

EVALUATION OF HEALTH BEHAVIORS OF POLISH ARMY SOLDIERS IN RELATION TO DEMOGRAPHIC FACTORS, BODY WEIGHT AND TYPE OF ARMED FORCES

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Abstract

Objectives: The aim of this article is to assess the health behaviors of Polish Army soldiers participating in the National Health Programme 2016–2020 in relation to types of armed forces, BMI and selected demographic factors. **Material and Methods:** Anthropometric and questionnaire data were obtained in a group of 1229 soldiers of the Polish Armed Forces (PAF) from military units from all over Poland. Health behaviors patterns were assessed using the *Health Behavior Inventory* (HBI), developed by Juczynski. **Results:** The HBI of PAF soldiers was 79.9 ± 12.68 , indicating an average score. Statistically significant differences were found in the HBI values and in the individual categories of health behaviors according to the type of armed forces. The highest scores in each category of health behaviors were obtained by the Air Force (AF) soldiers. The lowest HBI score was obtained by the Land Forces and Territorial Defence Forces soldiers. Soldiers with higher education obtained significantly higher scores in such health categories as proper eating habits, preventive behaviors and health practices, compared to respondents with secondary education. Soldiers residing in cities had statistically significantly higher health behaviors intensities in all categories, compared to village residents. A significantly higher score in all health categories was noted in soldiers with normal body weight compared to those with diagnosed obesity. There was no significant relationship between the age of the respondents and health behaviors. **Conclusions:** The study found that factors such as type of armed forces, BMI, place of residence and education level were significant for the adoption of health behaviors by PAF. The level of health practices was significantly higher among AF soldiers compared to other types of armed forces. It seems necessary to further disseminate education on pro-health behaviors, especially among soldiers with obesity through participation in organized training and psychodietetic consultations as part of the National Health Programme. *Int J Occup Med Environ Health.* 2023;36(4):437–49

Key words:

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INTRODUCTION

Lifestyle, which consists of behaviors primarily related to diet, physical activity, coping with stress and emotions, sleep and rest, avoidance of psychoactive substances is one of the most important determinants of health. Both on an individual basis, i.e., concerning an individual person, and in relation to population groups [1,2].

Based on the “fields of health” distinguished by M. Lalonde [1], a person’s health depends on 4 basic groups of factors, such as lifestyle, genetic factors, physical and social environment and medical care. According to the author’s concept, lifestyle and related behaviors have the greatest impact on health status. And although there is no consensus among researchers on this issue, the following share of the listed factors in influencing health status is most often cited: lifestyle (about 50%), genetic factors (about 20%), environment (about 20%), medical care (10%) [1,3,4].

In the literature, lifestyle and related behaviors are variously defined and classified. Health behaviors are generally defined as activities that directly or indirectly affect health. More broadly, health behaviors include beliefs, expectations, thoughts and motives related to health. In many definitions, authors point out that health behaviors are not only activities that lead to strengthening or restoring health, but in fact any human activity that is in any relation to health, including those that do not promote the maintenance of health [5]. Interestingly, health behaviors can result from both: possessed and scientifically validated knowledge as well as from colloquial beliefs that are not supported by science [6].

In this study, health-promoting behaviors are understood as conscious actions aimed at increasing health potential and simultaneously eliminating threatening behaviors. They include behaviors related to both physical health, such as eating healthy, engaging in physical activity and taking care of sleep quality. Furthermore, it is also meaningfully related to mental health, such as using and giving social support, and dealing effectively with every-

day problems. Health-enhancing behaviors include various types of preventive behaviors, undergoing preventive screenings as well as those aimed at avoiding unnecessary health risks, like giving up smoking and limited alcohol consumption [3].

The health behaviors of various population groups is determined by a wide range of socioeconomic, cultural and personality factors. Uniformed services, including soldiers, are among the riskier, more dangerous and therefore stressful professions [7]. Health-promoting behaviors are highly desirable in the military environment. However, the stress factors in the military contribute to numerous anti-health behaviors and mental health problems.

Previous research shows that inappropriate health behaviors, including improper eating habits, lack of physical activity and inability to cope with stress are significant factors in the development of civilization diseases, including cardiovascular disease [8]. A study of 112 young Polish soldiers [9] showed that cardiovascular disease risk factors were present in >50% of the subjects.

