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Social Determinants of Food Insecurity in Athlete Populations

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Abstract

Although the sensitivity of university students to food insecurity is well-established, there are few studies focusing on the prevalence of food insecurity among student athletes in our country, and the literature is insufficient. The aim of this study is to examine the social determinants of food insecurity in athlete populations and to explore the factors associated with it. The study included 212 volunteer students (88 women and 124 men) studying at the Faculty of Sports Sciences of Süleyman Demirel University during the 2025-2026 academic year and involved in different sports branches. The Food Insecurity Scale in Athletes was used to examine new athletes in terms of food insecurity and to determine food insecurity by observing changes in athletes who continue to participate in sports. Data analysis revealed that the data showed a normal distribution, and significant differences were found in the sub-dimensions of gender, age, department, class, type of accommodation, monthly income, and skipped meals ($p<0.05$). Men were more affected by food insecurity than women. Furthermore, food insecurity scores were found to be higher in obese individuals and students in the coaching department, indicating a greater severity of food insecurity in these groups. The research revealed that university athletes are vulnerable to food insecurity due to rising costs and difficulties in accessing tuition, housing, and food.
Keywords: Food insecurity, University athletes, Sports sciences, Sports nutrition

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INTRODUCTION

Food security means that all people have access to sufficient and nutritious food for an active and healthy life at all times. Lack of reliable access to affordable and nutritious food in the quantities needed by individuals is referred to as food insecurity.

Meeting nutritional needs during young adulthood is crucial for complete physical, mental, and emotional development. Nutritional needs during young adulthood are vital for the completion of physical, mental, and emotional development. While preventive measures against food insecurity are necessary for all age groups, nutritional needs during young adulthood are vital for physical, mental, and emotional development. While preventive measures are needed for food insecurity across all age groups, addressing it among adolescents and young adults (aged 15-24) is becoming increasingly important (Poll et al., 2020). Food insecurity is an often overlooked issue among university students, particularly during the demands of academic life and the transition to independent living. Student-athletes face unique barriers to food access due to their demanding academic and athletic schedules, special dietary needs, and regular travel away from home (Pacenta et al., 2024).

University student athletes are at risk of food insecurity due to the increased nutritional and physical demands of training, limited time for work, food preparation/purchase, rising costs of sports equipment, and lack of any financial support for sports. Studies have shown that students who faced food insecurity in both high school and university are associated with or exacerbate disordered eating behaviors (Mayeux et al., 2020; Poll et al., 2020). Insufficient energy intake by athletes leads to declines in aerobic and anaerobic performance, glycogen stores, coordination and concentration, muscle strength and endurance, as well as undesirable side effects such as depression and increased risk of injury. These health outcomes are particularly important for university athletes who are expected to achieve both physical and academic success (Brauman et al., 2023; Douglas et al., 2022). Adapting to increasingly demanding training programs and outperforming competitors leads these athletes to pay more attention to their nutrition, which in turn increases their gains by adapting to challenging training levels and indirectly improves their performance. On the other hand, when sports are practiced professionally, the human body's need for macro and micronutrients increases (Dinç & Beşikçi, 2025; Yarar et al., 2022). In addition, individuals experiencing food insecurity are observed to be less physically active than those with food security. It has been noted that in athletes, lack of access to adequate nutrition and the resulting anxiety negatively impact performance and athletic health, and affect their motivation to train (Burke et al., 2018; To et al., 2014). Among university students, food insecurity has also been associated with decreased academic performance, including lower grade point averages, difficulty concentrating in class, and an increased likelihood of failure (Anziano & Zigmont, 2024).

Studies involving university student athletes highlight their nutritional and economic concerns, and their inability to meet the increased nutritional needs due to training. Student athletes frequently experience issues such as skipping meals, reducing meal content, and lack of access to all nutrients due to economic reasons. In identifying food insecurity, in addition to the quantity of food consumed, the quality and variety of food in terms of containing all nutrients are also important. Therefore, it is crucial for universities aiming to win matches and train athletes to address these problems. However, studies examining food insecurity in athletes are

still limited (Baysal, 2015; Goldrick-Rab et al., 2020; Yıldırım, 2023). Although various factors affect access to food for all university students, recognizing the distinct challenges faced by student-athletes is crucial for developing effective interventions tailored to this specific demographic group (Pacenta et al., 2024). Athletes should be supported in maximizing the physical, psychological, social, and mental benefits they derive from participating in sports (Koçak et al., 2023).

