

## ASSOCIATION BETWEEN SELF-EFFICACY AND DIETARY BEHAVIOURS OF AMERICAN FOOTBALL PLAYERS IN THE POLISH CLUBS IN THE LIGHT OF DIETARY RECOMMENDATIONS FOR ATHLETES

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### ABSTRACT

**Background.** Personality traits associated with one's health beliefs and expectations constitute a determinant of dietary behaviours.

**Objective.** The aim of the study was to analyse the dietary behaviours of young American football players in the Polish clubs and association thereof with their general self-efficacy level.

**Materials and Methods.** The study included the group of 100 young men (20-30 years of age) who practiced American football on a professional basis in three Polish clubs. The study was based on an original dietary behaviour questionnaire derived from the Swiss Food Pyramid for Athletes and General Self-Efficacy Scale (GSES). Statistical analysis, conducted with Statistica 10.0 PL software, included intergroup comparisons with the *Chi*-square test.

**Results.** Having at least three meals per day (82%), consumption of such protein products as eggs and/or meat several times per week (68%) and including cereal products in every main meal (67%) turned out to be the most often followed qualitative recommendations of the Swiss Food Pyramid for Athletes in the group of American football players. Other, frequently followed dietary recommendations included remaining on a variable diet (75%), preference to mineral water and other non-sweetened beverages (69%), reduced intake of sweets and salted snacks (65%), energy drinks (64%) and fast food products (60%). The least frequently declared dietary behaviours included consuming recommended amounts of vegetables/fruits (48%) and wholegrain cereal products (45%), and reduced intake of animal fats (42%). Analysis of a relationship between specific dietary behaviours and general self-efficacy level showed that the athletes with higher levels of this trait consumed recommended daily amounts of vegetables (54% vs. 26%,  $p < 0.01$ ) and cereal products (87% vs. 50%,  $p < 0.001$ ), had recommended number of meals per day (96% vs. 70%,  $p < 0.001$ ) and ate regularly (76% vs. 24%,  $p < 0.001$ ) significantly more often than the persons characterized by lower self-efficacy levels.

**Conclusions.** Players with higher general self-efficacy levels adhere to the recommendations of the Swiss Food Pyramid for Athletes to a larger extent than the sportsmen with lower levels of this trait.

**Key words:** *athletes, American football, dietary behaviours, personality traits, general self-efficacy*

### STRESZCZENIE

**Wprowadzenie.** Jednym z czynników warunkujących zachowania żywieniowe są cechy osobowości związane z przekonaniami i oczekiwaniami zdrowotnymi.

**Cel.** Celem badań była ocena zachowań żywieniowych grupy polskich zawodników trenujących futbol amerykański w zależności od poczucia własnej uogólnionej skuteczności sportowców, jako jednej z cech osobowości.

**Materiał i metody.** Badaniem objęto grupę 100 młodych mężczyzn w wieku 20-30 lat, wyczynowo trenujących futbol amerykański w trzech polskich klubach. Badania przeprowadzono z zastosowaniem autorskiego kwestionariusza zachowań żywieniowych, uwzględniającego jakościowe zalecenia szwajcarskiej piramidy żywienia dla sportowców oraz Skali Uogólnionej Własnej Skuteczności (GSES). Analizy statystyczne wykonano za pomocą testu  $Chi^2$  w programie Statistica 10.0 PL.

**Wyniki.** Spośród jakościowych założeń szwajcarskiej piramidy żywienia dla sportowców, zawodnicy wyczynowo trenujący futbol amerykański w najwyższym stopniu realizowali zalecenia dotyczące spożywania przynajmniej 3 posiłków dziennie (82%) oraz produktów białkowych (jaj i/lub mięsa) kilka razy w tygodniu (68%) i produktów zbożowych w każdym posiłku głównym (67%). Często także stosowali urozmaiconą dietę (75%), preferowali wodę mineralną i inne niesłodzone napoje

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(69%), a także ograniczali spożycie słodczy i słonych przekąsek (65%), napojów energetyzujących (64%) i produktów Fast food (60%). Rzadziej spożywali zalecaną liczbę porcji warzyw i owoców (48%) i pełnoziarnistych produktów zbożowych (45%) oraz unikali tłuszczów zwierzęcych (42%). Analiza zachowań żywieniowych w zależności od poziomu własnej uogólnionej skuteczności wykazała, że zawodnicy o wysokiej samoskuteczności istotnie częściej niż o niskiej skuteczności spożywali codziennie zalecaną liczbę porcji warzyw (54% vs. 26%;  $p < 0,01$ ) i produktów zbożowych (87% vs. 50%;  $p < 0,001$ ) oraz zalecaną liczbę posiłków w ciągu dnia (96% vs. 70%;  $p < 0,001$ ), w regularnych odstępach czasu (76% vs. 24%;  $p < 0,001$ ).