Other notable results were provided by another cross-sectional observational study conducted on a group of 6440 soldiers (97% men) as part of the MIL-SCORE program, which aimed to assess the prevalence of cardiovascular disease risk factors in a population of Polish soldiers [10]. It was shown that almost half of the soldiers surveyed were past or current smokers, sedentary lifestyles were present in almost a third of those >40 years old, the percentage of overweight and obesity in those >50 years old was 58% and 27%, respectively. Cardiovascular risk scores were found to be high and very high in almost a third of soldiers >50 years old.

On the other hand, positive, regular health behaviors, such as proper diet, physical activity, sleep and rest, among others, promote good health. This is supported by the results of a study of U.S. Army Special Forces soldiers [11], whose good physical and mental health was linked to their propensity to engage in health-promoting

behaviors. The authors noted that soldiers' engagement in a greater number of health-enhancing behaviors can be an effective and at the same time cost-effective way to prevent disease and adverse health outcomes in military populations. At the same time, it should be emphasized that for soldiers, health status and related health habits are of great importance for resilience and combat readiness, and thus effectiveness in carrying out tasks [12,13].

Aim

This article's purpose is to present the study results of evaluation of health behaviors of Polish Army soldiers participating in the 2016–2020 National Health Programme in relation to types of armed forces, body mass index (BMI) and selected demographic factors. Given that health behaviors have a significant impact on the psychophysical health and combat performance of soldiers, and due to the prevalence of a high percentage of overweight and obese soldiers in the military population in our country [10,14–16], it is justified to conduct this type of research, which significantly expands the existing state of knowledge in the area of prevention and actively undertaken health-promoting activities in this group.

MATERIAL AND METHODS

Participants

The anthropometric and questionnaire data were obtained in a group of 1229 Caucasian men ($M \pm SD$ 36.4 \pm 8.0 years), soldiers of the Polish Armed Forces (PAF) from military units all over Poland that have declared their willingness to participate in the National Health Programme 2016–2020.

The invitation to participate in the National Health Programme through the General Command of the Armed Forces was earlier sent to all commanders of subordinate military units. A willingness to participate in the program was expressed by 105 military units (of which 40% were military units of the Air Force (AF), 25% of the Territo-

rial Defence Forces, 22% of the Land Forces, 8% of the Navy, 4% of the Special Forces and 1% of the Warsaw Garrison Command). To all who had agreed to take part in, invitations were sent via email to their subordinates. All soldiers who had expressed their willingness to participate in the program were enrolled. Only volunteers took part in the study. The research was conducted between April 2018–October 2020. In addition, only complete data sets relating to individual variables were included in the analyses. Hence, there will be differences in the size of the study groups depending on the variables analysed. All participants accounted for about 1% of the PAF.

All procedures were approved by the Institutional Review Board of the Military Institute of Aviation Medicine, Warsaw, Poland (decision No. 01/2018 of March 9, 2018), and have been performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. All participants provided informed consent.

Method

Body height was measured with an anthropometer (Holtain, UK) to the nearest 1 mm, in a standing upright position, without shoes. Body weight was determined in underwear alone, after emptying the bladder. Participants were categorized on the basis of BMI based on World Health Organization (WHO) criteria [17]. Three groups were created: BMI in the range 18.5–24.9 kg/m² (normal), 25.0–29.9 kg/m² (overweight) and ≥ 30.0 kg/m² (obese).

In order to analyze the relationship between the age of the respondents and health behavior, an additional division was made into 2 age groups: <40 and ≥ 40 years old.

Behavioural assessments

The patterns of health behaviors were assessed using the *Health Behaviour Inventory* (HBI), developed and standardized for the Polish population by Juczyński [18].

This is a Polish language questionnaire widely used in studies conducted in Poland. The HBI is a self-report questionnaire, which consists of 24 statements describing different behaviors related to health. Patients rate these behaviors on a 5-point scale, where 1 represents the lowest intensity of the behavior and 5 represents the highest. Therefore, the general index ranges 24–120 pts. The HBI scores are grouped into 4 categories:

- proper nutrition habits (PNH) focusing on the types of food consumed by the patient (wholemeal bread and eating significant amounts of fruit and vegetables),
- prophylactic behaviors (PB) associated with disease prevention, defined as adherence to doctor's recommendations, regular medical check-ups, receiving medical information,
- health practices (HP) assessing sleep quality, rest, exercise, monitoring body weight, and
- positive mental attitude (PMA) focusing on the avoidance of situations that might cause a depressed mood and the avoidance of strong emotions, anger, and anxiety.

The results for the categories were calculated as the mean number of points obtained for answers to the questions belonging to a particular category. The results obtained were compared with the average values of the normative group obtained by Juczyński [18]. The intensity of particular health related behaviors, as well as the general index, was categorized into high level, medium level, and low level.