The aim of this study is to examine the social determinants of food insecurity in athlete populations and to explore the factors associated with it. The goal is for the results to guide similar studies and contribute to scientific research. To this end, the Food Insecurity in Athletes Scale developed in Turkey in 2023 to measure food insecurity among athletes, will be used.

METHOD

Research Model

This research is a descriptive study using the survey model, a quantitative research method. The survey model is a research model in which the researcher does not intervene in any way. The researcher examines the current situation as it is within the scope of the research (Şata, 2020).

Research Groups

The research sample consisted of 212 volunteer students (88 women and 124 men) studying at Süleyman Demirel University's Faculty of Sports Sciences during the 2025–2026 academic year, who were selected through convenience sampling and were actively involved in various sports branches. The inclusion criteria required participants to be currently enrolled students who regularly participated in at least one sport discipline. Students who were not actively engaged in any sport or who did not volunteer to participate were excluded from the study. It should be noted that the single-center design of this study, conducted exclusively at one faculty, may limit the generalizability of the findings to broader athlete populations.

Table 1. Descriptive statistics on participants' demographic information

Variable	Age	N	%
Age	18-20 years old	81	38.2
	21-23 years old	116	54.7
	24 years and older	15	7.1
Gender	Female	88	41.5
	Male	124	58.5
BMI (kg/m^2)	Underweight (18.5 and below)	20	9.4
	Normal weight (18.5 - 24.9)	161	75.9
	Overweight (25-29.9)	27	12.7
	Obese (30 and over)	4	1.9
Department	Coaching Education	72	34.0
	Physical Education and Sports	67	31.6
	Sports Management	73	34.4
Class	1st	59	27.8
	2nd	53	25.0
	3rd	67	31.6
	4th	33	15.6
Accommodation	At home alone	57	26.9
	At home with my family	38	17.9
	In the student dormitory	68	32.1
	At home with my friends	49	23.1
Monthly income (TL)	Less than 2000 TL	25	11.8
	2001-4000 TL	60	28.3
	4001-6000 TL	40	18.9
	More than 6000 TL	87	41.0
Skipping meals	Yes	153	72.2
	No	59	27.8

When Table 1 is examined, 38.2% (81) of the participating group were aged 18-20, 54.7% (116) were aged 21-23, and 7.1% (15) were aged 24 and over. 41.5% (88) of the participants were female and 58.5% (124) were male. When their body composition was examined, 9.4% (20) were underweight, 75.9% (161) were normal weight, 12.7% (27) were overweight, and 1.9% (4) were obese. The coach education department constituted 34% (72), the physical education and sports department constituted 31.6% (67), and the sports management department constituted 34.4% (73). When examined in terms of class, 27.8% (59) are in the first year, 25% (53) are in the second year, 31.6% (67) are in the third year, and 15.6% (33) are in the fourth year. 26.9% (57) of the participants live alone at home, 17.9% (38) live with their families, 32.1% (68) live in a student dormitory, and 23.1% (49) live with friends. When their monthly income is examined, 11.8% (25) have an income less than 2000 TL, 28.3% (60) have an income between 2001-4000 TL, 18.9% (40) have an income between 4001-6000 TL, and 41% (87) have an income more than 6000 TL. While 72.2% (153) of the research group skip meals, 27.8% (59) do not skip meals.

Data Collection Tools

Personal Information Form: A form was created by the researcher to collect demographic information; questions were asked to obtain information about age, gender, height, weight, department, class, accommodation type, monthly income, and meal skipping status.

Food Insecurity Scale in Athletes: In order to examine new athletes in terms of food insecurity and to determine food insecurity by observing the changes in athletes who continue sports, the Food Insecurity in Athletes Scale developed by Yıldırım in 2023, consisting of 23 questions and 4 sub-factors with eigenvalues above 1, was used. The first 4 items in the scale are basic needs, items 5-12 are performance changes, items 13-19 are coping strategies, and items 20 to 23 constitute the sub-dimension of access interruptions. Cronbach's alpha coefficients of the scale factors are between 0.827-0.937. In the scale scoring, 0: never, 1: rarely, 2: sometimes, 3: usually, 4: always. The 2nd, 3rd and 4th items containing positive statements are coded in reverse. A high score indicates an increase in the severity of each sub-factor and thus food insecurity (Yıldırım, 2023).

