2020). A significance level of 0.05 was used for all statistical tests.

RESULTS

Some descriptive characteristics of the students (male and female) enrolled in the university with central placement (SECP) and students (male and female) enrolled with the aptitude test (SEAE) are shown in Table 1 and Table 2 as mean, standard deviation, minimum value and maximum value.

Table 1. *Descriptive Information of Male Students Enrolled in the University with a Central Placement Exam (MSECP) and Male Students Enrolled with an Aptitude Exam (MSEAE)*

Group	Variable	n	Min	Max	X̄	Sd
MSECP	Age (years)	30	17.00	29.00	19.73	2.29
	Height (cm)	30	165.00	196.00	177.67	6.87
	Weight (kg)	30	51.00	93.00	74.80	12.25
	BMI (kg/m²)	30	15.85	30.69	23.68	3.67
MSEAE	Age (years)	44	17.00	43.00	20.82	5.06
	Height (cm)	44	165.00	188.00	177.61	5.86
	Weight (kg)	44	58.00	102.00	71.75	10.22
	BMI (kg/m²)	44	18.90	29.14	22.69	2.59

When the mean values of the descriptive characteristics of male students enrolled in the university with central placement (MSECP) and male students enrolled with the aptitude exam (MSEAE) included in our study were examined, the mean age of the MSECP group was 19.73±2.29 years, their height was 177.67 ±6.87 cm, their body weight was 74.80±12.25 kg and their body mass index (BMI) was 23.68±3.67 kg/m^2. The mean age of the MSEAE group was 20.82±5.06 years, their height was 177.61 ±5.86 cm, their body weight was 71.75±10.22 kg and their body mass index (BMI) was 22.69±2.59 kg/m^2.

Table 2. *Descriptive Information of Female Students Enrolled in the University with a Central Placement Exam (FSECP) and Female Students Enrolled with an Aptitude Exam (FSEAE)*

Group	Variable	n	Min	Max	X̄	Sd
FSECP	Age (years)	20	17.00	20.00	18.65	1.09
	Height (cm)	20	153.00	173.00	163.70	6.45
	Weight (kg)	20	47.00	74.00	61.20	6.65
	BMI (kg/m²)	20	19.20	25.16	22.83	1.89
FSEAE	Age (years)	19	18.00	40.00	20.63	5.01
	Height (cm)	19	154.00	171.00	162.47	3.89
	Weight (kg)	19	40.00	117.00	62.53	20.86
	BMI (kg/m²)	19	15.60	44.58	23.68	7.73

When the mean values of the descriptive characteristics of female students enrolled in the university with central placement (FSECP) and female students enrolled with the aptitude exam (FSEAE) included in our study were examined, the mean age of the FSECP group was 18.65±1.09 years, their height was 163.70 ±6.45 cm, their body weight was 61.20±6.65 kg and their body mass index (BMI) was 22.83±1.89 kg/m^2. The mean age of the FSEAE group was 20.63±5.01 years, their height was 162.47 ±3.89 cm, their body weight was 62.53 ±20.86 kg and their body mass index (BMI) was 23.68±7.73 kg/m^2.

Table 3. *Comparison of Athletic Performance Elements of Male Students Enrolled with Central Placement Exam (MSECP) with the Male Students Enrolled with the Aptitude Exam (MSEAE)*

Measurement	Group	Pre-Test	Mid-Test	Final Test	Groups		Time		Group*Time	
		X̄±Sd	X̄±Sd	X̄±Sd	F	p	F	p	F	p
BS	MSECP	112.13±34.70	112.51±30.16	112.53±32.55	0.358	0.554	0.775	0.466	0.670	0.484
	MSEAE	104.40±23.82	108.07±23.65	110.41±26.25						
LS	MSECP	111.20±32.60	109.72±33.00	117.33±70.24	0.852	0.363	0.325	0.619	0.398	0.574
	MSEAE	105.82±23.46	102.52±31.32	103.65±32.03						
RHS	MSECP	39.16±8.07	41.03±8.68	42.96±8.49	0.599	0.445	5.860	0.008*	0.294	0.737
	MSEAE	38.45±6.74	39.28±9.35	41.14±7.98						
LHS	MSECP	38.16±7.07	39.06±10.20	41.54±7.51	0.003	0.958	5.401	0.007*	0.139	0.871
	MSEAE	38.84±7.59	39.04±7.92	41.15±8.21						
MBT	MSECP	6.20±1.61	7.25±1.69	6.86±1.53	0.343	0.563	11.115	0.001*	2.910	0.062
	MSEAE	6.66±1.17	7.02±1.65	7.24±1.46						
20mS	MSECP	3.65±0.79	3.60±0.48	3.58±0.43	11.531	0.002*	4.100	0.035*	3.074	.070
	MSEAE	3.43±0.31	3.13±0.42	3.40±0.32						

