PHYSICAL EDUCATION OF STUDENTS

ORIGINAL ARTICLE

The relationship between psychological well-being and loneliness levels of students participating in leisure-time physical activity

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Abstract

Background and Study Aim: There are many studies on the positive effects of leisure-time physical activities on individuals' psychological health. Social and emotional loneliness are among the important factors that negatively affect the psychological well-being of university students. The aim of the study is to determine the relationship between psychological well-being and the level of loneliness among students who engage in leisure-time physical activity.

Material and Methods: The study was designed according to the correlational survey model. The study group consisted of university students selected through the convenience sampling method. These students were studying at Istanbul University-Cerrahpaşa, Faculty of Sports Sciences (n = 210). Confirmatory Factor Analysis (CFA) was used to test the pre-constructed structures of the scales. For the analysis of normally distributed data, t-test, ANOVA, and Pearson correlation analysis were applied.

Results: Various demographic variables of the students were found to affect their levels of psychological well-being and loneliness. Significant negative correlations were found between psychological well-being and social loneliness ($r = -.34$; $p < .01$), as well as between psychological well-being and emotional loneliness–family ($r = -.28$; $p < .01$). However, no significant correlation was found between psychological well-being and emotional loneliness–romantic ($p > .05$).

Conclusions: As students' psychological well-being levels increase, their loneliness levels decrease. University students are recommended to participate in leisure-time physical activities. Programs encouraging participation in such activities should be increased at universities. In this way, students' psychological well-being can be supported, and their loneliness levels can be reduced.

Keywords: leisure-time physical activities, psychological well-being, social loneliness, emotional loneliness, romantic loneliness

Introduction

The concept of leisure can generally be defined as a state of being free from restrictions or as the time remaining after work or other mandatory tasks. Individuals engage in various activities during their leisure time. Physical activities are among the most common and prioritized choices in leisure-time activity preferences [1, 2]. These activities are selected voluntarily and performed during free time. They include sports participation, walking, running, and various recreational physical activities [3]. Studies have shown that physical activity during leisure time is effective in the prevention and treatment of various adverse health conditions [4]. Leisure-time physical activities have positive effects not only on physical health but also on the psychological well-being of individuals [5]. Psychological well-being is considered one of the key indicators of mental health supported by leisure-time physical activities [6].

Psychological well-being is a mental and emotional state that reflects an individual's ability to realize their potential, maintain productivity and creativity, and cope with stress [7]. It is a central concept in humanistic psychology and addresses individual well-being in a multidimensional manner. This concept includes the dimension of *self-acceptance*, which refers to the ability to make positive evaluations of one's past experiences, and *personal development*, defined as continuous growth and the realization of individual potential. Additionally, psychological well-being comprises several fundamental components: the belief that life is meaningful and purposeful (*purpose in life*); the existence of warm, trust-based, and satisfying relationships with others (*positive relationships with others*); the ability to effectively manage one's environment and living conditions (*environmental mastery*); and the sense of having control over one's own life (*autonomy*) [6]. Social relationships are an integral part of psychological well-being and represent an important factor directly influencing an individual's overall well-being [8]. However, in today's rapidly changing and increasingly

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individualized world, loneliness is receiving growing attention as a critical factor that can negatively impact psychological well-being.

Loneliness is a subjective and negative experience of social isolation that occurs when the quantity and quality of social relationships do not meet an individual's expectations [9, 10]. This feeling can lead to difficulties in interpersonal relationships, perception of the social environment as threatening, increased levels of depression and anxiety, avoidance of social interactions, mental distress, and the development of behavioral problems [11, 12, 13, 14].

This subjective and multidimensional experience becomes more pronounced during transitional periods of life, particularly during university years, when individuals undergo significant changes in their social environment [15]. During the transition from high school to university, students must restructure both their social roles and relationships. These changes may give rise to loneliness in various dimensions [16]. The types of loneliness commonly experienced by university students often manifest in social, familial, and romantic domains [17].

Loneliness is often categorized into three main types: social, familial, and romantic. Social loneliness refers to the absence of satisfying friendships and a supportive peer network. Familial loneliness is characterized by an inability to form emotional bonds with family members, despite physical proximity, often accompanied by a perceived lack of support. Romantic loneliness involves the absence of emotional intimacy and unmet emotional needs within a current or desired romantic relationship [18, 19].