**Wnioski.** Jakościowe zalecenia szwajcarskiej piramidy żywienia dla sportowców w wyższym stopniu realizowali zawodnicy o wysokim nasileniu poczucia własnej uogólnionej skuteczności.

**Słowa kluczowe:** sportowcy, futbol amerykański, zachowania żywieniowe, cechy osobowości, poczucie własnej uogólnionej skuteczności

## INTRODUCTION

Well-balanced diet, covering increased demand of athletes for energy, protein, vitamin B complex, antioxidants and some minerals, promotes improvement in their health potential and exercise capacity [12].

Satisfying physiological demand for nutrients requires planning variable food rations, including various products, in line with the recommendations for individuals characterized by high levels of physical activity. Diet of sportspersons can be rationalized with an aid of dedicated food pyramids [12], such as the Swiss Food Pyramid for Athletes, a new dietary model for individuals characterized by higher levels of physical activity [2, 17, 25]. The basis of the Swiss Pyramid is formed by non-sweetened beverages, whereas the top includes sweets, salted snacks and sweetened drinks; other, variably interspaced groups include vegetables, fruits, wholegrain cereals, legume seeds, protein products, oils, fats and nuts, with various amounts and frequency of consumption recommended for these foods [2, 17]. The pyramid represents a novel instrument supporting nutritional education; furthermore, it helps the athletes to make more rational dietary choices being adequate to their training loads, specifying the recommended amounts and frequency of consumption for products from various groups [2, 17].

Health-seeking behaviours of various population groups are determined by a wide spectrum of socioeconomic, cultural and personality-based factors. General self-efficacy plays an important role among personality traits determining health culture of an individual [4, 27]. Self-efficacy, defined as an optimistic belief in one's ability to reach goals, can be used to predict one's intentions and activities in various areas, including health-seeking behaviours. In this context, self-efficacy should be considered a key component of a modern, procession model of change in one's health-seeking behaviours, among them dietary habits [16].

Consequently, this study was undertaken to determine the role of self-efficacy as a predictor of dietary

behaviours in athletes. Specifically, the aim of the study was to analyse the dietary behaviours of young American football players in Polish clubs and association thereof with their general self-efficacy level.

## MATERIAL AND METHODS

The study included the group of 100 young men (20-30 years of age, mean 24.27 years) who practiced American football on a professional basis in three Polish clubs: 'Warsaw Eagles', 'Krakow King' and 'Wilki Łódzkie'. The participants were either students (45%) or professionally active employees with higher (23%), secondary (28%) or vocational education (4%). They have been practicing American football for three years on average and declared being in very good (70%) or good health (30%). The athletes participated in 1-2 training sessions per day, five times per week on average; mean duration of a single training session was two hours.

The participants were asked to complete an original dietary behaviour questionnaire including 18 diagnostic statements derived from the qualitative assumptions of the Swiss Food Pyramid for Athletes. The statements referred to the frequency and regularity of meals, consumption of recommended food products, avoidance of foods that are non-recommended in rational diet, and obeying the principles of fluid repletion for sportspersons. The respondents could answer 'yes' or 'no' to each statement. Prior to the proper study, the questionnaire was validated in a group of 23 individuals, with a retest after 6 weeks. Psychometric assessment revealed high reproducibility of results obtained with the dietary behaviour questionnaire. McNemar's *Chi-square* test did not show significant differences between the test and retest results for any of the statements ( $p > 0.05$ ). The level of general self-efficacy was determined with General Self-Efficacy Scale (GSES) by Schwarzer, Jerusalem and Juczyński [14]. The scale includes 10 statements that are scored in such way that the higher the global GSES score (ranging from 10 to 40 points), the stronger the sense

of self-efficacy. Based on the median of the raw GSES score for our sample, we classified the participants as presenting with lower and higher levels of self-efficacy. Statistical analysis was conducted with STATISTICA 10.0 PL software. The distributions of health-seeking behaviour types in the individuals with higher and lower self-efficacy levels were compared with the *Chi-square* test. The results were considered significant at  $p < 0.05$  and highly significant at  $p < 0.01$ .

