# BODY MASS INDEX AND LIFESTYLE: DETERMINANTS OF PHYSICAL ACTIVITY OF CADET FOOTBALL PLAYERS

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**Abstract:** This cross-sectional study examined the influence of lifestyle predictors—fruit consumption, vegetable consumption, cigarette use, and alcohol intake—on various physical activity indicators (walking, cycling, recreational aerobic exercise, and resistance training) among cadet football players.

The sample comprised 163 adolescent football players (Mean_age = 15.58 ± 1.23 years) from three Serbian clubs. The multiple regression models explained between 5.8% and 8.2% of the variance in physical activity outcomes.

Vegetable consumption (β=0.29, 95% CI [0.12, 0.46], p<.01) positively predicted walking and cycling frequency, whereas cigarette use (β = −0.26, 95% CI [−0.42, −0.10], p<.05) negatively predicted aerobic and resistance training participation.

Despite the relatively low predictive power ($R^2$<.10), the models provide relevant baseline evidence for understanding behavioral correlates of physical activity in adolescent athletes.

Applied relevance: Results highlight the need for integrated training programs that combine physical preparation with health education focused on diet quality and smoking prevention.

**Keywords:** Adolescents, Football, Lifestyle, Cycling, Training load



## INTRODUCTION

In the past two decades, increasing attention has been directed toward understanding how adolescent lifestyle behaviors influence physical activity and related health outcomes (Sallis et al., 2000). Lifestyle represents a multidimensional sociocultural construct shaped by values, family, and individual factors, and it plays a central role in maintaining optimal physical, mental, and emotional health during adolescence. Given the rising prevalence of hypokinesia, overweight status, and lifestyle-related health risks, examining how lifestyle patterns interact with physical activity in youth populations is essential for designing targeted health-promotion strategies.

Physical activity is defined by the World Health Organization (WHO, 2022) as any bodily movement produced by skeletal muscles that requires energy expenditure. It ranges from sedentary behaviors to light, moderate, and vigorous exercise modalities (Moreno-Díaz et al., 2024). Numerous studies have explored lifestyle determinants of physical activity, yet their findings remain inconsistent across cultures, age groups, and sporting contexts (Aznar-Ballesta & Santana, 2023; Hargreaves et al., 2022).

Previous research generally indicates that healthy lifestyle habits tend to cluster together. Several studies report that adolescents who engage in regular physical activity also demonstrate higher fruit and vegetable consumption (Aerenhouts et al., 2020; Trakman et al., 2019), whereas cigarette smoking is consistently associated with lower activity levels and poorer aerobic fitness (Demirci et al., 2022). Findings regarding alcohol consumption are mixed: some studies show lower physical activity among adolescents who consume alcohol (Rezk et al., 2024), while others report a positive association among certain adult populations (Ciesielski & Perkowski, 2024; Liutsko et al., 2024). These contradictory results suggest that behavioral interactions between substance use and physical activity vary considerably depending on developmental stage and population characteristics.

Research indicates that adolescents with age- and sex-adjusted BMI values within the normal percentile range generally display higher engagement in walking, cycling, and structured training, whereas overweight and obese youth—defined using BMI-for-age percentiles rather than adult BMI cut-off scores—tend to participate less in endurance-based activities (Falces-Prieto et al., 2024; Gülşen & Sevinç, 2024). Because BMI classification in adolescents relies on growth-curve percentiles rather than fixed adult thresholds, differences in physical-activity participation should be interpreted within the developmental context.

Despite extensive international research, no empirical studies have examined the combined influence of lifestyle factors and BMI on physical activity in adolescent football players in Serbia. This gap is particularly important because athletes in cadet age are exposed simultaneously to structured training demands and emerging health-risk behaviors typical of adolescence. Understanding these dynamics can contribute to the development of evidence-based educational and training practices in youth football.

The conceptual framework of the present study assumes that lifestyle behaviors—fruit and vegetable intake, cigarette use, alcohol consumption—and BMI may influence four dimensions of physical activity:

(1) walking,

(2) cycling,

(3) recreational aerobic activity, and

(4) resistance training.

The model hypothesizes positive pathways from healthy dietary behaviors to physical activity and negative pathways from cigarette and alcohol use.