Numerous national and international studies have examined the relationship between psychological well-being and general loneliness [20, 21, 22, 23]. These and similar studies emphasize the importance of understanding how different forms of loneliness can affect psychological well-being, particularly among young adults. However, there remains a need for more in-depth research into the multidimensional nature of loneliness and its distinct associations with psychological well-being in specific populations, such as university students who participate in leisure-time physical activities.

The aim of the study is to determine the relationship between psychological well-being and the level of loneliness among students who engage in leisure-time physical activity.

Materials and Methods

Participants

The population of the study consisted of individuals enrolled in Faculties of Sport Sciences in Türkiye. The sample group was drawn from students at the Istanbul University-Cerrahpaşa Faculty of Sport Sciences. Participants were selected using the convenience sampling method. The sample included students engaged in leisure-time physical activity. Incomplete or incorrectly completed questionnaires, as well as students who did not meet the inclusion criteria listed below, were excluded from the study. The final sample consisted of 210 students (n = 210).

The inclusion criteria were as follows:

- Being 18 years of age or older
- Being a Turkish citizen
- Being a student at a Faculty of Sport Sciences
- Engaging in leisure-time physical activity
- Volunteering to participate in the study

Ethical Consideration

Ethical approval for the present study was obtained from the Bartın University Social and Human Sciences Ethics Committee at its meeting dated 12.03.2025, decision number 5. During the research process, the ethical principles outlined in the Declaration of Helsinki were followed. Prior to completing the online survey, participants were required to check a box indicating their informed consent to participate in the study.

Research Design

The study, which examined the relationship between psychological well-being and the loneliness levels of students participating in leisure-time physical activity, was designed as a descriptive and correlational study.

Data Collection Tools

The *Demographic Information Form*, *Psychological Well-Being Scale (PWBS)*, and *Social and Emotional Loneliness Scale (SELSA-S)* were used in the present study.

The Demographic Information Form was developed by the researchers to collect basic information about the participants.

The Psychological Well-Being Scale (PWBS) was developed by Diener et al. [24] and adapted into Turkish by Telef [25, 26]. This 7-point Likert-type scale consists of eight items within a single dimension. The total score ranges from 8 to 56. Higher scores indicate that the individual possesses more psychological resources and strengths. The Cronbach's alpha coefficient calculated for the overall scale was .80 [26].

The Social and Emotional Loneliness Scale (SELSA-S) was developed by DiTommaso and Spinner [27] to assess adults' feelings of loneliness. It was adapted into Turkish by Akgül in 2020. The scale consists of 15 items and uses a 7-point Likert-type format. It includes three sub-dimensions: *social loneliness*, *emotional–familial loneliness*, and *emotional–romantic loneliness*. The total score ranges from 15 to 105. The Cronbach's alpha coefficient for the overall scale was .83. For the sub-dimensions, it was .82 for Social Loneliness (SL), .76 for Emotional

Loneliness–Familial (EL-F), and .85 for Emotional Loneliness–Romantic (EL-R) [19].

Validity and Reliability of the Scales

Confirmatory Factor Analysis (CFA) was conducted to assess the fit of the scales used in the current study. First, the predefined factor structure of the PWBS was examined using first-order CFA. Initial analyses indicated that some fit indices did not fall within the desired reference range, and the software suggested several modifications. Accordingly, covariances were added between items 2, 5, and 6 and item 8, and the analysis was repeated.

As a result of the revised analysis, the fit indices were found to be within the acceptable range (χ^2/df = 2.63; RMSEA = .08; SRMR = .05; CFI = .95; GFI = .95; AGFI = .89; IFI = .95).

While the final measurement model is presented in Figure 1, the results showed that the standardized factor loadings of the scale ranged between .46 and .78, and all factor paths were statistically significant. The Composite Reliability (CR) value of the scale was found to be .85, and the Average Variance Extracted (AVE) was .41. The Cronbach's alpha coefficient was .84, indicating that the scale is a valid and reliable measurement tool for the present study.

The predefined model structure of the SELSA-S, another scale used in the study, was analyzed using first-order CFA. The initial analysis revealed that the fit indices were below acceptable thresholds, and the software suggested modifications between the error terms of certain items. Additionally, it was found that the factor loadings for items 10 and 15 in the *Emotional Loneliness–Romantic* sub-dimension were low (.110 and .160, respectively), and the factor path for item 10 was not statistically significant (p = .115). Consequently, these items were excluded from the model, and the analysis was repeated with covariances added between relevant error terms.

