

Personal resources and nutritional behavior of polish basketball players

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Published online: January 30, 2021

(Accepted for publication January 22, 2021)

DOI:10.7752/jpes.2021.01018

Abstract

Problem statement: In our research, the predictive significance of personal resources on the quality of food choices is indicated. **Purpose:** The aim of this study was to assess the relationship between the localisation of sense of health control and the intensity of generalised self-efficacy, dispositional optimism, and nutritional behaviour of Polish basketball players. **Approach of the research:** This study was conducted on 165 high sport level players (23.44 ± 3.74 years). The following research tools were used: an original, author-designed, validated nutritional behaviour questionnaire (which refers to the recommendations of the Swiss sports nutrition pyramid), the Multidimensional Health Locus of Control (MHLC), the Generalised Self-Efficacy Scale (GSES), and the Life Orientation Test (LOT-R). Spearman's rank correlation coefficient and the Mann-Whitney U test were used to analyse the results. **Results:** This study confirmed that the intensity of rational eating behaviours among basketball players increased along with an increase in internal health control ($p = 0.014$), compared to that localised by chance ($p = 0.006$), and the generalised sense of self-efficacy ($p < 0.001$). Regarding the quality of eating habits, insufficient consumption of vegetables, fruits, and dairy products (including fermented dairy products) was demonstrated, as well as the lack of limitation of animal fats in athletes' diets. **Conclusions:** Among high sport level Polish basketball players, significant correlations were observed between specific personal resources and the level of proper nutritional behaviours. More rational food choices were associated with more intense internal and external (localised) health control and a higher sense of self-efficacy.

Keywords: dietary habits, athletes, localisation of sense of health control, sense of self-efficacy, disposable optimism

Introduction

Proper nutrition, in addition to effective training and biological predispositions, is one of the key factors contributing to sports success. One of the current models of sports nutrition is the Swiss Pyramid, recommending adequate hydration and daily consumption of vegetables and fruit, whole-grains, dairy products and vegetable fats. It also indicates the consumption of other sources of whole proteins, including fish, as well as limiting animal fats and salty as well as sweet snacks (Burke, 2008). The implementation of nutritional recommendations is conducive to maintaining health and exercise capacity as well as effective post-exercise recovery (Thomas, Erdmann & Burke, 2016; Kerksick et al., 2017; Kerksick et al., 2018).

Increased nutritional needs concern athletes of various disciplines, including basketball players, who must be characterised by speed, strength, endurance and concentration (Ziv & Lidor, 2009; Calleja-González et al., 2016; Koutsouridis, Lioutas, Galazoulas, Karamousalidis & Stavropoulos, 2020; Stamiris, Karamousalis & Stavropoulos 2020; Stavropoulos, 2020; Tokatlidou, Xirouchaki, Armenis & Apostolidis, 2020). Research among basketball players also allows to indicate the significance of mental readiness connected with, among others, the ability to self-regulate (Rochniak et al., 2020). These players are subjected to high-intensity training and matches, often with limited time for post-workout recovery (Calleja-González et al., 2016; Kostopoulos et al., 2017). They are also exposed to various injuries (Bolotin & Bakayev, 2016; Policastro, Sardo, Yazbek & Accardo, 2020). In a meta-analysis of studies from the last 15 years, it has been confirmed that the diet before, during and after a high-intensity match or training session is crucial for recovery rate in basketball players (Ott & Santos, 2020). New nutritional products appear to meet the specific dietary needs of athletes (Kolman et al., 2018).

In literature on the subject, it is shown that the nutritional behaviours of athletes are determined by various environmental and individual factors, including psychological ones (Birkenhead & Slater, 2015; Pelly, Burkhart & Dunn, 2018). One of the most important areas of psychological factors are the so-called personal resources related to health beliefs (Juczyński, 2012). The personal resources include the location of sense of health control, sense of self-generalised self-effectiveness and the level of dispositional optimism. The localisation of sense of health control may be internal or external. The internal location of control is related to the belief that an individual may influence state of health, and the external one is related to the belief that health

depends primarily on external factors (luck, chance, other people). Sense of generalised self-effectiveness expresses a belief in the ability to achieve intended goals, including those related to health. Similarly, dispositional optimism is related to an individual's expectation of positive effects of her/his own choices (Juczyński, 2012). Within this context, the predictive nature has been confirmed regarding personal resources for the quality of nutritional choices among athletes, including Polish footballers, which has been further confirmed that players with a more intense inner sense of control and a higher level of optimism declared applying a more rational model of nutrition (Gacek, 2019a; Gacek, 2019b). A group that has not been exploited among research in this area are athletes training basketball (Tsoufi, Maraki, Dimitrakopoulos, Famisis & Grammatikopoulou, 2017; Ott & Santos, 2020). Therefore, research was undertaken on the predictive role of personal resources for the implementation of assumptions from the Swiss sports nutrition pyramid, upholding the belief that the obtained results may favour the individualisation of educational impact and improve the effects of basketball players' sports training.

