



## Use of dietary supplements: patterns, prevalence, and determinants among physically active adults in Albania

*Uso de suplementos dietéticos: patrones, prevalencia y determinantes entre adultos físicamente activos en Albania*

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### Abstract

**Introduction:** Dietary supplements (DSs) are products intended to address nutritional deficiencies and support overall health. Although DS consumption has risen globally, evidence on their use, patterns, and determinants among physically active adults in Albania remains very limited. **Objectives:** This study explored DS use among adults engaged in physical activity in Albania focusing on use patterns, motivations, and factors influencing intake.

**Methods:** A cross-sectional study was conducted between March and September 2025. An anonymous questionnaire was distributed among 570 individuals engaged in physical activity in Albania.

**Results:** Overall, 52.3% of participants reported using DSs. Proteins (58.1%), vitamins and minerals (46.0%) and creatine (27.5%) were the most used supplements. The main reasons for supplement use were energy increase (44.9%), muscle gain (34.2%), and performance improvement (34.2%), all significantly associated with supplement user status ( $p < 0.001$ ;  $q = 0.002$ ). Supplement type was significantly related to motivations for use (all  $p < 0.001$ ;  $q = 0.014$ ). Weekly training hours and receiving advice from a coach were the strongest predictors of DS use in multivariable analyses (OR = 28.90 and OR = 16.62, both  $p < 0.001$ ).

**Conclusions:** DS use is common among physically active adults in Albania and is primarily influenced by training load and coach advice. Supplementation practices reflected performance and muscle-related motivations, while non-use was driven by perceptions of adequate diet and uncertainty regarding supplement efficacy. These findings provide baseline evidence to inform future research and promote safe and informed supplement use in this population.

### Keywords

Albania; dietary supplement; DS pattern; physical activity; prevalence

### Resumen

**Introducción:** Los suplementos dietéticos (SD) son productos destinados a abordar deficiencias nutricionales y apoyar la salud general. Aunque el consumo de SD ha aumentado globalmente, la evidencia sobre su uso, patrones y determinantes entre adultos físicamente activos en Albania sigue siendo muy limitada.

**Objetivos:** Este estudio exploró el uso de SD entre adultos que practican actividad física en Albania, centrándose en los patrones de consumo, las motivaciones y los factores que influyen en su ingesta.

**Métodos:** Se realizó un estudio transversal entre marzo y septiembre de 2025. Se distribuyó un cuestionario anónimo a 570 individuos físicamente activos en Albania.

**Resultados:** En total, el 52,3% de los participantes informó utilizar SD. Las proteínas (58,1%), las vitaminas y minerales (46,0%) y la creatina (27,5%) fueron los suplementos más consumidos. Las principales razones para el uso de suplementos fueron el aumento de energía (44,9%), la ganancia muscular (34,2%) y la mejora del rendimiento (34,2%), todas significativamente asociadas con el estado de usuario de suplementos ( $p < 0,001$ ;  $q = 0,002$ ). El tipo de suplemento se relacionó significativamente con las motivaciones de uso (todos  $p < 0,001$ ;  $q = 0,014$ ). Las horas semanales de entrenamiento y recibir asesoramiento de un entrenador fueron los predictores más fuertes del uso de SD en los análisis multivariados (OR = 28,90 y OR = 16,62; ambos  $p < 0,001$ ).

**Conclusión:** El uso de SD es común entre los adultos físicamente activos en Albania y está influenciado principalmente por la carga de entrenamiento y el asesoramiento del entrenador. Las prácticas de suplementación reflejan motivaciones relacionadas con el rendimiento y la ganancia muscular, mientras que el no uso se debe a la percepción de una dieta adecuada y a la incertidumbre sobre la eficacia de los suplementos. Estos hallazgos proporcionan evidencia basal para orientar futuras investigaciones y promover un uso seguro e informado de suplementos en esta población.

### Palabras clave

Albania; suplemento dietético; patrón de SD; actividad física; prevalencia



## Introduction

Dietary supplements (DSs) are products intended to address nutritional deficiencies, support, maintain and enhance overall health status (Djaoudene et al., 2023). They consist of a wide range of ingredients, including vitamins, minerals, herbs, amino acids, and enzymes, and are formulated in various forms such as tablets, capsules, powders, and liquids (FDA, 2023). However, despite their potential benefits, they cannot replace the diverse compounds found in whole foods. Therefore, maintaining a balanced and healthy eating pattern, along with the appropriate guidance on daily intake, is essential (Lentjes, 2019). Despite the existence of different definitions of DS from various organizations (DSHEA, FDA, NIH, IOC), DSs are nowadays considered an integral component of a modern healthy diet, offering a convenient way to complement nutritional needs and support overall well-being (Bozo et al., 2024; Vignesh et al., 2024; Khubchandani et al., 2024).