As a result, the revised fit indices confirmed the model's adequacy (χ^2/df = 2.59; RMSEA = .08; SRMR = .08; CFI = .95; GFI = .90; AGFI = .85; IFI = .95).

The final model structure of the scale is presented in Figure 2. According to the findings, the factor loadings for the *Social Loneliness* sub-dimension ranged between .30 and .78. The factor loadings for the *Emotional Loneliness–Family* sub-dimension ranged between .40 and .87, while those for the *Emotional Loneliness–Romantic* sub-dimension ranged between .93 and .98.

The Composite Reliability (CR) values for the sub-dimensions were calculated as .69, .83, and .98, and the Average Variance Extracted (AVE) values were .33, .51, and .93, respectively. The Cronbach's alpha coefficients were found to be .71, .67, .80, and .72.

These results indicate that the scale is a valid and reliable measurement tool suitable for use in the present study.

Statistical Analysis

The data obtained in the study were analyzed using IBM SPSS and AMOS software. Descriptive statistical methods were employed in the analysis process. Confirmatory Factor Analysis (CFA) was conducted to evaluate how well the collected data fit the theoretical structures of the scales used. CFA was used to assess the validity and reliability of the scales based on factor loadings, Composite Reliability (CR), Average Variance Extracted (AVE), and Cronbach's alpha. CR and AVE are indicators of reliability and validity, particularly in the context of

