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Willpower Level Scale for Athletes (WLSA): A Reliability and Validity Study

Sporcularda İrade Kontrol Düzeyi Ölçeği (SPIRKO): Güvenilirlik ve Geçerlilik Çalışması

Research Article / Araştırma Makalesi

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Abstract

This study aimed to develop the Willpower Level Scale for Athletes (WLSA), an instrument designed to assess athletes' capacity to maintain determination, self-discipline, and motivation under challenging conditions. The candidate scale comprised 35 items structured on a 7-point Likert scale ranging from 1 ("Does Not Describe Me at All") to 7 ("Describes Me Completely"). Content validity was established through comprehensive literature review, focus group interviews, and expert consultations during the scale development process. Exploratory factor analysis revealed a three-factor structure (stability, emotional control, and physical control), which collectively explained 60.918% of the total variance. The resultant structure was subsequently validated via confirmatory factor analysis, yielding satisfactory goodness-of-fit indices: $\chi 2/df = 4.46$, RMSEA = .075, CFI = .97, SRMR = .052, GFI = .92, and AGFI = .89. Internal consistency was demonstrated through Cronbach's alpha coefficients of .86 for Stability, .83 for Emotional Control, .75 for Physical Control, and .90 for the overall scale. The findings confirm that the WLSA constitutes a valid and reliable measurement instrument for assessing willpower levels in athletic populations.

Keywords: Sport, Willpower control, Reliability, Validity, Athletes

Öz

Bu çalışma, sporcuların zorlu koşullar altında kararlılık, öz disiplin ve motivasyonlarını sürdürebilme kapasitelerini değerlendirmek amacıyla Sporcularda İrade Kontrol Düzeyi Ölçeği'nin geliştirilmesini hedeflemektedir. Araştırma kapsamında 35 maddeden oluşan denemelik form, 1 = "Beni Hiç Tanımlamıyor" ile 7 = "Tamamen Beni Tanımlıyor" aralığında puanlanan 7 dereceli bir ölçek olarak yapılandırılmıştır. Ölçek geliştirme sürecinde literatür taraması, odak grup görüşmeleri ve uzman görüşlerinden hareketle rasyonel anlamda kapsam geçerliği sağlanmıştır. Keşfedici Faktör Analizi (KFA) sonucunda üç faktörlü bir yapı (İstikrar, Duygusal Kontrol, Fiziksel Kontrol) ortaya çıkmış ve toplam varyansın %60.918'ini açıklamıştır. Elde edilen yapı, Doğrulayıcı Faktör Analizi (DFA) ile test edilmiş; uyum iyiliği indeksleri $\chi^2/sd = 4.46$, RMSEA = .075, CFI = .97, SRMR = .052, GFI = .92 ve AGFI = .89 olarak bulunmuştur. Cronbach alfa katsayıları İstikrar = .86, Duygusal Kontrol = .83, Fiziksel Kontrol = .75 ve toplam ölçek için .90 olarak hesaplanmıştır. Bulgular, ölçeğin geçerli ve güvenilir bir ölçme aracı olduğunu ortaya koymaktadır.

Anahtar Kelimeler: Spor, İrade kontrol, Güvenirlik, Geçerlik, Sporcular

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Introduction

Human beings can be characterized as entities perpetually driven by purpose and the pursuit of motivation to realize their objectives throughout life. The motivation required in this process encompasses the factors that propel individuals to act toward accomplishing tasks (Ryan & Deci, 2000). In this context, achieving a state of motivation is considered crucial for realizing objectives. Indeed, maintaining determination and willpower is comparatively easier in situations that individuals find appealing and intrinsically motivating.

Willpower has been defined as the capacity for choice, decision-making, goal attainment, and self-control (Green & Cohen, 2004). The American Psychological Association (APA, 2012) characterized willpower as the ability to forgo short-term pleasures or rewards to achieve long-term objectives. Based on these definitions, it can be posited that the concept of willpower encompasses both affective and cognitive processes. Conceptually, the constituent processes of willpower can be enumerated as motivation, decision-making, selection, determination, responsibility, self-control, and reasoning (Okan, 2019). Motivation represents the driving force toward satisfying needs (Maslow, 1943). Decision-making behaviour, as part of this process, is the procedure of reducing uncertainty while selecting the most suitable option among alternatives (Tekin et al., 2009). Selection is the process of identifying an alternative from available options to achieve a specific goal (Simon, 1979). Determination is regarded as an indicator of consistency in decision-making processes and behaviours (Kelley, 1973). Responsibility is the capacity of individuals to assume the consequences of their own actions (Lerner & Tetlock, 1999), self-control is the ability of individuals to regulate their behaviours and impulses (Baumeister & Tierney, 2011), and reasoning signifies the capability to evaluate situations, compare potential solutions, and make inferences (Lai, 2011).

Within this framework, it can be asserted that these concepts are interrelated and collectively influential in the process of exerting willpower. Such concepts are particularly indispensable within the sporting environment. Ultimately, an athlete's success appears contingent not only on athletic performance but also on possessing the motivation to achieve goals, maintaining determination and consistency towards objectives, assuming responsibility, demonstrating self-control, and possessing reasoning abilities. In this context, a high level of willpower, alongside athletic performance, can be considered a significant determinant of success.

This is because willpower is directly related to athletes' ability to adhere to demanding training regimens, exhibit psychological resilience during competitive seasons, and commit to dietary and health-related plans. The concept of motivation is regarded as a crucial element enabling athletes to exercise willpower, a concept closely aligned with self-determination theory (Ryan & Deci, 2000; Hardy et al., 2020). Although there is existing measurement tools related to constructs closely associated with willpower—such as self-control, grit, or delay of gratification—these instruments often fail to capture the multidimensional structure of volitional regulation in sport-specific contexts. Therefore, the development of the current scale addresses a critical gap by offering a more domain-sensitive and theoretically grounded assessment of volitional control.

Developed by Deci and Ryan (1985), Self-Determination Theory (SDT) centres on how individuals' behaviours are guided by intrinsic and extrinsic motivations. The theory posits that fulfilling individuals' basic psychological needs for autonomy, competence, and relatedness enhances intrinsic motivation (Deci & Ryan, 2000). The need for autonomy refers to an individual's sense of control over their choices (Ryan et al., 2008); the need for competence relates to effectively interacting with one's environment (Deci & Ryan, 2000); and the need for relatedness signifies the requirement for meaningful social connections (Baumeister & Leary, 1995). Within the sports context, these three basic needs can be exemplified as follows: athletes acting according to their own volition during competition (autonomy); having opportunities to demonstrate their abilities and receiving resources for development (competence); and establishing effective relationships with teammates and coaches (relatedness). Fulfilling these basic psychological needs, in addition to enhancing athletic performance, may contribute to strengthening willpower and intrinsic motivation (Cheon et al., 2012; Standage & Ryan, 2020). While intrinsic motivation enhances the desire to engage in an activity independent of external rewards, willpower provides the self-discipline and resilience necessary to maintain commitment to these activities (Schunk & Zimmerman, 2008; Vallerand, 1997). In this context, athletes' intrinsic motivation concerning their efforts to improve performance and achieve goals represents an element that can strengthen their willpower (Silva et al., 2011). Stated differently, higher levels of intrinsic motivation among athletes may enable them to exhibit greater willpower (Ryan et al., 2008).

In essence, willpower—a vital component of mental resilience—is crucial for athletes to persevere through challenges, maintain focus, and adhere to rigorous training regimens. Activated by motivation and sustained through various cognitive processes, the effective exercise of willpower significantly influences athletic performance. Recognizing a gap in sports psychology specific to the Turkish context, the present study aimed to develop a valid and reliable measurement instrument designed to determine the extent to which athletes adhere to and sustain the necessary actions to achieve goals for which they are motivated. As a fundamental investigation, this research can contribute to the growing understanding of psychological factors in athletic success and establishes a basis for future work, such as refining the scale or exploring its applications across different sports or populations. The findings derived

from this tool are also intended to empower athletes by helping them identify specific areas where they face challenges in exercising willpower, thus providing opportunities for targeted self-improvement.

Method

Research Type

This research represents a significant effort to develop a scale for assessing willpower levels among athletes affiliated with various sports federations in Turkey. As a fundamental research endeavour, the study employed the summated rating scale construction technique, a well-established method in psychometric research, as outlined by DeVellis (2017). Such an approach involves designing a series of items, or statements, that athletes respond to on a Likert-type scale. The technique is valued for its simplicity, reliability, and ability to capture the intensity of a psychological trait, making it an appropriate choice for this foundational study.

Research Group

The research design incorporated two independent study groups to assess the willpower levels of athletes. This approach was adopted to strengthen the study's reliability and validity by allowing for comparative analysis between groups, reduce potential biases, and enhance the robustness of the findings. Exploratory factor analysis (EFA) was applied to the measurement model to identify underlying factors based on the relationships among variables and to establish an exploratory structure for theory generation. Data for the EFA were collected from the target population of athletes between January 15, 2025, and February 15, 2025. The sample for the EFA comprised 588 actively licensed athletes aged 18 years and older, whose descriptive information is presented in Table 1.

The EFA sample comprised 322 female athletes (54.8%) and 266 male athletes (45.2%). Among them, 305 (51.9%) participated in individual sports, while 283 (48.1%) engaged in team sports. Respecting their years of experience, 222 athletes (37.8%) had been actively licensed for 1-3 years, 133 (22.6%) for 4-6 years, 114 (19.4%) for 7-9 years, and 119 (20.2%) for 10 years or more.

Following EFA, confirmatory factor analysis (CFA) was conducted to evaluate the construct validity, including convergent and divergent validity, of the resulting final form. We aimed to ensure that participants within the independent groups exhibited a heterogeneous distribution concerning the measured trait. The data for the CFA were collected between March 1, 2025, and March 30, 2025, from licensed, actively competing athletes who voluntarily participated in the research. Descriptive statistics for the active athletes included in the CFA sample are listed in Table 1.

Table 1. Descriptive statistics for participants

		EFA samples		CFA samples	
		N	%	N	%
Gender	Female	322	54.8	341	56.1
	Male	266	45.2	267	43.9
Sport Category	Individual	305	51.9	310	51.0
	Team	283	48.1	298	49.0
Years of Athletic Experience	1-3 years	222	37.8	227	37.3
	4-6 years	133	22.6	137	22.5
	7-9 years	114	19.4	118	19.4
	>10 years	119	20.2	126	20.7
Total		588	100.0	608	100.0

To determine the psychometric construct validity of the Willpower Level Scale for Athletes (WLSA), data were collected from 608 active athletes in a separate sample from the EFA group. The CFA sample comprised 341 female (56.1%) and 267 male (43.9%) athletes. Among the participants, 310 (51.0%) competed in individual sports, while 298 (49.0%) engaged in team sports. Concerning athletic experience, 227 athletes (37.3%) had been actively licensed for 1-3 years, 137 (22.5%) for 4-6 years, 118 (19.4%) for 7-9 years, and 126 (20.7%) for 10 years or more. The CFA was conducted to evaluate the construct validity, including convergent and discriminant validity, of the final form derived from the EFA. The analyses were designed to ensure that participants within the independent groups exhibited a heterogeneous distribution concerning the measured trait.

Scale Development Process

Focus Group Interviews: To create the initial item pool, focus group interviews were conducted with 10 national-level athletes and 4 expert academics in the field. Convenience sampling, a qualitative research sampling method, was employed to select participants for these focus groups.

Essay Writing by Target Audience: To create the item pool, 38 actively licensed athletes (aged 18+) enrolled in the Faculties of Sport Sciences at MEU and MKU (Mersin University and Hatay Mustafa Kemal University) were asked to write essays responding to open-ended questions about their views and experiences as to the willpower levels in athletes.

Literature Review: Scale items from existing literature related to willpower and similar constructs (e.g., discipline, self-control) were systematically examined. This review contributed significantly to the item pool generation. Additionally, item writing was informed by analysing theories relevant to willpower, including Goal Setting Theory and Self-Determination Theory.

Content Validity Ratio (CVR) Analysis: After completing the preceding stages, the item pool and candidate scale were refined. The candidate text was read aloud to 8 active athletes for preliminary feedback. Based on this feedback, a 40-item candidate scale was developed, which was drafted according to

Lawshe's technique and distributed to 8 experts via email for evaluation based on representativeness and clarity. At an α = .05 significance level, the critical CVR value for 8 experts was .612 (Lawshe, 1975), so 3 items failed to meet this criterion, and 2 additional items were removed based on expert recommendations (Lawshe, 1975). Following the expert evaluation and content validity process, 10 items were removed from the initial 40-item form, and 5 items were added based on expert feedback, resulting in a 35-item candidate scale. Experts were also consulted regarding the rating scale format. Based on their input, a 7-point Likert-type rating scale (1: Does not describe me at all to 7: Describes me completely) was deemed most appropriate.

Application of the Candidate Scale: In accordance with expert opinions and the CVR analysis, the 35-item candidate scale using the 7-point rating scale was finalized, and then it was administered both face-to-face and via online platforms to 655 active athletes.

Data Analysis Techniques

Exploratory Factor Analysis and Confirmatory Factor Analysis: We conducted exploratory factor analysis and confirmatory factor analysis as part of the statistical analysis. To evaluate the reliability of the scale, Cronbach's α internal consistency coefficients and composite reliability values were calculated. Besides, assumption testing was conducted prior to the factor analyses. The collected 655 observations were examined for assumptions such as missing data, adequacy of the observation set, outliers, multicollinearity, factorability of the R matrix, normality, and linearity to assess their suitability for factor analysis. These assumption tests were applied separately for both observation groups (EFA and CFA samples).

EFA is often employed to uncover the underlying structure of a set of variables (Tabachnick et al., 2019). Determining an appropriate sample size in this analysis plays a critical role in ensuring the reliability and validity of the obtained results. Several researchers have offered different recommendations regarding the required sample size for EFA. Krichbaum et al. (2011) stated that at least 125 participants are necessary for a 25-item questionnaire, whereas Cheong et al. (2017) suggest a minimum participant-to-item ratio of five-to-one. Vielma-Aguilera et al. (2023) recommend at least 10 participants per scale item for both EFA and CFA, while Comrey and Lee (2013) indicate that more than 500 participants are sufficient for EFA during the scale validation process. In this context, the 655 observations obtained in the present study indicate that the required sample size was satisfied.

Comparison of central tendency measures—median, mode, and arithmetic mean—for the scale items revealed closely aligned values. This finding was interpreted as evidence of normal distribution, indicating that appropriate heterogeneity regarding the measured trait was achieved within the target population. A comprehensive outlier analysis was conducted on the initial 655 observations prior to executing Mahalanobis distance and Z-score analyses. Five observations from both the positive and negative extremes were eliminated, reducing the dataset to 645 observations before further assumption testing. Z-scores were utilized to evaluate the structure in multi-item scales, with scores typically considered acceptable within the range of -3 to +3 (Mertler et al., 2005). Upon examination of these Z-scores, 3 additional observations falling outside this range were excluded from subsequent analyses. The remaining Z-scores were found to range between -2.81 and 2.93, indicating acceptable univariate normality. To detect multivariate outliers, Mahalanobis distances were calculated and compared against the critical threshold derived from the Chi-square distribution ($\chi^2$35, 0.001 = 73.402). Based on this criterion, 54 observations exceeding the critical value were excluded from the analysis. Following these data screening procedures, the final analytical sample consisted of 588 observations, which were utilized for all subsequent analyses.

Testing of Statistical Assumptions: Aligned with Kara et al.'s (2023) assertion that achieving perfect linearity between two variables is virtually impossible; the analyses proceeded under the assumption that the existing relationships were sufficiently linear. Concerning the normality assumption, items were examined individually, with central tendency measures alongside skewness and kurtosis coefficients being evaluated. The proximity of the central tendency measures suggested that univariate normality was achieved (Can, 2018). For the 35 items in the scale, skewness values ranged from -0.957 to -0.172, and kurtosis values ranged from -0.586 to 0.566. Given that skewness coefficients between -3.3 and +3.3 and kurtosis coefficients between -7 and +7 are considered acceptable for normality (Bernstein, 2000), it can be concluded that the data adequately satisfied the normality assumption.

To identify potential multicollinearity issues, Tolerance and Variance Inflation Factor (VIF) values were examined. For the 35 items, Tolerance values ranged from .272 to .693, and VIF values ranged from 1.443 to 3.866. As all Tolerance values exceeded .20 and all VIF values were below 5, it was determined that no multicollinearity problem existed among the items in the dataset, justifying the retention of all items for subsequent analysis (Tabachnick & Fidell, 2015).

In the developed model, correlation between error terms at different points, known as autocorrelation, can increase the risk of Type I error (Jenson et al., 2007). The assessment conducted for this purpose yielded a Durbin-Watson (D-W) value of 2.292. This result, being close to the ideal value of 2 that indicates no autocorrelation, supported the conclusion that the error terms were independent (Kalaycı, 2010).

Assessment of Factor Analysis Suitability: In analyses conducted to determine the factorability of the R matrix, a crucial prerequisite for factor analysis, the results of the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test

of Sphericity were evaluated. The calculated KMO value of .91 indicated that the data were highly suitable for factor analysis and that the sampling adequacy was excellent. According to Hutcheson and Sofroniou (1999), KMO values between 0.5 and 0.7 are considered mediocre, 0.7 to 0.8 good, 0.8 to 0.9 great, and 0.9 or above are deemed excellent (Dağlı, 2015). Thus, the obtained KMO value of .91 was concluded to demonstrate excellent sampling adequacy. In addition, Bartlett's Test of Sphericity, which examines whether inter-item correlations differ significantly from zero, rejected the null hypothesis (χ^2 = 4059.149; $p < .05$), confirming that significant correlations existed among the items. This statistical significance ($p < .05$) supports the presence of a structure suitable for factor analysis (Gürbüz & Şahin, 2014). The KMO value of .91 better substantiates that the correlation matrix generated from the study group's data is highly factorable.

Confirmatory Factor Analysis Preparation: Prior to conducting CFA, the scale—now comprising 15 items following EFA—was administered again to the target population of active athletes. Comprehensive assumption analyses were initially performed on the 642 observations obtained. These analyses included checks for missing data, linearity, normality, sample size adequacy, and potential multicollinearity issues.

Following missing data analysis, the normality assumption was evaluated by examining central tendency measures (mode, median, and arithmetic mean) and their relative positions. The proximity of these values confirmed that the condition of univariate normality was met. Outlier analyses identified 5 observations each from the highest and lowest extremes, which were subsequently excluded, leaving 632 observations. Analysis of skewness and kurtosis values for these remaining cases revealed that skewness values generally indicated a negative distribution, ranging from -1.019 to -0.146, while kurtosis values ranged from -0.537 to 0.550. While skewness coefficients are typically recommended to fall within the ±1 range for optimal univariate normality (Göldağ, 2019), values between -3.3 and +3.3 are widely considered acceptable (Bernstein, 2000); thus, the results indicate the normality assumption was adequately satisfied.

To examine outliers to a greater extent, both Mahalanobis distances (for multivariate outliers) and Z-scores (for univariate outliers) were analysed. Based on the critical value for Mahalanobis distances ($\chi^2_{15,0.001}$ = 37.697), an additional 24 observations exceeding this threshold were excluded. The Z-scores for the remaining cases ranged from -3.59 to 2.46, and the analysis proceeded with these 608 observations.

To detect potential multicollinearity problems in the CFA sample, VIF and Tolerance values were calculated. Inter-item VIF values ranged from 1.49 to 2.409, and Tolerance values ranged from .415 to .670. As all Tolerance values exceeded 0.20 and all VIF values remained below 5, it was determined that no multicollinearity problem existed. Based on these comprehensive assumption analyses and considering the criteria recommended by Tabachnick and Fidell (2015), the final dataset of 608 observations was deemed appropriate for CFA implementation. Following these preparatory analyses, CFA was applied using the dataset comprising 608 observations and the 15-item scale form. Within the scope of CFA, analyses were conducted to determine the estimated error variances and standardized loading values for the items, as well as to evaluate goodness-of-fit criteria.

Ethical Statement

The ethical suitability of the research was approved by Nişantaşı University Rectorate Ethics Committee with decision 2023/38 at a meeting dated 29.09.2023. This study was conducted in strict compliance with the ethical standards and principles established by the Declaration of Helsinki, ensuring the protection of participants' rights, autonomy, and well-being throughout the research process.

Findings

EFA Results

Within the scope of the exploratory factor analysis (EFA), 655 observations were initially obtained, however this number was reduced to 588 following assumption testing. The explained communality values, which indicate the extent to which variables are represented by the factors, were determined to range between .437 and .747. In the relevant literature, it is generally accepted that item communality values below 0.10 may indicate an issue (Büyüköztürk, 2022), although it should also be emphasized that relying solely on communality values is not sufficient justification for decision-making. Based on the view that obtaining more comprehensive information about the contribution of items to the measurement is beneficial (Çokluk et al., 2012), additional methods such as the Scree Plot, Percentage of Total Variance Explained, Kaiser's Criterion (Eigenvalue > 1), and the Explained Variance Criterion were included in the analysis process to clarify the factor structure. As stated by Cattell (1966), assuming the plateau reached in the plot represents the start of trivial factors, each point before the plateau indicates a significant factor.