Although data show that the prevalence of DS use among the general population varies widely across countries, (35% - over 80%), systematic available data specifically addressing DS use and practices associated with their use remain still limited at global level (Khawagi et al., 2025, Burnett et al., 2017; Zhao et al., 2025).

Regular physical activity is recognized as an important component in maintaining a healthy lifestyle, promoting both physical and mental well-being (Rippe, 2024; Kalfin et al., 2024). Such behavior is particularly characteristic of individuals who regularly engage in exercise with the goal of improving their physical fitness, appearance and health reasons. Engagement in physical activity requires specific nutritional and recovery needs, which in turn affects the pattern of DS use. Within this framework, DS intake is shaped by individuals' health profile and their physical activity level, which together influence the type, purpose, and frequency of supplement consumption (Maughan et al., 2018). Over the past two decades, DS use among physically active individuals has increased significantly, driven primarily by the need to increase muscle mass, strength and power, improve endurance and recovery, optimize physical performance, as well as manage specific health conditions (Anugrah et al., 2024; Parada-Flores et al., 2025; Peeling et al., 2019).

There is an absence of comprehensive global data regarding the prevalence of DS use among physically active populations. While some studies suggest that the prevalence of DS use among competitive athletes varies widely from 11% to 100% (Puya-Braza et al., 2018; Daher et al., 2022, Schlickman et al., 2023; Mazzilli et al., 2021), a systematic review of 24 cross-sectional studies from 16 countries provides useful insights into the prevalence of DS use among non-competitive athletes show that the prevalence of DS use varies from low rates of 30-50% (Egypt, Spain, Arab Emirates, Portugal, Jordan and Saudi Arabia), to 50-90% in Brazil, Italy, Iran, Switzerland, Iraq and South Africa, up to 100% in the UK and Denmark (Hernandez et al., 2025).

Proteins, vitamin/mineral supplements, and branched-chain amino acids are the most commonly used DS among non-competitive practitioners, while competitive athletes more frequently use protein supplements, vitamins, omega-3 fatty acids, and probiotics (Wilda Welis et al., 2024; Galman et al., 2024; Mazzilli et al., 2021; Tardy et al., 2020). Evidence also suggests that the use of probiotic supplements and n-3 fatty acids is associated with outcomes relevant to endurance athletes, including modulation of oxidative stress, inflammatory responses, sports performance and immune function (Díaz-Jiménez et al., 2021; D'Angelo et al., 2020). Ergogenic sport supplements such as creatinine and caffeine are commonly used for increased muscle mass, strength, power and recovery (Parada-Rivera et al., 2025; Parada-Flores et al., 2025, Alvarez-Rayón et al., 2022; Wang, Z. et al., 2024).

Additionally, patterns of DS use vary also across gender and age groups. Males, whether involved in competitive or non-competitive activities, are more frequent users of dietary supplements than females (Aguilar-Navarro et al., 2021). Their primary motivations for DS use include enhancing physical performance and increasing muscle mass, with protein powders being the most commonly used products. In contrast, females tend to use DS mainly to support overall well-being and manage body weight (Lopes et al., 2024). Although findings on age-related differences among DS users are not entirely consistent, DS use among non-competitive athletes, was predominantly observed in the 25–40-year age group, whereas among athletes, the highest prevalence was found in the 18–25-year age group (Erdağ et al., 2021; Graybeal et al., 2023). Therefore, further studies exploring variations in DS use by age, gender, and training intensity, are still needed. Such research becomes crucial given the challenges related to



DSs, as their quality and safety are frequently questioned by the scientific community (Siddiqui et al., 2020; Li et al., 2023). Addressing these challenges requires rigorous quality control and guidance from healthcare professionals to provide consumers with accurate information and guidance.

In less developed countries such as Albania, where systematic data on dietary supplement use and related practices are very limited and where the market is not formally regulated, a comprehensive understanding of the prevalence and determinants of DS use in Albania is essential for developing appropriate public health strategies and for guiding safe and informed use. Therefore, this study, the first of its kind in Albania, aims to investigate the prevalence, patterns, and determinants of DS use among physically active adults in Albania, including the types of supplements used, motivations for use, and factors such as gender, age, and training frequency that may influence these behaviors.