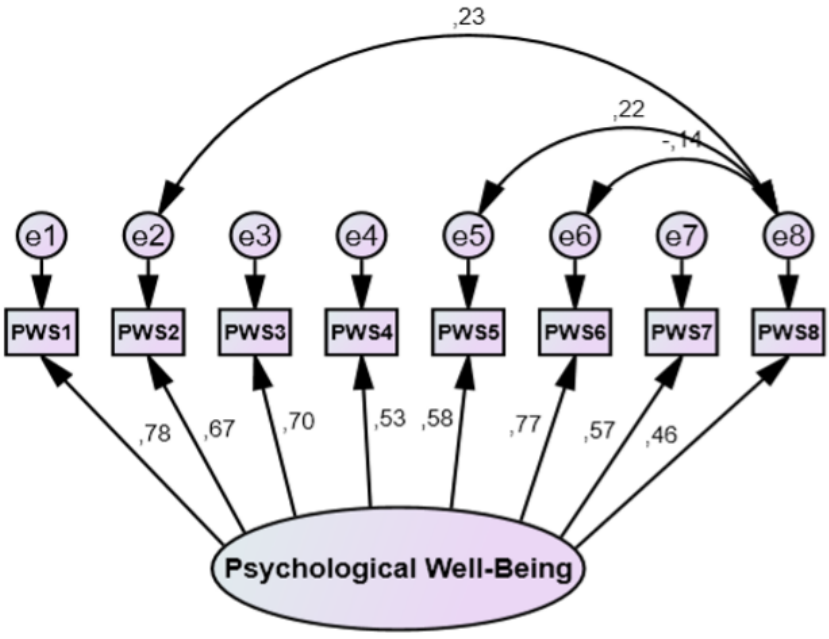

Figure 1. Psychological Well-Being Scale Model Structure

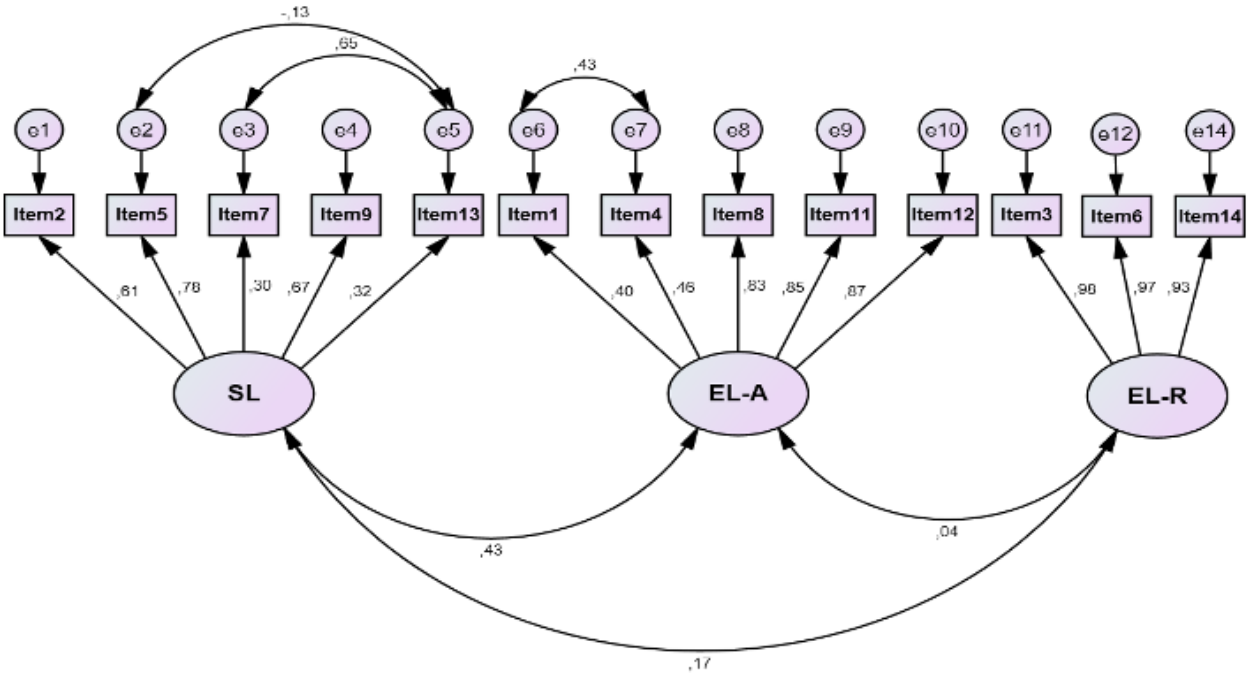

Figure 2. Social and Emotional Loneliness Scale Model Structure

CFA. The generally accepted threshold for CR is ⩾ .70. For AVE, the acceptable threshold is ⩾ .50. However, in certain cases, an AVE below .50 may be considered acceptable if the CR is .60 or higher. The following model fit indices and thresholds were used to assess the adequacy of the CFA models: Chi-Square divided by degrees of freedom (χ^2/df) ⩽ 3; Root Mean Square Error of Approximation (RMSEA) ⩽ .08; Standardized Root Mean Square Residual (SRMR) ⩽ .08; Comparative Fit Index (CFI) ⩾ .90; Goodness-of-Fit Index (GFI) ⩾ .90; Adjusted Goodness-of-Fit Index (AGFI) ⩾ .90; and Incremental Fit Index (IFI) ⩾ .90 [28, 29, 30]. Skewness and kurtosis values were examined to assess the normality of the data. Values between ±1.5 were considered to indicate a normal distribution [31]. No missing data or extreme outliers were found during the analysis. It was determined that the data followed a normal distribution. Accordingly, the data analysis process included the independent samples t-test, one-way analysis of variance (ANOVA), and Pearson correlation analysis. The Tukey HSD test was used as a post hoc method to identify which groups differed when significant differences were found via ANOVA. According to commonly accepted standards for interpreting correlation coefficients, values between .00 and .39 indicate a low-level relationship, between .40 and .69 a moderate relationship, and between .70 and 1.00 a strong relationship [32]. The significance levels were set at .01 and .05 for all analyses.

Results

The demographic characteristics of the participants are presented in Table 1. According to the findings presented in Table 1, the mean age of the students was 22.00 years (±4.19). Of the participants, 52.9% were male, 53.3% were enrolled in the Department of Coaching Education, and 41.0% were in their third year of study. Regarding academic achievement, 65.7% of the students reported a moderate level of perceived academic success. Additionally, 62.4% indicated that their family income was equal to their expenses. In terms of physical activity preferences, 62.4% of the students preferred individual activities. On average, they had been participating in physical activity for 71.54 months (±64.57) and exercised 2.20 times (±.79) per week.

Table 2 presents the descriptive statistics of the scales and the correlation results among them. According to the findings, there was a moderate negative correlation between psychological well-being and social loneliness (r = –.34, p < .01). Additionally, a low negative correlation was found between psychological well-being and emotional loneliness–family (r = –.28, p < .01). A significant low negative correlation was observed between age and emotional loneliness–romantic (r = –.20, p < .01). A significant low positive correlation was found between the number of leisure-time physical activity sessions per week and psychological well-being (r = .31, p < .01). Similarly, a significant low positive correlation was found between the duration of physical activity (in months) and psychological well-being (r = .17, p < .05). Further details regarding means, standard deviations, skewness, kurtosis, and additional correlation coefficients are provided in Table 2.