*****p<0.05; BS: Back Strength (kg); LS: Leg Strength (kg); RHS: Right Handgrip Strength (kg); LHS: Left Handgrip Strength (kg): MBT: Medicine Ball Throwing (cm) 20mS: 20 m Speed (sec)

Upon examination of Table 3, it was determined that there was no statistically significant difference in back strength performance in group*time interaction (F=0.670; p>0.05), time (pre-test - mid-test - final test) comparison (F=0.775; p > 0.05) and group comparison (F=0.358; p>0.05) as a result of two-way repeated measures of ANOVA for repeated measures applied in the comparison of athletic performance items of male students enrolled in the university with central placement (MSECP) and male students enrolled in the aptitude exam (MSEAE). It was observed that there was medium effect value in the groups (η^2=0.012), and large effect value in time (η^2=0.026) and group*time interaction (η^2=0.023). No statistically significant differences were found in leg strength performance in terms of group*time interaction (F=0.398; p>0.05), time (pre-test - mid-test - final test) comparison (F=0.325; p>0.05), and group comparison (F=0.852; p>0.05). It was observed that there was a large effect value in the groups (η^2=0.029) and group*time interaction (η^2=0.014) with a medium effect value at time (η^2=0.011). There was no statistically significant difference in the right handgrip force performance in the group* time

interaction (F=0.294; p>0.05), and there was a statistically significant difference in the comparison of time (pre-test -mid-test- final test) (F=5.860; p<0.05). It was observed that there was a medium effect in the group*time interaction (η^2=0.010), and a large effect value in the groups (η^2=0.020) and time (η^2=0.168). There was no statistically significant difference in left handgrip strength performance in group*time interaction (F=0.139; p>0.05), but there was a statistically significant difference in time (pre-test - mid-test- final test) comparison (F=5.401; p<0.05). It was observed that there was a small effect value in the group*time interaction (η^2=0.005) and in the groups (η^2=0.001) and a large effect value at time (η^2=0.168). It was determined that there was no statistically significant difference in group*time interaction (F=2.910; p>0.05) in medicine ball throwing performance, but there was a statistically significant difference in time (pre-test - mid-test - final test) comparison (F=11.115; p<0.05). The eta-square (η^2) statistic was used to determine the effect value, and it was observed that there was a large effect in group*time interaction (η^2=0.091) and in time (η^2=0.277), and a medium effect value in groups (η^2=0.012). There was no statistically significant difference in group*time interaction (F=3.074; p>0.05) in 20-meter speed performance, but there was a statistically significant difference in time (pre-test - mid-test - final test) comparison (F=4.100; p<0.05) and group comparison (F=11.531; p < 0.05). It was observed that there was a large effect value in the groups (η^2=0.284), time (η^2=0.124) and group*time interaction (η^2=0.096).

Table 4. *Comparison of Respiratory Parameters of Male Students Enrolled with Central Placement (MSECP) and Male Students Enrolled with the Aptitude Exam (MSEAE)*