The aim of research was to assess the relationship between sense of health control, efficacy as well as optimism and the nutritional behaviours of Polish basketball players representing high sports levels. The intensity of personal resources and the scale of rational food choices were also assessed, as well as differentiation regarding the level of psychological features depending on the implementation (or not) of individual recommendations of rational nutrition for athletes. Proper nutrition, in addition to effective training and biological predispositions, is one of the key factors contributing to sports success. One of the current models of sports nutrition is the Swiss Pyramid, recommending adequate hydration and daily consumption of vegetables and fruits, whole-grains, dairy products and vegetable fats. It also indicates the consumption of other sources of whole proteins, including fish, as well as limiting animal fats and salty as well as sweet snacks (Burke, 2008). The implementation of nutritional recommendations is conducive to maintaining health and exercise capacity as well as effective post-exercise recovery (Thomas, Erdmann & Burke, 2016; Kerksick et al., 2017; Kerksick et al., 2018).

Material and Methods

Participants

The study was carried out between 2019-2020 in a group of 165 men aged 20-37 (23.44 ± 3.74), professionally training basketball (1st and 2nd leagues as well as the top league). The surveyed, highly qualified athletes undertook training at least 5 times a week, in units lasting more than 1 hour, and participated in national and/or international competitions. The basic criterion for the open selection of participants was playing sports professionally for at least 3 years. The participants' professional sports experience was between 3 and 20 years (11.33 ± 3.71).

Instruments

To assess diet, the authors' original, validated questionnaire of nutritional behaviour was construed on the basis of 20 statements referring to the qualitative recommendations of the Swiss nutrition pyramid for athletes. Two categories were adopted for answering the subsequent statements: yes (1 point) and no (0 points). By totalling the points for all items, the variable "Proper nutritional behaviour" was created (within the range of 0-20 points; the more points, the higher the intensity of the implementing nutritional recommendations). The next statements concerned: adequate hydration, preferring water and other unsweetened beverages, eating 3-5 servings of vegetables and fruits a day, eating vegetables at least twice a day, and raw vegetables at least once a day, including cereal products in each main meal, wholemeal cereal products at least twice a day, consumption of dairy products at least twice a day, other protein products (in the amount of approximately 150 g) 2-3 times a week, fish 1-2 times a week, reducing animal fats, daily (or almost daily) consumption of vegetable fats, reducing carbonated and non-carbonated sweetened beverages, energy drinks, fast food, as well as salty and sweet snacks, and regularly eating at least 3 meals a day, implementing a varied diet, and eating the most caloric meal after training. The validation procedure (test and retest) with the use of the McNemar χ^2 test ($p > 0.05$) and the Phi coefficient ($p > 0.05$) showed a very strong correlation between the test and retest results, and thus, high repeatability of the results. The localisation of the sense of health control was measured using the Multidimensional Health Locus of Control (MHLC) scale by K.A. Wallston, B.S. Wallston and R. DeVellis, in accordance with the adaptation by Z. Juczyński (Juczyński, 2012). The MHLC scale includes 18 statements specifying 3 dimensions of the locus of the sense of health control: internality (IHLC), influence of powerful others (PHLC) and influence of chance (CHLC). The range of results for each of the scales is within the range of 6-36 points (the higher the score, the stronger the belief regarding the impact of a given factor on health).

Sense of efficacy was measured using the Generalised Sense of Self-Efficacy Scale (GSES) by R. Schwarzer, M. Jerusalem and Z. Juczyński (Juczyński, 2012). The GSES scores are within the range of 10-40 points (the higher the score, the higher the sense of generalised efficacy).

To measure the level of disposable optimism, the Life Orientation Test (LOT-R) by M.F. Scheier, Ch.S. Carver and M.F. Bridges, in the adaptation by R. Poprawa and Z. Juczyński, was used (Juczyński, 2012). The results of the LOT-R scale are within the range of 0-24 points (the higher the result, the higher the level of optimism). Descriptive statistics of the studied variables are presented in Table 1.