## RESULTS

Having at least three meals per day (82%), consumption of protein from such sources as eggs and/or meat several times per week (68%) and including cereal products in every main meal (67%) turned out to be the most often followed qualitative principles of rational nutrition in our group of athletes. Other, frequently followed dietary recommendations included remaining on a variable diet (75%), preference to mineral water and other non-sweetened beverages (69%), reduced intake of sweets and salted snacks (65%), energy drinks (64%) and fast food products (60%). In turn, the least frequently declared dietary behaviours included consuming vegetables and fruits with the recommended frequency of 3-5 servings per day (48%), including raw vegetables and whole grain cereal products in at least two servings per day (39% and 45%, respectively). Reduced intake of animal fats was declared by 42% of the respondents, and eating regularly, with 3- to 5-hour intervals between meals, by 48% (Table 1).

Analysis of a relationship between specific dietary behaviours and general self-efficacy level showed that the athletes with higher levels of this trait consumed two servings of vegetables per day (54% vs. 26%,  $p < 0.01$ ), included cereal products in every meal (87% vs. 50%,  $p < 0.001$ ), had at least 3 meals per day (96% vs. 70%,  $p < 0.001$ ) and ate regularly (76% vs. 24%,  $p < 0.001$ ) significantly more often than the persons characterized by lower self-efficacy levels (Table 1).

## DISCUSSION

We showed that American football players followed the qualitative recommendations of the Swiss Food Pyramid for Athletes only to a limited extent. Furthermore, we revealed that some dietary behaviours of the American football players differed depending on their general self-efficacy level.

Assuming that efficient fluid repletion of athletes who remain on an appropriate diet can be achieved with mineral water, diluted fruit, fruit-vegetable and vegetable juices and/or isotonic drinks [2], the fact that as many as 69% of our respondents declared their preference to mineral water and other non-sweetened beverages should be considered a positive finding. Vegetables and fruits (as well as fruit and vegetable juices), constituting moderately- and low-glycemic sources of bioavailable carbohydrates, fiber, minerals and vitamins (also antioxidants), were included in everyday diet of only a half of our athletes. Noticeably, the sportsmen who presented with higher self-efficacy

Table 1. Adherence of American football players in Polish clubs to the recommendations of the Swiss Food Pyramid for Athletes

Recommendation	Overall (%)	General self-efficacy (GSES) (%)		<i>p</i>
		High	Low	
Hydration with mineral water and other non-sweetened beverages	69.0	70.0	69.0	0.7083
3-5 servings of fruits and vegetables per day	48.0	54.0	43.0	0.2405
Vegetables included in at least two daily meals	39.0	54.0	26.0	<b>0.0035</b>
Raw vegetables at least once a day	54.0	63.0	46.0	0.0929
Cereal products in every main meal	67.0	87.0	50.0	<b>0.0000</b>
Wholegrain cereals at least twice a day	45.0	41.0	48.0	0.4926
Dairy products at least twice a day	47.0	50.0	46.0	0.2520
High-quality protein (eggs/meat) 2-3 times per week	68.0	74.0	63.0	0.2400
Fish 1-2 times per week	51.0	61.0	43.0	0.0676
Reduced intake of animal fats	42.0	52.0	33.0	0.0567
Plant oils daily or nearly every day	54.0	50.0	57.0	0.4588
Reduced intake of carbonated beverages	57.0	67.0	48.0	0.0515
Reduced intake of energy drinks	64.0	67.0	61.0	0.5137
Reduced intake of fast-food products	60.0	63.0	57.0	0.5660
Reduced intake of sweets and salted snacks	65.0	72.0	59.0	0.1903
At least three meals per day	82.0	96.0	70.0	<b>0.0004</b>
Eating regularly (every 3-5 hours)	48.0	76.0	24.0	<b>0.0000</b>
Variable diet	75.0	80.0	70.0	0.2437

*p* – significance of differences found on the chi-square test (comparison between athletes presenting with higher vs. lower self-efficacy levels)