## Method

### Study Design

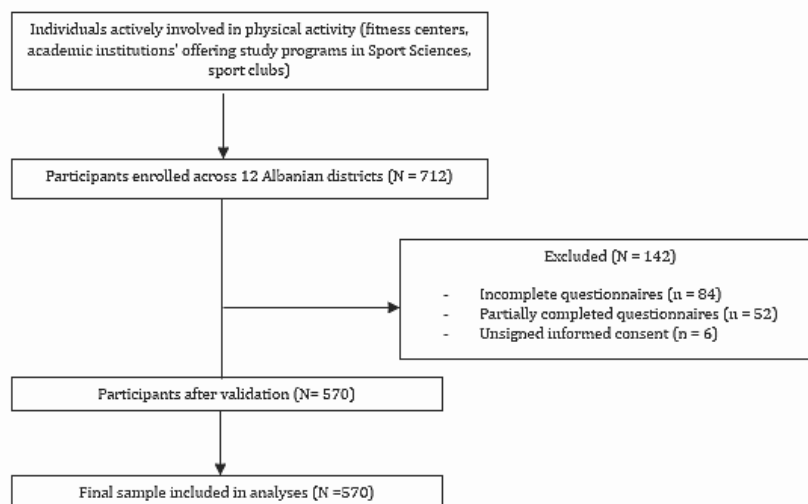
This study used a cross-sectional design and was conducted between March and September 2025. An anonymous questionnaire was distributed among 570 individuals engaged in physical activity at different levels in Albania. Training frequency was categorized as less than 3 times per week, 3–5 times per week, and more than 5 times per week, and was used to define participants' physical activity level.

### Participants and eligibility criteria

Eligible participants were Albanian resident adults aged 18 years or older, actively involved in physical activity, and capable of completing the questionnaire independently. Participants were excluded if they reported chronic medical conditions or recent injuries that could have limited their ability to train within the previous three months. Additional exclusion criteria included incomplete or partially complete questionnaires.

Considering the high degree of urbanization in Albania (Bollano, 2024), participants were recruited in key urban settings commonly frequented by physically active individuals, including fitness centers, sports clubs, and academic institutions offering Sport Sciences study programs. Participation was entirely voluntary. Prior to administration, participants were informed about the study's purpose, procedures, and confidentiality assurances. Written informed consent was obtained from all participants, and those who did not provide signed consent were excluded from the study. Figure 1 illustrates the participant recruitment and selection process, from the initial settings to the final sample included in the analysis. To ensure confidentiality and anonymity, a unique identification code was assigned to each participant.

Figure 1. Recruitment and selection of participants



## ***Ethical Considerations***

The study was carried out in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the Sports University of Tirana (Nr. Prot. 441/2, dated 04.02.2025).

## ***Linguistic and Content Validation***

To ensure the questionnaire was both linguistically accurate and content-valid, it was developed with reference to internationally recognized guidelines, including the World Health Organization's Global Recommendations on Physical Activity for Health and the Food and Agriculture Organization's Guidelines for Assessing Nutrition-Related Knowledge, Attitudes, and Practices (WHO, 2010; FAO, 2014). Content validity was further confirmed through expert review by three faculty members in Sport Sciences and Nutrition, who evaluated each item for relevance, clarity, and appropriateness.

The questionnaire was translated into the Albanian language. To ensure clarity and appropriateness of the language for the target population, a pilot test was conducted with 20 physically active adults, who provided feedback on the comprehensibility of the questions. Minor adjustments were made based on their suggestions to improve readability and cultural relevance.

## ***Questionnaire structure***

The questionnaire was organized into two main sections and included both close-ended (Yes/No) and multiple-choice questions. The first section gathered demographic information, including gender, age, place of residence, and training characteristics. The second section assessed participants' supplement-related practices, including supplement use status, frequency of use, reasons and motivations for use, sources of influence, types of supplements consumed, and reasons for non-use.

Age was categorized into the following groups: 18–24 years (young adults), 25–34 years (early adults), and 35–46 years (early middle-aged adults). Participants' residence was grouped according to the 12 administrative counties of Albania (Parliament of the Republic of Albania, 2014).

## ***Sampling and Population Data***

Population data for each of the 12 Albanian counties were obtained from the 2023 Population and Housing Census (INSTAT), with a total of 2,361,310 residents (INSTAT, 2023). Using Cochran's formula with a 95% confidence level ( $Z = 1.96$ ), a 5% margin of error ( $e = 0.05$ ), and  $p = 0.5$ , the required sample size for an infinite population was calculated as 384. Based on proportional allocation, the estimated number of participants to be recruited from each district was as follows: Tirana (121), Durrës (36), Elbasan (37), Fier (39), Korçë (28), Shkodër (25), Vlorë (23), Berat (23), Dibër (17), Lezhë (16), Kukës (10), and Gjirokastër (10). Sample size allocation followed population distribution, and participant recruitment within each district was conducted using convenience sampling. To reach the minimum sample size calculated for each county, enhance the representativeness of the sample and ensure adequate participation across different subgroups, additional questionnaires exceeding the calculated sample size were distributed in each county. The selected supplement categories were based on their widespread use in the population, functional relevance in sports and health, and classification in established literature (Kerksick et al., 2018).