Measurement	Group	Pre-Test	Mid-Test	Final test	Groups		Time		Group*Time	
		X̄±Sd	X̄±Sd	X̄±Sd	F	p	F	p	F	p
FEV1 (lt)	MSECP	3.68±1.01	3.45±0.83	3.71±0.67	0.083	0.818	3.986	0.036*	1.176	0.316
	MSEAE	3.53±1.05	3.58±1.06	3.85±0.85						
FVC (lt)	MSECP	4.08±0.96	4.87±0.98	4.11±0.82	0.385	0.540	1.045	0.347	0.521	0.526
	MSEAE	4.12±1.22	4.13±1.27	4.20±1.02						
FEV1/ FVC (%)	MSECP	89.72±7.39	92.99±7.03	91.75±10.05	1.196	0.190	3.164	0.058	1.958	0.160
	MSEAE	84.04±12.72	88.95±9.27	93.69±6.06						
PEF (lt/sec)	MSECP	5.50±1.65	5.73±1.55	5.57±1.46	0.279	0.601	6.485	0.006*	4.214	0.020*
	MSEAE	5.30±2.00	5.80±2.34	6.48±2.07						
MVV (lt/min)	MSECP	117.92±28.38	122.07±30.96	116.79±28.45	1.381	0.250	3.108	0.052	4.188	0.020*
	MSEAE	100.10±30.71	111.68±35.02	118.80±31.08						
VC (lt)	MSECP	3.79±0.79	3.88±0.83	4.09±0.66	0.329	0.571	4.394	0.017*	0.001	1.000
	MSEAE	3.68±1.14	3.77±1.14	3.99±1.23						
IC (lt)	MSECP	2.26±0.26	2.29±0.49	2.33±0.49	1.102	0.303	4.333	0.028*	1.663	0.199
	MSEAE	2.02±0.73	2.14±0.67	2.38±0.61						

*p<0.05

When Table 4 was examined, it was determined that there was no statistically significant difference in group*time interaction (F=1.176; p>0.05)in the comparison of FEV1 values, but there was a statistically significant difference (F=3.986; p<0.05) in the comparison of time (pre-test - mid-test - final test) as a result of two-way repeated measures of ANOVA for repeated measures applied in the comparison of respiratory parameters of male students enrolled in the university with central placement exam (MSECP) and male students enrolled through the aptitude exam (MSEAE). The eta square (η^2) statistic was used to determine the effect size, and it was observed that there was a large effect in time (η^2=0.121), group*time interaction (η^2=0.039), and a small effect value in groups (η^2=0.002). In the comparison of FVC values, it was determined that there was no statistically significant difference in group*time interaction (F=0.521; p>0.05), time (pre-test - mid-test - final test) comparison (F=1.045;

p>0.05) and group comparison (F=0.385; p>0.05). It was observed that there was a large effect in time (η^2=0.035) and group*time interaction (η^2=0.018), and a medium effect value in groups (η^2=0.013). In the comparison of FEV1/FVC values, no statistically significant difference was found in group*time interaction (F=1.958; p>0.05), time (pre-test - mid-test - final test) comparison (F=3.164; p>0.05) and group comparison (F=1.196; p>0.05). It was observed that there was a large effect value in the groups (η^2=0.119), time (η^2=0.184) and group*time interaction (η^2=0.123). In the comparison of PEF values, it was determined that there was a statistically significant difference in group*time interaction (F=4.214; p<0.05). It was observed that there was medium effect value in the groups (η^2=0.010), a large effect value in time (η^2=0.183) and group*time interaction (η^2=0.127). In the comparison of MVV values, it was determined that there was a statistically significant difference in group*time interaction (F=4.188; p<0.05). It was observed that there was a large effect value in the groups (η^2=0.045), time (η^2=0.097) and group*time interaction (η^2=0.126). In the comparison of VC values, it was determined that there was no statistically significant difference in the group*time interaction (F=0.001; p>0.05), but there was a statistically significant difference in the comparison of time (pre-test - mid-test - final test) (F=4.394; p<0.05). It was observed that there was a medium effect in the groups (η^2=0.011), a small effect in the group*time interaction (η^2=0.001), and a large effect value in the time (η^2=0.132). In the comparison of IC values, it was determined that there was no statistically significant difference in the group*time interaction (F=1.663; p>0.05), but there was a statistically significant difference in the comparison of time (pre-test - mid-test - final test) (F=4.333; p<0.05). It was observed that there was a large effect value in the groups (η^2=0.037), time (η^2=0.130), group*time interaction (η^2=0.054).