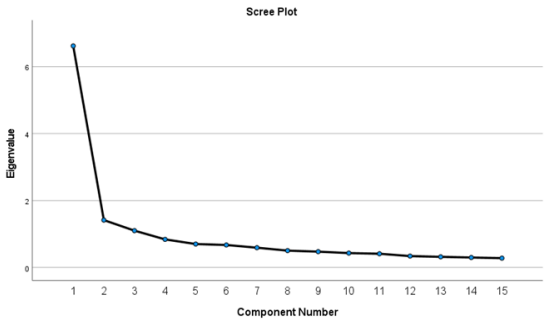

Figure1. Scree Plot

Accordingly, examining the scree plot presented in Figure 1, a rapid decrease was observed from the first component onwards, and the slope markedly decreased after the third point, indicating the beginning of a plateau. According to Cattell's Scree Test, this suggests the prominence of a 3-factor structure. Specifically, the curve beginning to follow a horizontal course from the fourth component onwards indicates that the first three factors carry significant variance and represent the underlying structure of the scale. In this context, it can be stated that the Willpower Level Scale for Athletes (WLSA) in sports consists of a 3-factor structure. To base the evaluations on more objective grounds and pre-empt potential criticisms, the table of explained variance was also included.

The percentage of total variance explained method, one of the techniques used to determine the number of factors, is a frequently employed statistical criterion for assessing the extent to which the overall variability in a data set is explained by different factors. According to this method, when the contribution of an added factor to the total variance drops below 5%, the model is considered to have reached the optimal number of factors (Kalaycı, 2010). The results presented in Table 2 support the presence of a three-factor structure based on this criterion.

Table 2. Total variance explained

Component	*Initial Eigenvalues*			*Extraction Sums of Squared Loadings*		
	Total	*% of Variance*	*Cumulative %*	*Total*	*% of Variance*	*Cumulative %*
1	6.620	44.134	44.134	3.637	24.245	24.245
2	1.416	9.443	53.577	2.965	19.766	44.011
3	1.101	7.340	60.918	2.536	16.907	60.918
15	.279	1.862	100.000			

According to Kaiser's criterion, factors with an eigenvalue greater than 1 are recommended for inclusion in the model. Although four factors in the current dataset appear to have eigenvalues greater than 1, the eigenvalue of the fourth factor is very close to this threshold and is marginal. Therefore, the significance of the fourth factor was considered debatable. Çokluk et al. (2012) state that in cases where an eigenvalue is borderline, one should not rely solely on numerical thresholds; it is sounder for the researcher to decide by considering the theoretical framework, graphical breaks—such as those in the scree plot, and the overall measurement model.

The result of the factor analysis, where the three-factor structure explained 60.918% of the total variance, indicates that it falls within acceptable limits for the social sciences (Tabachnick & Fidell, 2013). The first factor explains 44.134% of the variance, the second factor 9.443%, and the third factor 7.340%; each has an eigenvalue greater than 1. These findings are consistent with the variance criteria suggested in the literature (Büyüköztürk, 2018; Demir, 2023) and demonstrate that the scale provides a sufficient level of evidence for construct validity. The items not included in the analysis and the reasons for their exclusion are presented in Table 3.

Table 3. Items Removed from Exploratory Factor Analysis and Reasons for Removal

Items with Communalities < 0.30	*Items with Factor Loadings < 0.40*	*Cross-loading Items (Difference between highest two loadings < 0.10)*	*Rational Reasons (Factor Naming, Phrasing/Clarity)*
17,18,26	16,19,30	12,13,14,21,22,24,25 27,28,31,32	33,34,35

Within the scope of the EFA conducted, various items had to be excluded from the analysis to enhance the structural integrity of the measurement tool and achieve a statistically more robust structure. Items numbered '17, 18, and 26', which had communality coefficients below 0.30, and items '16, 19, and 30', which did not show sufficient loading (below 0.45) on any factor, were removed. In addition, items '12, 13, 14, 21, 22, 24, 25, 27, 28, 31, and 32', which loaded at similar levels on different factors (i.e., the difference in loadings was less than 0.10), making discrimination between structures difficult, were considered cross-loading items and were excluded from the analysis. Besides, items '33, 34, and 35' were also deemed appropriate for removal from the scale due to reasons such as content inconsistency or weak conceptual fit (related to factor naming, language, and expression). Therefore, the semantic integrity and measurement validity of the statements in the scale were supported, and a more robust factor structure was established. The final list of items obtained, along with the communality values for each retained item, are presented in detail in Table 4.

Table 4. Item communalities, factor loadings, and factor assignments

Item No	*Item*	*Factor 1*	*Factor 2*	*Factor 3*	*Common Factor Variance (h^2)*	*Item Factor Total Test Correlation*	*Cronbach's Alfa if Item Deleted*
1	I continue with my training even if the program is challenging			.831	.712	.598	.901
3	I adhere to the training program even if my performance declines.			.750	.670	.710	.897
4	I persistently work on techniques that are difficult to execute.			.714	.672	.716	.898
29	I participate in training sessions even when tired.			.681	.564	.610	.901
15	I adhere to my training program even when feeling demoralized.			.628	.560	.678	.898
2	Negative criticism I receive does not deter me from training.			.536	.450	.538	.904
9	Negative spectator pressure during a match does not affect my performance.		.783		.684	.607	.901
11	I am not daunted by my opponent's strengths.		.714		.643	.657	.899
10	Problems experienced with other athletes do not daunt me.		.696		.683	.869	.898
23	Provocations from my opponents do not affect my performance.		.640		604	.681	.899
20	I am not affected by unfavorable referee decisions.		.607		.524	.515	.904
7	I adhere to the dietary rules I am required to follow.	.812			.686	.499	.905
6	I resolutely continue training to maintain my physical fitness.	.708			.747	.716	.897
5	I strive to maintain my weight.	.689			.501	.375	.910
8	I abandon detrimental habits for the sake of my athletic success.	.592			.437	.491	.905
	Explained Variance Values (%)	%16.907	%19.766	%24.245	%60.918		
	Cronbach's Alpha Values	%75	% 83	%86	%90		

The communalities (h^2), factor loading values for the items, and their respective factor structure are presented in detail in Table 5. According to the analysis findings, the total variance explained was 60.918%; it can be stated that this value indicates the factor structure adequately explains the total variance. Regarding the explained variance proportions, factor 1 contributed 24.245%, factor 2 19.766%, and factor 3 16.907%. This indicates that the items in the scale loaded significantly onto the factor structure and that the sub-dimensions are distinctly structured (Kline, 2015).

The Corrected Item-Total Correlation values indicate the degree to which each item correlates with the total score excluding that item. Values above .40 are generally considered acceptable, reflecting adequate item discrimination (DeVellis, 2017). In this analysis, all items—except Item 5 (.375)—met or exceeded this threshold. The Cronbach's Alpha if Item Deleted values demonstrate the internal consistency of the scale if a given item were removed. Since the alpha values remain stable across items and do not substantially increase when any item is deleted, all items appear to contribute meaningfully to the overall reliability (Tavşancıl, 2014).

In the reliability assessments, Cronbach's α coefficients were calculated as .86 for the first factor, .83 for the second factor, .75 for the third factor, and .90 for the overall scale. From a psychometric perspective, these values indicate that the items in the scale possess a high level of internal consistency (Tabachnick & Fidell, 2013). The fact that both the levels of explained variance and the internal consistency coefficients fall within acceptable limits supports the structural validity of the developed scale. The naming of each sub-dimension, the number of items per factor, and their reliability levels, determined by considering the items' relationships with their respective factors, their wording, and their conceptual coherence with the literature, are presented in Table 5.

Table 5. Factor names and reliability coefficients

Factor	*Factor Name*	*Number of Items*	*Cronbach's Alpha*
Factor 1	Stability	6	.86
Factor 2	Emotional control	5	.83
Factor 3	Physical control	4	.75
Overall Scale / Total			.90

The data presented in Table 5 display the reliability coefficients along with the number of items designated for the three sub-dimensions of the scale. The Cronbach's α value of .86 obtained for the Stability sub-dimension indicates that this dimension is highly reliable. The coefficient for the Emotional Control dimension was .83, a value considered sufficient for measurement consistency. The reliability coefficient for the Physical Control sub-dimension was .75, which is generally regarded as an acceptable threshold in psychological measurement instruments. The calculated α value for the entire scale was .90, demonstrating that the scale possesses a reliable structure overall. In psychological measurement instruments, α coefficients above .70 are generally considered adequate; values of .80 and above are regarded as high, while values of .90 and above indicate a very strong level of internal consistency (Tavşancıl, 2014; Büyüköztürk, 2022).

CFA Results

Based on the confirmatory factor analysis (CFA), the standardized loading values ranged from .536 to .831 for factor 1, from .607 to .783 for factor 2, and from .592 to .812 for factor 3. The t-values for all items in the three-factor CFA model exceeded the ±1.96 threshold, indicating statistical significance. This demonstrates that the items within the *Stability*, *Emotional Control*, and *Physical Control* dimensions loaded significantly onto their respective factors. As noted in the literature, t-values outside this threshold are considered statistically significant (Kara et al., 2023). Therefore, each item exhibits a strong relationship with its corresponding factor, reflecting high item discriminability, which further supports the construct validity of the measurement instrument and confirms that it accurately assesses the intended theoretical constructs. The t-values for the 15 items included in the analysis demonstrate a consistent and valid structure within the model, as illustrated in the path diagrams below—the standardized loading values and t-values for the items are presented in Figure 2 and Figure 3, respectively, to support these analysis results.

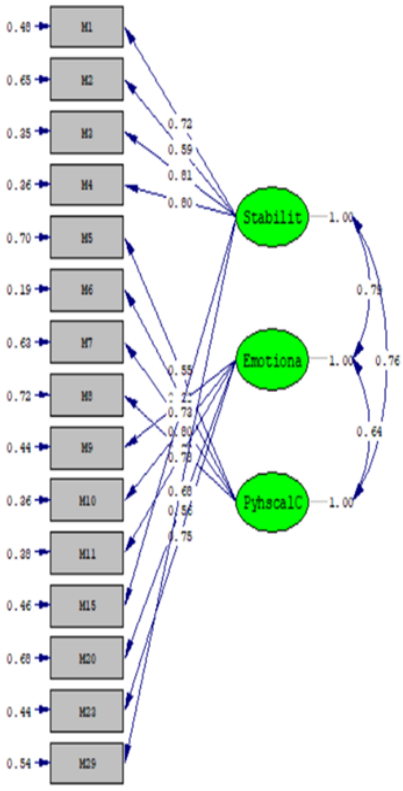

Figure 2. Standardized estimates for the tested model

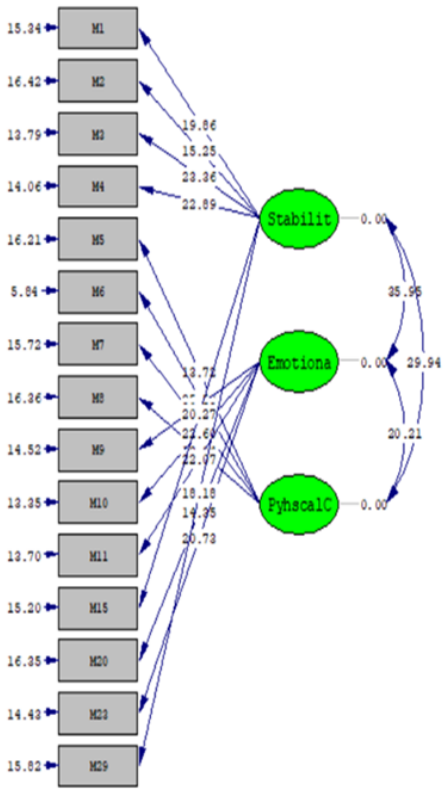

Figure 3. T-values for parameter estimates (p<=.05)

In the model presented in Figure 2, each item exhibits a significant and consistent relationship with its corresponding factor. Similarly, Figure 3 indicates that all t-values for these items exceed the ±1.96 threshold, confirming their statistical significance. Collectively, these findings demonstrate the scale's discriminative power at the item level and provide evidence of its construct validity (Hair et al., 2014). Likewise, a comprehensive evaluation of the model's goodness-of-fit criteria and the overall analysis results strongly confirms the proposed structure within the study sample.

Table 6. Goodness-of-fit criteria and obtained values

Goodness-of-fit index	*Perfect Fit*	*Good or Acceptable Fit*	*Value Achieved*
χ^2/df	< 2	< 5	4.46
RMSEA	0 ≤ RMSEA ≤ .05	.05 < RMSEA ≤ .08	.07
SRMR	0 ≤ SRMR ≤ .05	.05 < SRMR ≤ .10	.05
NFI	.95 ≤ NFI ≤ 1.00	.90 ≤ NFI < .95	.97
NNFI	.97 ≤ NNFI ≤ 1.00	.95 ≤ NNFI < .97	.97
CFI	.97 ≤ CFI ≤ 1.00	.95 ≤ CFI < .97	.97
GFI	.95 ≤ GFI ≤ 1.00	.90 ≤ GFI < .95	.92
AGFI	.90 ≤ AGFI ≤ 1.00	.85 ≤ AGFI < .90	.89

The evaluation of model fit for the proposed confirmatory factor analysis yielded a χ^2/df ratio of 4.46 (χ^2 = 387.86, df = 87). Although the Chi-square statistic is known to be sensitive to sample size, this ratio falls within acceptable limits, as supported by established guidelines (Kline, 2014; Sümer, 2000). Complementing this finding, additional goodness-of-fit indices confirm the adequacy of the model. The values obtained were as follows: Root Mean Square Error of Approximation (RMSEA) = .075, Standardized Root Mean Square Residual (SRMR) = .052, Normed Fit Index (NFI) = .97, Non-Normed Fit Index (NNFI) = .97, Comparative Fit Index (CFI) = .97, Goodness of Fit Index (GFI) = .92, and Adjusted Goodness of Fit Index (AGFI) = .89. These indices collectively fall within ranges indicative of a good fit, thereby confirming the validity of the model for the given sample (Jöreskog & Sörbom, 1993). Consequently, the measurement instrument, designed with a 3-factor structure comprising 15 items, demonstrates a significant and adequate level of model fit.

Table 7. Convergent and discriminant validity and CR Values for the scale

Factors	*AVE*	*MSV*	*ASV*	*CR*
1	0.56	0.43	0.12	0.86
2	0.58	0.46	0.12	0.83
3	0.50	0.29	0.12	0.75
Index	AVE>.50 CR>AVE	MSV<AVE	ASV<MSV	CR>.70

(Cronbach's alpha for the entire scale: .90)

To confirm convergent validity, it is generally recommended that the Average Variance Extracted (AVE) exceeds 0.50 and that the Composite Reliability (CR) is higher than the AVE (Yaşlıoğlu, 2017). In the current study, this criterion (CR > AVE) was fulfilled across all three dimensions. Regarding discriminant validity, especially in multi-dimensional scales, several criteria are applicable. One such criterion, which requires that the Average Shared Variance (ASV) remains lower than the Maximum Shared Variance (MSV), was also satisfied (ASV < MSV). These findings collectively indicate that discriminant validity was achieved. Moreover, all CR values surpassed the commonly accepted threshold of 0.70.

Conclusion

This study was designed to develop a measure to assess athletes' abilities to sustain determination, self-discipline, and motivation when faced with challenging conditions. The development of the scale was thorough, involving focus group interviews, extensive literature reviews, and expert evaluations to ensure a robust foundation. Through exploratory factor analysis, a three-factor structure emerged—comprising Stability, Emotional Control, and Physical Control—which was later validated using confirmatory factor analysis.

Stability sub-dimension captures an athlete's capacity to exhibit consistency and persistence in pursuing their goals. It reflects the ability to engage in planned and sustained efforts toward long-term objectives, as noted by Kelley (1973). Items within this factor demonstrate that athletes remain dedicated to their training programs despite difficulties, adhere to their goals even when motivation dips, and maintain steady training efforts over time.

Emotional Control addresses an athlete's ability to manage emotional responses under stress and pressure, thereby preserving performance levels (Baumeister, Vohs, & Tice, 2007). The items here emphasize maintaining emotional equilibrium and focus in the presence of external challenges, such as spectator pressure, superior opponents, or unfavourable referee decisions.

Physical Control sub-dimension relates to an athlete's discipline in maintaining lifestyle habits—such as sleep, nutrition, and avoidance of harmful behaviours—essential for physical preparedness (Bandura, 1991). Items in this category highlight adherence to training and nutrition plans, avoidance of unhealthy habits, and self-regulation of physical preparation processes.

The resulting scale utilizes a 7-point Likert format, ranging from 1 ("Does Not Describe Me at All") to 7 ("Describes Me Completely"), enabling precise self-assessment of these attributes (DeVellis, 2017; Tavşancıl, 2014). The scale's construct validity is supported by acceptable model fit indices: $\chi^2/df = 4.46$, RMSEA = .075, CFI = .97, SRMR = .052, NFI = .97, NNFI = .97, GFI = .92, and AGFI = .89. The scale exhibits strong internal consistency, with Cronbach's α coefficients of .86 for Stability, .83 for Emotional Control, .75 for Physical Control, and .90 for the overall scale. These results establish the scale as a reliable and valid instrument for measuring willpower levels among athletes.

Recommendations

The Willpower Level Scale for Athletes (WLSA), developed in this study, is a valid and reliable instrument for assessing an athlete's determination, self-discipline, and self-regulation skills across three dimensions. Future research could conduct comparative examinations of how this scale functions across different age groups and performance levels. An investigation into the relationship between motivation levels, within the framework of self-determination theory, and willpower levels may also prove insightful.

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Conflict of Interest

There is no conflict of interest among the authors related to publication of this article.

Author Contributions

Research Idea: NSK; Research Design: NSK, NBU; Data Collection: NSK, GL; Data Analysis: NSK, NBU; Writing: NSK, NBU, GL; Critical Review: NBU, NSK, GL

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The Intersection of Recreational Benefits and Sport Well-Being in Fitness Participation: A Relational Analysis

Fitness Katılımında Rekreasyonel Faydalar ve Spor İyi Oluş Kesişimi: İlişkisel Bir Analiz

Research Article / Araştırma Makalesi

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Abstract

The aim of this study was to examine the relationship between the recreational benefits of fitness participation and individuals' levels of sport well-being. The study was conducted with 500 volunteer participants (263 women and 237 men) who were engaged in fitness activities at private fitness centers in Ankara. A relational survey model, one of the quantitative research methods, was employed. Data were collected using the Recreation Benefit Scale (RBS) developed by Ho (2008) and validated by Akgül et al. (2018), and the Recreational Sport Well-Being Scale (RSWBS) developed by Pi, et al. (2022) and adapted into Turkish by Koç (2022). In addition to descriptive statistics, Pearson correlation analysis was used to examine the relationships between the scales. Furthermore, independent samples t-tests and one-way analysis of variance (ANOVA) were conducted to identify differences between groups based on demographic variables. The findings revealed a positive and significant correlation between the RBS and the RSWBS. Moreover, male participants reported significantly higher scores in perceived physical and psychological benefits compared to female participants. Significant increases were also observed in recreational benefits and well-being levels in relation to age and duration of fitness participation. In conclusion, it was determined that participation in fitness activities positively contributed to individuals' sport well-being by enhancing their perceptions of physical, psychological, and social benefits.

Keywords: Leisure benefits, Sport well-being, Fitness participants

Öz

Bu araştırmanın amacı, fitness katılımının rekreasyonel faydaları ile bireylerin spor iyi oluş düzeyleri arasındaki ilişkiyi incelemektir. Çalışma, Ankara ilindeki özel fitness merkezlerinde fitness yapan 500 gönüllü birey (263 kadın, 237 erkek) ile gerçekleştirilmiştir. Nicel araştırma yöntemlerinden ilişkisel tarama modeli kullanılmıştır. Veriler, Ho (2008) tarafından geliştirilen ve Akgül vd. (2018) tarafından geçerlilik-güvenirliği sağlanan Rekreasyon Fayda Ölçeği (RFÖ) ile Pi ve diğerleri (2022) tarafından geliştirilen ve Koç (2022) tarafından Türkçeye uyarlanan Rekreasyonel Spor İyi Oluş Ölçeği (RSİOÖ) aracılığıyla toplanmıştır. Verilerin analizde betimsel istatistiklerin yanı sıra, ölçekler arası ilişkileri belirlemek amacıyla Pearson korelasyon analizi, demografik değişkenlere göre gruplararası farkları belirlemek için bağımsız örneklem t-testi ve tek yönlü varyans analizi (ANOVA) uygulanmıştır. Bulgular, RFÖ ile RSİOÖ arasında pozitif ve anlamlı bir ilişki olduğunu göstermiştir. Ayrıca erkek bireylerin fiziksel ve psikolojik fayda algılarında kadınlara kıyasla daha yüksek skorlar elde ettiği, yaş ve fitness yapma süresi arttıkça rekreasyonel fayda ve iyi oluş düzeylerinde anlamlı artışlar gözlemlendiği belirlenmiştir. Sonuç olarak, fitness katılımının bireylerin fiziksel, psikolojik ve sosyal fayda algılarını geliştirerek spor iyi oluş düzeylerini olumlu yönde etkilediği tespit edilmiştir.