## ***Statistical Analysis***

Data was analyzed using the Statistical Package for Social Sciences (SPSS, Version 27.0, IBM, Armonk, NY, USA). Descriptive statistics, including means, standard deviations, frequencies, and percentages, were applied to summarize participants' demographic characteristics and DS use patterns. Associations between categorical variables, such as demographic and training characteristics and supplement use, were initially explored using chi-square tests of independence or Fisher's exact tests, with the Phi coefficient reported for  $2 \times 2$  associations. Statistical significance was defined as  $p < 0.05$ . To account for multiple comparisons, p-values were adjusted using the Benjamini–Hochberg false discovery rate (FDR), and the corresponding q-values are reported.

Furthermore, to examine the independent effects of multiple determinants on DS use, binary logistic regression models were fitted. The following predictors were included in the models based on their relevance to supplement-use behavior: gender (female vs male), age group (25–34 vs 18–24 years; 35–

46 vs 18–24 years), training frequency (3–5 times/week vs <3 times/week; >5 times/week vs <3 times/week), weekly training hours (continuous variable), and source of advice regarding supplement use (coach vs other/no advice). Separate regression models were constructed to assess determinants of overall DS use, frequency of DS use, and determinants of the most commonly used supplement types (proteins, creatine, and vitamins/minerals). Adjusted odds ratios (ORs) with 95% confidence intervals (95% CI) were reported.

## Results

### Demographic characteristics

A total of 570 participants were included in the study. The majority were male (61.1%), while females represented 38.9%. The minimum age was 18 years, and the maximum age was 46 years, with a mean age of  $21.8 \pm 4.8$  years. Most participants were young adults aged 18–24 years (81.8%), followed by early adults aged 25–34 years (14.9%), and a smaller group of early middle-aged adults aged 35–46 years (3.3%). By geographic distribution, participants were primarily from Tirana (31.2%), followed by Fier (10.0%), Elbasan (9.8%), and Durrës (9.3%). All demographic characteristics are summarized in Table 1.

Table 1. Demographic characteristics of participants (n=570)

Variable	Category	n	%
Gender	Female	222	38.9
	Male	348	61.1
Age group	18–24 years (Young adults)	466	81.8
	25–34 years (Early adults)	85	14.9
	35–46 years (Early middle-aged adults)	19	3.3
Region of residence	Tirana	178	31.2
	Korçë	41	7.2
	Durrës	53	9.3
	Shkodër	37	6.5
	Lezhë	24	4.2
	Dibër	26	4.6
	Kukës	15	2.6
	Berat	34	6.0
	Elbasan	56	9.8
	Vlorë	35	6.1
	Fier	57	10.0
Gjirokastrë	14	2.5	

### Physical activity and training

Overall, nearly half of the participants (48.6%) trained 3–5 times per week, whereas 24.0% trained less than 3 times per week, and 27.4% trained more than 5 times per week.

Weekly training duration ranged from 1 to 30 hours, with a mean of  $8.9 \pm 5.8$  hours. Mean weekly training duration was similar for males ( $8.9 \pm 5.8$  hours) and females ( $8.9 \pm 1.8$  hours), though variability was higher among males.

### Dietary supplement use and practices

#### Overall Sample Characteristics

Of the 570 participants, 52.3% (298/570) reported using DS.

47.6% (142/298) reported taking only one supplement, 21.5% (64/298) used two, 7.1% (21/298) used three, and 23.8% (71/298) reported using more than three concurrently. Overall, 27.5% of participants (82/298) used supplements 1–3 times per week, 16.5% (49/298) used them 3–5 times per week, 17.1% (51/298) used them daily, and 38.9% (116/298) reported occasional use throughout the year.



Patterns of DS use, including supplement types, sources of advice, and reasons for use and non-use, are presented in Table 2.

Table 2. Dietary supplements use patterns, advice sources and motivations for use/non-use among physically active individuals

Variable	Category	n	%
Types of supplements used	Proteins	173	58.1
	Vitamins and minerals	137	46.0
	Creatine	82	27.5
	Omega 3	70	23.5
	Energy drinks	69	23.2
	Caffeine	34	11.4
	Amino acids	31	10.4
	Herbal supplements	21	7.1
	Carnitine	9	3.0
	Probiotics	4	1.3
	Other	1	0.3
Sources of advice	Coaches	123	41.3
	Internet	77	25.8
	Other physically active individuals	62	20.8
	Family members	60	20.1
	Physicians	43	14.4
	Nutritionists	23	7.7
	Newspapers/magazines	14	4.7
Reasons for supplement use	Muscle damage prevention	72	24.2
	Someone recommended it	7	2.4
	Increase energy	134	44.9
	Reduce post-workout fatigue	94	31.5
	Correction of dietary deficiencies	79	26.5
	Muscle gain	102	34.2
	Improve performance	102	34.2
	Weight management	28	9.4
	Overall health	75	25.2
	Not sure	16	5.4
Reasons for not using supplements	Cost	8	2.9
	Concern about side effects	66	24.3
	Unsure which supplement is appropriate	50	18.4
	Unsure about efficacy	98	36.0
	Concern about safety	44	16.2
	Diet meets all needs	110	40.4

Note: Percentages are calculated among supplement users (n = 298) for types of supplements, sources of advice, and reasons for use, and among non-users (n = 272) for reasons for non-use. Multiple responses were allowed

The most commonly used DS were proteins (58.1%), vitamins and minerals (46.0%), creatine (27.5%), omega-3 (23.5%), and energy drinks (23.2%). The least frequently used supplements included herbal supplements (7.1%), carnitine (3.0%), and probiotics (1.3%).