Ethics Approval

All processes conducted within the scope of the research were deemed appropriate in terms of research and publication ethics by the Ethics Committee of Süleyman Demirel University, in accordance with decision number 73/6, dated February 13, 2024. Prior to participation, all participants were informed about the purpose of the study, the voluntary nature of their involvement, and their right to withdraw at any time without consequence, and written informed consent was obtained from each participant. All data collected throughout the study were kept strictly confidential, used solely for research purposes, and processed in accordance with personal data protection principles.

Collection of Data

The data collection process for this study was carried out in October 2025. Data were obtained through the Athlete Food Safety Insecurity Scale, administered face-to-face to students enrolled in the Faculty of Sports Sciences at Isparta Süleyman Demirel University.

Analysis of Data

Table 2. Normality test results

Variable	N	$\bar{X}$	S	Skewness	Kurtosis
Basic Needs Avg.	212	1.6156	0.85686	0.216	-0.160
Performance Changes Avg.	212	1.4564	0.96733	0.193	-0.758
Coping Strategies Avg.	212	1.0182	0.94932	0.887	-0.115
Access Interruptions Avg.	212	1.3078	1.08108	0.481	-0.692

Descriptive statistics were calculated for percentage, frequency, arithmetic mean, skewness, and kurtosis. When examining the kurtosis and skewness values of the total scale scores, it was observed that the kurtosis and skewness coefficients ranged between ±1 (Table 2). George & Mallery (2010) consider skewness and kurtosis values within the ±1 range sufficient to indicate that the distribution of the variable is close to normal. Therefore, parametric test statistics were

preferred in the analyses. Accordingly, independent t-tests were used for demographic data with binary response options, and one-way ANOVA tests were used for questions with more than two response options. In findings where significant differences were detected according to the data obtained from the ANOVA test, Post Hoc analysis was applied to determine the source of the difference, and these differences were shown using the letter coding method. The significance level was accepted as $p<0.01$ and $p<0.05$.

Effect Size Analysis Values

In determining effect sizes, Cohen's d effect size was used for pairwise group comparisons, and the eta squared (η^2) coefficient was used when comparing more than two groups (Cohen, 1988). Effect sizes were interpreted according to commonly used thresholds for Cohen's d and η^2. For Cohen's d, values between 0.00–0.19 were considered negligible, 0.20–0.49 small, 0.50–0.79 moderate, and ≥0.80 large impact. Similarly, for η^2, values between 0.00–0.009 were interpreted as negligible, 0.01–0.059 as small, 0.06–0.139 as moderate, and ≥0.14 as large impact. These ranges were used to evaluate the magnitude of the observed effects.

FINDINGS

Table 3. Comparison of the research group according to gender variable

Scale sub-dimensions	Gender	N	X̄	S	t	df	p	Cohen's d
Basic Needs	Female	88	1,67	,850	,907	210	,365	-
	Male	124	1,57	,861				
Performance Changes	Female	88	1,20	,899	-3,285	210	**,001****	–0.47
	Male	124	1,63	,977				
Coping Strategies	Female	88	0,81	,833	-2,816	210	**,005****	–0.39
	Male	124	1,16	1,00				
Access Interruptions	Female	88	1,07	1,02	-2,659	210	**,008****	–0.38
	Male	124	1,47	1,09				

*p<0.05, **p<0.01

Table 3 shows that there is no statistically significant difference between women and men in the Basic Needs sub-dimension ($p>0.05$). A significant gender-dependent change with a small effect size was observed in the Performance Changes sub-dimension ($t = –3.285$; $p<0.01$; $d= –0.47$). Similarly, significant differences were found in the Coping Strategies ($t=–2.816$; $p<0.01$; $d= –0.39$) and Access Interruptions ($t= –2.659$; $p<0.01$; $d = –0.38$) sub-dimensions, also showing small effect sizes. In all sub-dimensions where significant differences were found, men had higher average scores compared to women. A higher score indicates that men experience more food insecurity than women.