Statistical analysis

PS IMAGO PRO 7 program (IBM SPSS Statistics 27) was used for statistical analysis of the results. The results for quantitative variables were presented in the form of descriptive statistics – abundance, mean (M), standard deviation (SD), median (Me), maximum and minimum, for qualitative variables in the form of frequencies and graphs. For comparative analyses between groups (type

of armed forces) χ^2 and Kruskal-Wallis tests were used. For comparative analyses between 2 groups Mann-Whitney U test was used. To test the differences between the standard score for adult men and the individual categories of health behavior for soldiers by type of armed forces, the test of differences between 2 means was used. A statistical significance value of $p < 0.05$ was assumed, and the normality of the distributions was checked using the Shapiro-Wilk test.

RESULTS

Characteristics of the study group

As part of the implementation of the National Health Programme 2016–2020, 1229 soldiers took part in the study, the most numerous groups were soldiers of the Navy, the least numerous were soldiers of the Territorial Defence Forces. Detailed data are presented in Figure 1.

The age of the respondents taking part in the study was $M \pm SD$ 36.4 \pm 8.0 years, and a statistically significant difference was found in the age of the respondents between the groups ($p < 0.0001$). The youngest were soldiers of the Navy ($M \pm SD$ 34.4 \pm 7.6 years), while the oldest were soldiers of Warsaw Garrison Command ($M \pm SD$ 39.7 \pm 7.4 years). The BMI was $M \pm SD$ 26.8 \pm 4.0 kg/m². Only 33% of the subjects

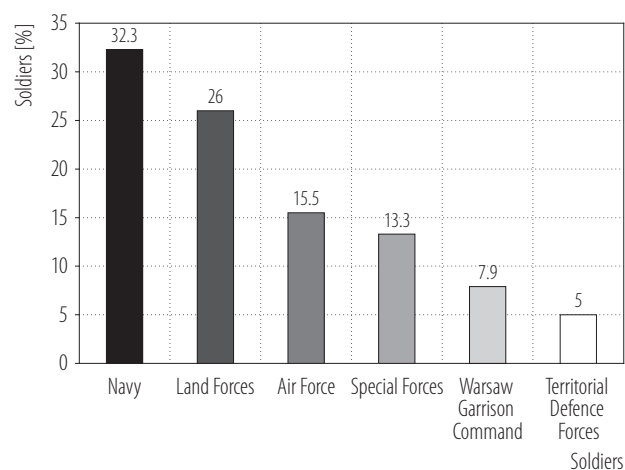


Figure 1. Surveyed soldiers (N = 1229) according to the type of the Polish Armed Forces, April 2018–October 2020

had normal body weight according to the BMI index, as many as 49.7% were overweight and 17.3% had obesity according to WHO criteria [17]. Soldiers of the Territorial Defence Forces had the highest average body mass index (BMI), which was 28.4±4.8 kg/m². Detailed data are presented in Table 1.

Most of the subjects lived in a town of ≥100 000 inhabitants (50.3%), 30.9% lived in a town of <100 000 and the rest lived in villages. The university degrees had 56.7% of respondents, while 43.3% had secondary education.

Assessment of the Health Behavior Inventory

Health behaviors represent a vast area of health-related issues. The main categories of health behavior based on the HBI scale were used in the analysis of the material. Detailed data are included in Table 2.

The average score of the HBI obtained by the Polish Army soldiers was M±SD 79.87±12.68 scores, indicating an average result. The minimum score of the study group was 13, and the maximum score was 115. In accordance with the procedure of the test used, indices were also calculated in 4 individual categories of behavior, i.e., PNH, PB, PMA and HP. The highest score in the entire study population was obtained in the category of PMA (M = 3.51) and the lowest in the category of HP (M = 3.13) (Table 2).

Analysing the results of the Juczyński HBI, statistically significant differences were found in the total scores of the HBI and in the total scores of each health behavior category, depending on the type of armed forces. The highest scores in each category of health behavior were obtained by the AF soldiers, and were significantly higher than the scores obtained by soldiers of the other types of armed forces (p < 0.001) (Table 3). The scores obtained by the AF soldiers were also significantly higher in relation to standard values in all categories studied (p < 0.05). The HBI for the AF soldiers was M±SD 84.5±10.2 pts, which corresponds to a level of 5–6 sten and is interpreted as an average score. The lowest global

Table 1. Basic anthropometric parameters of soldiers according to the type of the armed forces of the Republic of Poland, April 2018–October 2020