The most frequently reported reasons were energy increase (44.9%), muscle gain (34.2%), and performance improvement (34.2%). All reasons for supplement use were significantly associated with supplement user status (all  $p < 0.001$ ) and remained significant after FDR correction ( $q = 0.002$ ).

Significant associations were observed between the type of supplement used and the reported reasons for use (all  $p < 0.001$ ). Creatine use was strongly associated with goals of muscle gain and performance enhancement, while protein use was primarily linked to muscle gain. In addition, vitamins and minerals use was mainly associated with post-workout fatigue reduction, muscle damage prevention, and correction of dietary deficiencies. All associations remained statistically significant after FDR correction ( $q = 0.014$ ).

Coaches were the most frequently reported source of advice for dietary supplement use (41.3%), followed by the internet (25.8%), other physically active individuals (20.8%), and family members (20.1%). Associations between reported sources of advice and the type of supplement used were observed at the nominal significance level ( $p < 0.05$  for several comparisons), with coach recommendations being more common among protein and creatine users, and medical or online sources more frequently



reported for other supplement types. However, none of these associations remained statistically significant after adjustment for multiple comparisons ( $q > 0.05$ ).

Among participants who did not use supplements, the most frequently reported reasons were the perception that diet alone met all nutritional needs (40.4%), uncertainty regarding supplement efficacy (36.0%), and concerns about side effects (24.3%), while cost was the least cited reason (2.9%). User status was strongly associated with reported reasons for non-use (all  $p < 0.001$ ), and all associations remained statistically significant after FDR correction ( $q \leq 0.003$ ).

### **Patterns of DS use across training and demographic characteristics**

Patterns of DS use across training frequency, gender, and age groups are presented in Table 3.

Table 3. Dietary supplement usage patterns by age groups, gender, and training frequency

Category	Training frequency			Gender		Age groups		
	< 3 times/week n (%)	3-5 times/week n (%)	> 5 times/week n (%)	Males n (%)	Females n (%)	18-24 years n (%)	25-34 years n (%)	35-46 years n (%)
Supplement use								
Users	63 (46.0)	101 (64.7)	134 (48.4)	194 (55.7)	104 (46.8)	240 (51.5)	49 (57.6)	9 (47.4)
Non-users	74 (54.0)	55 (35.3)	143 (51.6)	154 (44.3)	118 (53.2)	226 (48.5)	36 (42.4)	10 (52.6)
Type of supplement								
Proteins	31 (49.2)	87 (86.1)	56 (41.8)	123 (63.4)	50 (48.1)	139 (57.9)	29 (59.2)	6 (66.7)
Carnitine	1 (1.6)	4 (4.0)	4 (3.0)	8 (4.1)	1 (1.0)	8 (3.3)	1 (2.0)	0 (0.0)
Creatine	5 (7.9)	45 (44.6)	32 (23.9)	71 (36.6)	11 (10.6)	64 (26.7)	13 (26.5)	5 (55.6)
Herbal supplements	4 (6.3)	15 (14.9)	2 (1.5)	8 (4.1)	13 (12.5)	18 (7.5)	3 (6.1)	0 (0.0)
Omega 3	9 (14.3)	39 (38.6)	22 (16.4)	44 (22.7)	26 (25.0)	55 (22.9)	13 (26.5)	2 (22.2)
Probiotics	1 (1.6)	2 (2.0)	1 (0.7)	0 (0.0)	4 (3.8)	2 (0.8)	2 (4.1)	0 (0.0)
Caffeine	6 (9.5)	21 (20.8)	6 (4.5)	24 (12.4)	10 (9.6)	28 (11.7)	4 (8.2)	2 (22.2)
Amino acids	2 (3.2)	12 (11.9)	16 (11.9)	24 (12.4)	6 (5.8)	19 (7.9)	9 (18.4)	1 (11.1)
Vitamins/minerals	18 (28.6)	65 (64.4)	53 (39.6)	86 (44.3)	51 (49.0)	107 (44.6)	26 (53.1)	4 (44.4)
Energy drinks	27 (42.9)	29 (28.7)	13 (9.7)	34 (17.5)	35 (33.7)	58 (24.2)	10 (20.4)	1 (11.1)
Other	0 (0)	1 (1.0)	0 (0)	1 (0.5)	0 (0.0)	1 (0.4)	0 (0.0)	0 (0.0)

Note: Percentages are calculated within each subgroup. For supplement types, multiple responses were allowed; therefore, percentages do not sum to 100%

Supplement use was more prevalent among participants training 3–5 times per week (64.7%) compared with those training less than 3 times per week (46.0%) or more than 5 times per week (48.4%). Across all training categories, proteins were the most frequently used supplements, particularly among those training 3–5 times per week (86.1%), followed by vitamins and minerals (64.4%) and creatine (44.6%). In contrast, energy drink use was highest among participants training less than 3 times per week (42.9%).