Table 4. Comparison of the research group according to age variable

Scale sub-dimensions	Age	N	X̄	S	F	df	p	Difference	(η²)
Basic Needs	[a]8-20	81	1,53	,845	1,000	2	,370	-	-
	[b]21-23	116	1,68	,877					
	[c]24 and over	15	1,46	,749					
Performance Changes	[a]18-20	81	1,26	,921	3,034	2	**,050***	b>a	0.028
	[b]21-23	116	1,60	,989					
	[c]24 and over	15	1,35	,902					
Coping Strategies	[a]18-20	81	,864	,921	4,237	2	**,016***	b>a b>c	0.039
	[b]21-23	116	1,17	,975					
	[c]24 and over	15	0,60	,614					
Access Interruptions	[a]18-20	81	1,21	1,01	1,229	2	,295	-	-
	[b]21-23	116	1,40	1,13					
	[c]24 and over	15	1,03	1,03					

***p<0.05, **p<0.01**

Table 4 shows that there is no statistically significant difference between age groups in the Basic Needs sub-dimension (p>0.05). A borderline significant difference was found between age groups in the Performance Changes sub-dimension (F=3.034; p<0.05; $\eta^2 = 0.028$). Multiple comparisons showed that the mean scores of the 21–23 age group (b) were significantly higher than those of the 18–20 age group (a) (b>a). The calculated eta-squared value indicates that the effect of age on this sub-dimension is small. Similarly, statistically significant differences were determined between age groups in the Coping Strategies sub-dimension (F= 4.237; p<0.05; η^2=0.039). Post-hoc analyses show that the 21–23 age group has higher mean scores compared to both the 18–20 age group and the 24 years and older group (b>a; b>c). The effect size indicates that these differences are small. On the other hand, no significant difference was found between age groups in the Access Interruptions sub-dimension (p>0.05). The fact that the average scores of the 21-23 age group (b) are high in both sub-dimensions indicates a higher level of food insecurity.

Table 5. Comparison of the research group according to BMI variable

Scale sub-dimensions	BMI	N	X̄	S	F	df	p	Difference	(η²)
Basic Needs	[a]Underweight	20	1,61	,890	4,281	3	**,006****	a>d b>d c>d	0.058
	[b]Normal weight	161	1,68	,825					
	[c]Overweight	27	1,43	,897					
	[d]Obese	4	,250	,500					
Performance Changes	[a]Underweight	20	1,33	,702	,450	3	,717	-	-
	[b]Normal weight	161	1,47	,987					
	[c]Overweight	27	1,50	,975					
	[d]Obese	4	1,00	1,41					
Coping Strategies	[a]Underweight	20	,764	,771	,873	3	,456	-	-
	[b]Normal weight	161	1,02	,936					
	[c]Overweight	27	1,21	1,12					
	[d]Obese	4	,892	1,03					
Access Interruptions	[a]Underweight	20	1,08	1,17	1,753	3	,157	-	-
	[b]Normal weight	161	1,32	1,03					
	[c]Overweight	27	1,50	1,25					
	[d]Obese	4	,312	,625					

**p<0.01, *p<0.05 BMI: Body Mass Indeks

Table 5 shows that a significant difference was found in the basic needs subscale of the food insecurity scale according to the BMI variable among athletes (F=4.281; p<0.01; η^2=0.058),

and this difference was at a small effect size. However, no significant difference was found in the performance changes coping strategies, and access interruptions subscales (p>0.05). Post hoc analyses indicated that the significant difference stemmed from the obese group compared to the underweight, normal-weight, and overweight groups. The study found that obese individuals had lower food insecurity scores compared to underweight, normal weight, and overweight individuals; consequently, obese individuals experienced lower levels of food insecurity. However, due to the small sample size of the obese group (n=4), the statistical stability of these findings is limited; therefore, this issue should be acknowledged as an important limitation of the study.