Table 5. *Comparison of Athletic Performance Elements of Female Students Enrolled with Central Placement (FSECP), Female Students Enrolled with the Aptitude Exam (FSEAE)*

Measurement	Group	Pre-Test	Mid-Test	Final test	Groups		Time		Group*Time	
		X̄±Sd	X̄±Sd	X̄±Sd	F	p	F	p	F	p
BS	FSECP	62.63±13.39	64.82±16.26	64.82±15.97	8.376	0.010*	2.556	0.092	1.654	0.205
	FSEAE	69.55±12.86	70.74±13.31	76.37±14.97						
LS	FSECP	61.76±18.20	59.76±17.93	58.55±16.78	8.520	0.009*	0.347	0.615	0.600	0.503
	FSEAE	71.81±16.68	70.23±15.82	72.74±14.28						
RHS	FSECP	24.83±5.26	23.27±4.36	24.32±3.82	5.847	0.026*	3.247	0.051	0.930	0.370
	FSEAE	26.98±6.35	25.90±4.51	28.62±3.67						
LHS	FSECP	24.32±5.30	22.87±4.05	22.17±5.79	5.320	0.033*	1.103	0.325	4.745	0.032*
	FSEAE	24.77±4.15	24.73±5.06	27.75±5.20						
MBT	FSECP	4.18±1.08	5.03±1.08	4.77±0.88	13.992	0.001*	5.527	0.008*	4.545	0.017*
	FSEAE	6.11±1.70	6.01±1.77	6.56±1.64						
20mS	FSECP	4.53±0.74	4.57±0.74	4.30±0.77	16.226	0.001*	4.266	0.022*	5.231	0.022*
	FSEAE	3.92±0.31	3.68±0.39	3.82±0.22						

*****p<0.05; BS: Back Strength (kg); LS: Leg Strength (kg); RHS: Right Handgrip Strength (kg); LHS: Left Handgrip Strength (kg): MBT: Medicine Ball Throwing (cm) 20mS: 20 m Speed (sec)

When Table 5 was examined, it was determined that there was no statistically significant difference in back strength performance in group*time interaction (F=1.654; p>0.05), but there was a statistically significant difference in group comparison (F=8.376; p<0.05) as a result of two-way repeated measures of ANOVA for repeated measures applied in the comparison of athletic performance items of female students enrolled in the university with central placement (FSECP) and female students enrolled through the aptitude exam (FSEAE). It was observed that there was a large effect value in the groups (η^2=0.318), time (η^2=0.124) and group*time interaction (η^2=0.084). It was determined that there was no statistically significant difference

in leg strength performance in group*time interaction (F=0.600; p>0.05), but there was a statistically significant difference in group comparison (F=8.520; p<0.05). It was observed that there was a large effect value in the groups (η^2=0.321), time (η^2=0.019) and group*time interaction (η^2=0.032). There was no statistically significant difference in right handgrip strength performance in group*time interaction (F=0.930; p>0.05), but there was a statistically significant difference in group comparison (F=5.847; p<0.05). It was observed that there was a large effect value in the groups (η^2=0.245), time (η^2=0.153) and group*time interaction (η^2=0.049). It was determined that there was a statistically significant difference in left handgrip force performance in group*time interaction (F=4.745; p<0.05). It was observed that there was a large effect value in the groups (η^2=0.228), time (η^2=0.058) and group*time interaction (η^2=0.209). It was determined that there was a statistically significant difference in group*time interaction (F=4.545; p<0.05) in medicine ball throwing performance. It was observed that there was a large effect value in the groups (η^2=0.437), time (η^2=0.235) and group*time interaction (η^2=0.202). It was determined that there was a statistically significant difference in group*time interaction (F=5.231; p<0.05) in 20-meter speed performance. It was observed that there was a large effect value in the groups (η^2=0.474), time (η^2=0.192) and group*time interaction (η^2=0.225).