Males reported higher use of proteins (63.4% vs. 48.1%), creatine (36.6% vs. 10.6%), whereas females more frequently used vitamins and minerals (49.0% vs. 44.3%) and energy drinks (33.7% vs. 17.5%). Across age groups, proteins remained the most commonly used supplements (57.9% in 18–24 years, 59.2% in 25–34 years, and 66.7% in 35–46 years). Creatine use was higher in the oldest age group (55.6%) compared with younger participants (26.7% in 18–24 years and 26.5% in 25–34 years), although this group represented a small proportion of the sample.

### **Multivariable analysis of factors associated with DS use**

To identify independent factors associated with dietary supplement use, multivariable logistic regression models were applied. In addition to the general model for dietary supplement use, separate models were fitted for the three most commonly used supplements, protein, creatine, and vitamins and minerals. The results of these analyses are presented in Table 4.

Table 4. Logistic regression models for overall use and specific supplement types

Predictor	Overall DS use		Protein use		Creatine use		Vitamins/minerals use	
	p		p		p		p	



	OR (95% CI)		OR (95% CI)		OR (95% CI)		OR (95% CI)	
Gender (F vs M)	1.44 (0.77-2.70)	0.253	1.31 (0.73-2.36)	0.364	3.80 (1.60-9.04)	0.003	1.22 (0.62-2.39)	0.568
Age 25-34 years vs 18-24 years	1.08 (0.63-1.86)	0.772	1.00 (0.59-1.69)	0.995	1.50 (0.83-2.72)	0.177	1.10 (0.61-1.99)	0.752
Age 35-46 years vs 18-24 years	1.00 (0.46-2.18)	0.998	1.00 (0.47-2.12)	0.998	1.00 (0.32-3.15)	0.996	1.00 (0.40-2.48)	0.998
Training frequency 3-5 times/week vs <3 times/week	1.00 (0.93-1.08)	0.919	1.02 (0.96-1.09)	0.464	1.06 (0.98-1.15)	0.133	1.06 (0.99-1.14)	0.115
Training frequency >5 times/week vs <3 times/week	1.58 (0.82-3.04)	0.173	0.88 (0.47-1.65)	0.688	0.68 (0.30-1.53)	0.351	1.24 (0.61-2.52)	0.561
Weekly training hours	28.90 (8.90-93.89)	<0.001	6.09 (3.01-12.32)	<0.001	6.56 (3.02-14.26)	<0.001	4.31 (2.01-9.27)	<0.001
Source of advice: Coach	16.62 (4.44-62.25)	<0.001	3.39 (1.32-8.68)	0.011	2.37 (0.79-7.15)	0.125	6.46 (2.41-17.29)	<0.001

Note. Bold values indicate statistically significant predictors ( $p < 0.05$ ). OR = Odds Ratio; CI = Confidence Interval. Each column represents a separate multivariable logistic regression model

Weekly training hours emerged as the strongest predictor of dietary supplement use. In the logistic regression model, training hours were strongly associated with supplement use (OR = 28.90, 95% CI: 8.90-93.89,  $p < 0.001$ ), indicating that participants with higher weekly training time had markedly higher odds of being supplement users.

Receiving advice from a coach was also a strong predictor of dietary supplement use. In the logistic regression model, participants who reported coaches as their main source of advice had significantly higher odds of using supplements (OR = 16.62, 95% CI: 4.44-62.25,  $p < 0.001$ ).

Gender and age group were not significant predictors in this multivariable model.

Weekly training hours and receiving advice from a coach were significant predictors of protein use (OR = 6.09, 95% CI: 3.01-12.32,  $p < 0.001$ ; OR = 3.39, 95% CI: 1.32-8.68,  $p = 0.011$ , respectively). Creatine use was significantly associated with weekly training hours (OR = 6.56, 95% CI: 3.02-14.26,  $p < 0.001$ ) and gender, with males showing higher odds of use (OR = 3.80, 95% CI: 1.60-9.04,  $p = 0.003$ ). Vitamins and minerals use was significantly associated with receiving advice from a coach (OR = 6.46, 95% CI: 2.41-17.29,  $p < 0.001$ ) and weekly training hours (OR = 4.31, 95% CI: 2.01-9.27,  $p < 0.001$ ).