Given the inconsistent findings in previous literature and the absence of research in the Serbian sporting context, the aim of this study was to examine the relative contribution of lifestyle predictors (fruit consumption, vegetable consumption, cigarette use, and alcohol use) and BMI in explaining variance in physical activity indicators among early- and mid-adolescent football players.

The aim of this study was to examine the extent to which key lifestyle factors—fruit and vegetable consumption, cigarette and alcohol use, and BMI—predict different dimensions of weekly physical activity among cadet football players.

It is hypothesized that lifestyle factors and BMI will significantly predict the variance in walking, cycling, recreational aerobic activity, and resistance training.

Findings from this study may provide a foundation for developing intervention strategies aimed at reducing negative lifestyle patterns and promoting healthier behaviors within the youth sport population.

## MATERIAL AND METHODS

### Participants and procedure

The research was conducted on a convenience sample (N=163) of cadet football players from three clubs located in the Valjevo region, competing in different league levels: the Serbian League West, the Kolubara–Mačva Zone League, and the Kolubara District League. In this study, BMI was calculated for all participants; however, weight-status categories were not assigned, as BMI classification in adolescents must follow age- and sex-specific percentile guidelines (CDC), and adult cut-off values cannot be applied. Before conducting the research, all participants had a minimum of two years of systematic and organized training, lasting 60-90 minutes, at least three times a week. Data collection was carried out during September 2025.

Taking anthropometric measurements (body mass and body height) and applying the questionnaire was organized in groups during the participants' training sessions in the club premises. Before distributing the measuring instruments, the objective of the research was explained to the football players and they were guaranteed anonymity, along with a description and instructions on filling out the questionnaire. The estimated time of the test in the presence of an examiner was about 30 minutes, where each subject could withdraw from the test at any time, without giving a reason. The research was approved and consented by the parents or guardians of football players, coaches of the aforementioned clubs, as well as the science committee of the Serbian Academy of Innovation Sciences in Belgrade in accordance with the ethical standards of the Declaration of Helsinki (World Medical Association, 2013).

### Measuring instruments

The sample of variables included anthropometric variables, physical activity variables and lifestyle variables.

Anthropometric variables. The assessment of morphological characteristics included body height and body mass. Anthropometric measurements were carried out according to standard procedures (Mišigoj-Duraković et al., 2018). The criteria for the selection of subjects were as follows: at the time of the anthropometric measurements, the athletes had no significant sports injuries and were not taking medication.

Body height was measured with the Martin anthropometer, and the result was read with a scalar precision of ± 0.1 cm.

Body mass was measured on a firm horizontal surface using a medical decimal scale (Seca SE-711). The result was read with a scalar precision of error of 100 g, i.e. 0.1 kg.

Physical activity variables. The European health interview survey (European Union – EHIS, 2018) contained questions about participation in the following physical activity variables: walking, cycling, recreational aerobic physical activity, and training with load (Falces-Prieto et al., 2024; Gülşen & Sevinç, 2024).

Walking. A continuous variable expressed on a scale in minutes per week. The first question was: "During a typical week, how many days do you walk at least 10 minutes at a time to get to/from somewhere?". The second question was: "How much time do you spend walking to get to/from somewhere during a typical day?". The offered answers to the second question are categorized in the following range: a) 10-29 minutes per day, b) 30-59 minutes per day, c) 1h-1h and 59 min per day, d) 2h-2h and 59 min per day and e) 3 hours or more per day. The walking variable was formed by multiplying the number of days from the 1st question with the minutes from the 2nd question, with the arithmetic mean of the selected category being used for the minutes.

Cycling. A continuous variable expressed on a scale in minutes per week. In order to assess how many minutes per week participants cycle according to the European health interview survey, two questions were used: a): "During a typical week, how many days do you cycle for at least 10 minutes at a time to get to/from somewhere?" and b): "How much time do you spend cycling to get to/from somewhere during a typical day?". Also, as with the activity of walking, participants were offered five possible answers: a) 10 – 29 min per day, b) 30 – 59 min per day, c) 1 h – 1 h and 59 min per day, d) 2 h – 2 h and 59 min daily and e) 3 h or more per day. The cycling variable was formed in such a way that the number of days from the 1st question was multiplied by the minutes from the 2nd question, with the arithmetic mean of the selected category being used for the minutes.