Table 6. *Comparison of Respiratory Parameters of Female Students Enrolled with Central Placement (FSECP) and Female Students Enrolled with the Aptitude Exam (FSEAE)*

Measurement	Group	Pre-Test	Mid-Test	Final test	Groups		Time		Group*Time	
		X̄±Sd	X̄±Sd	X̄±Sd	F	p	F	p	F	p
FEV1 (lt)	FSECP	2.38±0.76	2.31±0.74	2.24±0.80	1.617	0.220	2.263	0.122	11.837	0.001*
	FSEAE	2.23±0.59	2.54±0.68	2.89±0.59						
FVC (lt)	FSECP	2.97±0.93	2.62±0.80	2.74±0.95	1.295	0.270	2.507	0.096	5.860	0.006*
	FSEAE	2.70±0.86	2.95±0.84	3.42±0.76						
FEV1/ FVC (%)	FSECP	86.28±8.50	87.40±11.11	84.53±10.05	0.983	0.335	1.852	0.172	1.438	0.251
	FSEAE	78.71±12.33	86.24±10.87	84.89±11.44						
PEF (lt/sec)	FSECP	3.73±1.64	3.61±1.71	3.13±1.41	0.111	0.743	1.393	0.262	8.995	0.001*
	FSEAE	3.088±1.07	3.84±1.37	4.00±1.15						
MVV (lt/min)	FSECP	75.86±22.73	74.90±25.44	68.43±21.29	0.607	0.446	2.166	0.129	6.935	0.003*
	FSEAE	58.36±16.50	69.56±21.57	73.73±22.15						
VC (lt)	FSECP	2.70±0.82	2.75±0.65	2.56±0.73	0.008	0.930	3.242	0.051	10.573	0.001*
	FSEAE	2.29±0.81	2.66±0.57	3.11±0.72						
IC (lt)	FSECP	1.64±0.36	1.63±0.55	1.42±0.41	2.781	0.114	0.474	0.626	7.155	0.006*
	FSEAE	1.57±0.58	1.67±0.48	1.99±0.41						

*p<0.05

When Table 6 was examined, it was determined that there was a statistically significant difference in the group*time interaction (F=11.837; p<0.05) in the comparison of FEV1 values as a result of two-way repeated measures of ANOVA for repeated measurements applied in the comparison of respiratory parameters of female students enrolled in the university with central placement exam (FSECP) and female students enrolled through the aptitude exam (FSEAE). It was observed that there was a large effect value in time (η^2=0.082), groups (η^2=0.112), group*time interaction (η^2=0.397). In the comparison of FVC values, it was determined that there was a statistically significant difference in group*time interaction (F=5.860; p<0.05). It was observed that there was a large effect value in time (η^2=0.067), groups (η^2=0.122),

group*time interaction (η^2=0.246). In the comparison of FEV1/FVC values, no statistically significant difference was found in group*time interaction (F=1.438; p>0.05), time (pre-test - mid-test - final test) comparison (F=1.852; p>0.05) and group comparison (F=0.983; p>0.05). It was observed that there was a large effect value in the groups (η^2=0.055), time (η^2=0.098) and group*time interaction (η^2=0.078). In the comparison of PEF values, it was determined that there was a statistically significant difference in group*time interaction (F=8.995; p<0.05). It was observed that there was a large effect in time (η^2=0.072), group*time interaction (η^2=0.333), and medium effect value in groups (η^2=0.006). In the comparison of MVV values, it was determined that there was a statistically significant difference in group*time interaction (F=6.935; p<0.05). It was observed that there was a large effect value in time (η^2=0.107), groups (η^2=0.033), group*time interaction (η^2=0.278). In the comparison of VC values, it was determined that there was a statistically significant difference in group*time interaction (F=10.573; p<0.05). It was observed that there was a small effect value in the large effect groups (η^2=0.001) in time (η^2=0.153), group*time interaction (η^2=0.370). In the comparison of IC values, it was determined that there was a statistically significant difference in group*time interaction (F=7.155; p<0.05). It was observed that there was a large effect value in time (η^2=0.027), groups (η^2=0.141), group*time interaction (η^2=0.296).