levels declared consuming vegetables at least twice a day significantly more often than did the persons with lower levels of this trait ( $p < 0.01$ ). Comparison between our findings and the recommended frequencies of vegetable and fruit consumption (3 and 2 servings per day, respectively) [2, 17] pointed to an insufficient intake of these products in our group of American football players. Complex carbohydrates, present in large amounts in potatoes, cereal products and legume seeds, should constitute the principal source of energy in a rational diet [2, 17]. Wholegrain cereals and legumes are particularly valuable due to their high contents of various fractions of dietary fiber and low glycemic index, an important parameter considered in planning a diet for athletes during an intensive exercise period [17]. However, only 45% of our respondents declared consumption of cereal products with the recommended frequency. Physical exercise is generally associated with increased demand for protein [17], and therefore according to the Swiss Pyramid, athletes should choose between one serving of meat, fish, eggs, cheese or protein from other sources (e.g. tofu) daily, and enrich their diets with 2-3 servings of low-fat dairy products [2, 17]. Analyzing the frequencies of consuming these products by our athletes we showed that their diets included insufficient amounts of dairy (only 47% of the respondents declared consuming at least two servings of these products per day) and fish (consumed with the recommended frequency of 1-2 times per week by only 51% of the participants). These inconsistencies might lead to deficiency of calcium and polyunsaturated omega-3 fatty acids. Lipid profile of the blood can be also optimized with a plant oil- and nut-rich diet. Although, according to the Swiss Pyramid, athletes should include moderate amounts of these products in their everyday diet [25], we documented their reduced intake among our participants. The recommended reduced intake of atherogenic fats of animal origin was declared by only a half of our respondents (42%), and only a slightly higher fraction (54%) declared consuming plant oils on a daily basis or at least nearly every day. Concerning the products forming the top of the Swiss Food Pyramid, the intake of which should be controlled, our participants most often declared limited consumption of sweets and salted snacks (65%), energy drinks (64%) and fast food products (60%). They less often refrained from drinking sweetened carbonated beverages (57%), which as hypertonic are not suitable for an efficient repletion of fluids during intensive physical exercise [12]. A study of young Belgian sprinters showed that sweetened non-alcoholic beverages have contributed significantly to the energy value of their dietary intake [1]. Regarding other qualitative principles of rational diet, we observed a low, corresponding to no more than a half of our sample, prevalence of regular eating with 3- to 5-hour intervals

between the meals. In turn, eating regularly constitutes an important measure of rational diet and prerequisite of normal metabolism. A meal with high energy value, rich in carbohydrates, protein, vitamins and minerals, is vital for appropriate post-exercise regeneration [12]. In our study, the athletes characterized by higher self-efficacy levels showed more favorable attitude in this matter than did those presenting with low levels of this trait ( $p < 0.001$ ). The distribution of dietary behaviours presented by our athletes might be associated with their daily training schedules.

Dietary inconsistencies and qualitative mistakes documented in our group of American football players correspond to the tendencies reported by the authors of other Polish and international studies of athletes practicing various sports on a competitive basis. These studies confirmed that the intakes of some food products, namely wholegrain cereals, vegetables, fruits, dairy products and fish, in various groups of athletes are often insufficient [1, 5, 6, 7, 9, 13, 18, 23, 24]. Also the hereby documented dietary inconsistencies, such as the limited control of the dietary intake of sweetened carbonated beverages, were previously observed among elite athletes [1]. Too low intakes of vegetables and fruits, frequently observed among athletes, may potentially lead to unbalanced supply of some antioxidative vitamins [26]. This is unfavorable in the case of intensive physical exercise, as the latter is associated with enhanced oxidative stress. Furthermore, insufficient intake of wholegrain cereal products, vegetables and fruits promotes deficiency of vitamin B complex, which is reflected by limited exercise capacity, documented previously in various groups of athletes [26]. Finally, it may lead to dietary fiber deficiency in physically active individuals [1, 11, 22, 26]. Previous studies conducted among the representatives of various sports disciplines confirmed that too low intake of dairy is associated with the risk of calcium deficiency [8, 11, 22, 26].

The relationship between specific dietary behaviours of our American football players and their general self-efficacy level, namely the fact that the sportsmen presenting with higher levels of this trait usually undertook more rational dietary choices, can be explained by the characteristics of this personality dimension [4, 27] and corresponds to the associations observed previously in other groups of athletes [3, 10, 15, 16, 19, 20, 21]. More rational dietary choices undertaken by our American football players characterized by higher self-efficacy levels, namely more frequent consumption of vegetables and cereal products, and eating regularly, can be interpreted as a method for improving their health potential and training effect optimization, both requiring variable and well-balanced diet.

Incomplete adherence of our athletes to the qualitative dietary recommendations justifies monitoring and

rationalization of their diet, with emphasis on specific nutritional problems which can be modulated by individual traits, such as the level of general self-efficacy.

## CONCLUSIONS

1. This study documented incomplete adherence of American football players to the qualitative recommendations of the Swiss Food Pyramid for Athletes, especially with regards to the recommended frequency of vegetable, wholegrain cereal product, dairy, fish and plant oil consumption, reduced intake of animal fats and eating regularly.
2. The most prevalent rational dietary behaviours included having at least three meals per day, remaining on a variable diet, consuming high-quality protein, reduced intake of sweets, salted snacks, energy drinks and fast food products.
3. Dietary behaviours of the athletes were modulated by their general self-efficacy level; namely, the players with higher levels of this trait were shown to adhere to the recommendations of the Swiss Pyramid to a larger extent.

## Conflict of interest

*The author declares no conflict of interest.*

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