Table 3 presents the detailed results of the analysis of differences in psychological well-being

Table 1. Distribution of Demographic Information of Students

Variable	Category	f	%	M ± SD
Sex	Male	111	52.9	
	Female	99	47.1	
Department	Coaching Education	112	53.3	
	Sport Management	65	31.0	
	Physical Education and Sports Teaching	33	15.7	
Grade	1st Grade	29	13.8	
	2nd Grade	49	23.3	
	3rd Grade	86	41.0	
	4th Grade	46	21.9	
Academic Achievement Perception Level	Low	6	2.9	
	Moderate	138	65.7	
	High	66	31.4	
Family Income Level	Income Less Expenses	33	15.7	
	Income Equals Expenses	131	62.4	
	Income Exceeds Expenses	46	21.9	
Type of Leisure-Time Physical Activity	Individual	131	62.4	
	Team	79	37.6	
Average Number of Physical Activities Per Week				2.20±.79
Duration of Sustained Physical Activity (Month)				71.54±64.57
Age				22.00±4.19
Total		210	100.0	

Table 2. Scale Scores and Correlation Results

Variable	Psychological Well-Being	Social Loneliness	Emotional Loneliness-Family	Emotional Loneliness-Romantic
Social Loneliness	**-.336****			
Emotional Loneliness-Family	**-.282****			
Emotional Loneliness-Romantic	-.122			
Age	.060	.052	-.003	**-.196****
Average Number of Physical Activities Per Week	**.311****	-.087	.018	.120
Duration of Sustained Physical Activity (Month)	**.167***	-.047	.071	.033
Mean	44.50	13.24	12.03	12.56
Standard Deviation	7.04	5.39	5.89	7.20
Skewness	-.796	.621	1.010	-.087
Kurtosis	.459	-.138	.965	-1.713

Note. p<.01** p<.05*

and loneliness levels among students participating in leisure-time physical activities, based on various independent variables. According to the findings, a significant difference was found in social loneliness based on students' sex (t = 2.529, p = .012). The mean score for male students (M = 14.12) was higher than that of female students (M = 12.26). A significant difference was observed in emotional loneliness–romantic based on students' grade level (F = 6.169, p < .001). Fourth-year students had a lower mean score (M = 9.00) compared to students in other years. A statistically significant difference in psychological well-being was found based on students' perception of academic achievement (F = 3.841, p = .023).

Table 3. Analysis Results Between PWBS and SELSA-S According to Demographic Variables

Variable	Psychological Well-Being		Social Loneliness		Emotional Loneliness-Family		Emotional Loneliness-Romantic	
	x̄	SD	x̄	SD	x̄	SD	x̄	SD
Sex								
Male	44.86	6.70	14.12	5.62	12.53	6.11	12.74	6.94
Female	44.10	7.42	12.26	4.98	11.48	5.61	12.35	7.52
t/F; p	t=.783		**t=2.529**		t=1.286		t=.395	
	p=.434		**p=.012***		p=.200		p=.693	
Department								
Coaching Education	44.88	7,00	13,38	5,70	11,71	5,64	11,71	7,32
Sport Management	43.63	7,81	13,61	4,90	12,04	5,02	13,15	6,99
Physical Education and Sports Teaching	44.93	5,43	12,06	5,26	13,12	8,02	14,27	6,99
t/F; p	F=.723		F=.984		F=.724		F=1.940	
	p=.487		p=.376		p=.486		p=.146	
Grade								
1st Grade	43,27	7,25	13,06	6,80	12,34	7,37	14,06[1]	7,39
2nd Grade	44,57	5,89	12,12	3,82	11,46	4,97	14,79[2]	6,96
3rd Grade	44,12	7,77	13,30	5,17	12,15	5,90	12,68[3]	7,00
4th Grade	45,91	6,57	14,45	6,12	12,23	5,91	9,00[4]	6,55
t/F; p	F=.989		F=1.502		F=.204		**F=6.169**	
	p=.399		p=.215		p=.893		**p=.000**	
Tukey HSD							1,2,3>4	
Academic Achievement Perception Level								
Low	41,00[1]	7,09	11,83	6,49	13,50	7,58	8,66	7,39
Moderate	43,77[2]	6,89	13,26	5,22	12,04	5,82	12,70	7,05
High	46,34[3]	7,06	13,33	5,71	11,89	5,97	12,62	7,52
t/F; p	**F=3,841**		F=.214		F=.203		F=.904	
	p=.023*		p=.808		p=.817		p=.407	
Tukey HSD	3>2							
Family Income Level								
Income Less Expenses	43,30[1]	6,73	15,24	6,28	14,93[1]	7,80	11,78	7,36
Income Equals Expenses	43,90[2]	7,14	12,88	5,28	11,73[2]	5,42	12,66	7,32
Income Exceeds Expenses	47,06[3]	6,50	12,84	4,81	10,82[3]	5,02	12,82	6,87
t/F; p	**F=4.103**		F=2.717		**F=5.356**		F=.233	
	p=.018*		p=.068		**p=.005***		p=.793	
Tukey HSD	3>1				1>2			
	3>2				1>3			
Type of Leisure-Time Physical Activity								
Individual	44.38	7.25	13.13	5.42	12.48	6.27	12.40	7.15
Team	44.69	6.73	13.43	5.38	11.30	5.16	12.82	7.33
t/F; p	t=-.305		t=-.380		t=1.473		t=-.406	
	p=.761		p=.704		p=.142		p=.685	