Anahtar Kelimeler: Rekreasyon fayda, Spor iyi oluş, Fitness katılımcıları

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Introduction

In contemporary society, in response to the increasing physical activity demands of individuals, a variety of sports facilities are becoming widespread in both indoor and outdoor settings (Güdül & Ocak, 2022). Sports and fitness centers have become a significant part of the service sector, experiencing rapid growth in Turkey and globally (Tel et al., 2019). The activities provided in these facilities encompass physical exercises that individuals participate in, enjoy, and benefit from in numerous ways. With the effects of industrialization and urbanization, individuals are increasingly adopting more sedentary lifestyles, which further amplifies the need for physical activity (Kaya, 2019).

Recreation refers to a range of activities that individuals engage in voluntarily during their free time, with the aim of personal development and self-improvement (Karaküçük & Akgül, 2016). The impacts of recreational activities are commonly examined across physical, psychological, and social dimensions. The literature frequently highlights their significant contributions to life satisfaction and subjective well-being (Sirgy et al., 2017; Güzel, 2021). Regular physical activities such as fitness have been found to positively influence both physiological health and mental well-being (ACSM, 2024; Türksoy et al., 2011). Physical benefits include maintaining physical appearance, gaining energy, enhancing skills required for various activities, achieving regular rest, relieving fatigue, and the release of extra energy (Chen, 2001). Psychological benefits are associated with escaping life pressures, experiencing emotional relaxation, engaging in creative thinking, achieving mental and physical calmness, and deriving enjoyment from life (Chen, 2001). Through recreational activity experiences, individuals can develop a sense of freedom and benefit from expressing themselves and their emotions (Serçek & Özaltaş Serçek, 2015). Social benefits encompass forming new friendships and relationships, understanding others' emotions, and gaining the trust of others (Chen, 2001). Group-based recreational activities also create environments that fulfill social needs, leading to increased feelings of satisfaction among participants (Okuyucu & Ramazanoğlu, 2006).

Fitness participation is not only limited to physical development; it also enhances the individual's endurance and provides psychological benefits (Özkan, 2013). The positive effects of recreational sports activities also manifest in areas such as decreased stress, strengthened social relations, and increased life satisfaction (Kürkcü Akgönül et al., 2023). For example, a study conducted with parents participating in baby gym practices in Ankara revealed that psychological leisure benefits are more dominant than social and physical benefits (Ayyıldız & Karaküçük, 2017). It has also been observed that short-term recreation programs reduce negative mood and improve positive emotional components and physiological indicators (Bielinis et al., 2019). Since the 1960s, there has been considerable debate surrounding the definition of "well-being" (Ryan & Deci, 2001). The concept of well-being refers to an individual's overall quality of life and does not merely indicate the absence of illness but also encompasses positive experiences across various aspects of life (Göcen, 2012). Well-being has been defined as "optimal psychological functioning and experience" (Ryan & Deci, 2001). Understanding that well-being can be maintained in diverse ways has led to the development of multidimensional approaches to the study of well-being (Coffey et al., 2014).

Psychological well-being is closely linked to individuals' capacity to cope with life's challenges, set meaningful life goals, and build sustainable social relationships (Keyes et al., 2002). Physical well-being refers to the degree to which an individual is capable of building and maintaining physical health (Inoue et al., 2015). Butler and Kern (2016) conceptualize physical health as a person's self-perception of their physical condition and the satisfaction they derive from their overall physical state. It is appropriate to equate physical health with physical well-being (Kumai, 2024), as it is significantly associated with the five elements of well-being proposed by Seligman (2011): positive emotion, engagement, relationships, meaning, and accomplishment (Butler & Kern, 2016).Within this framework, well-being—defined as a multidimensional construct encompassing emotional, mental, and physical health—is regarded as a fundamental component of quality of life (Aldridge & McChesney, 2018).

Recreational sport well-being refers to the physical, psychological, social, and emotional well-being that individuals attain through voluntary participation in sport-based recreational activities during their leisure time. This concept represents a sport-oriented extension of the subjective well-being model and supports individuals in enhancing both physical and mental health, strengthening social bonds, and experiencing positive emotions (Pi et al., 2022). Recreational sport well-being is examined through four sub-dimensions: physical and mental health, life satisfaction, development of family relationships, and positive emotions. The "physical and mental health" component encompasses benefits such as the alleviation of physical pain, reduction of obesity, prevention of osteoporosis, and improvement in sleep quality through fitness activities. Particularly, physical exercises like fitness, which are widely practiced, play a crucial role in bone development and preservation. Appropriate weight-bearing and resistance exercises can increase muscular strength and reduce bone mineral loss (Henwood, 2006).

The "life satisfaction" component refers to the reduction of daily life stress through exercise and contributes to experiencing life in a more energetic and fulfilling way. During exercise, individuals must focus on their bodily movements and breathing, which reduces physical manifestations of stress and

fosters an effective mechanism for coping with tension (Shephard, 1997).

The "development of family relationships" dimension reflects the positive effects of exercise on family bonding. Engaging in enjoyable physical activities together strengthens family unity and enhances the quality of familial relationships (Chen & Chen, 2010). The "positive emotions" dimension refers to the potential of physical activity to generate happiness. During exercise, certain chemicals released by the brain help individuals feel mentally better and emotionally uplifted (Huang et al., 2017). In summary, the concept of recreational sport well-being reflects a multidimensional process of well-being that promotes not only physical gains through sport but also psychosocial integrity (Koç, 2022).

This study is grounded in Martin Seligman's Positive Psychology Approach, aiming to explore the relationship between fitness participants' perceptions of leisure benefits and their levels of sport well-being. The PERMA model, developed by Seligman (2011), consists of five core components: Positive Emotion, Engagement, Positive Relationships, Meaning, and Accomplishment. Firstly, positive emotions not only enhance one's overall well-being but also contribute positively to physical health, the quality of social relationships, psychological resilience, and life satisfaction (Cohn & Fredrickson, 2009). Engagement, in this context, refers to the emotional attachment an individual forms with a person, object, or activity. Active involvement in a particular activity and developing an interest in it are considered integral aspects of engagement (Khaw & Kern, 2015). Positive relationships constitute another fundamental element in the model. This component emphasizes the importance of utilizing social support systems when coping with life's challenges (Butler & Kern, 2016). The meaning dimension relates to the individual's pursuit of a purposeful and valuable life direction. This can manifest through involvement in volunteer activities or efforts directed toward a cause greater than oneself (Kun et al., 2017). Finally, the accomplishment component is defined by achieving goals and experiencing positive outcomes throughout that process. The accomplishments attained by the individual are not only acknowledged by others but also foster a sense of personal competence and inner satisfaction (Khaw & Kern, 2015). This model offers a comprehensive framework for understanding overall well-being in individuals' lives through participation in sport and recreational activities (Seligman, 2011, Seligman, 2018).

Research has shown that fitness practices positively affect a wide range of well-being indicators, including coping with stress (Ersöz et al., 2023), life satisfaction (Yıldız, 2025), social support (Chen & Chen, 2010), and positive emotional states (Huang et al., 2017). Moreover, the sub-dimensions of the PERMA model—positive emotions, engagement, positive relationships, meaning, and accomplishment—structurally overlap with the sub-dimensions of sport-related well-being, such as physical and mental health, development of family relationships, and life satisfaction. In particular, the "positive emotions" component corresponds to the "positive affect" dimension in sport well-being; "positive relationships" align with "family relationships"; and the "meaning" and "accomplishment" components correspond respectively to "life satisfaction" and "psychological health" (Butler & Kern, 2016; Coffey et al., 2014; Kun et al., 2017).

In this context, the primary aim of the study is to examine the relationship between the physical, psychological, and social benefits experienced by individuals who engage in fitness activities and their levels of recreational sport well-being, adopting a holistic perspective. While the effects of fitness on health and motivation have been widely explored in the existing literature (Kilpatrick et al., 2005; Teixeira et al., 2012; Liu et al., 2023), studies specifically focusing on the leisure benefits of fitness participants remain limited (Ertüzün et al., 2020). Quantitative research on the concept of recreational sport well-being within the Turkish context is scarce (Kırtepe & Çetinkaya, 2024; Yavuz & İlhan, 2023). This study is considered to address a significant gap in the literature, as it represents one of the first systematic approaches to examine both the leisure benefits and the well-being of fitness participants in conjunction with recreational sports. Accordingly, the hypotheses of the study are as follows:

H1: There is a statistically significant positive relationship between the scores of individuals engaged in fitness activities on the Leisure Benefit Scale (LBS) and the Recreational Sport Well-Being Scale (RSWBS), including their respective sub-dimensions.

H2: There are statistically significant differences in LBS and RSWBS scores of individuals who engage in fitness activities based on demographic characteristics such as sex and age.

H3: As the duration of fitness participation in years, the number of days per week, and the amount of time spent per week increase, significant increases are observed in individuals' LBS and RSWBS scores.

The existing literature emphasizes that physical activity contributes significantly to individuals' well-being by enhancing their capacity to cope with stress, fostering self-efficacy, facilitating social bonding, and promoting a sense of meaning (Cohn & Fredrickson, 2009; Ryan & Deci, 2001). Additionally, demographic factors such as age, sex, educational background, and income level have been found to influence physical activity habits, which in turn create variations in individuals' well-being outcomes (Göcen, 2012; Serçek & Serçek, 2015). Furthermore, studies indicate that longer and more frequent participation in physical exercise is associated with increased positive affect, greater life satisfaction, and a stronger sense of self-actualization (Deci & Ryan, 2001; Huang et al., 2017). Based on these findings, it is expected that higher levels of fitness participation will be positively related to individuals' perceived recreational benefits and levels of sport-related well-being, which theoretically supports the hypotheses tested in this study.

Method

Research Design

This study was structured in accordance with the relational survey model, one of the quantitative research methods. The relational survey model is a descriptive research design that not only depicts the current situation but also aims to reveal the direction and strength of the relationships between multiple variables (Karasar, 2020). No structural equation modeling (SEM) was conducted, as the study focused on examining correlational relationships rather than testing predictive or causal models.

Research Group

All demographic characteristics of the participants are presented in Table 1. As seen in the table, the sample consisted of females (52.6%) and males (47.4%). Most participants were aged between 24–35 years (64.8%), single (68.8%), and reported having a medium income level (72.8%). In terms of education, high school graduates (47.2%) and bachelor's degree holders (40.4%) made up the largest groups.

Regarding occupation, the main categories were students (36.6%), private sector employees (28.6%), and public sector employees (23.4%). Most participants reported exercising 4–9 hours per week (73.2%) and 3–4 days per week (55.4%). With respect to fitness experience, 47.4% had been participating for 1–2 years and 41.8% for 3–4 years. Concerning leisure activities, the most common preferences were social activities (24.2%) and physical activities (21.4%).

Table 1. Demographic variables of the participants

	Variable	*f*	*%*
Sex	Male	237	47,4
	Female	263	52,6
Age	18-23	129	25.8
	24-29	196	39.2
	30-35	128	25.6
	36 and above	47	9.4
Marital Status	Married	156	31.2
	Single	344	68.8
Educational Level	Primary/Secondary School	44	8.8
	High School	236	47.2
	Bachelor's Degree	202	40.4
	Master's/Doctorate Degree	18	3.6
Perceived Income Level	Low	84	16.8
	Medium	364	72.8
	High	52	10.4
Occupation	Student	183	36.6
	Private Sector Employee	143	28.6
	Public Sector Employee	117	23.4
	Retired / Homemaker	25	5.0
	Other	32	6.4
Weekly Duration of Fitness (Hours)	1-3	102	20.4
	4-6	161	32.2
	7-9	205	41.0
	10 and above	32	6.4
Weekly Frequency of Fitness (Days)	1-2	178	35.6
	3-4	277	55.4
	5 and above	45	9.0
Years of Fitness Participation	1-2	237	47.4
	3-4	209	41.8
	5 and above	54	10.8
Most Frequently Preferred Leisure Activity	Social Activities	121	24.2
	Physical Activities	107	21.4
	Cultural Activities	70	14.0
	Artistic Activities	23	4.6
	Touristic Activities	11	2.2
	Digital Activities	59	11.8
	Other	109	21.8
	Total	500	100.0

Procedures

Leisure Benefit Scale: To assess the benefits individuals, gain from participating in recreational activities, the Leisure Benefit Scale (LBF) was used. This scale was originally developed by Ho (2008) and adapted into Turkish by Akgül et al. (2018). The scale consists of 24 items and includes three sub-dimensions: physical, psychological, and social benefits. It employs a five-point Likert-type rating scale (1=Strongly disagree, 5=Strongly agree) and is designed to measure the multidimensional benefits individuals perceive from their participation in recreational activities. The Turkish version of the scale was adapted by following a systematic linguistic and psychometric process. Initially, the linguistic equivalence of the scale was examined through forward and backward translation. After confirming that the items demonstrated linguistic consistency, the adaptation process proceeded with validity and reliability analyses. Confirmatory factor analysis (CFA) was conducted to verify the construct validity of the scale, and the results indicated an acceptable model fit. In addition, internal consistency was assessed using Cronbach's Alpha, which showed high reliability for both the overall scale (α=.83) and its sub-dimensions (ranging from α=.80 to .86). These findings confirmed that the adapted scale was suitable for measuring recreational benefits in the Turkish context.

Recreational Sport Well-Being Scale: To determine individuals' levels of well-being experienced through recreational sports, the Recreational Sport Well-Being Scale (RSWBS) was used. The scale was originally developed by Pi et al. (2022) and adapted into Turkish by Koç (2022) through a rigorous linguistic and cultural adaptation process. The Turkish version of the scale consists of 14 items and includes four sub-dimensions: physical and mental health, life satisfaction, development of family relationships, and positive emotions. A five-point Likert-type rating scale (1=Strongly disagree, 5=Strongly agree) is used. During the adaptation process, linguistic equivalence was established through the forward–backward translation method, and the content was reviewed by experts to ensure cultural relevance. In the validation study conducted by Koç (2022), construct validity was examined through confirmatory factor analysis (CFA), and model fit indices were found to be within acceptable limits. In addition, the internal consistency reliability of the Turkish version was evaluated using Cronbach's Alpha, with sub-dimension reliability coefficients ranging from .80 to .88, and the overall scale reliability coefficient reported as .86. The psychometric properties obtained in Koç's study indicate that the Turkish version of the RSWBS is a valid and reliable instrument for assessing sport-based well-being in recreational contexts. In the present study, the same scale was employed using face-to-face data collection methods.

Data Analysis

The statistical analyses of the data collected in this study were conducted using the IBM SPSS 25.0 statistical software package. For the demographic characteristics, frequency and percentage values were calculated. The normality distribution of the sub-dimensions of the scales was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests, and it was determined that the distribution was suitable for parametric testing (Field, 2013). In addition, homogeneity of variances was confirmed through Levene's test, and it was concluded that parametric methods could be applied. To test the main hypothesis of the study and to determine whether there was a relationship between the Leisure Benefit Scale (LBF) and the Recreational Sport Well-Being Scale (RSWBS), Pearson correlation analysis was conducted. This analysis reveals the degree of linear relationship between the variables (Pallant, 2020).

To examine whether LBF and RSWBS scores differed according to sex, an independent samples t-test was performed. For multi-group variables such as age group, weekly fitness duration (hours), weekly frequency (days), and years of fitness experience, one-way analysis of variance (ANOVA) was used. In cases where ANOVA indicated significant differences, Tukey's HSD post-hoc test was conducted to identify which groups differed from one another (Büyüköztürk, 2022). A significance level of $p<.05$ was accepted for all statistical analyses.

Ethical Statement

This research was reviewed and approved by the Ethics Committee of Gazi University at its meeting dated March 25, 2025, with decision number 1209342, confirming that there were no ethical objections to the conduct of the study.

Findings

Within the scope of the study, the arithmetic means, standard deviations, and normality distribution findings related to the measurement tools were evaluated. According to the results, the average score obtained from the Leisure Benefit Scale (LBS) was 4.13. Among the sub-dimensions, the highest mean score was observed in the psychological dimension (4.19), while the lowest was in the physical dimension (4.06). The social dimension had a moderate average score of 4.13. Regarding the Recreational Sport Well-Being Scale (RSWBS), the participants' overall mean score was recorded as 4.11. Among its sub-dimensions, the highest average score was found in positive emotion (4.33), and the lowest in physical and mental health (3.92). The life satisfaction sub-dimension had an average score of 4.14, falling between positive emotion and physical-mental health, while the family flourishing dimension also had a high score of 4.33. These findings indicate that participants generally perceive a high level of benefit and well-being associated with their involvement in recreational and sports activities. Psychological benefits and positive emotional states were found to be the most prominent aspects.

Table 2. Pearson correlation test results between LBS and RSWBS

		1	*2*	*3*	*4*	*5*	*6*	*7*
1.	LBS Total	1						
2.	Physical Benefits	.891**	1					
3.	Psychological Benefits	.931**	.781**	1				
4.	Social Benefits	.918**	.693**	.786**	1			
5.	RSWBS Total	.848**	.707**	.768**	.835**	1		
6.	Physical and Mental Health	.723**	.624**	.657**	.694**	.847**	1	
7.	Life Satisfaction	.763**	.646**	.698**	.739**	.903**	.720**	1
8.	Family Flourishing	.676**	.554**	.618**	.668**	.811**	.536**	.634**
9.	Positive Emotion	.676**	.554**	.618**	.668**	.811**	.536**	.634**

** $p<0,01$

According to Table 2, there is a statistically significant and strong positive correlation between the Leisure Benefit Scale (LBS) and the Recreational Sport Well-Being Scale (RSWBS) (r=.848, p<.01). High-level, statistically significant correlations were also observed between the sub-dimensions of the LBS—namely, physical, psychological, and social benefits—and the total RSWBS score (r=.707, r=.768, and r=.835, respectively, p<.01). These findings indicate that individuals' perceived benefits from recreational activities are consistently aligned with higher levels of sport-based well-being.

Analyses of the sub-dimensions of the RSWBS revealed that physical and mental health scores showed a significant positive correlation with the total LBS score (r=.723), life satisfaction (r=.763), and both family flourishing and positive emotion sub-dimensions (r=.676) (all p<.01). Particularly noteworthy is the strong association between the psychological benefit sub-dimension of the LBS and the positive emotion (r=.618) and life satisfaction (r=.698) sub-dimensions of the RSWBS. These results clearly highlight the contribution of recreational activities to individuals' emotional and cognitive well-being. The correlation coefficients demonstrate that there are moderate to strong, positive, and statistically significant relationships between both the total scores and sub-dimensions of the LBS and RSWBS. The fact that Pearson correlation values range between .60 and .90 suggests strong associations among the variables. These findings indicate that the physical, psychological, and social benefits gained from recreational activities are positively aligned with the components of sport-based well-being, reflecting a multidimensional interaction between these constructs.

Table 3. Independent samples t-test results for LBS and RSWBS according to sex

	Sex	*N*	*X*	*SD*	*t*	*p*
LBS Total	Female	263	4.07	.63	-1.562	0,059
	Male	237	4.20	.57		
Physical Benefits	Female	263	4.01	.72	-2.039	**0.041***
	Male	237	4.13	.61		
Psychological Benefits	Female	263	4.12	.64	-2.655	**0.008***
	Male	237	4.26	.54		
Social Benefits	Female	263	4.07	.70	-1.929	0.054
	Male	237	4.19	.59		
RSWBS Total	Female	263	4,07	.63	-2.397	**0,008***
	Male	237	4,16	.57		
Physical and Mental Health	Female	263	3.87	.68	-1.742	0.082
	Male	237	3.98	.68		
Life Satisfaction	Female	263	4.10	.71	-1.253	0.211
	Male	237	4.18	.65		
Family Flourishing	Female	263	4.28	.78	-1.647	0.100
	Male	237	4.38	.67		
Positive Emotion	Female	263	4.28	.78	-1.647	0.100
	Male	237	4.38	.67		

* *p*<0,05

According to Table 3, there was no statistically significant difference between male and female participants in terms of total scores on the Leisure Benefit Scale (LBS) (t=-1.562, p=.059). However, when analyzed at the sub-dimension level, significant differences in favor of male participants were observed in physical benefit (t=-2.039, p=.041) and psychological benefit (t=-2.655, p=.008). These findings indicate that male participants derive greater physical and psychological benefits from fitness participation compared to female participants. Regarding the Recreational Sport Well-Being Scale (RSWBS), male participants scored significantly higher in overall well-being levels than female participants (t=-2.397, p=.008). Although the difference in the physical and mental health sub-dimension was close to significance, it was not statistically significant (t=-1.742, p=.082). No significant differences were found in the sub-dimensions of life satisfaction (t=-1.253, p=.211), family flourishing (t=-1.647, p=.100), and positive emotion (t=-1.647, p=.100).

Overall, it can be concluded that male participants tend to perceive higher levels of psychological and physical benefits from their recreational sport experiences, which is also reflected in their higher sport-based well-being scores.