Statistical analyses

Descriptive statistics, Spearman's rank correlation coefficient and the Mann-Whitney U test were used in the analysis of results. Due to the lack of normality of distribution, the median is the measure of the central tendency of all quantitative variables. Relationships between psychological variables and nutritional behaviours, and relationships between psychological traits were assessed via Spearman's rank correlation coefficient. Differences in the level of psychological variables depending on the implementation (yes or no) of individual nutritional recommendations were analysed using the Mann-Whitney U test. The analyses were performed using Statistica 13.3 software, the assumed level of statistical significance being $\alpha < 0.05$.

Results

As part of localising sense of health control, basketball players obtained the highest results in terms of internal control (Me=30.0), and lower results with regard to external control (influenced by others and chance). The median for sense of efficacy was 30.00 and sense of optimism was at the level of 15.00. On the other hand, the median index of proper nutritional behaviours, on a scale of 0-20 points, was 14.00 (Tab. 1).

Table 1. The level of psychological traits and the indicator of rational eating behaviours among Polish basketball players (descriptive statistics)

Variables	N	M	Me	Minimum	Maximum	Q25	Q75	SD
IHLC	165	28.68	30.00	14.00	36.00	25.00	32.00	4.56
PHLC	165	15.98	16.00	6.00	32.00	12.00	18.00	5.20
CHLC	165	15.96	15.00	9.00	27.00	13.00	20.00	4.54
GSES	165	32.09	32.00	24.00	40.00	30.00	34.00	2.85
LOT-R	165	14.94	15.00	10.00	23.00	13.00	16.00	2.50
Proper nutritional behaviours	165	13.53	14.00	6.00	19.00	10.00	17.00	3.58

M - mean, Me - median, Q25 - lower quartile, Q75 - upper quartile, SD - standard deviation

The relationships between the analysed basketball players' personal resources were also evaluated. It was found that with increasing optimism, the intensity of self-efficacy also increased ($p=0.002$) and recognition of the role of chance in maintaining health ($p<0.001$), while the level of health control localised in others decreased ($p=0.010$). Moreover, as the sense of efficacy increased, the recognition of the role of chance in maintaining health also experienced an increase ($p=0.009$), while the higher the level of internal health control, the lesser role in maintaining one's own health was assigned to others ($p<0.001$) (Tab. 2).

Table 2. Correlations between personal resources among Polish basketball players (Spearman's signed rank correlation coefficient)

Psychological variables	N	Spearman's R	t(N-2)	p
LOT-R & GSES	165	0.24	3.16	0.002
LOT-R & IHLC	165	0.06	0.79	0.431
LOT-R & PHLC	165	-0.20	-2.60	0.010
LOT-R & CHLC	165	0.39	5.35	<0.001
GSES & IHLC	165	-0.01	-0.09	0.925
GSES & PHLC	165	-0.07	-0.89	0.373
GSES & CHLC	165	0.20	2.64	0.009
IHLC & PHLC	165	-0.38	-5.26	<0.001
IHLC & CHLC	165	-0.11	-1.42	0.158
PHLC & CHLC	165	0.08	1.03	0.305

The analyses showed that the intensity of rational nutritional behaviours among the basketball players increased along with the increase in internal ($p=0.014$) and localised health control ($p=0.006$), as well as with the increase in sense of generalised self-efficacy ($p<0.001$) (Tab. 3).

Table 3. Correlations between rational eating behaviours and personal resources of Polish basketball players (Spearman's signed rank correlation coefficient)

Generalised variables	N	Spearman's R	t(N-2)	p
IHLC & Proper nutritional behaviours	165	0.19	2.47	0.014
PHLC & Proper nutritional behaviours	165	0.06	0.76	0.446
CHLC & Proper nutritional behaviours	165	0.21	2.78	0.006
GSES & Proper nutritional behaviours	165	0.27	3.58	<0.001
LOT-R & Proper nutritional behaviours	165	-0.01	-0.08	0.934

The degree of implementing individual recommendations for the rational nutrition of athletes was also assessed (Tab. 4-8). Basketball players, in the highest percentage (over 90%), consumed at least 3 meals a day and used water and other beverages to maintain hydrated. In the smallest percentage (less than 50%), they consumed, among others, fruits and vegetables, cereal and dairy products at the recommended frequency, reduced animal fats while avoiding the consumption of energy drinks.