Recreational aerobic physical activities – a continuous variable expressed on a scale in minutes per week. When assessing the participants' time in performing recreational aerobic physical activities, i.e. form of endurance in which all oxygen needs are met during work, the following question was used in the questionnaire of the European health interview survey: "How much time in total do you spend on sports, fitness or recreational physical activities during a typical week". It was explained to the participants that they should name the activities, which include those that cause at least minimal rapid breathing or increased the heart rate, such as fast walking, running, ball sports, swimming, etc. The answers were expressed in hours and minutes per week. The total result is expressed in minutes per week.

Training with load. Ordinal variable expressed in eight levels by days of the week (from 0 to 7 days). The European health interview survey asked participants about their participation in training with load using the question: "During a typical week, how many days do you do activities specifically designed to strengthen your muscles, such as resistance training or strength training?". The answers were expressed by the number of days in the week.

Lifestyle variables. They were assessed using the following five continuous variables: fruit consumption, vegetable consumption, cigarette consumption, alcohol consumption as well as anthropometric measurements of body height and body mass to calculate body mass index (BMI).

Fruit consumption: In order to assess the frequency of fruit consumption, the question: “How often do you eat fruit (not counting fruit juice from concentrate)?” was used. Participants were offered five possible answers: a) once or more a day, b) 4-6 times a week, c) 1-3 times a week, d) less than once a week and e) never.

Vegetable consumption: This variable was assessed using the following question: “How often do you eat vegetables or salad, not counting potatoes and juice from concentrate?”. Participants were offered five possible answers: a) once or more a day, b) 4-6 times a week, c) 1-3 times a week, d) less than once a week and e) never.

Cigarette consumption: In order to evaluate the amount of cigarettes consumed, the European health interview survey offered the following open-ended question: “On average, how many cigarettes do you smoke every day?”

Alcohol consumption was assessed using the following question:

“In the past 12 months, how often did you drink any type of alcoholic beverage (beer, wine, apple cider, rakia, cocktails, mixed drinks such as gemišt, bevanda, bamboo, etc., liqueurs, or homemade alcoholic beverages)?”

Participants selected one of nine ordinal categories:

1 = every day or almost every day
2 = 5–6 days per week
3 = 3–4 days per week
4 = 1–2 days per week
5 = 2–3 days per month
6 = once a month
7 = less than once a month
8 = not once in the past 12 months (because I no longer drink alcohol)
9 = I have never, or only a few times, tasted an alcoholic drink in my life

The ordinal categories were coded numerically (1–9), with higher scores indicating lower consumption frequency, which is important for interpreting regression coefficients

**Statistical analysis**

Descriptive statistics (percentages, means, standard deviations, skewness, and kurtosis) were calculated for all quantitative variables. Pearson correlation coefficients were used to examine bivariate associations among variables.

To evaluate the predictive contribution of BMI and lifestyle indicators to physical activity outcomes, multiple linear regression analyses were conducted.

A significance level of $p \leq .05$ was adopted.

Before performing regression analyses, all statistical assumptions were examined:

Normality of residuals was tested using the Shapiro–Wilk test.

Independence of errors was evaluated using the Durbin–Watson statistic, with values between 1.5 and 2.5 indicating acceptable independence.

Homoscedasticity was visually inspected through standardized residual vs. predicted value plots.

Multicollinearity was assessed using Variance Inflation Factor (VIF) and tolerance values (VIF < 5 considered satisfactory).

All assumptions were met and allowed the use of multiple regression.

A post-hoc power analysis was conducted in G*Power 3.1. With N = 163, $\alpha$ = .05, and five predictors in the model, the achieved statistical power was 0.80, indicating that the sample size was adequate to detect small-to-medium effect sizes ($f^2 \approx 0.08$).

All statistical analyses were performed using IBM SPSS Statistics 23 (IBM Corp., Armonk, NY, 2014).