## Discussion

DS use among physically active individuals has become increasingly common worldwide, driven by growing interest in enhancing performance, supporting recovery, and meeting nutritional needs (Bozo et al., 2024; Puya-Braza et al., 2018; Alvarez-Rayón et al., 2022). This study provides new insight into DS use among physically active individuals in Albania, a population for which data have been limited. Over half (52.3%) of participants reported using DS, highlighting that supplementation is also common among recreational exercisers in Albania. Very few studies have addressed this topic in the Albanian population, with only one comparable study in the general population reporting a prevalence of 56.4%, which is surprising since supplement use is generally lower among non-athletic populations (Peç Uli et al., 2021; Mettler et al., 2020).

When compared internationally, the prevalence observed in our study is higher than in several neighboring or regional countries, including Portugal (43.8%), Greece (41.0%), Bosnia and Herzegovina (40.4%), and Spain (39.7%). However, it is lower than in Italy (86.8%), Saudi Arabia (82.4%), and the United Kingdom (72.0%) (Ruano et al., 2020; Tsitsimpikou et al., 2011; Čaušević et al., 2025; Schlickmann et al., 2023; Mazzilli et al., 2021; Wafi et al., 2024; Evans et al., 2017). These differences may reflect local supplementation habits, marketing strategies, and product availability, suggesting that DS use is influenced by a combination of geographic, social, and market-related factors rather than physical activity alone. Nonetheless, the growing interest in supplements in Albania indicates an emerging market trend that may, over time, lead to prevalence levels comparable to those observed in high-prevalence countries (Metani et al., 2024).



Beyond overall prevalence, supplementation practices indicate a relatively cautious approach. Nearly half of users reported taking a single product (47.6%), a pattern consistent with international findings where single-product use remains more common than multi-product combinations (Lopes et al., 2024). Nonetheless, a subgroup of participants (23.8%) reported using more than three supplements concurrently, indicating more intensive supplementation practices. Similar trends have been described internationally, where supplement use among physically active individuals is shaped not only by performance goals but also by routine habits, perceived benefits, and product availability in fitness environments (Athanasopoulou et al., 2025; Wilda Welis et al., 2024). In Albania, the increasing availability of supplements in gyms and fitness centers may likewise encourage more extensive use in some groups, suggesting that more intensive supplementation is not limited to elite athletes (Metani et al., 2024).

Despite multiple-product use by some participants, frequency data indicate that most individuals use supplements occasionally throughout the year (38.9%) or 1-3 times per week (27.5%). Such behavior suggests selective or situational use (e.g., during periods of more intense training) rather than integration into daily nutrition practices.

Regarding supplement types, proteins (58.1%), vitamins/minerals (46.0%) and creatine (27.5%) were the most used. These findings are consistent with previous studies reporting that proteins and vitamins/minerals remain the most frequently consumed supplements among non-elite exercisers globally (Finamore et al., 2022; Lopes et al., 2024; Cohen et al., 2018).

The types of DS used in our study were significantly associated with participants' primary motivations for supplementation, particularly energy enhancement (44.9%), muscle gain (34.2%), and performance improvement (34.2%). Supplement choices appear to be guided by perceived training and recovery needs, suggesting purposeful rather than incidental use and a general awareness of the functional roles of commonly used supplements among physically active individuals. This interpretation is supported by existing evidence showing that protein supplementation promotes muscle growth and strength, while creatine enhances phosphocreatine availability and improves strength and training adaptations that support muscle gain and performance goals (Morton et al., 2018; Vliet et al., 2018; Kreider et al., 2017). Vitamins/minerals contribute to energy metabolism, enzymatic activity, and neuromuscular function, supporting general well-being and exercise recovery (Tardy et al., 2020). However, despite their widespread use, vitamins/minerals supplementation is often unnecessary when dietary intake is adequate, since deficiencies are uncommon except in individuals restricting food intake for weight control. When nutrient requirements are met through a balanced diet, additional supplementation is unlikely to yield further performance benefits (Carlsohn, 2025; Attlee et al., 2018).

Given that supplementation choices appear to reflect training demands, it is not surprising that weekly training hours emerged as the strongest independent predictor of supplement use, whereas training frequency did not remain significant after adjustment. This suggests that total training load, rather than the number of training sessions, is the primary driver of supplementation behavior. Individuals with longer cumulative training time may perceive greater nutritional and recovery demands, which could encourage supplement use. Similar relationships have been reported in other physically active populations, in which supplement users report higher exercise minutes than non-users, while differences in training frequency are smaller or weaker (Ewan et al., 2019; Schlickmann et al., 2023).