DISCUSSION AND CONCLUSION

The aim of this study is to examine the effects of the training that the students who entered the Faculty of Sports Sciences with the central placement and aptitude exams will receive during their education on the respiratory functions and upper and lower extremity strengths of the students. Review of the relevant literature supports the hypothesis that the physical activity level of students in departments with intensive applied courses in their curriculum will be higher. A difference was found in the right and left handgrip strength, medicine ball throwing values in terms of time, 20 m speed value in terms of group and time at the athletic performance elements of male students. To explain, when the right and left handgrip strength, medicine ball throwing values are compared between the first measurement, interim measurement and final measurement in both groups, there is an improvement in these values over time. At the value of 20 m speed, a difference was found between the groups and in terms of time in both groups. In other words, when the comparison was made between the first measurement, interim measurement and the final measurement in both groups at 20 m speed, it was seen that there was a worsening in the MSECP 20 m speed values over time, while there was an improvement in the MSEAE 20 m speed values (Table 3). When we look at the athletic performance of female students, a difference was found in back strength, leg strength, right and left handgrip strength values in terms of group, throwing a medicine ball and 20 m speed values in terms of group and time. We can say that there is a difference between the groups in terms of back strength, leg strength, right and left handgrip strength values when the first measurements, interim measurements and final measurements are compared in both groups, but time has no effect over this. There is a difference between the groups in the values for throwing a medicine ball and 20 m speed and that development is achieved over time (Table 5). In other words, we can say that there is progress in FSEAE due to the curriculum. When we examined the respiratory parameters of male students, we found that there were statistically significant differences in PEF and MVV values in the group*time interaction when comparing pre-measurements, intermediate measurements, and final measurements (Table 4). When we examined the respiratory parameters of female students, we found statistically significant differences in the group*time

interaction when comparing the pre-, intermediate, and final measurements of FEV1, FVC, PEF, MVV, VC, and IC (Table 6).

A total of 79 students, 21 girls, 58 boys, participated voluntarily in a study conducted to determine whether there is a difference between the endurance performances of the students of the Department of Physical Education and Sports Teaching in the aptitude exam and their endurance performances during the education period, and what are the internal and external factors affecting this, if any. According to the results of the shuttle run test applied as a result of this study, the endurance performances of the students while being accepted to the department were higher than the endurance performances during the education period. In conclusion, this study reveals the necessity of Physical Education and Sports Teacher candidates to increase their sports performance as well as their habit of exercising regularly in their education and training processes (Ertuş, 2010). A total of 400 students were studied in another study conducted to reveal the relationship between the success scores of the students of the Faculty of Sports Sciences, their central placement and aptitude exam scores and their success status of some applied courses, to evaluate the existing student selection methods, to develop new approaches to determine the criteria that can be set at the student selection stage, and to contribute to increasing the quality of student selection. In result, the average success scores in applied courses of the Sports Management and Recreation Department students who entered the university with only their central placement exam scores were found to be close to the students of the Physical Education and Sports Teaching and Coaching Education departments. In general, a positive correlation was observed between the applied course and aptitude test scores in the departments that accept students with the aptitude test. It has been concluded that the students who entered the university with the sportive aptitude exam were more successful in applied courses (Çaredar, 2020). A total of 14 sedentary individuals, 7 in the experimental group and 7 in the control group, participated in a study conducted to examine the effect of resistance training applied to sedentary individuals aged 18 and over preparing for aptitude exams, on physical parameters. As a result of this study, it was observed that resistance training had a positive effect on favorable performance in addition to the speed and coordination studies carried out on the candidates who participated in the aptitude exam in order to receive higher education in the field of sports sciences (Koç, 2021). In a study, the vital capacities, mandatory vital capacities and mandatory expiratory volumes of basketball, water polo players and rowers per second were higher than normal sedentary control individuals. Maximum voluntary ventilation was also recorded in the water polo player and rower group (Mazic et al., 2015). According to the findings of another study, different sports activities performed ≥16 hours a week have a significant effect on the physiological adaptation of the respiratory system (Malik et al., 2017). It has been shown that eight weeks of medium-intensity endurance training improves the volume and lung capacity of male student smokers, can partially eliminate the harmful effects of smoking on physical and psychological health, and can help them quit smoking (Enayatjazi et al., 2023). Participation in sports is associated with respiratory adaptation, and the degree of adaptation depends on the type of activity. Lung volumes of endurance athletes are higher compared to skill, mixed and strength sports groups (Lazovic et al., 2018). Higher lung volumes are associated with higher aerobic fitness, higher physical fitness, and higher weekly amount of physical activity in students. The healthier body mass index is associated with higher aerobic fitness (relative VO2max) in students of both genders (Mihailova & Kaminska, 2016). It is seen that the literature examined is in line with the results of this study. Therefore, we can say that the lung capacity of those who exercise continuously develop compared to those who do not.