Differences in the level of athletes' personal resources were also determined depending on the implementation (yes vs. no) of individual nutritional recommendations (Tab. 4-8). Eating at least 3 meals a day was associated with more severe external health control ($p=0.002$) and higher self-efficacy ($p=0.003$). Meal regularity was associated with higher internal health control ($p=0.002$) and that left to chance ($p=0.004$) with lower health control localised in others ($p=0.001$). Eating every 3-5 h was associated with lower health control influenced by chance ($p<0.001$) and higher internal control ($p=0.036$) and, at the same time, a lower sense of self-efficacy ($p=0.008$). The implementation of a varied diet was associated with a lower sense of control ($p=0.002$) and a lower level of optimism ($p<0.001$). Consuming the meal highest in caloric content after training was associated with a higher level of control due to chance ($p=0.003$) and a higher level of optimism ($p<0.001$) (Tab. 4).

Table 1. Level of personal resources among basketball players depending on carrying out nutritional recommendations with regard to the number, regularity and variety of meals (Mann-Whitney U test)

Nutritional behaviours	Psychological traits	Mean Group 1	Mean Group 2	U	Z	p	N Group 1	N Group 2
At least 3 meals a day	IHLC	28.81	26.91	675.5	1.12	0.264	154	11
	PHLC	16.08	14.45	716.5	0.85	0.396	154	11
	CHLC	16.23	12.18	367.0	3.13	0.002	154	11
	GSES	32.23	30.09	399.0	2.92	0.003	154	11
	LOT-R	14.92	15.27	718.50	-0.84	0.403	154	11
Regularly consuming meals	IHLC	29.56	26.54	1940.0	3.11	0.002	117	48
	PHLC	15.10	18.10	1842.0	-3.46	0.001	117	48
	CHLC	16.52	14.60	2008.5	2.87	0.004	117	48
	GSES	32.37	31.42	2396.0	1.48	0.140	117	48
	LOT-R	15.15	14.42	2354.0	1.63	0.104	117	48
Meals every 3-5 hours	IHLC	29.09	27.74	2284.5	2.09	0.036	115	50
	PHLC	15.96	16.02	2771.0	0.37	0.714	115	50
	CHLC	15.23	17.64	1884.0	-3.51	<0.001	115	50
	GSES	31.71	32.96	2130.5	-2.64	0.008	115	50
	LOT-R	14.88	15.08	2660.0	-0.76	0.447	115	50
Varied diet	IHLC	28.61	28.86	2469.0	0.71	0.478	121	44
	PHLC	16.37	14.89	2357.5	1.12	0.263	121	44
	CHLC	15.32	17.73	1825.0	-3.08	0.002	121	44
	GSES	32.14	31.95	2245.0	1.53	0.125	121	44
	LOT-R	14.52	16.09	1539.5	-4.13	<0.001	121	44
Meal with highest caloric content after training	IHLC	29.05	28.48	3043.5	-0.12	0.907	57	108
	PHLC	14.89	16.55	2349.0	-2.50	0.013	57	108
	CHLC	17.23	15.30	2219.5	2.94	0.003	57	108
	GSES	32.19	32.04	2700.0	1.29	0.196	57	108
	LOT-R	15.88	14.44	2025.0	3.61	<0.001	57	108

Group 1 - applying nutritional recommendations, Group 2 - not applying nutritional recommendations (yes vs. no)

Basketball players properly hydrating after training showed higher optimism than those not applying this rule ($p<0.001$). The athletes strongly preferring water and other unsweetened beverages demonstrated higher levels of internal ($p<0.001$) and localised health control ($p=0.032$), a lower level of health control placed in others ($p<0.001$) and a lower level of optimism ($p=0.024$) than basketball players who did not follow this recommendation (Tab. 5).