Variable	Participants (N = 1229*)				p								
	Air Force soldiers (N = 191)	Land Forces soldiers (N = 320)	Warsaw Garrison Command soldiers (N = 97)	Navy soldiers (N = 397)									
	M±SD	Me	M±SD	Me	M±SD	Me	M±SD	Me					
Age [years]	36.8±8.1	37.0	38.0±8.1	38.0	39.7±7.4	39.0	34.4±7.6	33.0	35.0±6.1	35.0	38.6±8.6	39.0	<0.0001
Body weight [kg]	84.7±13.1	84.0	85.0±16.6	85.0	84.5±15.9	84.0	83.3±14.9	83.0	84.8±11.3	85.0	88.6±20.5	86.0	0.3061
Height [cm]	178.0±5.9	178.0	176.4±8.0	177.7	177.1±8.0	178.0	177.0±7.9	178.0	179.3±6.7	180.0	175.8±9.4	175.0	0.4058
BMI [kg/m ²]	26.7±3.6	26.2	27.2±4.5	26.9	26.8±4.2	26.5	26.5±4.1	26.0	26.3±2.7	26.0	28.4±4.8	28.9	0.0246

p – Kruskal-Wallis test result.

* Total number of soldiers of the Polish Armed Forces (PAF) from military units all over Poland that have declared their willingness to participate in the National Health Programme 2016–2020.

Table 2. Results for each category of the *Health Behaviour Inventory* in the study group of soldiers (N = 1153*), April 2018–October 2020, Poland

Category	<i>Health Behavior Index</i>		
	M±SD	Me	min.–max
Total score	79.87±12.68	81.00	13.00–115.00
Proper nutrition habits	3.37±0.75	3.33	0.83–5.00
Prophylactic behaviors	3.24±0.73	3.33	0.33–5.00
Positive mental attitude	3.51±0.66	3.50	0.33–5.00
Health practices	3.13±0.59	3.17	0.67–5.00

* Complete data sets relating to individual variables.

average HBI scores were obtained by the Land Forces soldiers (M±SD 78.2±12.54 pts), and the Territorial Defence Forces soldiers (M±SD 78.8±12.3 pts). However, these results are comparable to the standard values (M±SD 78.50±14.02 pts), still within the range, for scores indicating an average intensity of health-enhancing behaviors.

Analysing the individual categories of health behavior in comparison with standard values [18], significantly higher scores were shown in the PNH category in soldiers of all types of armed forces (Table 3).

It is noteworthy that almost half (44.7%) of the AF soldiers received a score indicating a high intensity of health behavior (Figure 2a). In comparison, a high health behavior score was obtained by 28.4% of the Warsaw Garrison Command soldiers, 27% of the Navy soldiers, 26.1% of the Special Forces soldiers, 25.9% of the Land Forces soldiers, and 19.5% of the Territorial Defence Forces soldiers.

A variety of factors may influence the presented health behaviors. Selected variables were analyzed. There was no significant statistical correlation of the overall HBI index with the age of the subjects ($r = 0.03$, $p = 0.268$), as well as in individual categories of health behavior. However, it was observed that in the age group over forty, the values of the PB and HP index increased significantly ($p < 0.05$). Due to significant differences in the age of respondents in each type of armed forces, an age division was also made between the ≥ 40 and < 40 categories in each group of soldiers. In-depth analyses showed significant differences

in health behavior only in the group of Navy soldiers. Soldiers > 40 years of age scored significantly higher in the overall HBI, PMA and HP compared to younger soldiers ($p < 0.05$). No such differences were observed in the other types of armed forces. Soldiers with higher education obtained significantly higher scores in such health categories as proper eating habits, preventive behaviors and health practices ($p < 0.05$), compared to respondents with secondary education (Table 4). A score indicating a high intensity of health behavior was obtained by 29.1% of those with higher education, compared to 27.8% of respondents with secondary education (Figure 2b).

Place of residence also had an impact on respondents' health behavior. Soldiers residing in cities had statistically significantly higher health behavior intensities in all categories, compared to village residents ($p < 0.005$) (Table 4). The highest percentage of those with a high health behavior severity score was in the group of those living in cities with a population $\geq 100\,000$, at 31.9%, compared to 25.1% of village residents and city $< 100\,000$ (Figure 2c).

Analyzing health behaviors according to the weight of the subjects, a significantly higher score on the overall HBI and in all health categories was noted in soldiers with normal weight and overweight ($p < 0.05$), compared to those with diagnosed obesity (Table 4). Only 20% of soldiers with obesity had scores indicating a high intensity of health behavior, compared to 35.3% of normal-weight subjects (Figure 2d).