Table 6. Comparison of the research group according to the department variable

Scale sub-dimensions	Department	N	X̄	S	F	df	p	Difference	(η²)
Basic Needs	[a]Coaching Education	72	1,61	,799	,039	2	,962	-	-
	[b]Physical Education and Sports	67	1,59	,871					
	[c]Sports Management	73	1,63	,908					
Performance Changes	[a]Coaching Education	72	1,57	1,03	2,757	2	,066	-	-
	[b]Physical Education and Sports	67	1,22	,917					
	[c]Sports Management	73	1,54	,924					
Coping Strategies	[a]Coaching Education	72	1,25	1,06	3,643	2	**,028***	a>b	0.0337
	[b]Physical Education and Sports	67	,833	,791					
	[c]Sports Management	73	,958	,921					
Access Interruptions	[a]Coaching Education	72	1,55	1,13	3,008	2	,052	-	-
	[b]Physical Education and Sports	67	1,19	1,07					
	[c]Sports Management	73	1,16	,997					

*p<0.05, **p<0.01

Table 6 shows that there is a statistically significant but small effect size difference in the coping strategies subscale of the food insecurity scale among athletes, according to the section variable (F=3.643; p<0.05; η²=0.0337). No significant difference was found in the basic needs, performance changes, and access interruptions subdimensions (p>0.05). Post Hoc analysis revealed that the difference in the coping strategies subdimension was between the coaching education department and the physical education and sports department.

Table 7. Comparison of the research group according to class variable

Scale sub-dimensions	Class	N	X̄	S	F	df	p	Difference	(η²)
Basic Needs	[a]1	59	1,50	,930	1,386	3	,248	-	-
	[b]2	53	1,59	,755					
	[c]3	67	1,78	,862					
	[d]4	33	1,51	,845					
Performance Changes	[a]1	59	1,34	,897	1,147	3	,331	-	-
	[b]2	53	1,33	1,01					
	[c]3	67	1,59	1,00					
	[d]4	33	1,56	,925					
Coping Strategies	[a]1	59	,900	,990	3,814	3	**,011***	c>a c>b	0.11
	[b]2	53	,789	,782					
	[c]3	67	1,32	,999					
	[d]4	33	,974	,893					
Access Interruptions	[a]1	59	1,23	1,02	2,303	3	,078	-	-
	[b]2	53	1,12	1,03					
	[c]3	67	1,58	1,10					
	[d]4	33	1,15	1,12					

*p<0.05, **p<0.01

Table 7 shows that a significant difference and a moderate effect were found in the coping strategies sub-dimension of the food insecurity scale in athletes according to class level (F=3.814; p<0.05; η²=0.11); however, no significant difference was found in the basic needs, performance changes, and access disruption sub-dimensions (p>0.05). Post Hoc analysis revealed that the difference was between 3rd-year students and 1st and 2nd-year students.

Table 8. Comparison of the research group according to the accommodation type variable

Scale sub-dimensions	Accommodation	N	X̄	S	F	df	p	Difference	(η²)
Basic Needs	[a]At home alone	57	1,40	,706	3,692	3	**,013***	c>a d>a c>b d>b	0.051
	[b]At home with family	38	1,40	,684					
	[c]In the student dormitory	68	1,80	,989					
	[d]At home with friends	49	1,77	,868					
Performance Changes	[a]At home alone	57	1,48	,935	3,799	3	**,011***	a>b c>b d>b	0.052
	[b]At home with family	38	1,05	,921					
	[c]In the student dormitory	68	1,44	1,03					
	[d]At home with friends	49	1,75	,857					
Coping Strategies	[a]At home alone	57	1,17	,932	4,050	3	**,008****	a>c d>b d>c	0.055
	[b]At home with family	38	,797	,772					
	[c]In the student dormitory	68	,802	,868					
	[d]At home with friends	49	1,30	1,10					
Access Interruptions	[a]At home alone	57	1,31	1,10	,979	3	,404	-	-
	[b]At home with family	38	1,16	1,03					
	[c]In the student dormitory	68	1,22	1,06					
	[d]At home with friends	49	1,52	1,10					

*p<0.05, **p<0.01

When Table 8 is examined, it is seen that there is a significant difference and a small effect level (p<0.05) in the basic needs (F=3.692; p<0.05; η²=0.051), performance changes (F=3.799; p<0.05; η²=0.052) and coping strategies (F=4.050; p<0.05; η²=0.055) sub-dimensions of the food insecurity scale according to the type of accommodation of the athletes, while no significant difference was found in the access interruptions sub-dimension. As a result of the Post Hoc analysis conducted to examine which groups differed, the difference in the basic

needs sub-dimension was between those staying in student dormitories and those staying alone at home and those staying with their families; The study found differences between those living with friends, those living alone at home, and those living with their families. In the sub-dimension of performance changes, the difference was found between those living with their families and those living alone at home, and between those living with their families and those living in student dormitories. In the sub-dimension of coping strategies, differences were found between those living in dormitories and those living alone, and those living with a friend; and between those living with a friend and those living with their families.