Another important finding is the influential role of coaches in supplement decision making. Receiving advice from a coach strongly predicted both general supplement use and specific use of protein and vitamins/minerals. This suggests that supplement behaviors are shaped primarily within training environments rather than through medical or nutrition professionals. This trend is further illustrated by a study across 58 gyms in Albania, where 77.6% of gym representatives reported actively promoting dietary supplements, citing customer benefit and financial gain as primary motivations (Metani et al., 2024). Similar patterns have been observed internationally in non-elite settings, where coaches and trainers are seen as accessible authorities on nutrition and supplement guidance (Mettler et al., 2020; Coopoo et al., 2020). However, unlike certified sports nutritionists, coaches often lack formal training in evidence-based nutrition or supplement safety, raising concerns about the accuracy and appropriateness of the information provided (Miragaia et al., 2023).

Gender differences were evident in the choice of specific supplements, particularly the higher likelihood of creatine use among males. This pattern can be partly explained by our finding that creatine use was



closely linked to muscle gain and performance goals. As supported by previous research, these motivations are more frequently reported by males and likely drive their greater use of creatine and other performance-oriented supplements (Jawadi et al., 2017; El Khoury et al., 2012; Parada-Flores et al., 2025). However, gender did not remain an independent predictor of overall supplement use after adjustment for training- and advice-related factors. This suggests that observed gender differences in supplementation largely reflect differences in training patterns and performance goals rather than gender alone. Age was also not a significant predictor, likely due to the relatively narrow age range and small proportion of older participants in the sample.

Reasons for non-use of supplements further support the role of knowledge and perception in shaping supplementation practices. Reported reasons for non-use were strongly associated with supplement user status, indicating distinct behavioral profiles between users and non-users. Non-users most commonly reported that their diet met nutritional needs (40.4%) or expressed uncertainty about supplement efficacy (36.0%) and safety (24.3%). These findings suggest that hesitation toward supplement use is driven more by uncertainty and caution than by access or cost, reflecting a generally diet-centered approach in which adequate food intake is prioritized over supplementation. However, evidence from Albania indicates that this perception may not fully reflect reality. Studies among young adults and university students in Albania indicate low intake of several key vitamins and minerals, including vitamin D, vitamin E, folate, potassium, calcium, iodine, and magnesium, while national health reports highlight that micronutrient deficiencies remain a public health concern (Gurazi et al., 2025; IPH Albania, 2014). Although studies specifically assessing deficiencies in physically active individuals in Albania are lacking, this raises concerns about a potential gap between perceived and actual nutritional adequacy.

### ***Implications and Recommendations***

The moderately high prevalence of dietary supplement use in Albania underscores the need for careful monitoring, particularly given the expanding supplement market and growing interest among physically active individuals. Given the strong influence of training environments and coach advice on supplementation behaviors, targeted educational initiatives should be developed to improve knowledge of appropriate supplement use, potential benefits, and safety considerations. Providing structured nutrition education for those engaged in regular physical activity may support more informed decision-making and reduce reliance on non-evidence-based sources of information.

Emphasis should be placed on achieving nutrient adequacy through a balanced diet, as supplementation, including vitamins and minerals, is generally unnecessary when dietary intake meets nutritional needs. At the same time, widespread protein supplementation warrants particular attention due to potential health risks associated with excessive or inappropriate use. Individuals consuming multiple supplements concurrently require special attention to mitigate the risks of over-supplementation and potential nutrient interactions.

Finally, the strong association between weekly training load and supplement use suggests that individuals with higher training demands may benefit from access to qualified nutrition counseling. Future research should investigate nutritional status and supplementation practices in physically active populations to support the development of context-specific guidelines and policies for safe and effective supplement use.

### ***Strengths and Limitations***

This study represents the first investigation in Albania examining DS use among physically active individuals. This population remains underrepresented both nationally and internationally, as most existing research has focused on elite athletes. Therefore, our findings provide novel insights and contribute to addressing a broader knowledge gap within the wider scientific literature and beyond the Albanian context. The use of a nationwide sampling approach with broad geographical coverage enhances the generalizability and relevance of the results across different regions of Albania.

The main limitation is the reliance on self-reported data, which may be influenced by memory inaccuracies or differences in how participants classify DS, potentially affecting the accuracy of the findings. In rural areas of Albania, the absence of fitness centers and academic institutions limits the availability and accessibility of organized physical activity opportunities, which may impact the study results.



## Conclusions

DS use is prevalent among physically active individuals in Albania, with proteins, vitamins and minerals, and creatine being the most consumed products. Supplementation patterns reflect performance- and muscle-oriented motivations. Weekly training load and coach advice were the strongest independent predictors of supplement use, while demographic factors showed limited influence. Non-use was primarily associated with perceptions of adequate dietary intake and uncertainty regarding supplement efficacy and safety.

In a context of limited market regulation and scarce national data on supplement practices, these findings provide baseline evidence on supplementation behaviors in Albania. Strengthening evidence-based nutrition education and conducting further research on nutritional status in physically active populations are warranted to support safe and informed supplement use.

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