Table 3. Results for each category of the *Health Behaviour Inventory* in the study group of soldiers according to the type of armed forces, April 2018–October 2020, Poland

Category	Participants (N = 1171)										Standard score for Polish adult men (N = 235) [18]	p		
	Air Force soldiers (N = 188)		Land Forces soldiers (N = 305)		Warsaw Garrison Command soldiers (N = 95)		Navy soldiers (N = 389)		Special Forces soldiers (N = 134)				Territorial Defence Forces soldiers (N = 60)	
	M±SD	Me	M±SD	Me	M±SD	Me	M±SD	Me	M±SD	Me	M±SD	Me	M±SD	
<i>Health Behavior Index</i> total score	84.5*±10.2	85.00	78.2±12.54	78.00	81.4±12.9	81.0	79.4±12.7	80.0	79.0±12.2	80.0	78.8±12.3	79.0	78.50±14.02	<0.001
proper nutrition habits	3.58*±0.65	3.67	3.30*±0.76	3.33	3.3*±0.8	3.3	3.4±0.7	3.3	3.4*±0.7	3.5	3.3*±0.8	3.2	2.85±0.79	0.002
prophylactic behaviors	3.49*±0.63	3.50	3.07*±0.71	3.17	3.3±0.7	3.3	3.2±0.7	3.3	3.3±0.7	3.3	3.2±0.7	3.3	3.30±0.77	<0.001
positive mental attitude	3.75*±0.51	3.83	3.38±0.68	3.50	3.5*±0.6	3.3	3.5±0.7	3.5	3.6*±0.6	3.5	3.5*±0.7	3.3	3.24±0.66	<0.001
health practices	3.32*±0.47	3.33	3.08±0.59	3.17	3.2±0.6	3.2	3.1±0.6	3.2	2.9±0.6	3.0	3.2±0.6	3.2	3.08±0.95	<0.001

p – Kruskal-Wallis test result (between types of armed forces).

* p < 0.05 for comparison with standard score – t-test for comparing 2 means.

DISCUSSION

In the study presented in this article, it was shown that the level of intensity of health behaviors among the surveyed soldiers ranks at the average level, with the highest intensity of health behaviors in all categories obtained by the AF soldiers, which may be related to the intensively undertaken educational activities, concerning proper nutrition and undertaking physical activity among soldiers, which have been implemented by the Military Institute of Aviation Medicine as part of the National Health Programme since 2016. The activities undertaken, although implemented for all soldiers and employees of the Ministry of Defence are due to the profile of the Institute’s activities, particularly targeted at members of the military aviation personnel. It should also be noted that piloting aircrafts require special psychophysical predispositions and good health, and aviation personnel aware of this fact have additional motivation to make efforts aimed at maintaining and improving their health, especially since they undergo mandatory, very detailed medical examinations every year. On the other hand, the lowest HBI score was obtained by the Land Forces soldiers as well as the Territorial Defence Forces soldiers. The observed lowest intensity of health behaviors among Territorial Defence Forces soldiers may result from the specificity of this military formation, related to the mode and training program different from other types of armed forces (e.g., shorter training period, simultaneous possibility of performing one’s own professional work not related to the military), as well as a relatively short period of service of this formation.

Interestingly, there have been shown significantly higher PNH scores in soldiers of all types of armed forces, compared to standard values. As it is well known, proper nutrition is the key to maintaining good health, both physical and mental. A significant relationship between nutrition and the incidence of anxiety and depression in American soldiers was demonstrated by Forsys-Donahue et al. [19].