Table 9. Comparison of the research group according to monthly income variable

Scale sub-dimensions	Monthly income	N	X̄	S	F	df	p	Difference	(η^2)
Basic Need	[a]Less than 2000 TL	25	1,85	,892	5,581	3	**,001****	a>d b>d	0.074
	[b]2001-4000 TL	60	1,89	,799					
	[c]4001-6000 TL	40	1,60	,860					
	[d]More than 6000 TL	87	1,36	,819					
Performance Changes	[a]Less than 2000 TL	25	1,45	,826	,944	3	,420	-	-
	[b]2001-4000 TL	60	1,62	1,01					
	[c]4001-6000 TL	40	1,41	1,00					
	[d]More than 6000 TL	87	1,35	,952					
Coping Strategies	[a]Less than 2000 TL	25	1,33	1,24	1,143	3	,333	-	-
	[b]2001-4000 TL	60	1,01	,936					
	[c]4001-6000 TL	40	,978	,813					
	[d]More than 6000 TL	87	,944	,915					
Access Interruptions	[a]Less than 2000 TL	25	1,18	1,07	,287	3	,835	-	-
	[b]2001-4000 TL	60	1,30	1,02					
	[c]4001-6000 TL	40	1,23	1,02					
	[d]More than 6000 TL	87	1,37	1,15					

*p<0.05, **p<0.01

Table 9 shows that in athletes, a significant difference and moderate effect size were observed in the basic needs sub-dimension of the food insecurity scale according to the monthly income variable (F=5.581; p<0.01; η^2=0.074); however, no significant difference was found in the performance changes, coping strategies, and access disruption sub-dimensions (p>0.05). Post Hoc analysis revealed that the difference was between those with incomes exceeding 6000 TL and those with incomes less than 2000 TL and between 2001-4000 TL.

Table 10. Comparison of the research group according to the variable of skipping meals

Scale sub-dimensions	Skipping meals	N	X̄	S	t	df	p	Cohen's d
Basic Needs	Yes	153	1,73	,863	3,259	210	**,001****	0.048
	No	59	1,31	,767				
Performance Changes	Yes	153	1,47	,939	,344	210	,731	-
	No	59	1,41	1,04				
Coping Strategies	Yes	153	1,08	,958	1,773	210	,078	-
	No	59	,832	,905				
Access Interruptions	Yes	153	1,40	1,05	2,204	210	**,029***	0.023
	No	59	1,04	1,11				

*p<0.05, **p<0.01

Table 10 shows that among athletes, the skipping of meals variable resulted in a significant difference and a small effect in the basic needs (t=3.259; p<0.01; d=0.048) and access

disruptions (t=2.204; p<0.05; d=0.023) sub-dimensions of the food insecurity scale; however, no significant difference was found in the performance changes and coping strategies sub-dimensions (p>0.05). It appears that the severity of food insecurity is higher in individuals who skip meals.

DISCUSSION

This study aimed to examine the social determinants of food insecurity in athlete populations and investigate related factors. The data obtained from the analysis are interpreted in this section with the support of the literature. A total of 212 student athletes, 88 females and 124 males, participated in the study.

According to the findings obtained as a result of the research, a significant difference was found in the sub-dimensions of performance changes, coping strategies and access interruptions in food insecurity according to gender. In these sub-dimensions, it was observed that men experienced food insecurity more than women (Table 3). In a study conducted on first league student athletes, it was found that 52% of female athletes experienced food insecurity, while this rate was 83% for men (Reader et al., 2022). In another similar study, it was found that food insecurity was associated with disordered eating behaviors and triggered these behaviors in male university athletes in the 1st league (Poll et al., 2020). In a study examining the food insecurity of university athletes competing in the third league; it was observed that male athletes had more positive food insecurity results compared to females (Misener, 2020). A review of the literature reveals varying results regarding the effect of gender. This may be attributed to differences in living environment, cultural, and social influences. The fact that men pay less attention to and dedicate less time to their nutrition than women could be considered a reason for their higher scale scores and consequently higher levels of food insecurity.