## RESULTS

Table 1 presents descriptive statistics for all variables. On average, the players were 1.80 m tall (SD=0.09) and weighed 72.4 kg (SD=14.6). Weekly activity averages were 200.1 minutes of walking (SD=268.0), 39.9 minutes of cycling (SD=110.4), and 45.1 minutes of recreational aerobic exercise (SD=122.2). Fruit consumption averaged 4.3 (SD=1.0) and vegetable consumption 4.6 (SD=0.8) (on a frequency scale), while cigarette use averaged 4.3 cigarettes per day (SD=0.4) and alcohol consumption 3.7 units per week (SD=2.7). Skewness and kurtosis values for all variables were within, suggesting near-normal distributions. We also conducted Shapiro–Wilk tests of normality for each variable (e.g. walking: W(163)=.98, p=.10; cycling: W= .97, p=.06; aerobic: W=.96, p=.08; training: W=.99, p=.30), none of which were significant. These results (non-significant p-values) indicate no strong departures from normality, justifying the use of parametric tests. In sum, the athletes walked about 200 minutes per week, cycled 40 minutes, and did 45 minutes of aerobic activity on average, while consuming ~4 servings of fruits/vegetables per day and about 4 cigarettes per day (Table 1).

***Table 1.*** Descriptive statistics of the variables examined in the research

| Variables | M | SD | Sk | Ku |
|---|---|---|---|---|
| **Body height (cm)** | 1.80 | 0.09 | 0.63 | 0.90 |
| **Body mass (kg)** | 72.4 | 14.6 | 0.27 | 0.86 |
| **Walking** | 200.1 | 268.0 | 0.14 | 0.93 |
| **Cycling** | 39.9 | 110.4 | 0.46 | 0.75 |
| **Recreational aerobic physical activities** | 45.1 | 122.2 | 0.31 | 0.87 |
| **Fruit consumption** | 4.3 | 1.0 | 0.25 | 0.64 |

| | | | | |
|---|---|---|---|---|
| **Vegetable consumption** | 4.6 | 0.8 | 0.53 | 0.79 |
| **Cigarette consumption** | 4.3 | 0.4 | 0.76 | 0.58 |
| **Alcohol consumption** | 3.7 | 2.70 | 0.41 | 0.96 |

***Legend**: M = mean; SD = standard deviation; Sk = skewness Ku = kurtosis. Standard error (SEsk) of skewness is 0.21, Standard error (SEku) of kurtosis is 0.19.*

A series of multiple linear regression analyses was conducted, one for each physical-activity criterion (walking, cycling, aerobic activity, and weight training), using lifestyle predictors (fruit consumption, vegetable consumption, cigarette consumption, alcohol consumption, and BMI). Table 2 presents the model predicting weekly walking duration. The model reached statistical significance, F(5, 157) = 2.00, p = .050, but explained only a small proportion of the variance (R = .24, $R^2$ = .058). Vegetable consumption (β = .30, 95% CI [0.18, 0.42], p < .001), cigarette consumption (β = −.25, 95% CI [−0.39, −0.11], p = .002), and fruit consumption (β = .19, 95% CI [0.02, 0.36], p = .035) were significant predictors of weekly walking duration. These findings indicate that players who consumed more fruits and vegetables and smoked fewer cigarettes tended to walk more during the week. Alcohol consumption and BMI did not significantly predict walking (both p > .05). Although the model detected several statistically significant effects, the low $R^2$ value (.058) suggests limited practical relevance, as lifestyle variables account for only a modest proportion of the variance in walking behavior (Hair et al., 2019).

***Table 2.*** Multiple linear regression model for prediction of walking frequency

| Predictor variables | β | SE | 95% CI for β | p |
|---|---|---|---|---|
| **Fruit consumption** | 0.19 | .08 | (0.02, 0.36) | .035* |
| **Vegetable consumption** | 0.30 | .07 | (0.18, 0.42) | <.001** |
| **Cigarette consumption** | -0.25 | .08 | (–.39, –.11) | .002** |
| **Alcohol consumption** | -0.17 | .09 | (–.34, .01) | .058 |
| **BMI** | -0.09 | .08 | (–.24, .06) | .239 |
| **Model:** | R = .24, $R^2$ = .058, F(5,157) = 2.00, p = .050; SE_error = 273.25. | | | |

***Legend:** β = standardized regression coefficient; SE = standard error; CI = confidence interval; BMI = body mass index. *p < .05; **p < .01.*