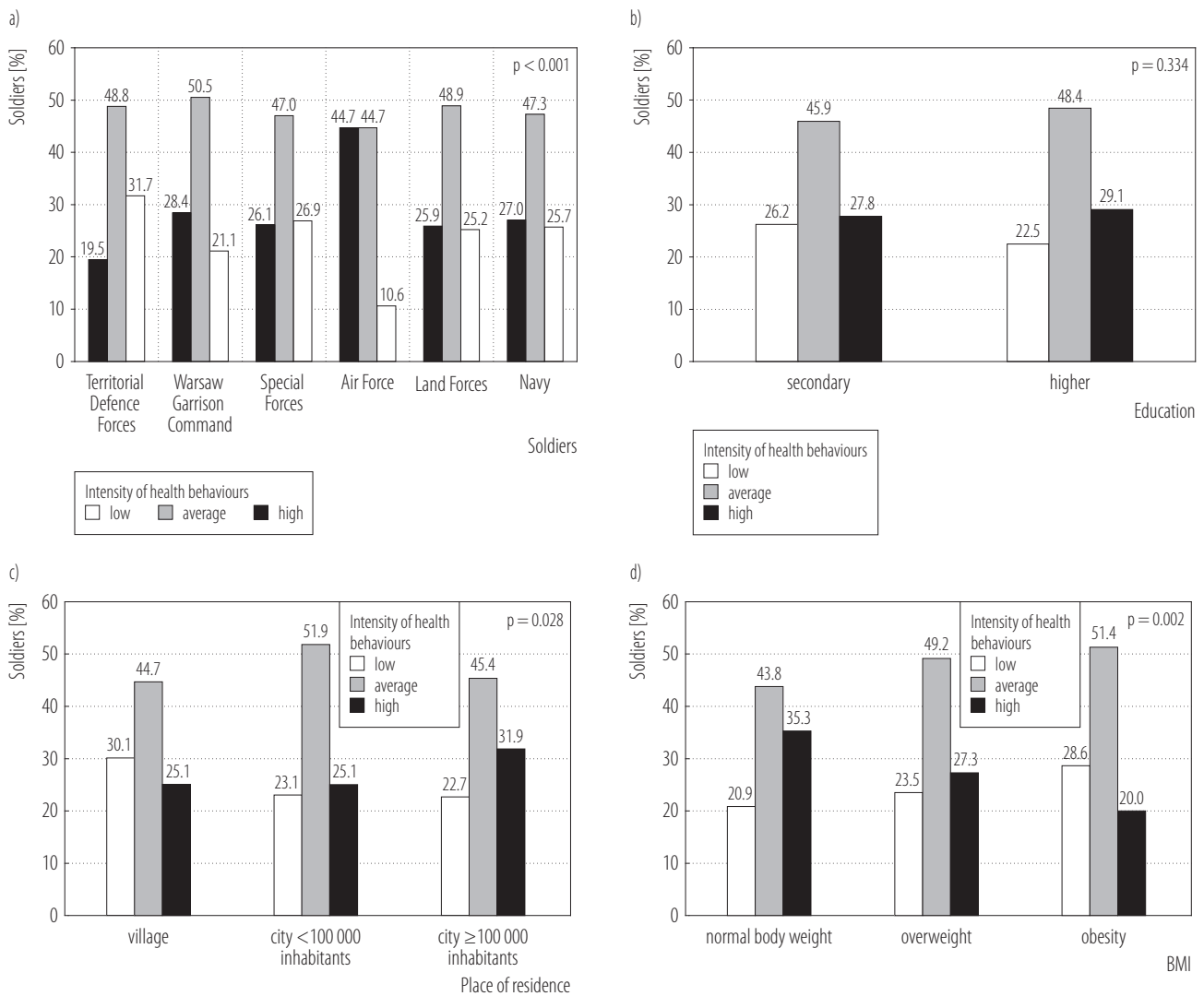


Figure 2. Intensity of health behaviors according to a) the type of the Polish Armed Forces, b) the level of education, c) the place of residence, d) the BMI of the soldiers, April 2018–October 2020, Poland

It was shown that the odds of anxiety were significantly higher among soldiers who reported a low fruit intake compared with soldiers who reported a high fruit intake. Furthermore, soldiers who reported a low fruit intake, low green vegetable intake and/or a high sugary drink intake had a higher odd of depression.

The results of our own study in terms of global assessment of health behaviors are higher than those noted by Arendt et al. [20] in studies assessing health behaviors of different groups. The study, conducted in a group

of 204 civil men 40–82 years old, showed a mean HBI of 76.28 pts.

In the group of men studied by Juczyński [18], a lower mean health behavior index score of 78.5 was also obtained. Considering the 4 categories of health behaviors, the soldiers in this study obtained higher scores in the categories of proper eating habits ($M = 3.37$), positive mental attitude ($M = 3.51$) and health practices ($M = 3.13$), compared to the group normalization (PNH – 2.85, PMA – 3.24, HP – 3.08). In contrast, lower mean scores

Table 4. Health behaviors among soldiers according to education level, place of residence, and body mass index (BMI), April 2018–October 2020, Poland