Table 5. Level of personal resources among basketball players depending on carrying out nutritional recommendations with regard to hydration (Mann-Whitney U test)

Nutritional behaviours	Psychological traits	Mean Group 1	Mean Group 2	U	Z	<i>p</i>	N Group 1	N Group 2
Proper hydration during training	IHLC	28.49	29.63	1698.0	-0.72	0.469	138	27
	PHLC	16.16	15.04	1629.5	1.03	0.305	138	27
	CHLC	16.20	14.74	1650.0	0.94	0.349	138	27
	GSES	32.06	32.26	1646.5	-0.95	0.341	138	27
	LOT-R	15.31	13.04	791.5	4.72	<0.001	138	27
Preferring water and unsweetened beverages	IHLC	29.19	17.14	79.5	3.82	<0.001	158	7
	PHLC	15.56	25.43	34.5	-4.19	<0.001	158	7
	CHLC	16.10	12.86	287.0	2.15	0.032	158	7
	GSES	32.06	32.86	432.5	-0.97	0.332	158	7
	LOT-R	14.94	14.86	551.5	0.01	0.994	158	7

Group 1 - applying nutritional behaviours, Group 2 - not applying nutritional recommendations (yes vs. no)

Consuming 3-5 servings of fruits and vegetables daily was associated with a higher level of internalised health control ($p=0.007$) and a greater sense of self-efficacy ($p<0.001$). Eating at least 2 servings of vegetables daily was associated with higher internalised health control ($p=0.016$). Daily consumption of raw vegetables was also associated with higher internalised health control ($p=0.047$), but also with more severe control located in chance ($p=0.006$) and a higher level of optimism ($p=0.005$). Consuming cereal products during each meal was associated with a higher sense of self-efficacy and a sense of control localised in chance ($p<0.001$) and a higher level of optimism ($p=0.027$). Consumption of whole grain cereal products at least twice a day was favoured higher sense of self-efficacy ($p=0.001$) and higher control dictated by chance ($p=0.006$) (Tab. 6).

Table 6. Level of personal resources among basketball players depending on carrying out nutritional recommendations with regard to the consumption of fruit, vegetables and cereal products (Mann-Whitney U test)

Nutritional behaviours	Psychological traits	Mean Group 1	Mean Group 2	U	Z	<i>p</i>	N Group 1	N Group 2
3-5 servings of fruits and vegetables a day	IHLC	29.65	27.83	2565.0	2.686	0.007	77	88
	PHLC	16.16	15.82	3286.0	0.332	0.740	77	88
	CHLC	15.84	16.07	3369.5	0.059	0.953	77	88
	GSES	32.91	31.37	2173.5	3.965	<0.001	77	88
	LOT-R	14.91	14.97	3183.5	-0.67	0.505	77	88
Vegetables at least twice a day	IHLC	29.49	27.41	2513.0	2.40	0.016	101	64
	PHLC	16.28	15.50	3007.5	0.75	0.454	101	64
	CHLC	16.20	15.59	2900.0	1.11	0.268	101	64
	GSES	32.14	32.02	2874.0	1.20	0.232	101	64
	LOT-R	14.91	14.98	3091.0	-0.47	0.638	101	64
Raw vegetables at least once a day	IHLC	29.32	27.46	2498.0	1.99	0.047	108	57
	PHLC	16.00	15.93	3060.0	0.06	0.952	108	57
	CHLC	16.52	14.91	2269.0	2.77	0.006	108	57
	GSES	31.95	32.35	3055.5	0.08	0.940	108	57
	LOT-R	15.35	14.16	2257.5	2.81	0.005	108	57
Cereal products with every meal	IHLC	29.14	28.37	2979.0	0.96	0.339	66	99
	PHLC	15.92	16.01	3197.5	0.23	0.818	66	99
	CHLC	17.50	14.94	2117.5	3.82	<0.001	66	99
	GSES	33.41	31.21	1651.5	5.37	<0.001	66	99
	LOT-R	15.50	14.57	2601.0	2.21	0.027	66	99
Cereal wholemeal products at least twice a day	IHLC	28.36	29.10	2989.5	-1.14	0.253	94	71
	PHLC	16.53	15.24	2779.0	1.83	0.067	94	71
	CHLC	16.63	15.08	2505.0	2.74	0.006	94	71
	GSES	32.62	31.39	2358.0	3.22	0.001	94	71
	LOT-R	14.71	15.24	2799.5	-1.77	0.077	94	71

Group 1 - applying nutritional behaviours, Group 2 - not applying nutritional recommendations (yes vs. no)

The athletes who consumed dairy products at least twice a day showed a higher level of health control placed in others ($p=0.001$) and a lower level of optimism ($p=0.013$). Those consuming other protein products at the recommended frequency had a higher level of optimism than those not following this recommendation ($p=0.005$). Subjects who consumed fish 1-2 times a week recognised the role of chance and others in maintaining health more frequently ($p<0.001$), and also had a higher sense of self-efficacy ($p=0.021$). To a greater extent, basketball players limiting animal fats recognised the role of chance ($p=0.016$) and others ($p<0.001$) in maintaining health, while demonstrating lower optimism ($p<0.001$) than the athletes not following this recommendation. On the other hand, the players who consumed vegetable fats every day were characterised by a higher level of optimism ($p=0.015$) (Tab. 7).