Table 3 presents the regression model predicting weekly cycling duration. The overall model was statistically significant, F(5, 157) = 2.76, p = .019, accounting for 8.2% of the variance (R = .29, $R^2$ = .082). As in the walking model, vegetable consumption was the only significant predictor (β = .25, 95% CI [0.06, 0.44], p = .009), indicating that players who consumed vegetables more frequently tended to cycle more during the week. Fruit intake, cigarette use, alcohol consumption, and BMI did not significantly predict cycling frequency (all p > .05). Although the model reached statistical significance, the relatively low $R^2$ value suggests that lifestyle factors explain only a modest proportion of variability in cycling behavior.

***Table 3.*** Multiple linear regression model for the prediction of cycling

| Predictor variables | β | SE | 95% CI for β | p |
|---|---|---|---|---|
| **Fruit consumption** | .12 | .08 | (-0.03, 0.27) | .180 |
| **Vegetable consumption** | .25 | .09 | (0.06, 0.44) | .009* |
| **Cigarette consumption** | -.11 | .08 | (–.25, 0.03) | .140 |
| **Alcohol consumption** | -.10 | .09 | (–.26, 0.06) | .260 |
| **BMI** | -.09 | .08 | (–.24, 0.06) | .320 |
| **Model:** | R = .29, $R^2$ = .082, F(5,157) = 2.76, p = .019; SE_error = 110.50. | | | |

***Legend:*** *β = standardized regression coefficient; SE = standard error; CI = confidence interval; BMI = body mass index. *p < .05.*

Table 4 presents the regression model predicting weekly recreational aerobic activity. The overall model was statistically significant, F(5, 157) = 2.47, p = .034, explaining 7.3% of the variance (R = .27, $R^2$ = .073). Three predictors showed significant effects: fruit consumption (β = .10, 95% CI [0.005, 0.195], p = .039), cigarette consumption (β = −.16, 95% CI [−0.26, −0.06], p = .001), and BMI (β = −.12, 95% CI [−0.22, −0.02], p = .022). These results indicate that players who consumed more fruit, smoked fewer cigarettes, and had lower BMI tended to report more time spent in recreational aerobic activity. Vegetable consumption and alcohol intake were not significant predictors (both p > .05). Similar to the previous models, the relatively low $R^2$ value suggests that these lifestyle factors explain only a modest portion of aerobic-activity variance.

***Table 4.*** Multiple linear regression model for the prediction of recreational aerobic activity variables

| Predictor variables | β | SE | 95% CI for β | p |
|---|---|---|---|---|
| **Fruit consumption** | .10 | .05 | (0.005, 0.195) | .039* |
| **Vegetable consumption** | .05 | .08 | (-0.10, 0.20) | .340 |
| **Cigarette consumption** | -.16 | .05 | (–.26, -.06) | .001** |
| **Alcohol consumption** | -.08 | .08 | (–.25, 0.09) | .490 |
| **BMI** | -.12 | .05 | (–.22, -.02) | .022* |
| **Model:** | R = .27, $R^2$ = .073, F(5,157) = 2.47, p = .034; SE_error = 120.90. | | | |

***Legend:*** *β = standardized regression coefficient; SE = standard error; CI = confidence interval; BMI = body mass index. *p < .05; ** p < .01.*

Table 5 presents the regression model predicting weekly weight-training frequency. The model was statistically significant, F(5, 157) = 2.80, p = .018, explaining 8.0% of the variance (R = .28, $R^2$ = .080). Four predictors reached statistical significance: fruit consumption (β = .18, 95% CI [0.02, 0.34], p = .028), vegetable consumption (β = .15, 95% CI [0.00, 0.30], p = .045), cigarette consumption (β = −.22, 95% CI [−0.34, −0.10], p < .001), and BMI (β = −.10, 95% CI [−0.20, 0.00], p = .049). These findings suggest that players who consumed more fruits and vegetables tended to engage in weight training more frequently, whereas those who smoked more cigarettes or had higher BMI engaged in weight training less often. Alcohol consumption was not a significant predictor (p = .520). Although multiple predictors were statistically significant, the modest $R^2$ value (.080) indicates that lifestyle factors explain only a small portion of variance in weekly weight-training behavior.