Table 4. ANOVA results for LBS and RSWBS by age group

	Age	*N*	*X*	*SD*	*F*	*p*	*Difference*
LBS Total	18-23[1]	129	3.97	.82	5.146	**.002***	1<2
	24-29[2]	196	4.12	.48			1<3
	30-35[3]	128	4.21	.47			1<4
	36 and above[4]	47	4.24	.65			
	Total	500	4.11	.60			
Physical Benefits	18-23[1]	129	3.90	.94	4.291	**.005***	1<3<4
	24-29[2]	196	4.08	.53			
	30-35[3]	128	4.17	.48			
	36 and above[4]	47	4.19	.71			
	Total	500	4.06	.67			
Psychological Benefits	18-23[1]	129	4.02	.80	4.911	**.002***	1<3<4
	24-29[2]	196	4.23	.50			
	30-35[3]	128	4.26	.46			
	36 and above[4]	47	4.28	.64			
	Total	500	4.19	.60			
Social Benefits	18-23[1]	129	3.97	.88	3.913	**.009***	1<3
	24-29[2]	196	4.15	.51			
	30-35[3]	128	4.21	.53			
	36 and above[4]	47	4.24	.70			
	Total	500	4.13	.65			
RSWBS Total	18-23[1]	129	3.97	.826	4.001	**.008***	1<3
	24-29[2]	196	4.12	.480			
	30-35[3]	128	4.21	.471			
	36 and above[4]	47	4.24	.654			
	Total	500	4.11	.608			
Physical and Mental Health	18-23[1]	129	3.87	.799	1.549	.201	
	24-29[2]	196	3.87	.628			
	30-35[3]	128	3.99	.611			
	36 and above[4]	47	4.06	.787			
	Total	500	3.92	.689			
Life Satisfaction	18-23[1]	129	4.00	.946	2.387	.068	
	24-29[2]	196	4.16	.542			
	30-35[3]	128	4.20	.542			
	36 and above[4]	47	4.22	.691			
	Total	500	4.14	.686			
Family Flourishing	18-23[1]	129	4.12	.9483	5.742	**.001***	1<2
	24-29[2]	196	4.34	.628			1<3
	30-35[3]	128	4.48	.583			
	36 and above[4]	47	4.43	.726			
	Total	500	4.33	.733			
Positive Emotion	18-23[1]	129	4.12	.948	5.742	<.001	1<2
	24-29[2]	196	4.34	.6287			1<3
	30-35[3]	128	4.48	.583			
	36 and above[4]	47	4.43	.726			
	Total	500	4.33	.733			

** p*<0,05

The results presented in Table 4 reveal that there is a statistically significant difference among age groups in the total scores of the Leisure Benefit Scale (LBS) (F=5.146, p=.002). Post-hoc analyses showed that participants in the 18–23 age group scored significantly lower on the LBS compared to those in the 30–35 and 36 and over age groups. At the sub-dimension level, significant age-related differences were also found in physical benefit (F=4.291, p=.005), psychological benefit (F=4.911, p=.002), and social benefit (F=3.913, p=.009). In all three sub-dimensions, the 18–23 age group had the lowest mean scores, indicating that perceived benefit levels increase with age. Similarly, total scores on the Recreational Sport Well-Being Scale (RSWBS) also varied significantly across age groups (F=4.001, p=.008), with participants aged 30–35 reporting significantly higher well-being scores than those aged 18–23. While no significant differences were found in physical and mental health (F=1.549, p=.201) and life satisfaction (F=2.387, p=.068), the sub-dimensions of family flourishing (F=5.742, p<.001) and positive emotion (F=5.742, p<.001) did show statistically significant differences. Post-hoc results indicated that the 18–23 age group scored significantly lower than the 24–29 and 30–35 groups in both dimensions.

Overall, these findings suggest that as individuals grow older, they tend to perceive greater benefits from recreational activities and report higher levels of sport-based well-being.

Table 5. ANOVA results for LBS and RSWBS by weekly fitness duration

	Duration (Hours)	*N*	*X*	*SD*	*F*	*p*	*Difference*
LBS Total	1-3[1]	102	4.10	.87	1.693	.168	
	4-6[2]	161	4.12	.60			
	7-9[3]	205	4.12	.41			
	10 and above[4]	32	4.35	.26			
Physical Benefits	1-3[1]	102	4.12	.96	2.060	.105	
	4-6[2]	161	4.03	.64			
	7-9[3]	205	4.03	.54			
	10 and above[4]	32	4.32	.38			
Psychological Benefits	1-3[1]	102	4.12	.87	2.245	.082	
	4-6[2]	161	4.21	.61			
	7-9[3]	205	4.17	.44			
	10 and above[4]	32	4.42	.35			
Social Benefits	1-3[1]	102	4.07	.91	1.224	.300	
	4-6[2]	161	4.11	.69			
	7-9[3]	205	4.14	.49			
	10 and above[4]	32	4.32	.33			
RSWBS Total	1-3[1]	102	4.14	.84	3.826	**.010**	1<2<3<4
	4-6[2]	161	4.05	.61			
	7-9[3]	205	4.09	.47			
	10 and above[4]	32	4.44	.32			
Physical and Mental Health	1-3[1]	102	4.14	.81	10.527	**<.001**	4>1>2>3
	4-6[2]	161	3.91	.71			
	7-9[3]	205	3.76	.56			
	10 and above[4]	32	4.28	.55			
Life Satisfaction	1-3[1]	102	4.16	.92	2.031	.109	
	4-6[2]	161	4.09	.67			
	7-9[3]	205	4.12	.57			
	10 and above[4]	32	4.41	.40			
Family Flourishing	1-3[1]	102	4.24	.93	3.566	**.014**	1<2<4
	4-6[2]	161	4.24	.71			
	7-9[3]	205	4.39	.65			
	10 and above[4]	32	4.63	.40			
Positive Emotion	1-3[1]	102	4.24	.93	3.566	**.014**	1<2<4
	4-6[2]	161	4.24	.71			
	7-9[3]	205	4.39	.65			
	10 and above[4]	32	4.63	.40			

** p<0,05*

According to Table 5, no statistically significant difference was found between groups in terms of total scores on the Leisure Benefit Scale (LBS) based on weekly fitness duration (F=1.693, p=.168). However, the group performing 10 or more hours of exercise per week had the highest mean score (x̄=4.35), and the overall trend showed increasing mean scores with longer fitness durations. Similarly, although there were no statistically significant differences in the physical benefit (F=2.060, p=.105) and psychological benefit (F=2.245, p=.082) sub-dimensions, the mean scores in these dimensions also increased with fitness duration, particularly in the group exercising 10 or more hours per week. No significant difference was found in the social benefit sub-dimension (F=1.224, p=.300).

On the other hand, a statistically significant difference was found in Recreational Sport Well-Being Scale (RSWBS) total scores across weekly fitness duration groups (F=3.826, p=.010). According to Tukey HSD post-hoc tests, individuals who exercised 10 or more hours per week reported significantly higher well-being scores than all other groups (x̄=4.44, p<.05). This result suggests that regular and intensive fitness participation enhances sport-based well-being. Regarding the sub-dimensions, a significant difference was observed in physical and mental health scores (F=10.527, p<.001). Post-hoc analysis revealed that individuals exercising 10 or more hours per week had significantly higher scores (x̄=4.28), followed by the 1–3 hour, 4–6 hour, and 7–9 hour groups, respectively (4>1>2>3). A significant difference was also found in the family flourishing sub-dimension (F=3.566, p=.014), with the 10+ hour group again reporting the highest average. Similarly, in the positive emotion sub-dimension (F=3.566, p=.014), the 1–3 hour group scored significantly lower than the 7–9 hour and 10+ hour groups, as indicated by post-hoc analysis. These findings demonstrate that as weekly fitness duration increases, individuals report higher levels of perceived physical and psychological benefits, as well as enhanced sport-based well-being.

Table 6. ANOVA results for LBS and RSWBS by years of fitness participation

	Year	*N*	*X*	*SD*	*F*	*p*	*Difference*
LBS Total	1-2[1]	237	4.07	.69	3.848	.022	1<3
	3-4[2]	209	4.16	.48			
	5 ve üzeri[3]	54	4.30	.36			
Physical Benefits	1-2[1]	237	4.01	.76	1.883	.153	
	3-4[2]	209	4.08	.58			
	5 ve üzeri[3]	54	4.20	.58			
Psychological Benefits	1-2[1]	237	4.13	.71	2.414	.090	
	3-4[2]	209	4.22	.51			
	5 ve üzeri[3]	54	4.31	.37			
Social Benefits	1-2[1]	237	4.05	.75	5.540	.004	1<3
	3-4[2]	209	4.16	.57			2<3
	5 ve üzeri[3]	54	4.36	.42			
RSWBS Total	1-2[1]	237	4.04	.68	6.110	.002	1<3
	3-4[2]	209	4.13	.53			2<3
	5 ve üzeri[3]	54	4.35	.44			
Physical and Mental Health	1-2[1]	237	3.86	.73	4.048	.018	1<3
	3-4[2]	209	3.93	.63			2<3
	5 ve üzeri[3]	54	4.15	.64			
Life Satisfaction	1-2[1]	237	4.07	.75	5.951	.003	1<3
	3-4[2]	209	4.14	.59			2<3
	5 ve üzeri[3]	54	4.42	.59			
Family Flourishing	1-2[1]	237	4.23	.82	4.982	.007	1<2<3
	3-4[2]	209	4.39	.65			1<2
	5 ve üzeri[3]	54	4.52	.50			1<3
Positive Emotion	1-2[1]	237	4.23	.82	4.982	.007	1<2<3
	3-4[2]	209	4.39	.65			1<2
	5 ve üzeri[3]	54	4.52	.50			1<3

** p*<0,05

Table 6 indicates that there is a statistically significant difference in total Leisure Benefit Scale (LBS) scores based on years of fitness participation (F=3.848, p=.022). According to the Tukey HSD post-hoc test, participants with 1–2 years of fitness experience had significantly lower LBS scores compared to those with 5 or more years of experience (1<3). A similar significant difference was found in the social benefit sub-dimension (F=5.540, p=.004), where both the 1–2 year and 3–4 year groups scored significantly lower than the 5+ year group (1<3, 2<3). This finding suggests that social interaction and a sense of belonging are more strongly developed through long-term fitness participation. No significant differences were found in the physical and psychological benefit sub-dimensions (p>.05).

Table 6 also shows a statistically significant difference across fitness experience groups (F=6.110, p=.002). Post-hoc analysis revealed that individuals with 5 or more years of fitness participation had significantly higher well-being scores compared to those in the 1–2 and 3–4 year groups (1<3, 2<3). This upward trend was also evident in all sub-dimensions: physical and mental health (F=4.048, p=.018), life satisfaction (F=5.951, p=.003), family flourishing (F=4.982, p=.007), and positive emotion (F=4.982, p=.007). A clear progression was noted in the family flourishing and positive emotion dimensions, where mean scores increased sequentially across the groups (1<2<3). These findings demonstrate that long-term fitness participation significantly enhances individuals' perceived leisure benefits and their sport-based well-being.

Discussion

The primary objective of this study is to examine, through a multidimensional approach, the relationship between the physical, psychological, and social benefits derived from recreational activities by individuals engaged in fitness and their levels of recreational sport well-being. Most participants were identified as young adults (aged 24–29), single, and belonging to the middle-income group, engaging in fitness activities regularly for 3–4 days and 7–9 hours per week. This indicates a high tendency for participation in recreational activities.

Descriptive statistics revealed that participants scored highly on both the Leisure Benefit Scale (LBS) ($\bar{x}$=4.13) and the Recreational Sport Well-Being Scale (RSWBS) ($\bar{x}$=4.11). Among the LBS sub-dimensions, the highest average was observed in psychological benefits ($\bar{x}$=4.19), while the RSWBS sub-dimensions showed the highest averages in positive affect ($\bar{x}$=4.33) and family flourishing ($\bar{x}$=4.33). These findings suggest that individuals derive significant benefits from fitness participation, particularly in terms of emotional relaxation, strengthening social bonds, and finding meaning in life. Ayyıldız Durhan et al. (2017) examined the recreational benefit levels of parents whose children participated in baby gym activities and reported that participants scored highest in the psychological sub-dimension. This finding aligns with our study, indicating that fitness participants also perceive psychological benefits more intensely. Conversely, Karaküçük et al. (2019) conducted a study on orienteering athletes and reported that participants

obtained the highest benefit scores in the physical sub-dimension (30.27±4.40) and the lowest in the psychological sub-dimension (34.49±4.95), which contrasts with our study's findings. Similarly, Mensink et al. (1999) investigated the effects of leisure-time physical activities on cardiovascular risk profiles in elderly individuals and found that regular physical activity has the potential to reduce these risks physiologically.

These studies suggest that perceptions of leisure benefits can vary based on factors such as age group, type of sport, and contextual conditions. Pearson correlation analysis revealed a significant and positive high-level relationship between the total scores of LBS and RSWBS (r=.848, p<.01). Similar high correlations were observed at the sub-dimension level, particularly between the psychological benefit sub-dimension of LBS and the positive effect (r=.618) and life satisfaction (r=.698) sub-dimensions of RSWBS. This finding supports existing literature indicating that fitness activities contribute to individuals' emotional and cognitive well-being. The positive relationship between recreational benefits and sport-related well-being indicates that individuals gain both subjective and social advantages through fitness participation. In particular, the mutual reinforcement of sub-dimensions such as positive emotions, family relationships, and life satisfaction demonstrates the multidimensional benefits of fitness activities (Huang et al., 2010; Pi et al., 2022).

Ersöz et al. (2023) found positive and statistically significant correlations between participants' awareness of physical, psychological, and social leisure benefits and their levels of physical activity (r=0.116; r=0.122; r=0.100; p<.01). These findings suggest that the perceived benefits of recreational activities in various dimensions can enhance individuals' inclination toward physical activity. Similarly, Yıldız (2025) reported a positive and moderate relationship between activity satisfaction and recreational well-being levels. This indicates that the satisfaction derived from activities directly influences individuals' overall well-being perceptions.

Kırtepe and Çetinkaya (2024) identified a positive and low-level significant relationship between recreational well-being and quality of life. Leisure activities contribute meaning to individuals' lives and are considered a fundamental determinant of subjective well-being (Diener et al., 2018). Xu et al. (2019) found that cycling provides both motivational and psychosocial benefits, positively affecting subjective well-being components such as life satisfaction, self-confidence, and self-affirmation. Similarly, Zurawik (2020) reported that nature walks support feelings of satisfaction, belonging, and achievement, enhancing overall psychological and social well-being. Collectively, these findings demonstrate that the physical, psychological, and social benefits of recreational activities have multifaceted and significant impacts on individuals' sport-based well-being perceptions. Notably, the strong relationship between social benefit perception and well-being levels suggests that recreation is not only an individual experience but also a process that strengthens social bonds and societal belonging.

According to the t-test results examining the relationship between LBS and RSWBS and the sex variable, males scored significantly higher than females in the physical and psychological sub-dimensions. Supporting this finding, Hagger and Chatzisarantis (2007) argued that males' beliefs in physical competence contribute to higher psychological benefits by supporting feelings of autonomy and competence in sports. However, Ertüzün et al. (2020) found no significant difference in recreational benefit levels based on sex among fitness center members.

The higher benefit scores among males in our study may be related not only to biological and performance-based differences but also to sociocultural norms, the structure of sports environments, and differences in participation patterns. Therefore, sex-based differences should be examined not only through numerical comparisons but also through qualitative and contextual approaches. Factors such as the inclusivity of recreational environments, motivational aspects of participation patterns, and societal sex perceptions should be considered in explaining such differences (Shaw & Henderson, 2005).

ANOVA analyses based on age variables revealed statistically significant differences in both LBS and RSWBS scores. Specifically, the 18–23 age group had lower averages in both benefit and well-being compared to other age groups. Tukey HSD test results indicated that this difference was particularly in favor of the 30–35 and 36 and above age groups. This suggests that recreational participation becomes more conscious and needs-based with age, leading to increased benefits. Additionally, increases in social-psychological components such as life satisfaction, family relationships, and positive emotions strengthen the construction of recreational meaning in relation to the individual's life stage. Yıldız (2025) found that the 20–30 age group had a higher average in family flourishing (M=4.27) compared to the 31–40 age group (M=4.09). Kaplan and Ardahan (2012) reported that the benefits obtained by individuals under 24 years old from recreational activities showed statistically significant differences based on age.

Our study's findings indicate that as the duration of fitness participation increases, individuals' sport-based well-being levels, physical and mental health status, family relationships, and positive affect levels show significant improvements. These results align with the World Health Organization's (WHO) physical activity guidelines. WHO (2020) states that even small amounts of physical activity have positive health effects compared to inactivity and recommends that adults start with low levels of activity and gradually increase frequency, intensity, and duration. Blair et al. (1992) reported that 30 minutes of moderate-intensity regular physical activity per day significantly reduces the risk of chronic diseases and improves daily functionality by enhancing physical fitness.

Another finding of our study is that individuals who have been engaged in fitness for 5 years or more have significantly higher averages in social benefits, overall LBS, and RSWBS compared to other groups. This demonstrates the cumulative effects of long-term participation, indicating that individuals gain not only physical benefits but also social belonging and life satisfaction (Warburton & Bredin, 2017). Aygün and Karayol (2024) and Başar (2018) also emphasized the positive effects of regular physical activity on psychological well-being, happiness, and depression levels. In this context, it can be said that long-term fitness participation contributes to individuals' holistic well-being experiences in both physical and psychosocial domains.

Conclusion

The primary aim of this study is to examine, through a holistic approach, the relationship between the physical, psychological, and social gains of individuals who engage in fitness activities and their levels of recreational sport well-being. The findings obtained in line with this objective indicate that regular and long-term participation in fitness activities significantly enhances individuals' quality of life not only physically but also psychologically and socially. The strong positive correlations observed between the Leisure Benefit Scale (LBS) and the Recreational Sport Well-Being Scale (RSWBS) demonstrate that recreational activities play a crucial role in shaping individuals' emotional satisfaction, social relationships, and sense of meaning in life. Individuals with five or more years of participation were found to have higher levels of social benefit, sense of belonging, and life satisfaction, highlighting the cumulative and integrative effects of recreation. The differences observed in relation to sex and age variables suggest that perceived leisure benefits and well-being may vary depending on individual characteristics. These findings underscore the strategic importance of promoting physical activity not only for physical health but also for overall psychological and social well-being and suggest that institutions at various levels—from universities to municipalities—should design programs accordingly.

However, the findings of this study should be interpreted in consideration of the limitations associated with the convenience sampling method employed. Since participants were not selected through random sampling, the generalizability of the results to broader populations is inherently limited. Therefore, future studies utilizing more representative sampling methods are needed to enhance the validity and generalizability of the findings.

Practical Implications

Similar research can be extended beyond private fitness centers to include public sports facilities and community-based recreational spaces. In doing so, the leisure benefits and sport well-being levels of individuals from different social groups can be assessed from a broader perspective. Moreover, future studies may focus on individuals participating in various sports disciplines to conduct comparative analyses of the effects of non-fitness-based activities—such as swimming, cycling, yoga, and team sports—on recreational benefit and recreational sport well-being. It is also recommended that intervention programs be developed to guide individuals toward increasing the frequency and duration of their fitness participation.

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Conflict of Interest

There is no conflict of interest among the authors related to publication of this article.

Author Contributions

Research Idea: KŞ, BMA, ET; Research Design: KŞ, BMA, ET; Data Collection: KŞ, BMA, ET; Data Analysis: KŞ, BMA, ET; Writing: KŞ, BMA, ET; Critical Review: KŞ, BMA, ET.

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Relationship Between Leg Circumference and Limb Occlusion Pressure in Dominant and Non-Dominant Legs Using an Automated BFR Device in Healthy Male Individuals

Sağlıklı Erkek Bireylerde Otomatik BFR Cihazı Kullanılarak Baskın ve Baskın Olmayan Bacaklarda Bacak Çevresi ve Ekstremite Oklüzyon Basıncı Arasındaki İlişki

Research Article / Araştırma Makalesi

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Abstract

The aim of this research was twofold: i) to investigate the relationship between leg circumference and limb occlusion pressure (LOP) by using an automated blood flow restriction (BFR) device, ii) to compare the LOP and leg circumferences between the dominant (D) and non-dominant (ND) legs. One hundred and four participants (age=20.79±2.47 years; height= 177.8±5.72 cm; body weight=73.74±13.24 kg) visited the laboratory for the testing session. D and ND leg circumferences were measured with a tape measure. After 10 minutes of resting, LOP was then assessed bilaterally in the supine position using an automated BFR device (Cuff width: 10 cm). Pearson's correlation coefficient (r) was used to analyse the relationship between leg circumference and LOP values. A simple linear regression analysis was also conducted on the D and ND legs to determine the predictive relationship between leg circumference and LOP. Paired sample t-test was used to analyse differences for LOP and leg circumferences between D and ND legs. Moderate positive correlation was found between D and ND leg circumference and LOP (r=0.5937, p<0.0001; r=0.5999, p<0.0001), respectively. The linear regression analysis model was found statistically significant (F(1,102):55.51; p<0.0001) with approximately 35.24% of the variance (R^2=0.3524) for the D leg and the ND leg (F(1,102):57.34; p<0.0001) with approximately 35.98% of the variance (R^2=0.3598). There were significant differences between the D and ND leg for the LOP and leg circumference outcomes (p=0.029; ES: 0.217; p=0.037; ES=0.207), respectively. Our findings suggest that as leg circumference increases, LOP also tends to increase in the lower limbs when assessing LOP with an automated BFR device with a 10 cm cuff width.