Note. p<.05*

Students with a high level of academic achievement perception had a higher mean score (M = 46.34) than those with a moderate level of academic achievement perception (M = 43.77). There was also a significant difference in psychological well-being based on family income status (F = 4.103, p = .018). Students whose family income was higher than their expenses had higher mean scores (M = 47.06) than those in other income categories. Finally, a significant difference in emotional loneliness–family was found according to family income status (F = 5.356, p = .005). Students whose family income was less than their expenses had higher mean scores (M = 14.93) than those whose family income was equal to or greater than their expenses.

Discussion

In the present study, the relationship between psychological well-being and loneliness levels among students participating in leisure-time physical activity was examined. Additionally, differences in psychological well-being and loneliness were analyzed according to various independent variables.

According to the findings, there was no significant difference in psychological well-being based on the sex of the students. This result is consistent with Ryff's psychological well-being model [33], which posits that well-being is shaped by individual characteristics and life experiences. According to the model, the determinants of well-being include subjective life experiences and developmental processes rather than demographic factors such as sex.

There are also studies in the literature that support the present findings. For example, in a similar study conducted by Bajramovic et al. [34], no difference in well-being was found between male and female students following physical activity. Although there is supporting evidence, this issue should be further examined in future studies. Being a student may not produce significant social differences between sexes; therefore, sex-related differences in psychological well-being should be re-examined in adult and older adult populations who participate in leisure-time physical activity.

However, a significant difference in social loneliness was found between male and female students participating in leisure-time physical activity. Male students were found to experience higher levels of social loneliness.

When this result is evaluated within the framework of sex role theory, it can be interpreted as a consequence of men being more hesitant to express their emotions and less likely to seek social support due to socially constructed gender roles. Traditional masculinity norms often place pressure on individuals to appear strong, independent, and emotionally reserved. As a result, male students may have greater difficulty forming social relationships and coping with loneliness, even when participating in physical activity. This finding highlights the influence of gender roles on loneliness perception and social relationship patterns.

A study conducted by Nakajima et al. [35] investigated whether exercise habits were associated with loneliness among older adults, with a focus on sex differences. The results showed that the type of exercise was associated with loneliness among males, while no such association was observed among females. Similarly, another study reported that physical activity reduced loneliness in men, but this effect was not observed in women [36]. These findings support the current results.

It can be suggested that young individuals participating in leisure-time physical activity may prioritize performance and achievement over emotional sharing. In other words, they may be satisfied with superficial relationships. Females, on the other hand, may be more inclined to value social interaction during physical activity. This may help explain the observed differences between sexes.