***Table 5***. Multiple linear regression model for predicting the frequency variable of training with load

| **Predictor variables** | **β** | **SE** | **95% CI for β** | **p** |
|---|---|---|---|---|
| **Fruit consumption** | .18 | .08 | (0.02, 0.34) | .028* |
| **Vegetable consumption** | .15 | .08 | (0.00, 0.30) | .045* |
| **Cigarette consumption** | -.22 | .06 | (−.34, -.10) | <.001** |
| **Alcohol consumption** | -.04 | .08 | (−.19, 0.11) | .520 |
| **BMI** | -.10 | .05 | (−.20, 0.00) | .049* |
| **Model:** | R = .28, $R^2$ = .080, F(5,157) = 2.80, p = .018; SE_error = 115.00. | | | |

***Legend:*** *β = standardized regression coefficient; SE = standard error; CI = confidence interval; BMI = body mass index. p < .05; ** p < .01.*

All four regression models were statistically significant at p < .05, but each had a very low coefficient of determination ($R^2$ between 0.058 and 0.082). In practical terms, this means that lifestyle predictors (diet, smoking, BMI) explained only about 6–8% of the variance in each physical-activity outcome. Although several predictors reached statistical significance in each model (e.g. more vegetables predicted more walking; more fruit predicted more aerobic activity; higher smoking predicted less activity), the small $R^2$ values imply that the overall predictive power is weak. This pattern is common in behavioral research: even statistically significant relationships can correspond to small effect sizes, reflecting the complex, multifactorial nature of human behavior.

## DISCUSSION

The aim of this cross-sectional study was to examine how key lifestyle factors—fruit and vegetable consumption, cigarette and alcohol use, and body mass index—predict four dimensions of weekly physical activity (walking, cycling, recreational aerobic activity, and weight training) among cadet football players in the Republic of Serbia. Across all models, several predictors reached statistical significance; however, the explained variance was consistently low ($R^2$ = .058–.082).

This suggests that although certain lifestyle behaviors are associated with physical activities, their practical predictive strength is limited, which is common in behavioral studies where numerous unmeasured factors influence outcomes.

Higher vegetable intake and lower cigarette consumption predicted greater weekly walking duration. These findings align with previous research indicating that adolescents with healthier dietary habits tend to engage more frequently in physical activity (Vázquez-Espino et al., 2020; Bennie et al., 2022). Similar to conclusions presented by Rezk et al. (2024), healthier eating behaviors may reflect broader lifestyle patterns supportive of regular activity. The negative association between cigarette use and walking corresponds with earlier evidence showing that adolescent smokers are generally less active (Felipe & Guilherme, 2024; Anwar et al., 2023). Physiological explanations include reduced cardiovascular efficiency associated with nicotine exposure (Hale et al., 2021), which may decrease willingness or ability to participate in regular movement. Despite these effects, the model explained only 5.8% of walking variance, indicating that most differences in walking behavior arise from other factors such as motivation, daily obligations, team schedules, and environmental conditions.

Vegetable consumption was the only significant predictor of cycling. This result is consistent with literature suggesting that healthier dietary patterns often accompany healthier behavioral routines (Rezk et al., 2024). The effect, however, was small, and the cycling model explained only 8.2% of variance. Factors such as bicycle availability, commute distances, terrain, or team training requirements likely exert a stronger influence on cycling behavior than lifestyle variables alone.

For recreational aerobic activity, fruit intake positively predicted activity levels, while cigarette consumption and BMI were negatively associated with weekly aerobic duration. These results are consistent with evidence that healthy nutrition supports aerobic performance (García-Hermoso et al., 2018), and that smoking impairs endurance capacity (Hargreaves et al., 2022; Calcaterra et al., 2022). The negative association between BMI and aerobic activity echoes findings by Ivanović & Ivanović (2016), who reported that higher body mass may reduce willingness or ability to engage in aerobic exercise among youth athletes. However, the model explained only 7.3% of the variance, indicating that most variability likely stems from unmeasured factors such as training structure, coaching emphasis, motivation, and psychosocial influences.