When food insecurity in athletes was associated according to age factor data, significant differences were found in the sub-dimensions of performance changes and coping strategies among the four sub-dimensions of the food insecurity scale as a result of the Anova test (Table 4). In the performance changes sub-dimension, the severity of food insecurity was found to be higher in individuals aged 21-23 years compared to individuals aged 18-20 years. In the coping strategies sub-dimension, the severity of food insecurity was higher in individuals aged 21-23 years compared to those aged 18-20 years and those aged 24 and over. In a study conducted with university students, it was observed that students aged 24 to 29 years and ≥30 years were at greater risk of food insecurity compared to students aged 18 to 23 years (Keller et al., 2023). When the samples were analyzed among themselves, it was observed that food insecurity was directly proportional to increasing age. Young adulthood defines an important period of change and development, distinct from adolescence and older adulthood, during which educational and economic changes may increase the likelihood of food insecurity (Stroud, 2015). However, the university environment represents a period of life that is often accompanied by change, increased responsibility and independence, which may explain the increase in outcomes with age.

When we correlated sports science students' BMI values with food insecurity data in athletes, significant differences were found in the basic needs sub-dimension ($p<0.05$). According to the basic needs sub-dimension, obese individuals had lower scores compared to underweight, normal weight, and overweight individuals; and their food insecurity status was more positive compared to normal weight and overweight individuals (Table 5). In a study involving first-year university students in the USA, no significant difference was found between students experiencing and not experiencing food insecurity in terms of BMI and waist circumference (El Zein et al., 2019). In a study examining the impact of food insecurity on health outcomes in university students, it was found that being overweight/obese was higher in students experiencing food insecurity (53%) compared to those not experiencing food insecurity (35%) (Willis, 2021). A review of the literature revealed varying results regarding the effect of BMI values. The fact that obese individuals place food and drink at the center of their lives and prioritize nutrition for their basic needs may be considered the reason why they have a lower risk of food insecurity.

Tests conducted on the food insecurity scale in athletes, based on departmental variables, revealed no significant differences in the sub-dimensions of basic needs, performance changes, and access disruptions, while a significant difference was found in the coping strategies sub-dimension. The food insecurity scale score, and consequently the level of food insecurity, was found to be higher among students in the coaching education department (Table 6). The higher incidence of food insecurity among coaching students can be explained by the additional expenses this group faces due to sports equipment, competition participation, and training processes. However, intense and often irregular training programs can make it difficult for students to access regular and sufficient nutrition. Furthermore, high levels of physical activity increase energy requirements, leading to a perception of insufficient food intake. All these findings demonstrate that food insecurity is not only an economic issue but also a multidimensional phenomenon closely related to individuals' perceptions and living conditions.

In the analyses related to the food insecurity scale in athletes according to the grade variable, a significant difference was found in the coping strategies sub-dimension. In the sub-dimension of coping strategies, food insecurity of 3rd graders was found to be higher than 1st and 2nd graders (Table 7). In a similar study, it was found that upper grade students such as 3rd and 4th graders were more likely to experience food insecurity than lower grade students (Keller et al., 2023). In another study, food insecurity was associated with the academic year and it was found that populations with food insecurity increased after the first grade, with the highest prevalence in the second and third grade years (Hagedorn & Olfert, 2018). The results of the literature are similar to this study. The fact that upperclassmen have taken courses in the field of training and nutrition and have more knowledge on this subject than lowerclassmen can be considered as the reason why they are more likely to experience anxiety about food insecurity.