Keywords: Blood flow restriction, Arterial occlusion pressure, Vascular occlusion, Thigh circumference, Autoregulation

Öz

Bu araştırmanın amacı iki yönlüdür: i) otomatik bir kan akışı kısıtlama (BFR) cihazı kullanarak bacak çevresi ile ekstremite oklüzyon basıncı (LOP) arasındaki ilişkiyi araştırmak, ii) baskın (D) ve baskın-olmayan (ND) bacaklar arasında LOP ve bacak çevrelerini karşılaştırmak. Yüz dört katılımcı (yaş=20.79±2.47 yıl; boy uzunluğu= 177.8±5.72 cm; vücut ağırlığı=73.74±13.24 kg) test seansı için laboratuvarı ziyaret etmiştir. D ve ND bacak çevreleri mezura ile ölçülmüştür. 10 dakikalık dinlenmenin ardından, LOP otomatik bir BFR cihazı (Manşet genişliği: 10 cm) kullanılarak sırtüstü pozisyonda bilateral olarak değerlendirilmiştir. Bacak çevresi ile LOP değerleri arasındaki ilişkiyi analiz etmek için Pearson korelasyon katsayısı (r) kullanılmıştır. Bacak çevresi ile LOP arasındaki prediktif ilişkiyi belirlemek için D ve ND bacakları üzerinde basit bir doğrusal regresyon analizi de yapılmıştır. D ve ND bacakları arasındaki LOP ve bacak çevresi farklılıklarını analiz etmek için Paired Sample t-testi kullanılmıştır. D ve ND bacak çevresi ile LOP arasında sırasıyla orta düzeyde pozitif korelasyon (r=0.5937, p<0.0001; r=0.5999, p<0.0001) bulunmuştur. Doğrusal regresyon analizi modeli D bacak için varyansın yaklaşık %35,24'üne (R^2=0,3524) karşılık gelen (F(1,102):55,51; p<0,0001) ve ND bacak için varyansın yaklaşık %35,98'ine (R^2:0,3598) karşılık gelen (F(1,102):57,34; p<0,0001) istatistiksel olarak anlamlı bulunmuştur. D ve ND bacak arasında LOP ve bacak çevresi sonuçları açısından sırasıyla anlamlı farklılıklar (p=0.029; ES= 0.217; p:0.037; ES= 0.207) bulunmuştur. Bulgularımız, 10 cm manşon genişliğine sahip otomatik bir BFR cihazı ile LOP değerlendirilirken bacak çevresi arttıkça LOP'nin de alt ekstremitelerde artma eğiliminde olduğunu göstermektedir.

Anahtar Kelimeler: Kan akışı kısıtlama, Arteriyel oklüzyon basıncı, Vasküler oklüzyon, Bacak çevresi, Otoregülasyon

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Introduction

Blood flow restriction (BFR) training has gained popularity as a new training method to gain muscle mass and strength by performing low-load/intensity exercise in the last decade (de Queiros et al., 2024a; Patterson & Brandner, 2018). When performing BFR exercise, assessing limb occlusion pressure (LOP) accurately is of utmost importance (Kamiş & Aydos, 2022; Patterson et al., 2019). Therefore, some studies have investigated the methodological concerns published in BFR literature (Rolnick et al., 2024; Rolnick & Kamis, 2023). LOP can be defined as the minimum amount of pressure that you need to fully occlude blood flow to the muscles (Chulvi-Medrano et al., 2023; Patterson et al., 2019).

There are some factors that affect LOP and previous literature investigated the BFR device features, for instance, cuff widths (Laurentino et al., 2016; Loenneke et al., 2012), cuff types/materials (Buckner et al., 2017; Loenneke, Thiebaud, et al., 2013; Rolnick et al., 2024) , thigh circumference/limb size (Hunt et al., 2016; Loenneke et al., 2015) and body position during measurement (de Queiros et al., 2024b; Hughes et al., 2018; Kamiş et al., 2024b). All these factors can affect the desired outcomes that occur from BFR exercise. Thigh circumference has been identified as one of the determinants of LOP; larger thighs require higher pressure, while smaller thighs require lower pressure to fully occlude blood flow (Loenneke et al., 2015; Loenneke, Fahs, et al., 2013). Moreover, wider cuffs need less pressure while narrow cuffs need more pressure to fully occlude blood flow (Loenneke et al., 2012).

Previous papers that were published in the early stage of BFR literature used arbitrary pressures for each individual (Shinohara et al., 1998); however, personalized BFR pressures were safe and effective when performing BFR exercise (Kamiş et al., 2024a; Patterson et al., 2019). Thanks to cutting-edge technology, to date, different types of BFR devices can be found on the market. These devices can assess LOP automatically and safely. For the last 25 years, numerous BFR studies from the BFR lab group have been published and therefore, BFR has gained popularity in both international and national literature (Loenneke et al., 2025; Pişkin et al., 2023).

Variations in LOP between legs were also investigated by Montoye et al. (2024), variations can occur potentially due to differences in leg dominance or measurement techniques (i.e.standing, sitting or supine position) (Montoye et al., 2024).

Authors have concluded that significant differences were found in LOP between left and right limbs and they suggested that bilateral measurements may not always be necessary. However, these variations may occur since different types of cuffs and widths, and the assessment technique used in BFR research. Therefore, personalizing LOP is crucial to maximize training benefits while minimizing potential risks.

Measuring the leg circumference can be practically helpful for practitioners to achieve individualized LOP and to perform BFR exercise safely. Moreover, a range of cuff brands have been used in studies, and practitioners may need to get new data with different types of BFR devices. Given these considerations, we aimed to investigate the relationship between leg circumference and LOP in D and ND legs using simple linear regression analysis. The second aim was to compare leg circumference and LOP values between D and ND legs.

Methods

Research Design

A cross-sectional design was used to investigate the relationship between limb occlusion pressure (LOP) and leg circumference in healthy male individuals. Participants visited the laboratory for the testing session (Figure 1). The same trained examiner performed all measurements to minimize inter-rater variability and to ensure consistency by taking them at the same time of day, thereby controlling for potential variations due to circadian rhythms.

Research Group

This study involved 104 healthy male individuals (age=20.79±2.47 years; height=177.8±5.72 cm; body weight= 73.74±13.24 kg). All participants were recreationally active and free from musculoskeletal, cardiovascular, or neurological disorders that could affect the measurements. Subjects were also instructed not to consume caffeine for the previous 8 hours and participate the strenuous exercise for the previous 24 hours. A sample size calculation was performed using G*Power (version 3.1.9.7)(Faul et al., 2007). Based on Cohen's (1988) conventional threshold for correlation, r=0.3, an alpha level of 0.05, and a power of 0.80, a minimum of 84 participants was required (Cohen, 1988). However, we included 104 recreationally trained males (aged 18–25 years) to account for potential dropouts.

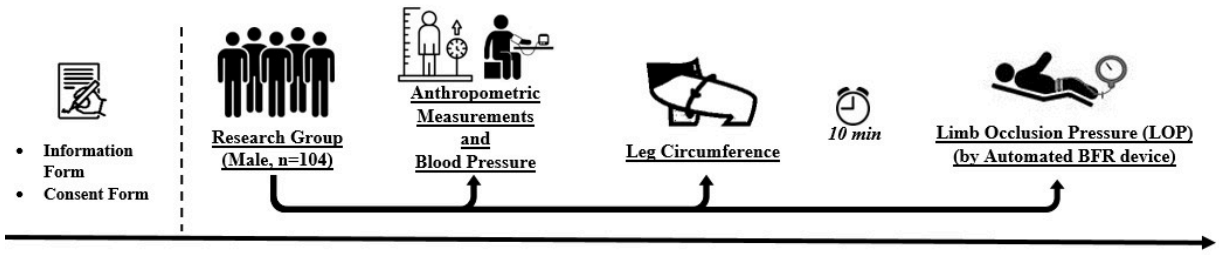

Figure 1. Experimental design of the study

Procedures

Anthropometric Measurements. Height was measured by a stadiometer (Holtain Stadiometer, England). Body weight and body mass index (BMI) were evaluated by the Inbody 270 body analysis device (Biospace, California, USA), following the manufacturer's instructions.

Heart Rate and Blood Pressure. OMRON M4 Intelli HEM-7155T (Omron Healthcare Co. Ltd., Kyoto, Japan) was used to measure blood pressure (BP) and heart rate (HR). The subjects' left arm was used to test their blood pressure after they had been sitting on the chair for five minutes at room temperature. The measurement was made twice, one minute apart, and the mean value was recorded in mmHg (Kamiş et al., 2024a).

Leg Circumference. The circumference of both D and ND legs was measured from the inguinal crease to the top of the patella (33% of the distance). Since this region accurately represents the region where BFR cuffs are applied (Loenneke et al., 2015).

Determining Limb Occlusion Pressure. Following 10 minutes of supine rest, LOP was measured on both D and ND legs using an automated BFR device (FitCuffs BFR Unit, Denmark, cuff width: 10 cm; single-chambered, straight cylindrical fit) while participants were in a supine position. In this study, a 10 cm cuff width and straight version with an automated BFR device was used (FitCuffs BFR Unit, v4 cuff, straight design, Denmark).

Data Analysis

Data are presented as mean and standard deviation with 95% confidence intervals. The normality of the data was analysed using the Shapiro-Wilk test. The data were normally distributed ($p>0.05$); therefore, parametric tests were used. Pearson's correlation coefficient (r) was computed to evaluate the relationship between leg circumference and LOP values. The Cohen's d effect size ranges were categorized as 0.2, a small effect; 0.5, a medium effect; and 0.8 or higher, a large effect (Cohen, 1988). Correlation coefficient values were evaluated as 0.00-0.25 very weak, 0.26–0.49 weak, 0.50–0.69 moderate, 0.70–0.89 high, 0.90-1.00 very high correlation (Schober et al., 2018). A simple linear regression analysis was also conducted on the D and ND legs separately to determine the predictive relationship between leg circumference (independent variable) and LOP (dependent variable). GraphPad Prism 10 (GraphPad Software Inc., San Diego, CA, USA) was used to analyze the data. Significance was set at $p<0.05$.

Ethical Statement

This study was approved by the Gazi University Ethics Committee with the decision dated May 13, 2025, and numbered 1242357. Participants provided written informed consent before participation, and the study design and procedures conformed to ethical standards and the principles outlined in the Declaration of Helsinki.

Findings

Table 1. Descriptive characteristics of the subjects

Variables	*Mean ± SD*
Age (year)	20.79±2.47
Height (cm)	177.8±5.72
Weight (kg)	73.74±13.24
BMI (kg/m^2)	26.20±6.64
SBP (mmHg)	120.1±11.27
DBP (mmHg)	70.52±8.63
RHR (bpm)	78.37±11.51
LOP (mmHg) (Dominant / Non-dominant)	183.6±22.93 / 181.9±22.58
Leg Circumference (cm) (Dominant / Non-dominant)	54.82±5.31 / 54.66±5.42

BMI: Body mass index; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; RHR: Resting Heart Rate; bpm: beats per minute; LOP: Limb Occlusion Pressure; SD: standard deviation

Dominant Leg and Limb Occlusion Pressure. A moderate positive correlation was found between D leg circumference and LOP ($r=0.5937$, $p<0.0001$) (Table 2 and Figure 1). A simple linear regression analysis model was found statistically significant ($F_{(1,102)}$:55.51; $p<0.0001$) with approximately 35.24% of the variance ($R^2=0.3524$). The regression equation was determined as $LOP_D=2.560\times$(Dominant Leg Circumference)+43.22. The results indicate that for each 1 cm increase in D leg circumference, the LOP increases by approximately 2.56 mmHg.

Table 2. Regression analysis for the prediction of LOP from leg circumference

Predictor Variable	*B with 95% CI (Slope)*	*SE (B)*	*Y Intercept*	*R^2*	*F*	*f^2 (ES)*	*p*
Leg Circumference (Dominant)	2.560 (1.879-3.242)	0.3437	43.22	0.3524	55.51	0.54	<0.0001
Leg Circumference (Non-Dominant)	2.496 (1.842-3.150)	0.3296	45.51	0.3598	57.34	0.56	<0.0001

CI: Confidence interval; SE: Standard Error of the Coefficient; R^2: Coefficient of Determination; B: Unstandardized Regression Coefficient; ES: Effect size

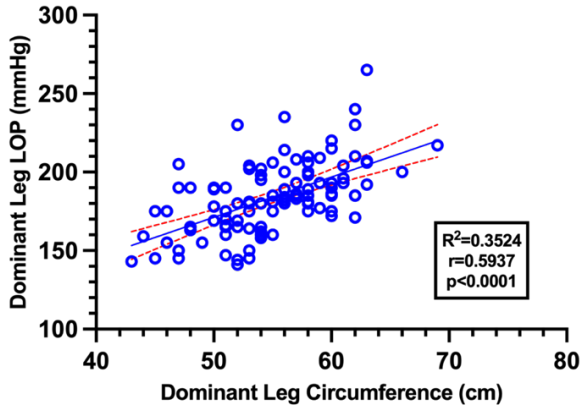

Figure 1. Relationship between D leg circumference and limb occlusion pressure

Non-Dominant Leg and Limb Occlusion Pressure. Similarly to D leg findings, a moderate positive correlation was also found between ND leg circumference and LOP (r=0.5999; p<0.0001) (Table 2 and Figure 2). A simple linear regression analysis model was found significant ($F_{(1,102)}$:57.34; p<0.0001) with approximately 35.98% of the variance (R^2=0.3598, f^2=0.56). The regression equation was determined as LOP_{ND}=2.496×(Non-dominant Leg Circumference)+45.51. The results showed that for each 1 cm increase in ND leg circumference, the LOP increases by approximately 2.49 mmHg.

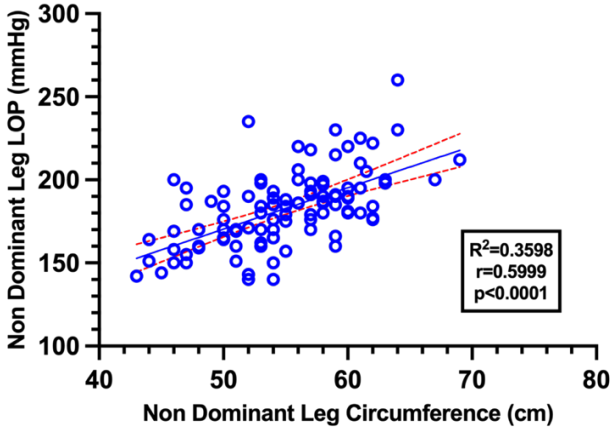

Figure 2. Relationship between ND leg circumference and limb occlusion pressure

Table 3. Comparison of LOP values between the D and ND legs

Variable	*Mean Diff. with 95% CI (D-ND)*	*t (df=103)*	*p*	*Cohen's d*	*Effect Size*
LOP (mmHg)	1.64 (-0.17-3.11)	2.215	0.029	0.217	Small
Leg Circumference (cm)	0.15 (-0.009-0.31)	2.109	0.037	0.207	Small

ND: Non dominant; D: Dominant; CI: Confidence interval

There were significant differences found between the D and ND leg for the LOP (mmHg) and leg circumference (cm) outcomes (p =0.029; ES=0.217; p =0.037; ES=0.207), respectively (Table 3 and Figure 3). ND leg LOP and leg circumference values were significantly lower than the D leg.

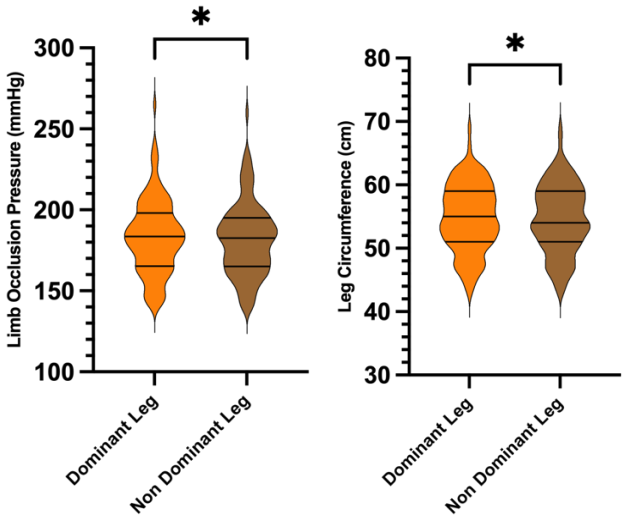

Figure 3. Comparison of LOP and leg circumference between D and ND legs (*p<0.05)

Discussion

The aim of this study was twofold: i) to investigate the relationship between leg circumference and LOP in healthy male individuals aged between 18-25 years. ii) to compare the LOP and leg circumferences between the D and ND legs. The main findings of the study showed that i) there was a moderate positive relationship between leg circumferences and LOP values and ii) there were significant differences found for LOP and leg circumferences between D and ND legs.

Our findings suggest that healthy young individuals with larger leg circumferences tend to have higher limb occlusion pressures in both D and ND legs. The model showed a moderate level of predictive value for estimating LOP based on leg circumference. Our study suggests that every 1cm increase in leg circumference can increase the LOP values of approximately 2.56 mmHg (D leg) and 2.49 mmHg (ND leg), when assessed with an automated BFR device with a 10 cm cuff width.

The results indicated that there were statistically significant differences between the D and ND legs in both LOP and leg circumference values (p=0.029 and p=0.037, respectively). However, the effect sizes for both variables were small (ES=0.217 for LOP and ES=0.207 for leg circumference, Table 3). We may conclude that although the differences were statistically significant, they may not be practically meaningful. Therefore, our findings highlight that the magnitude of the differences between limbs was minimal.

Similar to our findings, Loenneke et al. (2012) found that leg circumference is the largest determinant of limb occlusion pressure. The authors compared both narrow cuffs (width: 5cm) and wider cuffs (width: 13.5 cm) and their findings showed that wider cuffs need less pressure to fully occlude blood flow while narrow cuffs need more pressure (Loenneke et al., 2012). They also suggest that when using wider cuffs, future studies can adjust the desired cuff pressures based on leg circumference or limb composition, along with ankle blood pressure and diastolic blood pressure (DBP). However, when using narrow cuffs, it may be more suitable to adjust cuff pressure for both leg circumference and limb composition along with the DBP. Moreover, when determining limb occlusion pressure in the upper body, research showed that arm circumference and systolic blood pressure should be considered (Loenneke et al., 2015)

In this study, we used a 10 cm-wide cuff and measured LOP in the supine position. Wider cuffs generally require lower pressure to achieve full occlusion, whereas narrow cuffs require higher pressure, and both the cuff and leg characteristics affect the LOP values (Loenneke et al., 2012). Findings in our study between D and ND legs reinforce the reliability of leg circumference as an estimating LOP, especially when using automated BFR device systems under standardized conditions. The predictive equations shown in our study can provide practical insights for estimating LOP, where LOP measurement is not feasible.

Limitation

This study has some limitations. First, LOP was measured in the supine position. Previous studies have shown that body position can influence LOP (de Queiros et al., 2024b; Hughes et al., 2018). Therefore, findings cannot be translated directly to the seated and sitting positions. Second, we only included healthy male participants; therefore, our findings may not be generalizable to other populations (i.e., females, older adults). Furthermore, we only measured LOP with one specific automated BFR device (Fit Cuffs BFR device) and it should be noted that the BFR device features can influence LOP values.

Conclusion

In conclusion, our findings suggest that leg circumference is one of the most effective predictors of the limb occlusion pressure. When measuring LOP with a larger cuff by using an automated BFR device, leg circumference should be considered. Although we found statistical differences in LOP and limb circumference between D and ND legs, they may not be practically meaningful.

Practical Implications

This study provides some practical implications for practitioners. Leg circumference measurements can be used to estimate LOP values when an automated BFR device or vascular doppler device is not accessible. Furthermore, when performing BFR training, leg circumference and cuff features should be considered to individualize pressure and avoid over-restriction. The predictive equations derived in our study provide practical insights for estimating LOP, particularly in settings where LOP measurement is not feasible.

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Conflict of Interest

There is no conflict of interest among the authors related to publication of this article.

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Author Contributions

Research Idea: OK, NA, CS, KK; Research Design: OK; Data Collection: NA, CS; Data Analysis: OK; Writing: OK, NA, CS, KK; Critical Review: OK, NA, KK.

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The Moderating Role of Gender in the Relationship Between Leisure Involvement and Life Satisfaction

Serbest Zaman İlgilenimi ile Yaşam Doyumu Arasında Cinsiyetin Düzenleyici Rolü

Research Article / Araştırma Makalesi

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Abstract

The study aimed to examine the relationship between the leisure involvement and life satisfaction of sports-fitness center participants and to determine the role of gender in this relationship. This study was designed in correlation survey design. A structured online survey method was used to examine leisure involvement, life satisfaction and personal information form and was delivered to potential participants. From the private sports-fitness center determined through deliberate sampling, 227 individuals answered the survey anonymously and voluntarily. Pearson correlation analysis and regression analysis based on the Bootstrap method were performed for statistical evaluation. In the regression analysis, it was found that the predictor variables included in the model explained approximately 11% of the change in life satisfaction. It was determined that leisure involvement did not have a significant effect on life satisfaction, while gender had a negative significant effect. It was determined that the moderating effect of leisure involvement and gender variables on life satisfaction was also positively significant. When the details regarding the moderating effect were examined, it was found that the effect of leisure involvement on life satisfaction was statistically significant in men, while the effect of leisure involvement on life satisfaction was statistically insignificant in females. As a result, the effect of leisure involvement on life satisfaction differs significantly according to gender. It was found that participants with higher levels of leisure involvement tended to report higher levels of life satisfaction, and there was a significant difference in terms of gender. Leisure involvement has a stronger effect on the level of life satisfaction in male participants. The findings of this study provide references to relevant sector stakeholders regarding the leisure behaviors, participation and leisure experiences of sports-fitness participants.