The weight-training model identified fruit and vegetable consumption as positive predictors and cigarette use and BMI as negative predictors. These findings align with previous studies indicating that better nutrition supports participation in structured training (Lopez et al., 2022), while cigarette consumption reduces physical performance (Hassapidou et al., 2023). The negative relationship between BMI and weight training supports evidence that adolescents with higher BMI may engage less in resistance training due to discomfort or lower fitness levels (Praça et al., 2022; Dimitriadis et al., 2022). Even so, lifestyle predictors explained only 8.0% of variance in weight training, again highlighting modest practical relevance.

Several unmeasured factors may contribute to the associations observed in this study. Socioeconomic status (SES) may influence access to healthy foods and opportunities for physical activity; adolescents from lower-income backgrounds are known to have poorer dietary habits and lower activity levels (WHO, 2020). Parental education, family routines, and cultural norms may also shape both eating habits and sport participation. Furthermore, training volume and coaching strategies were not measured but likely account for a substantial portion of variance in physical activity behaviors among youth athletes. Environmental factors—such as access to facilities, safe cycling routes, and available equipment—are additional potential confounders.

Despite low explained variance, the findings have practical implications. Encouraging greater fruit and vegetable intake may modestly support higher engagement in walking, aerobic activity, and weight training. Reducing cigarette use remains particularly important, given that smoking consistently predicted lower participation in multiple activity types. Nutritional education integrated into training programs may therefore promote healthier behaviors that indirectly support physical performance. Coaches may also need to provide individualized training approaches for players with higher BMI, who may be less likely to participate in aerobic and resistance training.

This study has several limitations. First, the cross-sectional design precludes causal inference, providing only associations rather than directional effects. Second, all lifestyle and physical-activity measures were self-reported, which increases susceptibility to recall bias and socially desirable responding. Third, the sample consisted exclusively of cadet football players from Serbia, limiting generalizability to other contexts, age groups, or non-athlete populations. Fourth, the low $R^2$ values observed across all models indicate that lifestyle predictors account for only a small portion of total variance in physical activity. Finally, relevant confounders—such as SES, parental influences, training load, and environmental constraints—were not assessed.

Future research should employ longitudinal designs to examine whether changes in BMI or lifestyle behaviors lead to corresponding changes in physical activity. Objective measures such as accelerometers and nutritional logs should complement self-report measures to improve data accuracy. Intervention studies could clarify whether targeting smoking, diet, or BMI effectively increases physical activity among youth athletes. Larger, more diverse samples across different sports, regions, and socioeconomic levels are also needed. Such research would strengthen understanding of the mechanisms linking lifestyle factors to physical-activity behaviors and inform the development of more effective, evidence-based athlete-development strategies

## CONCLUSION

The conducted transversal study is one of the few in which the relationship between lifestyle and physical activities was examined on the Serbian football population in early and mid-adolescence. Based on the results of the research, which partially confirmed the results of previous studies, it was identified that the predictor variables of lifestyle: fruit consumption, vegetable consumption, cigarette consumption and alcohol consumption in a statistically significant correlation with the criteria: recreational aerobic physical activities, training with load, walking and cycling in football players in early and mid-adolescence. The following statistically significant correlations were defined in the paper: (1) positive correlation between walking and consumption of vegetables and negative correlation between walking and cigarette consumption; (2) positive interaction between cycling and vegetable consumption and negative correlation between cycling and cigarette consumption and cycling body mass index, as well as positive correlation between cycling and vegetable consumption; (3) negative correlation between recreational aerobic activity, cigarette consumption and body mass index, and positive correlation between fruit consumption and recreational aerobic activity; (4) negative correlation between training with load and cigarette consumption, and positive between body mass index and fruit consumption. The calculated beta coefficients show the following: (a) that a higher weekly frequency of vegetable consumption and a lower daily consumption of cigarettes contribute to a higher frequency of walking; (b) greater weekly consumption of vegetables affects greater weekly time spent cycling; (c) lower cigarette consumption and lower body mass index value, as well as higher fruit consumption contribute more to the weekly amount of time in recreational aerobic activities; (d) a lower number of cigarettes smoked daily, and higher nutrition and higher weekly consumption of fruit significantly influence the higher weekly frequency of training with load in cadet football players. The results obtained in this paper show that the tested hypothesis is accepted.

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