Table 7. Level of personal resources among basketball players depending on carrying out nutritional recommendations with regard to the consumption of products containing proteins and fats (Mann-Whitney U test)

Nutritional behaviours	Psychological traits	Mean Group 1	Mean Group 2	U	Z	p	N Group 1	N Group 2
Dairy products at least twice a day	IHLC	28.01	29.52	2796.5	1.84	0.066	73	92
	PHLC	17.10	14.56	2312.5	-3.43	0.001	73	92
	CHLC	15.62	16.40	2802.5	1.82	0.069	73	92
	GSES	31.65	32.64	2866.0	1.61	0.107	73	92
	LOT-R	14.38	15.64	2602.0	2.48	0.013	73	92
Protein products at least 2-3 times a week	IHLC	28.76	28.14	1312.5	1.25	0.213	143	22
	PHLC	15.92	16.36	1551.0	-0.10	0.918	143	22
	CHLC	15.84	16.77	1315.0	-1.23	0.217	143	22
	GSES	32.17	31.55	1516.5	-0.27	0.788	143	22
	LOT-R	15.10	13.91	989.0	2.80	0.005	143	22
Fish 1-2 times a week	IHLC	28.72	28.63	3203.5	0.65	0.517	82	83
	PHLC	16.90	15.04	2288.5	-3.63	<0.001	82	83
	CHLC	17.47	14.44	2202.0	-3.91	<0.001	82	83
	GSES	32.39	31.79	2693.0	-2.31	0.021	82	83
	LOT-R	14.89	14.99	3358.5	0.14	0.886	82	83
Limiting animals fats in diet	IHLC	29.28	28.22	3083.5	0.87	0.386	72	93
	PHLC	17.64	14.69	2236.0	3.65	<0.001	72	93
	CHLC	16.92	15.23	2612.0	2.42	0.016	72	93
	GSES	31.69	32.40	3014.0	-1.10	0.273	72	93
	LOT-R	14.17	15.54	2119.0	-4.04	<0.001	72	93
Vegetable fats almost every day	IHLC	28.59	28.87	2750.0	0.76	0.448	112	53
	PHLC	16.25	15.40	2554.0	1.44	0.149	112	53
	CHLC	15.99	15.91	2936.0	0.11	0.912	112	53
	GSES	32.31	31.62	2540.5	1.49	0.136	112	53
	LOT-R	15.27	14.25	2273.0	2.42	0.015	112	53

Group 1 - applying nutritional behaviours, Group 2 - not applying nutritional recommendations (yes vs. no)

Limiting the consumption of sweetened carbonated beverages was associated with lower health control localised in others ($p=0.011$), as well as more severe control found in chance ($p=0.003$) and higher self-efficacy ($p=0.022$). Limiting energy drinks was associated with a lower level of internal health control ($p=0.001$) and a lower sense of self-efficacy ($p=0.016$) and optimism ($p<0.001$).

Avoidance of fast food consumption was associated with higher internal health control ($p=0.029$) and localised control ($p=0.014$) as well as a higher sense of efficacy ($p=0.004$). Avoiding the consumption of sweet and salty snacks was associated with higher internal health control and self-efficacy ($p<0.001$) and lower intensity of health control placed in others ($p=0.014$) (Tab. 8).

Table 8. Level of personal resources among basketball players depending on carrying out nutritional recommendations with regard to the consumption of non-recommended products (Mann-Whitney U test)