No significant differences were found in the psychological well-being levels of students participating in leisure-time physical activity based on their department or grade level. The literature reveals that studies comparing the departments and grade levels of students enrolled in faculties of sport sciences are limited. However, other research has shown that students in sport sciences faculties tend to report higher levels of well-being compared to students from other faculties [37, 38]. This may be explained by the fact that sport sciences students are typically more physically active and regularly participate in exercise-based courses, which could contribute to a uniformly high level of psychological well-being across both departments and grades. Similarly, no significant differences in loneliness levels were found according to students' departments. Studies supporting these findings have also been reported [39]. However, a significant difference was found in emotional loneliness–romantic based on grade level. Fourth-year students reported lower levels of romantic loneliness compared to students in earlier years. The initial years of university are often characterized by a period of adjustment to campus life and limited familiarity with the social environment. By the fourth year, emotional bonds may be more established, as these adaptation processes are largely complete.

A significant difference was found in psychological well-being based on students' perceived level of academic achievement. The results indicated that students with a high level of academic achievement perception reported better psychological well-being than those with a moderate level. Previous research has provided evidence of a positive relationship between students' well-

being and academic achievement [40]. However, no statistically significant differences were found between levels of academic achievement perception and loneliness. This finding is not supported by existing literature. For instance, one study reported a correlation between academic burnout and emotional loneliness [41]. It is possible that the lack of homogeneity in group distribution in the current study may have contributed to the absence of significant findings in this area.

A significant difference was found in students' psychological well-being based on their family income status. As expected, students whose family income was higher than their expenses reported higher levels of psychological well-being compared to those in other income categories. A review of the literature indicates that existing studies support this finding [7, 41]. It has been noted that economic status is an important factor that can positively influence psychological well-being [43]. In this context, it can be suggested that financial resources play a determining role in individuals' psychological health. A significant difference was also observed in emotional loneliness–family based on family income status. Students whose family income was lower than their expenses reported higher levels of emotional loneliness. However, a study conducted by Kızılırmak Tatu [44] found no significant relationship between students' income levels and their loneliness. Therefore, the current findings are not fully supported by existing literature. Nonetheless, it can be argued that economic status has a substantial impact on family dynamics and interpersonal relationships. Families with lower socio-economic status often face multiple emotional stressors. These difficulties may negatively affect family communication and emotional support, potentially leading students to experience greater emotional loneliness.

Students' leisure-time physical activity preferences were categorized as either individual or team-based. No significant differences were found in psychological well-being levels according to the type of activity preferred. This finding is consistent with previous studies. For example, Uluç [45] found no significant difference in psychological well-being based on sport type. Similarly, Simons and Bird [46] reported no significant difference in psychological well-being according to the type of physical activity. These findings suggest that the act of engaging in physical activity itself, rather than the specific type of activity, may be the key determinant of psychological well-being. Likewise, no significant differences were observed in students' loneliness levels based on the type of leisure-time physical activity they preferred. However, some studies have reported that individuals who engage in team-based physical activities tend to experience lower levels of loneliness due to the inherently social nature of such activities [47]. In light of these earlier findings, similar results were expected in the present study. The lack of a significant effect in this context may be attributable to individual differences. Each person's personality traits, social preferences, and interests may influence their inclination toward individual or team-based activities. Therefore, rather than the type of physical activity itself, students' personal attitudes and approaches toward these activities may be the more decisive factor.

No significant relationship was found between age and the psychological well-being of students who engaged in leisure-time physical activity. This finding is supported by studies in the existing literature [48]. Psychological well-being is a multidimensional construct shaped by the interaction of numerous individual, environmental, and social factors. In this context, age alone may not serve as a determining factor.

However, a negative correlation was found between age and emotional loneliness–romantic. In other words, as age increased, students reported lower levels of romantic loneliness. This result aligns with the findings of a study conducted by Yonar and Demir [49], which also reported a significant decrease in romantic loneliness levels with increasing age among university students. These results are further supported by prior research.

Several factors may explain this relationship. First, it is believed that individuals become more emotionally mature with age, which may facilitate the formation of healthier and more satisfying romantic relationships. Additionally, the university years represent a critical period for the development of social skills and the accumulation of romantic relationship experiences. These experiences may contribute to more effective interpersonal interactions, ultimately reducing feelings of loneliness.