In school physical education programs, students are taught coaching lessons and coaching skills. Prior to 1906, the physical education curriculum had one purpose: to improve students' health through

hygiene and physiology courses in public primary and secondary schools. Between 1917 and 1939, less emphasis was placed on health and fitness goals in physical education classes than on athletics. In these years, athletics programs have also changed significantly compared to university physical education teaching programs (Konukman et al., 2010). The students studying in the Sports Management department are thought to have some doubts about the efficiency of their departments. In the education received by the students of the Department of Sports Management, some problems were identified in terms of the difficulty of the department, academic efficiency and the efficiency of the facilities, and these findings did not differ according to the gender, age, and year of study of the students (Ceyhun et al., 2013). Antonova and Maslak argue that the aim of higher education in EU countries is the creation and development of specialised competences. A characteristic feature of the curricula of foreign countries was that they varied: they included three types of courses: compulsory, partially elective (optional), and fully elective. Based on these principles, Western European universities and institutes began to continuously improve the content of learning managers in the field of physical education and sports by studying the relevant disciplines in the curriculum (Kryshtanovych et al., 2021). The results of a study emphasize the heterogeneity of the areas covered by sports science bachelor's degrees in higher education institutions. Based on these results and the academic literature on the training of sports coaches, we can draw some conclusions. When redesigning the curriculum and offering higher education degrees to sports coaches, providers should carefully evaluate the educational programs already available in higher education institutions, create a special profile of graduates, and choose the most appropriate content and methods to achieve the desired results. It seems prudent to offer sports coaching bachelor's degrees through a collaborative and democratic process, as curriculum design has become an important topic of discussion and encompasses a wide range of stakeholders with often conflicting reference frameworks (Dos Santos, 2021).

Sports is a profession of the 21st century. As in most professions, in sports the profession consists of elements such as previous education, knowledge, career, career development, clear ethics and value norms, professional organization, professional practice, clarity in terms of roles and responsibilities. Although sports and physical education faculties in Serbia are limited to academic study programs, laws or university regulations, internal organization and development strategies, they do not act responsibly towards the education and training programs of the sports coaches they implement (Radojevic et al., 2019). A sample of 10 participants was selected from the population of sports managers who graduated from the sports management program of a university in the southeastern USA. Semi-structured interviews as well as field visits were conducted to gather information on daily operations and procedures, and proposals for curriculum changes. The current study concluded that a) graduates are ready to take on the task related to the management aspects of the career field, but face challenges when it comes to leadership, b) curriculum change will not help student retention rates, and c) changing the types of courses offered may affect management and leadership readiness (Day, 2020).

Our study revealed significant differences in certain respiratory functions and physical performance values, favoring students who gained admission to the Faculty of Sports Sciences through special aptitude. Both the SEAE and SECP students have roughly equal hours of practical and theoretical courses in their curricula. We believe that the statistically significant difference observed between the two groups during the period is due to the physical and physiological gains achieved by the SEAE students as a result of the physical training they underwent during their preparation for the aptitude test. Another reason for the difference is thought to be that sports background and level of participation result in higher-level physical and physiological responses in individuals to practical courses taken after entering the school.

In future studies, we recommend determining the sports branch and training level of the individuals participating in the research in the past, evaluating different physical and physiological characteristics, making a comparison among students from different departments in higher education institutions, and conducting a large-scale evaluation by increasing the size of the research group.

Limitations of the Study

Our study has limitations because we only included students who started their education at Kahramanmaraş Sütçü İmam University, and we were unable to determine what sport or sport the participants had practiced in the past, at what level, whether they were actively involved in sports, or whether they participated in any sporting activities during the study period.

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