Keywords: Leisure involvement, Life satisfaction, Gender, Sports fitness center

Öz

Çalışmada spor-fitness merkezi katılımcılarının serbest zaman ilgilenimi ile yaşam doyumu arasındaki ilişkiyi incelemek ve bu ilişkide cinsiyetin rolünü belirlemek amaçlanmıştır. Çalışma, korelasyon türü ilişkisel tarama modelinde tasarlanmıştır. Veriler, serbest zaman ilgilenimi, yaşam doyumu ve kişisel bilgi formu aracılığı ile yapılandırılmış çevrimiçi anket yöntemiyle potansiyel katılımcılara ulaştırılmıştır. Kasti örnekleme yoluyla belirlenen özel spor-fitness merkezinden, 227 birey anonim ve gönüllü olarak anketi yanıtlamıştır. Pearson korelasyon analizi ve Bootstrap yöntemini temel alan regresyon analizi gerçekleştirilerek istatistiksel değerlendirmede bulunulmuştur. Regresyon analizinde modele dahil edilen tahmin değişkenlerinin, yaşam doyumundaki değişimin yaklaşık %11'ini açıkladığı tespit edilmiştir. Yaşam doyumu üzerinde, serbest zaman ilgileniminin anlamlı bir etkisinin olmadığı, cinsiyetin ise olumsuz yönde anlamlı etkisinin olduğu belirlenmiştir. Serbest zaman ilgilenimi ve cinsiyet değişkenlerinin, yaşam doyumu üzerindeki düzenleyici etkisinin de olumlu yönde anlamlı olduğu belirlenmiştir. Düzenleyici etkiye ilişkin ayrıntılar incelendiğinde, erkeklerde serbest zaman ilgileniminin yaşam doyumu üzerinde istatistiksel olarak anlamlı bir etkisinin olduğu, kadınlarda ise anlamsız olduğu tespit edilmiştir. Sonuç olarak serbest zaman ilgileniminin yaşam doyumu üzerindeki etkisi cinsiyete göre anlamlı düzeyde farklılaşmaktadır. Daha yüksek düzeyde serbest zaman ilgilenimine sahip katılımcıların daha yüksek düzeyde yaşam doyumu bildirme eğiliminde olduğu ve cinsiyetin anlamlı bir etkisinin olduğu tespit edilmiştir. Serbest zaman ilgileniminin erkek katılımcılarda yaşam doyumu düzeyi üzerinde daha güçlü bir etkisi vardır. Bu çalışmanın bulguları, spor-fitness katılımcılarının serbest zaman davranışları, katılımı ve serbest zaman deneyimleri konusunda ilgili sektör paydaşlarına referanslar sunmaktadır.

Anahtar Kelimeler: Serbest zaman ilgilenimi, Yaşam doyumu, Cinsiyet, Spor-fitness merkezi

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Introduction

Leisure is defined as the period during which individuals, free from any pressure, engage in activities for pleasure and entertainment based on their own preferences, outside of working hours that are allocated to meet biological needs and sustain their lives (Sönmez & Gürbüz, 2022; Walker, 2008). Planned and structured activities, especially those involving physical effort, carried out during this period form the basis of leisure activities. Participation in such activities is important for the development of individuals' physical, social, and mental health (Steinhardt et al., 2021; Gürkan et al., 2021). Therefore, physical activities performed during leisure play a significant role in our lives. Since individuals' leisure preferences vary according to their desires, needs, and expectations, the concept of involvement gains importance (Yetim & Argan, 2018). In this context, leisure is also defined as the freedom to choose among options with a fundamental approach that includes enjoyment, relaxation, and personal development (Leitner & Leitner, 2012; Demirel et al., 2022).

The concept of involvement, grounded in social judgment theory, was extended to marketing research by Laurent and Kapferer (1985) to better understand consumer purchasing behavior. In this context, involvement is defined as an unobservable interest, a state of arousal, a motivational element that can vary in cause, and a condition triggered by a specific stimulus (Kerstetter & Kovich, 1997; Laurent & Kapferer, 1985; Mitchell, 1979; Eskiler & Karakaş, 2017). In subsequent years, the concept of involvement was adapted to the context of leisure to understand people's behaviors and attitudes toward a recreational activity. Within this framework, leisure involvement is defined as an unobservable state of motivation, arousal, and/or interest directed toward a recreational activity (Havitz & Dimanche, 1997; Song et al., 2022). In other words, leisure involvement is also conceptualized as a motivational connection that individuals form toward a leisure activity, arising from their current leisure behaviors and exhibited attitudes (Havitz & Dimanche, 1997; Bal Turan & Gülşen, 2023). Although there are different conceptualization attempts among scholars, the consensus regarding leisure involvement is that it represents the degree to which individuals dedicate themselves to a leisure activity, or the strength of the cognitive link between the self and the leisure activity (Havitz & Dimanche, 1997). Chien (2020) stated that leisure involvement is associated with the intensity, duration, and frequency of activity participation, while Burnkrant and Sawyer (1983) emphasized that due to the highly motivational and satisfying nature of involvement, it influences individuals' re-engagement in leisure activities and the sustainability of their behavior (Öztürk & Alpullu, 2023). Indeed, engaging in leisure activities enables individuals to strengthen their social relationships, create personal meaning (Chen et al., 2020), and enhance their life satisfaction (Hawkins et al., 2004; Masood & Khan, 2023).

Life satisfaction, considered another important factor in terms of individuals' behavior and health (Beşikçi et al., 2019), is defined as an attitude resulting from the cognitive evaluation of one's overall contentment with life (Heller et al., 2004). From a different perspective, life satisfaction is a psychological state in which individuals evaluate their lives as a whole and feel content with this evaluation (Diener et al., 1985). According to Heller and colleagues (2004), events and contextual factors play a prominent role in life satisfaction, and in this context, life satisfaction is formed by the sum of pleasant and unpleasant life experiences. On the other hand, leisure participation is considered an important source of enjoyment, and leisure satisfaction offers various social and psychological benefits such as life satisfaction, subjective well-being, and a sense of accomplishment (Liu & Chu, 2020; Stebbins, 2018). Moreover, regular participation in leisure activities is said to fulfill individuals' psychological needs such as belonging (attachment), autonomy, relaxation, meaning, and a sense of mastery, all of which can contribute to promoting life satisfaction (Sato et al., 2017; Newman et al., 2014). Research has shown that leisure shaped by individuals' involvement has a positive impact on their life satisfaction (Aydın, 2022; Aktop & Göksel, 2023; Hawkins et al., 2004).

There is overwhelming evidence that participation in sports and exercise is associated with both physical and mental health benefits (Paluska & Schwenk, 2000; Heckel et al., 2023). However, due to the social construction of gender roles (Moen, 2001), a significant gender disparity in participation in physical activities is frequently reported (Eime et al., 2022). Studies also indicate consistent gender differences in leisure activities (Chang, 2016; Mao et al., 2023). Although research on leisure and gender dates to the 1970s, studies on leisure activities have primarily focused on the impact of social roles on leisure. (Karaküçük et al., 2017). On the other hand, the concept of gender is a phenomenon that can positively or negatively influence leisure preferences in society. At this point, the Hierarchical Leisure Constraints Theory (Crawford et al., 1991), which addresses gender-based constraints, is an important theoretical approach to consider when understanding social differences in access to leisure opportunities. The theory, by specifically explaining barriers arising from gender differences, allows for a more comprehensive analysis of factors that limit participation in leisure activities. In this context, the perspective offered by the Hierarchical Leisure Constraints Theory provides a meaningful framework for gender-focused leisure research and forms the theoretical foundation of this study.

According to the theory, factors such as age, gender, health problems, shyness, lack of skills, disinterest in activities, responsibilities and duties, and facility conditions can affect leisure use and preferences (Karaküçük et al., 2017; Son et al., 2008). The Hierarchical Leisure Constraints Model argues that individuals must overcome individual constraints, interpersonal

constraints, and structural constraints (social and environmental factors) to participate in leisure activities (Godbey et al., 2010; Kim & Trail, 2010). According to this theory, women experience individual constraints due to stereotypical and sexist attitudes (Karaküçük et al., 2017). It is also known that women face more interpersonal constraints regarding leisure compared to men (Godbey et al., 2010). The likelihood and frequency of women participating in organized and informal sports activities are reported to be lower than those of men (Chang, 2016). The social gender role of women can be considered a recreational constraint (Orhun et al., 2024). The roles and perceptions of differences attributed by society to female and male identities even segregate the leisure spaces utilized by individuals (Karacan, 2016). One of the spaces frequently used for leisure activities is sports and fitness centers. It is believed that the leisure spent in these settings should be examined from a gender perspective.

In this context, the present study aims to examine the relationship between leisure involvement and life satisfaction among participants of sports and fitness centers, and to determine the role of gender in this relationship. It is anticipated that the research findings will help us better understand the effects of leisure involvement on life satisfaction and enable practitioners to develop more effective interventions by considering gender differences. In line with the purpose of the study, the following hypotheses have been proposed:

H_1: Leisure involvement is positively correlated with life satisfaction.

H_2: Gender moderates the relationship between leisure involvement and life satisfaction

Method

Research Design

This study, conducted to examine the relationship between leisure involvement and life satisfaction and to determine the role of gender in this relationship, was designed using a correlational relational screening model, which is one of the quantitative research approaches.

Research Group

The research group consists of participants from a private sports-fitness center located in Istanbul, in a region favorable for access to sports activities. Data was collected from 227 participants between April and June 2024 through convenience sampling, using both face-to-face interviews and Google Forms. In this context, the selected sample provides an appropriate representation to understand gender participation among individuals who have access to leisure activities. Of the participants, 63% (n=143) are male and 37% (n=84) are female; 74.9% (n=170) reported being single, and 25.1% (n=57) reported being married. Participants ranged in age from 18 to 52 years ($\bar{X}$=26.01 ± 6.56).

Table 1. Participants' leisure participation information

		n	*%*
Daily Time Spent	1-2 hours	148	65.2
	3-4 hours	48	21.1
	≥ 5 hours	31	13.7
Days Attended per Week	1-2 days	117	51.5
	3-4 days	66	29.1
	≥ 5 days	44	19.4
Weekly Time Spent	1-5 hours	50	22.0
	6-10 hours	56	24.7
	11-15 hours	49	21.6
	≥ 16 hours	72	31.7

As seen in Table 1, the participants, 51.5% (n=117) reported visiting the sports-fitness centers at least 1–2 days per week, 29.1% (n=66) visited 3–4 days per week, and 19.4% (n=44) visited 5 days or more per week. During each visit, 65.2% (n=148) spent 1–2 hours, 21.1% (n=48) spent 3–4 hours, and 13.7% (n=31) spent 5 hours or more at the center. Finally, participants stated that the average weekly time they dedicated to leisure activities was distributed as follows: 16 hours and above (31.7%, n=72), 6–10 hours (24.7%, n=56), 1–5 hours (22%, n=50), and 11–15 hours (21.6%, n=49).

Data Collection Tools

Based on previous research, a questionnaire structured in three sections was developed to examine leisure involvement, life satisfaction, and socio-economic information. The socio-economic section included items such as gender, age, and education level. Participants were also asked about their experiences at the sports-fitness center, the frequency of their activity participation, and the average time they spent on leisure activities per week.

To determine participants' levels of leisure involvement, the Leisure Involvement Scale developed by Kyle et al. (2007) and adapted into Turkish by Gürbüz et al. (2018) was used. This scale consists of 15 items and 5 sub-dimensions. All items were rated on a 5-point Likert scale (1=strongly disagree, 5=strongly agree). Cronbach's alpha values for the sub-dimensions ranged between .820 and .882, while the overall scale Cronbach's alpha was found to be .958.

For life satisfaction, the Life Satisfaction Scale developed by Diener et al. (1985) was employed. This scale has been adapted to the Turkish culture with different samples (Köker, 1991; Durak et al., 2010). The scale consists of five statements used to assess participants' overall life satisfaction. Participants were asked to indicate their agreement with each statement on a 7-point Likert scale (1=strongly disagree, 7=strongly agree). Higher scores indicate greater life satisfaction. The Cronbach's alpha value for this scale is .889.

Data Collection and Analysis

Ethical approval for the study was obtained from the Ethics Committee of Sakarya University of Applied Sciences (Approval No: E.167838), and permission to conduct the research was granted by the relevant sports-fitness center. Before administering the data collection instruments, participants were provided with a brief explanation about the purpose and significance of the study. Statistical analyses were conducted using SPSS and AMOS software. In the initial stage, descriptive statistics (mean, standard deviation, skewness, kurtosis) were calculated using SPSS. Normality was tested based on the criterion that skewness and kurtosis values fall within the ±2 range (George & Mallery, 2016), and multivariate kurtosis was assessed using Mardia's coefficient (Mardia, 1985) (see Table 2).

In the second stage, the measurement model's validity and reliability were evaluated using AMOS. Cronbach's alpha (α>.70) and Composite Reliability (CR > .70) values were used to assess construct reliability. Factor loadings, CR, and Average Variance Extracted (AVE > .50 and CR > AVE) values were used to evaluate convergent validity (Fornell & Larcker, 1981; Hair et al., 2009). Model fit was assessed using indices such as Goodness-of-Fit Index (GFI), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA), alongside Chi-square (χ^2/df) test results (Kline, 2005; Schermelleh-Engel et al., 2003). Finally, to test the hypothesized relationships between variables, regression analysis based on the Bootstrap method (Process v4.2, Model 1) was conducted. A bootstrap resampling option of 5000 samples was used. To accurately detect the effect of the interaction term on the outcome variable, continuous variables were mean-centered (Gürbüz, 2019; Hayes, 2013). Cohen's f^2 was calculated to evaluate the effect size of the model (Kenny, 2020).

Table 2. Descriptive statistics of the variables

	r	$\bar{X}$	*Sd*	*Skewness*	*Kurtosis*	*α*
Attractiveness (LIS)	.308**	3.46	1.060	-.343	-.539	.882
Centrality (LIS)	.256**	3.60	1.012	-.498	-.320	.845
Social Bonding (LIS)	.241**	3.74	.983	-.722	.089	.863
Identity Affirmation (LIS)	.259**	3.74	.963	-.710	.286	.831
Identity Expression (LIS)	.219**	3.60	.982	-.558	-.109	.820
LIS	.285**	3.64	.904	-.681	.330	.948
Life Satisfaction	1	4.56	1.483	-.550	-.778	.889

Note: **p<.01, $\bar{X}$: Mean, Sd; Standard deviation, α: Cronbach's alpha, LIS: Leisure Involvement Scale

When examining the descriptive statistics and correlations of the variables, all constructs are moderately to weakly correlated with each other and statistically significant (p <0.01). Among the variables, Attractiveness ($\bar{X}$=3.91 ± 0.93) has the lowest mean, while Life Satisfaction ($\bar{X}$=6.17 ± 1.05) has the highest mean. The skewness and kurtosis values for all variables fall within the ±2 range. Additionally, Cronbach's alpha internal consistency coefficients were found to be above .70, ranging between .820 and .948.

Table 3. Factor loading, validity, and reliability

Variables	*Items*	*λ¥*	*R^2*	*CR (>.70)*	*AVE (>.50)*
Attractiveness (LIS)	LIS3	.860	.740	.896	.742
	LIS2	.904	.817		
	LIS1	.780	.608		
Centrality (LIS)	LIS6	.821	.674	.849	.653
	LIS5	.826	.682		
	LIS4	.776	.602		
Social Bonding (LIS)	LIS9	.856	.733	.868	.688
	LIS8	.881	.776		
	LIS7	.745	.555		
Identity Affirmation (LIS)	LIS12	.846	.716	.841	.640
	LIS11	.708	.501		
	LIS10	.831	.691		
Identity Expression (LIS)	LIS15	.742	.551	.811	.590
	LIS14	.713	.508		
	LIS13	.857	.734		
Life Satisfaction	LSS5	.735	.540	.889	.617
	LSS4	.840	.706		
	LSS3	.812	.659		
	LSS2	.866	.750		
	LSS1	.649	.421		

¥p<.001, Standardized factor loading, AVE: Average variance extracted, CR: Composite reliability, LIS: Leisure Involvement Scale, LSS: Life Satisfaction Scale

Confirmatory Factor Analysis (CFA)

The CFA results indicated that the model provided a satisfactory fit to the observed data (χ^2/df=1.761, SRMR=.041, RMSEA=.058 [90% CI: .046–.069], GFI=.90, NFI=.93, TLI=.96, CFI=.97). RMSEA values between .05 and .08, and GFI and NFI indices ranging from .90 to .95 indicate an acceptable model fit (Schermelleh-Engel et al., 2003). Accordingly, the RMSEA, GFI, and NFI values fall within acceptable limits. Furthermore, the SRMR value below .05 and TLI and CFI indices above .95 suggest a good model fit (Hair et al., 2009; Kline, 2005). The χ^2 statistic was significant ($p < .01$), and the ratio of χ^2 to degrees of freedom was below the recommended threshold of 3.0 (Kline, 2005).

Table 3 presents the standardized regression coefficients (λ), indicating the relationship of each item to its respective factor and the squared values of these coefficients. All standardized factor loadings ranged from .649 to .904 ($\lambda > .60$) and were significant, demonstrating that each item meaningfully represents its construct (Fornell & Larcker, 1981; Hair et al., 2009).

Reliability and validity assessments of the model are summarized in Tables 2 and 3. Cronbach's alpha values (.820–.948) and Composite Reliability (CR) values (.811–.896) exceeded the acceptable threshold of .70 (Hair et al., 2009). Average Variance Extracted (AVE) values ranged from .590 to .742, exceeding the .50 cutoff, with CR values higher than AVE, supporting convergent validity (Fornell & Larcker, 1981; Hair et al., 2009). These findings confirm the reliability and validity of the measurement model.

Findings

Table 4. The moderating effect of gender on the relationship between leisure involvement and life satisfaction

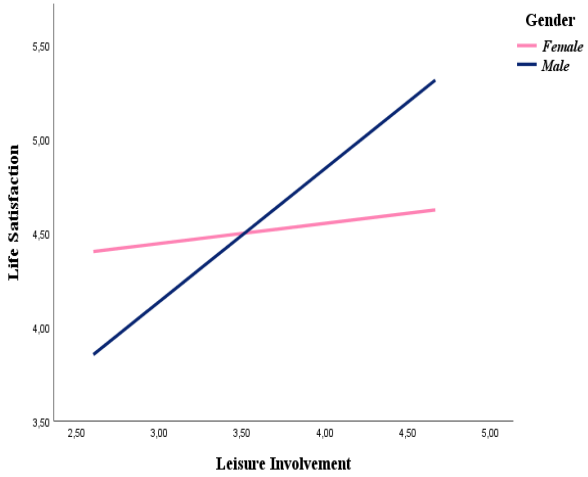
Variables	*Unstandardized Coefficients*	*SH*	*t*	*p*	*95% CI*	
					Lower	*Upper*
LIS	.107	.164	.655	.513	-.215	.430
Gender	-2.106	.793	-2.659	.008	-3.669	-.546
Interaction	.599	.211	2.840	.005	.184	1.016
Constant	4.124	.616	6.598	.000	2.910	5.337

Model: R^2=.114, $F_{(3, 223)}$ =9.535, p<.001

A regression analysis based on the bootstrap method with 5000 resamples was conducted to determine the moderating role of gender in the effect of leisure involvement on life satisfaction. It was found that the predictor variables included in the regression model explained approximately 11% of the variance in life satisfaction (R^2=.114). Leisure involvement was found to have no significant effect on life satisfaction (b=.107, p> .05), whereas gender had a significant negative effect (b =-2.107, p <.01). The interaction effect between leisure involvement and gender on life satisfaction (moderating effect) was also found to be positively significant (b=.599, p <.01). The inclusion of the interaction term increased the explained variance by 3.2% (ΔR^2=.032). Additionally, Cohen's f^2 value for the interaction term was calculated as .046, indicating a small effect size (Kenny, 2020). This suggests that although the interaction effect is statistically significant, its contribution to the overall explanatory power of the model is limited.

Table 5. The moderating effect of gender on the relationship between leisure involvement and life satisfaction

Gender	Effect	SE	t	p	95% CI	
					Lower	Upper
Female	.107	.164	.655	.513	-.215	.430
Male	.707	.134	5.296	.000	.443	.964



Graph 1. The moderating effect of gender on the relationship between leisure involvement and life satisfaction

When examining the details related to the moderating effect (Graph 1 and Table 5), it was found that leisure involvement had a statistically significant impact on life satisfaction in males (b=.707, 95% CI [.443, .964], t=5.296, $p < .001$). In females, however, the effect of leisure involvement on life satisfaction was determined to be statistically non-significant (b=.107, 95% CI [-.215, .430], t=.513, $p > .05$). As a result, the impact of leisure involvement on life satisfaction differs significantly by gender.