Nutritional behaviours	Psychological traits	Mean Group 1	Mean Group 2	U	Z	p	N Group 1	N Group 2
Limiting consumption of sweetened carbonated beverages	IHLC	29.26	27.13	2347.0	1.29	0.197	120	45
	PHLC	15.45	17.32	2008.0	-2.53	0.011	120	45
	CHLC	16.37	14.89	1901.0	2.92	0.003	120	45
	GSES	32.33	31.44	2072.0	2.30	0.022	120	45
	LOT-R	15.02	14.73	2652.5	0.17	0.863	120	45
Limiting consumption of energy drinks	IHLC	28.27	29.41	2176.0	3.23	0.001	59	106
	PHLC	16.34	15.32	2813.5	-1.06	0.287	59	106
	CHLC	16.09	15.73	2975.5	-0.51	0.608	59	106
	GSES	31.70	32.80	2420.5	2.40	0.016	59	106
	LOT-R	14.41	15.90	2063.5	3.61	<0.001	59	106
Avoiding consumption of fast food products	IHLC	29.50	27.09	2416.5	2.19	0.029	109	56
	PHLC	15.56	16.79	2614.0	-1.51	0.132	109	56
	CHLC	16.37	15.18	2334.0	2.47	0.014	109	56
	GSES	32.46	31.38	2204.5	2.91	0.004	109	56
	LOT-R	14.96	14.89	3018.5	-0.11	0.910	109	56
Avoiding consumption of salty and sweet snacks	IHLC	30.24	26.80	1918.5	4.76	<0.001	90	75
	PHLC	15.22	16.88	2620.5	-2.47	0.014	90	75
	CHLC	15.18	16.91	2810.5	-1.85	0.065	90	75
	GSES	33.28	30.67	1657.5	5.62	<0.001	90	75
	LOT-R	14.72	15.20	2868.0	-1.66	0.097	90	75

Group 1 - applying nutritional behaviours, Group 2 - not applying nutritional recommendations (yes vs. no)

Discussion

In the discussed research, an average level of rational nutritional behaviours and significant dependencies between some personal resources and the level of proper eating behaviour, as well as the diversification in the intensity of the analysed personal resources in the groups of basketball players meeting and not meeting individual dietary recommendations were noted. It was also shown that among the analysed personal resources, basketball players obtained the highest results in terms of internal health control and the sense of generalised self-efficacy. However, they showed less intense external health control and a lower level of optimism.

The described limited scale of rational food choices, particularly concerning the insufficient frequency of consuming vegetables, fruits and dairy products, including those fermented, as well as not restricting the consumption animal fats, could limit the nutritional and health value of the diet, e.g. due to the risk of shortages in antioxidants, probiotics and calcium, as well as an oversupply of atherogenic saturated fatty acids. Nutritional disorders related to the limited implementation of assumptions from the sports nutrition pyramid have also been described in other groups of players in team disciplines, both in Poland (Frączek & Gacek, 2013; Frączek et al., 2020) and in other countries (Ono, Kennedy, Reeves & Cronin, 2012; Alaunyte, Perry & Aubrey, 2015; Jenner et al., 2018). On the other hand, in the elite group of Greek basketball players, under the care of a dietician, a high index of dietary quality was demonstrated, but also in this group, a low consumption of vegetables and cereal products on training days was demonstrated (Tsoufi et al., 2017), which corresponds to the results of the authors' research. Similarly, other studies among junior basketball players showed, i.e. calcium deficiencies, which may suggest the low consumption of dairy products (Nikic et al., 2014). In another study, it was found that the diet of Nigerian basketball players was imbalanced (Eugene & Agwubuike, 2012). By contrast, in Spanish studies an excessive content of body fat in basketball players was shown, which could be related to improper nutrition (Godoy-Cumillaf, Cárcamo-Araneda, Hermosilla-Rodríguez, Oyarzún-Ruiz & Viveros-Herrera, 2015). Also, in the diets of elite Spanish wheelchair basketball players, carbohydrate deficiencies and excess fats (Ferro, Garrido, Villaceros, Pérez & Grams, 2017) as well as vitamin E and calcium shortages (Grams, Garrido, Villaceros & Ferro, 2016) were described.

In the discussed study, significant positive relationships were also confirmed between internal and external (localised in chance) health control and the sense of self-efficacy as well as the intensity of proper eating behaviours. These trends should be interpreted within the context of the intensity of the analysed personal resources of basketball players, with an indication of a high level of internal health control and generalised self-efficacy, which may thus determine the quality of food choices. The concept of self-efficacy, as a belief in the ability to achieve specific goals, is the basic factor determining motivation and actions, including nutritional