Variable	Health behaviors category																			
	Health Behavior Index total score			proper nutrition habits			prophylactic behaviors			positive mental attitude			health practices							
	M±SD	Me	min.–max	p	M±SD	Me	min.–max	p	M±SD	Me	min.–max	p	M±SD	Me	min.–max	p				
Level of education ^a				0.025 ^b				0.002				0.042				0.018				
secondary (N = 504)	78.75±13.33	80.00	13–115		3.29±0.75	3.33	0.83–5.00		3.19±0.77	3.17	0.33–5.00		3.49±0.67	3.50	0.33–5.00	0.415	3.08±0.61	3.17	0.67–4.67	
higher (N = 641)	80.74±12.12	81.50	31–115		3.43±0.74	3.50	1.00–5.00		3.28±0.69	3.33	1.00–5.00		3.52±0.66	3.50	0.83–5.00		3.17±0.56	3.17	0.83–5.00	
Place of residence ^b				0.040				<0.001				0.003				0.001				0.006
village (N = 219)	78.40±12.05	78.00	45–109		3.26±0.75	3.33	0.83–5.00		3.15±0.72	3.17	0.33–5.00		3.49±0.63	3.50	0.33–5.00		3.11±0.58	3.17	0.67–4.83	
city																				
≥100 000 inhabitants (N = 579)	79.59±12.12	81.00	39–112		3.36±0.72	3.33	0.83–5.00		3.21±0.67	3.17	1.00–5.00		3.51±0.65	3.50	1.33–5.00		3.14±0.56	3.17	0.83–4.67	
<100 000 inhabitants (N = 347)	80.55±13.21	82.00	13–115		3.42±0.76	3.50	1.00–5.00		3.29±0.76	3.33	1.00–4.83		3.51±0.69	3.50	0.83–4.83		3.13±0.60	3.17	0.83–5.00	
BMI ^b				<0.001				<0.001				0.003				0.012				0.006
18.50–24.99 kg/m ² (N = 389)	82.00±13.00	83.00	13–115		3.50±0.75	3.67	0.83–5.00		3.34±0.72	3.33	0.33–5.00		3.59±0.65	3.67	0.33–5.00		3.20±0.58	3.17	0.67–4.83	
25.00–29.99 kg/m ² (N = 554)	79.57±12.08	81.00	39–115		3.34±0.72	3.33	0.83–5.00		3.23±0.72	3.33	1.00–5.00		3.51±0.64	3.50	1.33–5.00		3.11±0.58	3.17	0.83–4.67	
≥30 kg/m ² (N = 185)	76.66±13.41	78.00	33–112		3.21±0.74	3.17	1.00–5.00		3.11±0.73	3.17	1.00–4.83		3.39±0.75	3.33	0.83–4.83		3.04±0.61	3.00	0.83–5.00	

^a p – U Mann-Whitney test result.

^b p – Kruskal-Wallis test result (between types of armed forces).

in this own study were obtained only in the category of preventive behaviors ($M = 3.24$) compared to the group of men surveyed by Juczyński ($M = 3.30$).

Health-preventive actions refer to avoiding diseases, as well as protecting oneself from them, and are related to various factors, which can include, for example habits, customs or attitudes towards health [21]. Other factors that underlie health behavior is mentioned in the literature. These are: the level of knowledge and skills of each individual regarding the determinants of health, the economic and political conditions of the country that determine the institutional capacity for health care, social conditions related to the perception of one's own health, as well as demographic factors and body weight.

The study found that the overall rate of health behaviors was significantly higher in soldiers with normal body weight compared to those diagnosed with obesity. This result is consistent with other studies [22], which found that as BMI increases, the rate of adherence to health-promoting practices decreases. In obese individuals, body weight correlates negatively, especially with PNH and PMA [23].

Although the analyses conducted do not provide a basis for causal inference, it can be speculated that failure to engage in health-enhancing behaviors may lead to obesity, but conversely, excessive body weight may hinder health-promoting practices, including, most notably, physical activity.

Previous analyses [24] showed that the Polish Army soldiers with $BMI \geq 30$ were significantly less likely to engage in moderate physical activity in the week preceding the survey ($p < 0.001$), while they spent significantly more time in front of the computer and television ($p = 0.003$), compared to normal-weight and overweight soldiers. Soldiers with a $BMI \geq 30$ were significantly more likely ($p = 0.001$) to reach for food when experiencing negative emotions and a bad mood (28.9% vs. 10.8%), and signifi-

cantly more likely to sweeten beverages ($p = 0.002$), compared to normal-weight soldiers (47.4% vs. 57.7%).