Discussion and Conclusion

The aim of this study is to examine the relationship between leisure involvement and life satisfaction among fitness center participants and to determine the role of gender in this relationship. The gender-based aspects of social life can have an impact on individuals' leisure participation and outcomes. The meaning/satisfaction of life inherent in leisure can be achieved by individuals through different types and levels of involvement. Fitness centers, which are one of the ways to stay fit and engage in physical activity, are leisure spaces that maintain a fresh place in popular sports culture. Given their widespread use, fitness centers are leisure activity venues where the effects of gender differences should not be overlooked. In this regard, the present study was conducted specifically in fitness centers, which are relatively more accessible and have a broader audience.

The results indicate a positive and significant relationship between leisure involvement and life satisfaction ($r=.285$, $p<.01$). This suggests that participants with higher levels of leisure involvement tend to have higher levels of life satisfaction. It is well-known that participation in physical activities at fitness centers extends beyond just physical benefits (Heckel et al., 2023). Studies in the literature also mention the positive effect of individuals' leisure involvement on life satisfaction (Aydın, 2022; Aktop & Göksel, 2023; Çevik et al., 2021; Öztürk & Alpullu, 2023). These findings provide empirical evidence supporting previous research results. On the other hand, it was found that leisure involvement has a stronger effect on life satisfaction among male participants. Considering that fitness centers are leisure spaces with relatively intensive use by men, it can be stated that the obtained results are acceptable for the specific sample in this study. However, the Cohen's f^2 value calculated for the interaction term indicates a small effect size. Indeed, previous large-scale international studies have found that, despite using different samples, life satisfaction measures, and statistical methods, the contribution of gender to life satisfaction is significant but small (Fortin et al., 2015; Graham & Chattopadhyay, 2013; Joshanloo & Jovanović, 2020). These findings align with Hyde's (2005) gender similarity hypothesis, which suggests that males and females are fundamentally similar in many psychological variables. Inglehart (2002) explains the small gender difference in life satisfaction by stating that "a person's gender is a permanent characteristic, meaning that by the time most people take the survey, they have already adapted to the advantages and disadvantages of being male or female."

Leisure activity participation preferences not only provide spaces for the experience of gender relations but also contribute to the production of new gender codes in these spaces (Bozok et al., 2019). Studies have shown that men and women prefer sports-fitness centers with different goals and expectations (Güdül, 2008; Afthinos et al., 2005). This is because gender plays an active role in influencing consumer behavior, interest, and motivation (Peterson, 2005; Tekvar, 2016; Yerlisu Lapa et al., 2012). Research suggests that men show more interest in sports than women and report higher levels of both psychological and physiological satisfaction (Aydın, 2022; Ağyar et al., 2012; Kalfa, 2017). Men place more importance on physical details such as health, competition, body and appearance, self-esteem, social interaction, fun, skill development, as well as sports equipment, apparatus, equipment quality, and environmental conditions in their motivation for exercise compared to women (Cengiz & Yaşartürk, 2020; Güzel et al., 2020; Tekvar, 2016). Similarly, men's involvement in sports-fitness centers is higher than women's in the subdimensions of importance (Serdar, 2021) and attractiveness (Kara & Sarol, 2021). Male participants perceive their activities as more exciting, engaging, and fun (Kara & Sarol, 2021). Therefore, in an area where men place such high importance on details, it becomes increasingly important for businesses to cater specifically to men, while women's level of involvement remains relatively lower. This is because marketing efforts in this field are often more strongly associated with the male body, which is linked to strength, health, and fitness (Özer & Yarar, 2023). Particularly, various advertisements shown during sports programs are typically targeted towards men. Such advertisements, which often portray a macho male image, emphasize male dominance in the service (Tekvar, 2016). In ads featuring women, they are usually depicted as weak, thin, and delicate, while men are shown as much stronger and more muscular compared to women. Women are not depicted as muscular in these advertisements because muscular women could be perceived as challenging the strength and superiority of men (Özer & Yarar, 2023). The gender regime that associates muscularity with male biological traits and avoids associating muscular bodies with femininity reinforces this perception. In this regard, sports can be considered a form of resistance, as it allows women to break out of the narrow boundaries of being thin, delicate, and fragile qualities traditionally ascribed to them (Kavasoğlu & Macit, 2018). However, such discriminatory practices and unfair competitive attitudes not only lead to gender inequalities but can also harm consumers and ultimately societies (Tekvar, 2016).

It is known that women have relatively less access to leisure compared to men (Eckermann, 2012). Women often feel that the time they dedicate to physical activity is "stolen" from other pursuits that are more socially acceptable in their circles. As a result, they may not be able to devote enough attention to their sports activities, which negatively impacts their satisfaction, pleasure, and overall wellbeing (Karaküçük et al., 2017:247). Since gender roles are socially constructed, there are different roles and persistent inequality issues in society (Moen, 2001). However, women and men also follow different biographical paths and paces. These differences can provide valuable insights for the development and implementation of physical activity programs and services based on leisure (Son et al., 2008).

Some physical activities, due to their associations with masculinity and societal attitudes toward gender, are more frequently preferred by men (Kara & Sarol, 2021). In various studies, sports requiring power usage (e.g., football, bodybuilding, wrestling, boxing) are considered masculine (Adams, 2011; Alsamih, 2024; Bulgu, 2012; Gillett & White, 1992; Hacısoftaoğlu & Safter, 2015), while sports like dance, gymnastics, and pilates are labeled as feminine (Bozok et al., 2019; Koca & Demirhan, 2005). Due to gender differences, it can be said that women's participation and preference rates for such activities are lower compared to men, and this could negatively affect the level of satisfaction they derive from the activity and their overall life satisfaction (Aydın, 2022).

Furthermore, leisure, today has become an area surrounded by body ideals, discourses, practices, and relationships where men can establish their identities (Bozok et al., 2019). In this sense, it can be said that women's leisure preferences and usage spaces are constrained by gender perspectives. This is because women's bodies and their use of leisure spaces are often controlled by men (Demirbaş, 2020). Given societal attributions, women are more likely to prefer activities that are considered relatively more "feminine," such as dance, pilates, or zumba. This could have resulted in lower levels of interest in sports-fitness centers, diminishing the significance of leisure involvement and its impact on life satisfaction. According to Nuqoba et al. (2023), life satisfaction is a multi-dimensional and complex structure influenced by various factors, such as economic status, health conditions, social environment, individual expectations, and the meaning one attributes to life. In this context, it is possible to talk about the existence of external and/or uncontrollable variables that could have both positive and negative effects on life satisfaction. In other words, since the leisure involvement and gender variables tested in this study only represent certain aspects of life satisfaction, it can be said that the overall explanatory power of the model remains somewhat limited.

The results obtained in this study indicate that individuals' leisure involvement has a direct impact on life satisfaction, and this effect differs based on gender. It was found that high leisure involvement is strongly related to high life satisfaction among male participants. This research clearly demonstrates that leisure involvement is a significant determinant of life satisfaction among fitness center clients, and that gender plays a distinct moderating role in this relationship. These findings reinforce the idea that leisure activities are not just hobbies, but critical factors that enhance individuals' life satisfaction.

Limitations and Recommendations

The study data were collected from a cross-sectional sample of sports-fitness participants at a single private fitness center. The high number of male participants may be attributed to the fact that the study was conducted in one specific fitness center. Similar studies focused on fitness centers have also observed male-dominated participant groups (Arslanboğa, 2024; Çiftçi & Çakmak, 2018). Larger or smaller gender differences might emerge in studies focused on groups or nations. Global trends are not always applicable to one single nation or group. Therefore, a useful avenue for future research would be to examine gender differences in various contexts. To ensure greater data diversity, it is suggested that future studies include fitness centers that offer a broader range of services and have larger and more diverse membership bases. A limitation of this study is its exclusive focus on the moderating role of gender. Conducting similar studies across different demographic groups, cultures, and larger chain businesses could make the findings more generalizable.

The findings of this study provide valuable references for industry stakeholders related to sports and fitness participants' leisure behaviors, involvement, and experiences. Fitness centers and other leisure activity providers should develop programs and events that encourage increased leisure involvement. Given the high popularity and accessibility of sports-fitness centers, it is expected that they provide gender-neutral approaches. Advertisements targeting potential customers should focus on promoting healthy lifestyles rather than adopting a gendered approach to body image. The messaging should emphasize mental and emotional well-being rather than just physical appearance. Gender-specific leisure programs and marketing strategies should be developed to encourage participation in activities that increase life satisfaction for individuals of both genders.

Future studies could assess sports-fitness centers alongside other industry sectors from a gender perspective for a broader comparison. Future research could also examine the underlying mechanisms of gender's moderating role in this relationship. For example, psychological, social, or cultural factors that differentiate the impact of leisure activities on life satisfaction for men and women could be explored through qualitative methods. Additionally, the impact of different types of leisure activities (e.g., creative, social, physical) on life satisfaction, and how these effects vary by gender, can be investigated. Longitudinal studies provide valuable insights into the dynamics of the relationship between leisure involvement and life satisfaction over time.

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Conflict of Interest

There is no conflict of interest among the authors related to publication of this article.

Author Contributions

Research Idea: ES and GK; Research Design: GK and EE; Data Collection: ES; Data Analysis: EE; Writing: GK, EE and ES; Critical Review: GK, EE.

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Examining the Effects of Parent-Assisted Equipment-Based Pilates Exercises on Social Skills and Peer Adaptation in a Child Diagnosed with Autism Spectrum Disorder

Otizm Spektrum Bozukluğu Tanılı Bir Bireyin Ebeveyn Katılımlı Aletli Pilates Egzersizleri Sonucunda Sosyal Beceri ve Akran Uyumunun İncelenmesi

Research Article / Araştırma Makalesi

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Abstract

This study aimed to examine the developmental changes in social skills and peer adjustment of an individual diagnosed with autism spectrum disorder (ASD) following a parent-assisted reformer Pilates exercise program. The research was conducted using a case study design, one of the qualitative research methods. A personalized reformer Pilates program was implemented for 8 weeks, with sessions held twice a week for a total of 16 sessions. Data were collected through semi-structured interviews with the participant's mother and special education teacher and analyzed using descriptive and content analysis methods. The findings revealed that prior to the exercise program, the individual experienced various difficulties in physical, cognitive and psycho-social domains. After the program, significant improvements were observed in these areas. The individual showed notable progress in attention span, emotional expression, and initiating play. In conclusion, parent-assisted reformer Pilates exercises were found to contribute positively to the social, cognitive, and physical development of the individual with ASD. The findings suggest that such structured physical activity programs can serve as therapeutic and developmental interventions for individuals with ASD and should be more widely adopted.

Keywords: Autism, Pilates, Peer adjustment, Social skills

Öz

Bu araştırmada, otizm spektrum bozukluğu (OSB) tanılı bir bireyin ebeveyn katılımlı aletli pilates egzersizleri sonrasında sosyal beceri ve akran uyumu açısından yaşadığı gelişimlerin incelenmesi amaçlanmıştır. Nitel araştırma yöntemlerinden durum çalışması deseninde yürütülen araştırmada, 8 hafta süresince haftada iki gün, toplam 16 seans süren bireyselleştirilmiş aletli pilates programı uygulanmıştır. Veri toplama aracı olarak, bireyin annesi ve özel eğitim öğretmeniyle yapılan yarı yapılandırılmış görüşmeler kullanılmış, veriler betimsel ve içerik analiziyle değerlendirilmiştir. Araştırma bulguları, bireyin egzersiz öncesi fiziksel, bilişsel ve psiko-sosyal alanlarda çeşitli yetersizlikler yaşadığını göstermiştir. Egzersiz programı sonrası ise bu alanlarda belirgin gelişmeler gözlemlenmiştir. Birey, dikkat süresinde artış, duygularını ifade etme ve oyun başlatma gibi becerilerde ilerleme kaydetmiştir. Sonuç olarak, ebeveyn katılımlı aletli pilates egzersizlerinin OSB tanılı bireylerin sosyal, bilişsel ve fiziksel gelişimlerine olumlu katkı sunduğu görülmektedir. Araştırmanın bulguları, bu tür yapılandırılmış fiziksel aktivitelerin, OSB tanılı bireyler için terapötik ve geliştirici bir müdahale yöntemi olarak yaygınlaştırılabileceğini önermektedir.

Anahtar Kelimeler: Otizm, Pilates, Akran uyumu, Sosyal beceri

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Introduction

Autism Spectrum Disorder (ASD) is a developmental disability, a neurological disorder that is usually diagnosed in early childhood and lasts throughout an individual's life (Koegel and Lazebnık, 2004). Individuals diagnosed with ASD often face challenges in social communication and interaction. Deficits in social skills, impairments in motor abilities, and difficulties in forming peer relationships are among the most prominent issues experienced by these individuals. Many recent studies have shown that a significant number of individuals globally are affected by ASD (İssac et al., 2025; Global Burden of Disease Study, 2021). Exercise interventions aim to enhance social skills, improve peer adaptation, foster the acquisition of new abilities, and support the development of existing skills in individuals with ASD. Notably, the implementation of exercise programs beginning in early childhood has been shown to yield long-term benefits for individuals with ASD (Yarımkaya, İlhan & Karasu, 2017).

Engagement in regular physical activity is critically important for both the overall health and well-being of individuals diagnosed with ASD. However, many individuals with ASD demonstrate low levels of physical activity participation due to factors such as social impairments, prevalent societal attitudes toward ASD, repetitive behaviors, and poor motor skills (Pan & Frey, 2006). Moreover, compared to the general population, individuals with ASD are more likely to be overweight, face an increased risk of obesity, and lead sedentary lifestyles (Curtin, Anderson, Must, & Bandini, 2010). Excess weight may further contribute to the social marginalization of individuals with ASD, as appearance-based discrimination in social settings can exacerbate their already complex interpersonal challenges. Individuals with ASD represent a disadvantaged group that strives for inclusion in society but is often subjected to persistent social exclusion (Salari et al., 2022). Their social environments are typically limited. Exercise can serve as a tool to help individuals with ASD move beyond their familiar family-centered surroundings and engage with unfamiliar environments and new individuals. In doing so, they could interact with others and participate in structured physical activities governed by specific rules (Atalay & Karadağ, 2011).

A review of the relevant literature reveals that individuals diagnosed with ASD often fail to develop positive peer relationships due to certain social deficits such as reluctance to initiate relationships, deficiencies in expressive language skills, and difficulties in using or interpreting facial expressions and gestures. As a result, they are frequently isolated and excluded by their peers (Attwood, 2000; Bauminger & Kasari, 2000; Menteş & Arnas, 2019). Individuals with ASD demonstrate significant difficulties in displaying and improving social skills. Although research on peer adaptation among individuals with ASD has increased in recent years, there is still a notable lack of studies focusing specifically on the role of exercise in enhancing their social skills. In a study conducted by Yarımkaya, İlhan & Karasu (2017) titled "Peer-Mediated Adapted Physical Activity Practices for Individuals with Autism Spectrum Disorder," it was observed that individuals with ASD were able to improve their social skills, achieve better peer adaptation, and enhance their communication abilities through peer-mediated adapted physical activities. Similarly, Esentürk (2019) examined the effects of a family-involved Adapted Physical Activity (APA) program on the communication skills of individuals with ASD. According to observations reported by mothers, positive developments in communication skills were observed following completion of the program together with their children. Several studies have demonstrated that individuals with ASD experience serious limitations in their social relationships due to deficits in social interaction and communication, often struggling to express their desires and needs and facing numerous challenges in daily life (Alzrayer, Banda, & Koul, 2014; Matson, Hess, & Mahan, 2013; Ramdoss et al., 2011). It is thought that these difficulties may reveal socially maladaptive behaviors. However, despite growing awareness, there remains a lack of research in the literature examining how parent-assisted physical activity programs may influence the development of social skills in individuals with ASD. There are only a few studies on Pilates exercises in individuals with ASD (Saraçoğlu & Şirinkan, 2016; Öztürk et al., 2023; Jia et al., 2023). Studies involving different physical activities other than Pilates have been conducted in individuals diagnosed with ASD, so this study is unique in that it focuses on Pilates practice in individuals diagnosed with ASD. This study aims to answer the following questions: How does Pilates exercise affect the physical development of an individual diagnosed with ASD? Does it affect psychosocial development? Does it affect cognitive development? In a study conducted by Nicholson et al. (2011), it was reported that engagement in exercise had a positive effect on the academic participation levels of individuals diagnosed with ASD (Nicholson, Kehle, Bray, & Heest, 2011). Exercise may contribute to the development of motor skills as well as improvements in social and communication abilities in individuals with ASD. Given that individuals with ASD commonly experience motor difficulties, sensory processing issues, social interaction deficits, and behavioral challenges, structured and controlled forms of exercise—such as Pilates—may be particularly effective in addressing these concerns. Pilates provides significant benefits to individuals with ASD in areas such as motor skills, balance, coordination, and body awareness (Saraçoğlu & Şirinkan, 2016). By supporting sensory regulation in individuals with ASD, Pilates can have a calming effect and promote improvements in mental and emotional well-being while also reducing stress and anxiety levels (Ramdos et al., 2011; Öztürk et al., 2023; Jia et al., 2024). Additionally, it facilitates the development of social interaction and communication skills by providing opportunities for individuals to engage in structured group environments. Regular participation in Pilates exercises can

enhance physical endurance and support more effective movement in daily life, while also contributing to emotional self-regulation (Akpınar et al., 2016). Building upon this foundation, the present study aims to examine the effects of parent-assisted equipment-based Pilates exercises on the social skills and peer adaptation of individuals diagnosed with ASD. The research sought to answer the following questions: What are the thoughts about the physical development process of individuals with ASD? What are the thoughts about the cognitive development process of individuals with ASD? What are the thoughts about the psychosocial development process of individuals with ASD?

Method

Research Model

This study was conducted using a case study design, one of the qualitative research methods. Single case study is an approach that aims to provide an in-depth understanding of a particular individual or group within its natural context. In the context of this research, the case examined is a student diagnosed with ASD who participated in an equipment-based Pilates training program. The participant with ASD was diagnosed by a psychiatrist based on the necessary tests and behavioral observations. The individual with ASD does not have intellectual disability. Therefore, the findings of this study are specific to the conditions of the individual in question and are limited to the experiences of this student and the relevant instructors. A case study can be considered a systematic framework that guides the researcher throughout the entire research process. At the beginning of the study, guiding questions are formulated, and the research process is shaped by the search for answers to these questions. At the end of the process, findings are used to present answers and draw conclusions based on the initial inquiries. This process encompasses multiple stages, including data collection and analysis (Yıldırım & Şimşek, 2000).

Data for this study were collected through interviews. Data for this study were collected through interviews. The Pilates physical activity model employed in the study consisted of 16 individualized sessions, two sessions per week for eight weeks. Each session was limited to 50 minutes. The opinions of one special education specialist, one Pilates instructor, and one academic were obtained during the program development process. The exercise protocol consisted of 15 structured reformer-based Pilates exercises performed in 16 individualized sessions, two sessions per week for eight weeks. Each session lasted approximately 50 minutes and followed a three-phase structure: warm-up (5-10 minutes), main exercise phase (30-40 minutes), and cool-down (5-10 minutes). The intensity and duration of each exercise were individualized according to the participant's physical capacity, sensory profile, and attention span. The number of repetitions per exercise ranged from 5 to 10, and the exercises were performed at submaximal levels to prioritize safety, movement quality, and motor planning. On average, approximately 60-70% of the maximum potential repetitions per exercise were completed. Rest intervals of 30–60 seconds were provided between exercises and extended as needed to meet sensory regulation or emotional self-regulation needs. The structure of the equipment-based Pilates physical activity program is detailed in Table 1. Prior to each session, the participant’s psychological and physical condition was observed, and the sessions were individualized based on the participant’s physical capacity, sensory sensitivities, and attention span. While preparing the program, 1 special education specialist, 1 pilates instructor and 1 academician were consulted. The structure of the equipment-based Pilates physical activity program is detailed in Table 1.

Table 1. Equipment-based pilates physical activity program

Day 1	*Exercise*	*Day 2*	*Exercise*
	Warm-Up Exercise		Warm-Up Exercise
	Footwork Series (Parallel Heels, Parallel Toes, V Position Toes, Wide Heels / Wide Toes)		Roll Back (on the cadillac)
	The Hundred		Push Through Series (Seated Push Through, Supine Push Through, Side Push Through)
	Leg Circles / Frogs (Leg Circles / Frog)		Arm Springs Series (Chest Expansion, Hug a Tree, Serving Tray, Arm Circles)
	Arms Pulling Straps / Chest Expansion		Monkey
			Cat Stretch
	Side Splits		Mermaid with Push Through Bar
	Elephant		
	Bridging		
	Cool-Down Exercise		Cool-Down Exercise

Table 2. Pilates movements and gains

Footwork Series (Parallel Heels, Parallel Toes, V Position Toes, Wide Heels/Wide Toes)	The primary objectives of Footwork exercises are to strengthen the lower extremity muscles while maintaining lumbopelvic stability and proper alignment, to promote joint stability at the hip, knee, and ankle, and to activate the deep hip rotators for enhanced lower limb muscle engagement.
The Hundred	To improve breathing awareness and enhance core stabilization skills
Leg Circles / Frogs	Leg Circle and Frog exercises primarily target the hip and leg muscles, enhance flexibility, and aim to improve spinal alignment.
Arms Pulling Straps / Chest Expansion	It aims to enhance scapular mobility while strengthening the periscapular, shoulder girdle, and trunk extensor muscles
Side Splits	To develop balance and lateral stability, and promote muscular symmetry in the legs
Elephant	To mobilize the spine, develop anterior-posterior body awareness, and improve balance
Bridging	It aims to develop hip extension, spinal stabilization, and lumbopelvic control by activating the gluteus maximus, hamstring group, erector spinae, multifidus, and abdominal muscles.
Monkey	To enhance spinal flexibility, limb coordination, and movement sequencing awareness
Cat Stretch	To support spinal mobility and develop body awareness
Mermaid with Push Through Bar	To improve lateral flexibility and support trunk awareness
Roll Back (on the Cadillac)	To improve spinal flexion and control, and enhance segmental movement awareness
Push Through Series (Seated, Supine, Side)	The Push Through Series is a multi-position Pilates exercise designed to enhance pelvic and spinal stability, strengthen the core, shoulder girdle, and lower extremity muscles, and improve postural control, balance, and muscle coordination.
Arm Springs Series (Chest Expansion, Hug a Tree, Serving Tray, Arm Circles)	To enhance upper limb awareness, muscular control, postural alignment, and visual-motor coordination

(Karadenizli & Kambur, 2016; Latey, 2001; Segal, Hein & Basford, 2004)

Research Group

The study group consists of individuals who receive individual or group education in a practice unit that provides support services to individuals with special needs. This individual is registered as an inclusive student. An 18-year-old individual diagnosed with ASD, the individual's parent, and a special education teacher. To allow for an in-depth and comprehensive examination, the sample size was deliberately limited. The participants were selected using criterion sampling, a purposive sampling method in which individuals are chosen based on specific characteristics aligned with the purpose of the study (Merriam & Tisdell, 2015).