behaviours (Juczyński, 2012). In turn, the inner locus of the sense of health control is related to the individual's belief that s/he has control over her/his health and has direct influence on it, and the external locus of the sense of health control expresses the belief of the individual that her/his health is dependent on external factors, including happiness, chance or other people (Juczyński, 2012). In this context, the players more convinced of their own impact on health (and exercise capacity) and more convinced about the effectiveness of their impact (including that related to health) presented a more rational model of nutrition. A significant, positive relationship between the indicated personal resources and the rational eating behaviour index was also confirmed in the analysis of differences among personality traits depending on the implementation (or the lack) of subsequent recommendations of the Swiss sports nutrition pyramid. In particular, many aspects concerned the relationship with GSES (here the strongest correlation with the indicator of proper eating behaviour), including: consumption of the recommended number of meals, number of servings of vegetables and fruit, as well as cereal products (including whole-grains) and fish, as well as limiting the consumption of animal fats, sweetened carbonated beverages, fast food and sweet and salty snacks. In turn, associations with more intense internal health control concerned regularity of meals, preference for water and other unsweetened beverages, and the consumption of fruits and vegetables (including those raw). The indicated nutritional behaviour is one of the important diagnostic aspects of diet quality, influencing the nutritional quality and health value of a diet, also important in the context of physical exercise and practicing sports discipline. A diet rich in vegetables and fruits as well as wholemeal cereal products is, among others, has high antioxidant status, important in athletes due to the developing phenomenon of oxidative stress (Frączek, Morawska, Gacek & Pogoń, 2019). Sea fish (omega-3 polyunsaturated fatty acids) have antioxidant and antiatherosclerotic properties (Shahidi & Ambigaipalan, 2018). The reduction of atherogenic saturated fats, trans isomers and simple sugars, more widespread in athletes with a higher sense of efficacy, increases the nutritional value of the diet, which was confirmed in meta-analytical research (Imamura et al., 2016).

The results of other studies among athletes in team and individual disciplines correspond to the described trends. Research has confirmed the predictive significance of a high sense of efficacy for the quality of food choices among Polish American football players (Gacek, 2015) and players of individual disciplines (Gacek, 2019c), and internal control for more rational nutritional choices of athletes training team sports (Gacek, 2013). In another study, it was found that the internal locus of control among athletes had a positive effect on self-regulation of nutritional attitudes within the context of social interactions (Scoffier, Paquet & 'Arripe-Longueville, 2010).

The predictive importance of the level of optimism for the implementation of certain nutritional recommendations among athletes should also be pointed out, although this variable was not significantly related to the general indicator of correct nutritional behaviours in basketball players. Nonetheless, a higher level of optimism in groups of individuals who follow some recommendations (including eating the most caloric meal after training, proper fluid replacement, eating raw vegetables, wholegrain products, certain protein products and vegetable fats) allows us to outline the trends. As in the case of the relationships described above (GSES and IHLC), these regularities have also been previously demonstrated among athletes training team sports (Gacek, 2019a) and various individual disciplines (Gacek, 2019c).

It should be noted, however, that the trends in the discussed results of the authors' study are not fully unambiguous in all areas, which suggests the need for further exploration. The discussed research showed the predictive importance of personal resources in relation to the quality of food choices among Polish basketball players. The diagnosis of individual determinants of nutritional behaviours (an important health resource) may favour the individualisation of educational interactions and rationalisation of athletes' diets.

At the same time, referring to the limitations of the work, it is necessary to point out the legitimacy of further research on the psychological determinants of nutritional behaviours among athletes, taking the greater size and diversity of the group into account. and a wider spectrum of psychological and nutritional analyses.

Conclusions

1. Polish basketball players show a high level of internal health control and a sense of generalised self-efficacy, they are also characterised by less intense external health control and a lower level of optimism. Therefore, they express the belief that they can effectively influence their health.
2. Polish basketball players showed an average level of rational eating behaviours, particularly related to insufficient consumption of vegetables and fruits, as well as dairy products (including those fermented), and furthermore, not limiting animal fats and energy drinks in their diets.
3. Significant relationships were found between some personal resources and the quality of nutritional behaviours, including positive relationships between internal and external (localised) health control and the sense of self-efficacy, as well as the intensification of rational food choices. These regularities were confirmed by differentiating the intensity of the analysed personal resources in the groups of basketball players fulfilling and not fulfilling individual nutritional recommendations. Taking into account the personal resources mostly intensified among basketball players, it has been shown that players declaring positive eating behaviours (consuming meals more regularly, preferring unsweetened drinks, consuming fruit and vegetables on a daily

basis, limiting the intake of fast food and salty and sweet snacks) are also characterised by a higher level of internal health control and a sense of generalised self-effectiveness.

4. Actions favouring the rationalisation of the nutrition model for Polish basketball players should be individualised, considering psychological characteristics of the players.

Conflict of interest

None declared.

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