In this study, there was no significant correlation between the age of the subjects and health behaviors. Nevertheless, it was observed that in the age group >40 years old, the value of the PH and HP index increased significantly ($p < 0.05$). Kawalec et al. [23], on the other hand, observed that adherence to proper eating habits significantly decreased with age ($r = -0.04$). However, they showed that the other dimensions of health behaviors were not significantly affected by age. As differences in health behavior between age groups (>40 and <40 years old) were only found in the case of Navy soldiers, it can be concluded that the variable age is not important for the adoption of health behavior in the surveyed group of soldiers.

Significant differences were found between soldiers differing in their level of education with regard to health behaviors ($p < 0.05$). The fact that soldiers from the entire study group with higher education obtained significantly higher scores in such health categories as proper eating habits, preventive behaviors and health practices only confirm that knowledge and related health awareness can actually translate into daily behaviors. This is an important result, as it confirms the validity of educational activities on healthy lifestyles and related daily health-promoting behaviors. Similar observations were made by Fidecki et al. [25] in a study of the health behaviors of elderly men. Respondents with higher education presented a higher index of health behaviors, both in the global assessment and in each of the 4 categories. A statistically significant difference occurred in the global assessment, as well as in preventive behaviors ($p = 0.024$) and health practices ($p = 0.034$).

In the currently presented own research, a significant relationship was found between the place of residence of the surveyed soldiers and the index of health behaviors: 31.9% of those from the city showed a high level of health behaviors, while 30.1% of those living in the coun-

tryside showed a low rate of health behaviors. What is more, the presented results of the study indicate that soldiers living in cities exhibit a higher intensity of health behaviors in all categories compared to village residents. The result is consistent with the data available in the literature [8,20,26,27], in which the authors found a higher frequency of correct health behaviors in urban residents compared to village residents. This result may be related to the fact that the city offers greater opportunities and easier access to services aimed at promoting healthy lifestyles, such as a wide range of diet catering directly delivered home or workplace, a rich sports infrastructure (including, for example, an ever-expanding network of bicycle paths), various public events, such as family picnics dedicated to health and making residents aware of the impact of everyday, even the smallest behaviors on health. The aforementioned factors translate into the fact that in cities there is a kind of a trend for healthy lifestyle, which is evident, among other things, in the growing number of people who practice jogging or commute to their workplace by bicycle. Village residents, on the other hand, perceive difficulties in accessing preventive examinations and have a low opinion of the health education provided in the area, which, as the results of previous studies indicate, may be reflected in their health behaviors [28].

Finally, it is worth mentioning that a certain limitation of the presented research results may be the fact that a questionnaire tool was used to assess health behaviors, i.e., based on the self-reporting of the subjects and their declared frequency of engaging in health beneficial behaviors. This is a limitation typical of questionnaire studies and closely related to their specificity, but should be kept in mind when interpreting the results.

Moreover, due to the number of people surveyed in the different types of armed forces, the conclusions the authors have formulated apply only to the population of soldiers surveyed and one should be cautious in generalizing them to the entire population of armed forces soldiers.

In conclusion, the study of soldiers' health behaviors is one of the methods of assessing the health status of this population, providing results for the development of preventive programs and health promotion projects in the military environment. It should be noted that all interactions related to health promotion education are important elements in the process of shaping health-promoting attitudes in soldiers and encouraging them to engage in health-promoting behaviors. This is particularly important in the military environment, as it is dominated by men, who as studies indicate significantly more often than women engage in unhealthy behaviors [2,28] and are additionally exposed to high levels of stress due to the specifics of their service [7].

CONCLUSIONS

The study found that factors such as type of armed forces, body mass index, place of residence and level of education were significant for the adoption of health behaviors by Polish Army soldiers. The level of health practices was significantly higher among AF soldiers compared to soldiers of other types of armed forces. Soldiers with higher education, living in large cities and with normal body weight obtained better results in the presented health behaviors compared to soldiers with lower education, living in the countryside and with diagnosed obesity. The age of the subjects was not significantly related to health behaviors of the soldiers.

It seems necessary to further disseminate education on pro-health behaviors, especially among soldiers with diagnosed obesity through participation in organized training and psychodietetic consultations as part of the National Health Programme.

In conclusion, an important element of the prevention of civilization diseases in the military environment should be health promotion, consisting primarily in increasing awareness of factors determining health and the impact of everyday behavior on the psychophysical condition of the organism.

Author contributions**Research concept:** Agata Gaździńska**Research methodology:** Agata Gaździńska, Paulina Baran**Collecting material:** Agata Gaździńska, Marta Turczyńska**Statistical analysis:** Paweł Jagielski**Interpretation of results:** Agata Gaździńska, Paulina Baran**References:** Agata Gaździńska, Paulina Baran,

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