The inclusion criteria for parents required that they have a child diagnosed with autism spectrum disorder (ASD). For individuals with ASD, participation was limited to those with a confirmed medical diagnosis of ASD, prior experience with special education, no discomfort with social interaction involving touch, the absence of any health-related problems, and a history of regular participation in programs or exercises aimed at improving social skills or peer adaptation.

Teacher selection criteria were established as follows: holding either a bachelor's or master's degree in special education, actively teaching children with ASD in individual or group settings, and agreeing to participate in the study on a voluntary basis.

Before the implementation of the study, face-to-face meetings were conducted with the parents and teachers to explain the objectives of the research and the participation process in detail. Following these meetings, informed consent forms were distributed to the participants, and interview dates were scheduled. To ensure the confidentiality of participants' identities, special education teachers were assigned the code "T1" and parents were assigned the code "P1."

Data Collection and Analysis

In this study, interviews—one of the qualitative research methods—were used as the primary data collection tool. Within this framework, the semi-structured interview technique, which allows for the collection of in-depth data, was

employed. Interviews were conducted with the mother of the individual diagnosed with ASD who received equipment-based Pilates training, as well as with the special education teacher. These interviews focused on the planning, implementation, and evaluation of the Pilates sessions, as well as general observations regarding the process. The semi-structured interview method was chosen for its ability to elicit rich, detailed information and to provide participants with the opportunity to express themselves freely (Büyüköztürk et al., 2018). The interview form developed by the researchers consisted of two main sections. The first section gathered demographic information about the participants, while the second included questions addressing the perceived impact of equipment-based Pilates training on social skills and peer relationships. A comprehensive literature review was conducted during the development phase of the form. The draft form was then reviewed and revised based on expert feedback from an academic in the field of sports sciences, a measurement and evaluation expert, and a special education expert. Finally, the form was piloted to ensure clarity and applicability.

The questions in the form are as follows.

- What are your thoughts regarding the physical development process of the individual with ASD?
- What are your thoughts regarding the cognitive development process of the individual with ASD?
- What are your thoughts regarding the psychosocial development process of the individual with ASD?

The interviews were conducted face-to-face at times and dates convenient for the participants. The data collected in the study were analyzed using content analysis. The main purpose of content analysis is to bring together similar concepts and relationships and interpret them in a way that can be clearly understood by the reader (McMillan & Schumacher, 2010). In this study, both descriptive and content analysis methods were employed concurrently. The interview data were first recorded digitally and then transcribed verbatim. During the analysis process, selected quotations from the teacher interviews were presented to support the findings. A deductive approach was adopted in the evaluation of the data. In other words, this study is based on the experiences of the parent and teacher of an individual diagnosed with ASD who participated in an equipment-based Pilates exercise program. The responses given by the parent and teacher to the open-ended questions in the interview form were identified, coded, and then categorized into overarching themes (see Table 1).

The analysis of the pre- and post-interview statements provided by the mother and the teacher was conducted independently by the researcher and two field experts to ensure the reliability of the coding process. The consistency of the identified statements was assessed; in other words, the data were interpreted within the framework of predetermined themes, associated with the existing literature, and supported by direct quotations (Yıldırım & Şimşek, 2005). Based on the evaluations made by the experts and the researchers, responses were categorized as either “agreement” or “disagreement.” To calculate the reliability of the study, the formula proposed by Miles and Huberman (1994) was used, and the reliability level was determined to be 91%. This value was considered adequate for the purposes of this study. The formula used was Reliability Percentage = (Agreement) / (Agreement + Disagreement) × 100. According to Miles and Huberman (1994), a reliability level above 70% indicates acceptable inter-coder agreement.

In line with the principles of validity and reliability in qualitative research, informed consent forms were signed by the participating mother and teacher, confirming their voluntary participation. The identities of the participants were kept confidential, and their rights were protected throughout the study. Participants were thoroughly informed about the research process and its outcomes, and their approval was obtained. The research process and findings were reported in detail. During the interpretation phase where participant data were compared and integrated with the literature both the internal consistency of the findings and their alignment with theoretical foundations were evaluated with input from field experts (Brantlinger et al., 2005; Yıldırım & Şimşek, 2005).

Results

Before and after the equipment-based Pilates physical activity intervention, evaluations regarding the developmental domains of the individual diagnosed with ASD were obtained from the parent and the special education teacher. The responses provided by the participants across physical, cognitive, and psychosocial dimensions, along with the distribution of these responses, are presented in Table 3.

Evaluation of Physical Development

As shown in Table 1, prior to the implementation of the equipment-based Pilates exercise program, responses from the parent and special education teacher to questions related to the participant’s physical development included statements such as *“difficulty in maintaining balance”* and *“limited flexibility.”*

Sub-Themes Identified Before the Equipment-Based Pilates Program

Inability to maintain balance (A1): “She has difficulty maintaining her balance, standing on one foot, and sometimes even walking steadily.”

Limited flexibility (T1): “We occasionally do yoga activities at school, and compared to her peers, she has a noticeably less flexible body.”

Sleep problems (A1): “She always wants to chat for a while before sleeping. It's very rare that she falls asleep easily or sleeps through the night.”

Table 3. Pre- and post-intervention views of the parent and special education teacher on the equipment-based pilates physical activity program

Theme	*Sub-Themes Before the Equipment-Based Pilates Program*	*Sub-Themes After the Equipment-Based Pilates Program*
Physical Development	• Inability to maintain balance • Limited flexibility • Sleep problems	• Ability to maintain balance • Increased flexibility • Positive changes in sleep patterns • Improved control over motor movements • Enhanced physical self-awareness
Cognitive Development	• Difficulty in focusing and sustaining attention • Difficulty in developing solutions to problems • Inadequacy in modeling and imitation behaviors • Deficits in comprehension and perception • Inadequacy in self-recognition and self-introduction	• Improvement in focusing and sustaining attention • Development of problem-solving skills • Progress in modeling and imitation behaviors • Improved communication in self-recognition and social self-introduction • Ability to engage in future-oriented imaginative thinking • Expansion of vocabulary • Increase in academic achievement
Psychosocial Development	• Lack of self-confidence • Difficulty in expressing needs and desires • Inability to convey emotional states verbally or behaviorally • Lack of eye contact • Difficulty in transitioning between activities • Communication difficulties in peer relationships	• Enhanced self-confidence • Improved ability to express needs and desires • Ability to express emotional states verbally and behaviorally • Improved ability to establish eye contact • Increased tendency to cooperate and offer help • Ability to initiate and sustain play • Improved awareness of social events and the surrounding environment • Ability to regulate emotional responses • Active participation in social relationships • Conscious awareness of breathing

Sub-Themes Identified After the Equipment-Based Pilates Program

As shown in Table 2, following the implementation of the equipment-based Pilates program, responses from the parent and teacher to questions regarding physical development highlighted themes such as *"ability to maintain balance," "increased physical flexibility," "improvement in motor control skills,"* and *"enhanced physical self-awareness."*

Ability to maintain balance (A1): "My child used to prefer walking arm-in-arm for support. Now, most of the time, she walks on her own. Sometimes she even shows us that she can stand on one foot for a few seconds."

Increased flexibility (A1): "She gained remarkable flexibility through equipment-based Pilates. Her ability to do side splits has significantly improved compared to when she started. Now, when sitting, she can reach forward and touch her toes."

Positive changes in sleep patterns (A1): "On the days we have Pilates sessions, I notice her physical stress decreases, and she tends to fall asleep earlier and sleep through the night without interruptions."

Improved control over motor movements (A1): "About two weeks after starting equipment-based Pilates, I observed that she became more attentive in controlling her body. She started standing upright on her own—before we used to remind her to do so, now she reminds us."

Enhanced physical self-awareness (A1): "Equipment-based Pilates has been very beneficial in helping our child become more aware of her body."

Evaluation of Cognitive Development

As seen in the data presented in Table 2, pre-intervention interviews with the parent and teacher revealed shared observations regarding the individual's cognitive development. These included *inadequate attention and focus*, *insufficient problem-solving skills*, *deficits in imitation abilities*, *limitations in comprehension and perception*, and *difficulties in self-recognition and self-presentation*.

Sub-Themes Identified Before the Equipment-Based Pilates Program

- Difficulty in focusing and maintaining attention (A1): "She struggles significantly with focusing. Her attention is easily distracted."
- Challenges in developing solutions to problems (T1): "She needs support when trying to think through or solve something academically. She often experiences confusion."
- Deficiencies in modeling and imitation behaviors (A1): "In order for her to imitate something we show, we need to demonstrate and explain it multiple times."
- Deficits in comprehension and perception (T1): "She can understand what she reads, but there are noticeable pauses and hesitations while reading."

Sub-Themes Identified After the Equipment-Based Pilates Program

An examination of the data in Table 2 reveals that, following the implementation of the equipment-based Pilates exercise program, both the parent and the special education teacher shared similar observations regarding the participant's cognitive development. These included improvement in focusing and sustaining attention, enhanced problem-solving abilities, progress in modeling and imitation behaviors, expansion of vocabulary, increase in academic performance, and the ability to engage in imaginative thinking.

Improvement in focusing and sustaining attention (A1): "Previously, whenever we planned an activity together, she would get bored and say she wanted to do something else. Now, I observe that her attention span has increased."

Development of problem-solving skills (T1): "I have observed a positive improvement in her ability to solve problems."

Progress in modeling and imitation behaviors (A1): "She now performs actions she observes much better. At first, she couldn't do the Pilates movements, but now she performs them simultaneously with me."

Improved communication in self-recognition and social self-introduction (A1): "Now, when she enters a new environment, she can share information about herself and ask questions to get to know the other person."

Development of future-oriented imaginative thinking (A1): "Sometimes, before falling asleep at night, she talks about the dreams she imagines. That's a significant improvement."

Expansion of vocabulary (T1): "Her mind has become more open to learning and using new words."

Increase in academic performance (T1): "Her academic performance at school is improving day by day. I believe it is linked to her increased attention span. She now reads with fewer pauses."

Evaluation of Psychosocial Development

According to the findings presented in Table 2, responses provided by the parent and the special education teacher prior to the implementation of the equipment-based Pilates exercise program highlighted several issues related to the participant's psychosocial development. These included a lack of self-confidence, difficulty in expressing needs and desires, inability to express emotional states verbally or behaviorally, lack of eye contact, difficulty transitioning between activities, and communication difficulties in peer relationships.

Sub-Themes Identified Before the Equipment-Based Pilates Program

Lack of self-confidence (A1): "Sometimes she shows weaknesses when it comes to self-confidence. Even if she's capable of doing something, she won't even try due to her lack of confidence."

Difficulty in expressing needs and desires (A1): "Her father and I constantly encourage her to express what she wants. She finds it very difficult to state her desires independently."

Inability to express emotional states verbally or behaviorally (T1): "We can understand when she's angry, upset, or happy in response to something, but she is very limited when it comes to expressing more nuanced emotions."

Lack of eye contact (A1): "She doesn't make eye contact with people other than me while speaking. Especially when meeting someone new, she avoids eye contact altogether."

Difficulty in transitioning between activities (T1): "It's quite difficult for her to switch from one activity to another."

Communication difficulties in peer relationships (T1): "She can be friends with peers in her ASD group, but when someone new joins the group, she becomes hesitant before forming a relationship.

Sub-Themes Identified After the Equipment-Based Pilates Program

Based on the findings presented in Table 2, responses from the final interviews conducted with the parent and the special education teacher regarding psychosocial development revealed the following shared themes: *increased self-confidence*, *ability to express needs and desires*, *improvement in expressing emotional states verbally or behaviorally*, *ability to establish eye contact*, *tendency to cooperate and offer help*, *ability to initiate and sustain play*, *enhanced awareness of social events and the surrounding environment*, *ability to regulate emotional responses*, *active participation in social relationships*, and *conscious awareness of breathing*.

Increased self-confidence (T1): "She used to participate in group activities at school only as a follower. Recently, for the first time, she said she wanted to be the leader in a game. This

was a first for us—her self-confidence has increased significantly."

Ability to express needs and desires (A1): "She now expresses her wants more frequently. Without us asking, she verbalizes what she wants. When we go shopping, if there's something she wants, she says it right away."

Ability to express emotional states verbally or behaviorally (A1): "She now articulates her feelings more often. While she used to express only basic emotions, now she also recognizes and communicates more nuanced states. For instance, when she sees we're tired, she asks, 'Are you tired, Mom? Dad, are you tired?' and also expresses her own fatigue."

Improved eye contact (T1): "She never used to make eye contact with unfamiliar or newly introduced people. Now, with our guidance, she can make eye contact with new peers during introductions—even shakes hands and uses basic greeting phrases."

Tendency to cooperate and offer help (A1): "Empathy and helpfulness used to be almost nonexistent. Now, she has made remarkable progress. If she sees a friend or one of us in need, she tries to connect emotionally—sometimes by sitting next to someone who's sad or offering a hug."

Ability to initiate and sustain play (T1): "She had no major issues participating in or continuing group play, but initiating a game was a real challenge. She had never led a game before. Thanks to the exercise sessions, she now takes initiative in physical play, starts games, and even assumes leadership roles."

Improved awareness of social events and the surrounding environment (T1): "She has become much more aware of her surroundings. For example, when she sees someone littering, she immediately warns them. I believe her social awareness has improved."

Ability to regulate emotional responses (A1): "The days she does Pilates are calmer. Sometimes on Friday nights, before bed, she asks, 'Are we going to Pilates tomorrow?' or 'Is there Pilates tomorrow?' I've noticed that doing equipment-based Pilates is not only good for her muscles but also for her soul."

Active participation in social relationships (T1): "She used to avoid interaction with peers outside of structured group activities and rarely formed emotional bonds. Recently, during a board game, I saw her helping a friend. That's a major development. If she notices a close peer is upset, she now tends to sit next to them or offer support—she engages both physically and emotionally."

Conscious awareness of breathing (A1): "Sometimes, when she has sudden outbursts or episodes, we take deep breaths together and count. It helps her calm down. This increased awareness of her breathing began after starting the Pilates training."

Discussion and Conclusion

To gather data from multiple perspectives, this study collected views from both the mother and the special education teacher of an individual diagnosed with ASD before and after the implementation of an equipment-based Pilates exercise program. The findings indicate that the individual faced various difficulties in psychosocial, cognitive, and physical developmental domains prior to the intervention. However, after completing the program, notable improvements were observed in these areas. Before participating in the equipment-based Pilates program, the individual experienced challenges such as limited flexibility, poor balance, and sleep disturbances. Post-intervention feedback revealed significant positive effects in the areas of flexibility, balance, body awareness, and motor control, along with improved sleep patterns. These findings suggest that movement-based interventions like equipment-based Pilates can have a beneficial impact on the physical development of individuals with ASD. In individuals with ASD, the Footwork Series helps activate lower extremity muscles and improve body alignment. Leg Circles contribute specifically to supporting lower body awareness. Arm Pull-Ups contribute to strengthening the extremities. The Elephant Stretch contributes to activating the spine. Bridging and pelvic control contribute to improving spinal awareness. The Monkey Stretch contributes to improving spinal flexibility and limb coordination. The Cat Stretch contributes to supporting spinal mobility. The Mermaid Stretch with Push-Ups contributes to improving lateral flexibility. The Back Twist contributes to improving spinal flexion and control. The Push-Up Series contributes to improving directional awareness. The Arm Springs Series contributes to improving visual-motor coordination. Research has observed many of these effects in individuals with ASD.

Studies support the conclusion that Pilates equipment exercises have positive effects on the physical development of individuals with autism spectrum disorder (ASD) (Saraçoğlu and Şirinkan, 2016; Öztürk et al., 2023). For example, Hıdıroğlu, Peker, Karavuş, Tepe et al. (2022) reported that eye contact improved in an individual with ASD after Pilates training. Similarly, Srinivasan et al. (2014) compiled exercise-based intervention studies in the literature and concluded that regular physical activity can improve behavioral, cognitive, social and motor deficits in children with ASD by 40-70%. Saraçoğlu and Şirinkan (2016) found that a Pilates-based movement training program contributed positively to the flexibility and balance skills of children with ASD. In another study, Öztürk, Söyler, Saçan, Ünver et al. (2023) emphasized that Pilates training can improve balance performance and motor skills, suggesting it as a potential alternative training method for children with ASD. Pilates movements such as Facials, Footwork Series, Bridging, Back Twists, Side Splits, and Arm Springs Series can support eye contact in individuals with ASD, which increases body perception, balance, and motor development (Lang et al., 2010). Doğru and Yalçın (2017) investigated the effects of a special Pilates movement

education program on balance and flexibility in children aged 6–12 with ASD, finding statistically significant improvements in both areas within the experimental group. Yalçın and Doğru (2023) also examined the effects of a Pilates-based program on physical performance and social skills in children with ASD, reporting improvements in gross motor skills and balance performance, although no statistically significant improvement was found in social skills.

On the other hand, Zhao and Chen (2018) demonstrated that Pilates-based exercise programs produced meaningful gains in social skills, particularly in communication, cooperation, and self-regulation among individuals with ASD. In a recent meta-analysis by Koh (2024), physical exercise programs were found to significantly improve social cognition, social awareness, social communication, and social motivation in individuals with ASD. Similarly, Toscano, Ferreira, Quinaud, Silva et al. (2022) concluded that regular physical exercise led to improvements in social interaction, behavioral adaptation, and communication skills in children and adolescents with ASD. These interventions were also shown to facilitate daily life adaptation and enhance social integration.

Prior to participating in the equipment-based Pilates exercise program, the individual diagnosed with ASD experienced various cognitive challenges, including difficulties in focusing and sustaining attention, limited problem-solving skills, inadequacies in modeling and imitation, and deficits in comprehension and perception. However, post-intervention observations indicated notable improvements in these cognitive domains. The program was found to enhance attention span, academic performance, vocabulary development, problem-solving ability, and self-expression skills including both self-introduction and social communication—as well as support imaginative thinking about the future. These findings suggest that movement-based developmental programs, such as equipment-based Pilates, may positively contribute to the cognitive development of individuals with ASD. The views obtained from the special education teacher and the mother before the intervention highlighted significant difficulties in the individual's ability to focus, solve problems, imitate, comprehend, and express oneself cognitively, as well as challenges in emotional expression and eye contact in the psychosocial domain. After the intervention, however, both participants reported improvements in attention regulation, problem-solving abilities, modeling and imitation behaviors, communication skills related to self-awareness and social interaction, vocabulary use, and overall academic performance. In terms of psychosocial development, the individual demonstrated positive changes in expressing needs and desires, maintaining eye contact, actively engaging in social relationships, and regulating emotional responses. Furthermore, prior to the implementation of the program, the individual exhibited psychosocial difficulties such as low self-confidence, difficulty expressing wants and needs, limited emotional expression, reduced eye contact duration, difficulty transitioning between activities, challenges in peer interaction, and a lack of awareness regarding breathing. Following the intervention, the individual showed significant progress in areas including increased self-confidence, improved ability to express desires, better interpersonal communication, enhanced emotional articulation, increased prosocial behaviors (e.g., helping and cooperating), ability to initiate and maintain play, improved social awareness, extended duration of eye contact, and improved emotional self-regulation. These findings suggest that the equipment-based Pilates exercise program, as a movement-oriented intervention, has a supportive effect on the psychosocial development of individuals with ASD. In this respect, such a program may be considered a promising approach and is recommended for broader implementation within therapeutic intervention programs for individuals with ASD. It is recommended to conduct multidimensional research with the contribution of experts from different disciplines. In addition, it is recommended to conduct research in which quantitative and qualitative methods will be used together.

Limitations

These research findings are specific to the circumstances of the individual in question and are limited by the experiences of that student and the faculty involved.

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Conflict of Interest

There is no conflict of interest among the authors related to publication of this article.

Author Contributions

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