As a result of the analyses, a significant positive relationship was found between the frequency and duration of weekly leisure-time physical activity and psychological well-being levels. In other words, the findings indicated that as students' participation in physical activity increased, so did their levels of psychological well-being. This finding is supported by previous studies [50, 51]. Regular participation in physical activities is believed to enhance psychological well-being by strengthening individuals' sense of self-confidence and achievement. However, no significant relationship was found between the frequency or duration of leisure-time physical activity and loneliness levels. In a study conducted by Ma et al. [52], no significant relationship was observed between students' physical activity levels and social loneliness, although a significant negative relationship was found between physical activity and emotional loneliness. Similarly, another study

showed that young individuals who regularly engage in sports activities report lower levels of loneliness [47]. Musich et al. [53] also noted that physical activity may help reduce loneliness and serve as an effective intervention strategy. Therefore, it can be said that the findings of the current study are not fully consistent with the existing literature. This inconsistency may be attributed to contextual factors such as differences in age groups, socioeconomic status, or cultural background across studies, which could have influenced the outcomes observed in the present research.

The main purpose of the present study was to examine the relationship between psychological well-being and loneliness levels among students participating in leisure-time physical activity. The results revealed a significant negative correlation between psychological well-being and both social loneliness and emotional loneliness in the family context. In other words, higher levels of psychological well-being were associated with lower levels of social and familial loneliness. However, no significant relationship was found between psychological well-being and emotional loneliness in romantic relationships. These findings are supported by previous studies [54, 55]. Leisure-time physical activities are often carried out in social contexts, providing opportunities for individuals to build new social connections and strengthen existing ones. These interactions may positively influence psychological well-being by reducing feelings of loneliness. This relationship can be explained through theoretical frameworks such as attachment theory and social support theory, which emphasize the importance of secure interpersonal relationships and active social engagement in promoting mental health. The lack of a significant relationship between psychological well-being and romantic loneliness suggests that other variables may influence this dimension of loneliness.

Limitations

This study has several limitations. First, the sample consisted of students from a faculty of sport sciences, who were already enrolled in courses that include regular physical activity. This represents a limitation because it creates a significant difference in physical activity levels when compared to the general population. As a result, the generalizability of the findings is limited, and the results may not be applicable to individuals with lower levels of physical activity or to the broader population. Another limitation concerns the age variable. The study was conducted exclusively with university students, resulting in a sample that reflects a narrow age range. Therefore, the findings are limited to the demographic and cognitive characteristics of this specific group. Most participants were of similar age, had comparable educational levels, and shared relatively limited life experience, which restricts the applicability of the results to different populations such as older adults, working professionals, or individuals from varied socioeconomic backgrounds. In addition, the voluntary nature of participation may have introduced systematic response biases. Participants' motivations for taking part in the study or tendencies toward socially desirable responding could have influenced the results. Another limitation is that the study did not examine specific types of leisure-time physical activities in detail. Activities were broadly categorized as individual or team-based, which does not provide sufficient detail about the nature of the activities or their unique effects. This lack of specificity may have led to an underestimation of the differences between the psychological impacts of different types of sports and further limits the generalizability of the findings. Future research is recommended to address these limitations by including more diverse samples and by analyzing physical activity types in greater detail.

In conclusion, this study highlights several psychosocial patterns in how students experience loneliness and psychological well-being in the context of leisure-time physical activity. The findings suggest that while certain dimensions of loneliness can be reduced through active engagement in physical activity, others such as romantic loneliness may require further exploration. These outcomes reinforce the importance of examining both personal and environmental factors that influence emotional well-being among university students.

Conclusions

This study contributes to a deeper understanding of how leisure-time physical activity is associated with the psychological well-being and loneliness experiences of university students. The findings emphasize the psychological value of engaging in physical activity during free time, especially in supporting emotional stability and reducing certain forms of loneliness. The study draws attention to the complex relationship between psychological well-being and factors such as social connection, academic self-perception, and socioeconomic status. These results suggest that student support programs should take into account not only behavioral aspects like physical activity but also contextual and individual characteristics that influence mental health. Although no relationship was found between psychological well-being and romantic loneliness, this area remains important for further research. Different types of loneliness may have distinct causes and mechanisms that are not equally influenced by physical activity. Future studies should explore these differences more thoroughly, considering variables such as personality traits, relationship dynamics, and emotional development.

Given the limitations of the current research, including a relatively homogeneous sample and general categorization of activity types, future studies are encouraged to include more diverse populations and examine specific forms of physical activity. Promoting regular leisure-time physical activity among university students may serve not only as a beneficial health behavior but also as a valuable psychosocial strategy for enhancing emotional well-being in educational settings.

Conflict of interests

The authors declare that there is no conflict of interests.

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