As a result of the test conducted on the food insecurity scale in athletes according to their accommodation type, a significant difference was found in the sub-dimensions of basic needs, performance changes and coping strategies, while no significant difference was found in the sub-dimension of access interruptions. The lower scale scores of students living with their families indicate that the severity of food insecurity is lower in this group (Table 8). In a study involving university student athletes, food insecurity was found to be lower in students living

in dormitories (Reader et al., 2022). In another study, students living off-campus and students who spend more money on transportation, food and rent were reported to experience more food insecurity than students living with their families (Chaparro et al., 2009). Similarly, the prevalence of food insecurity was found to be higher among students living off-campus compared to those living in campus dormitories (Hagedorn & Olfert, 2018). In particular, living off-campus affects the prevalence of food insecurity (Dubick et al., 2016). The financial burden faced by students and significant increases in housing costs may cause them to prioritize their spending to compensate, allocating a larger proportion of their stipends to housing and less to meal plans. Living in a family home reduces financial worries and provides a more organized life, which may account for the lower risk.

In the analysis of the food insecurity scale in athletes according to monthly income level, a significant difference was found in the basic needs sub-dimension (Table 9). Scale scores were higher in the group with lower monthly income. Decreased income is a risk factor for food insecurity. In another similar study, it was reported that the food insecure group in student athletes struggled with limited time and money and purchased food based on cost rather than nutritional quality compared to food secure students (Douglas et al., 2022). A study conducted at a state university found that households earning more were less likely to be food insecure than households earning less (Keller et al., 2023). A study of 91 female student-athletes found that 25% of participants reported inadequate finances as the primary barrier to adequate food intake (Mayeux et al., 2020). Student-athletes often face additional costs such as equipment and travel fees that institutions are expected to pay. The challenges of juggling their training program and studies can often force student-athletes to prioritize their expenses and implement a number of coping strategies. As a result of financial prioritization, student-athletes may be choosing to eat less, skip meals, reduce their activity, or eat more affordable but less nutritious meals.

When food insecurity in athletes was correlated with meal skipping data, a t-test revealed a significant difference in the basic needs and access disruption sub-dimensions of the four sub-dimensions of the food insecurity scale (Table 10). Individuals who skipped meals were observed to have higher scale scores, experience difficulties in meeting their basic needs and accessing safe food, and have higher levels of food insecurity. In a study with university athletes, student athletes reported reducing their food intake and skipping meals due to low income. They reported that cafeterias were expensive, options were limited, and meal plans did not include 3 full meals a day (Brown et al., 2021; Reader et al., 2022). In a study examining food insecurity among general university students, especially student athletes, it was found that students used various coping strategies to meet their food needs; These include more frequent participation in events offering free snacks and meals, increased frequency of skipping meals, reduced portion sizes, spreading available food intake over a longer period, and purchasing low-cost, highly processed foods (Abbey et al., 2022). The results in the literature support our study. Today, the difficulty in accessing adequate and healthy food may cause athletes to skip meals and consume less energy and protein than they need.

Research findings indicate that food insecurity is a widespread and multifaceted problem among university athletes in Turkey. The results show that food insecurity is not limited to nutrition alone, but has a significant impact on athletes' health status, performance levels, and

the continuity of their athletic development. In this context, it is crucial for universities and sports-related institutions to regularly monitor athletes' nutritional status, expand nutrition education programs, and develop practices that include nutritional support, especially during intense training and competition periods. This study demonstrates the need for more comprehensive and longitudinal research addressing food insecurity among university athletes in Turkey across different disciplines, genders, and socioeconomic levels.

CONCLUSION AND RECOMMENDATIONS

Although the susceptibility of university students to food insecurity is well established, there are few studies focusing on the prevalence of food insecurity among student athletes in Turkey and the literature is insufficient. As a result of the study, it was observed that university athletes are vulnerable to food insecurity due to increased costs of education, housing and food and difficulties in their access. However, food insecurity is a significant problem in our country because individuals often lack the time and financial resources to meet the increased nutritional needs required by intense training. The food insecurity of university athletes poses a problem in terms of health and sports performance as well as evaluating new athletes, observing changes over time in continuing athletes, and the continuity of athletes' development. In order to prevent this situation, there is a need for studies examining the effect of food insecurity on both sports performance and sporting success in our country with more diverse samples. In line with the data to be obtained from the studies, solutions that will contribute to the reduction of food insecurity such as nutrition education for athletes, providing food support especially during competitions, and implementing practices that can increase their access to healthy foods should be produced.

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