



# Comparison of healthy behavior in Ukrainian and Polish students of physical education

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## Abstract

**Introduction:** This study aimed to examine the healthy behaviors in undergraduate students of Physical Education (PE) from Ukraine and Poland in comparison to the control sample of students of other faculties. **Material and methods:** The group of 564 university students (67% of males), ranging in age from 18 to 41 years ( $M = 22.05$ ,  $SD = 2.49$ ), was surveyed using a written form of the Health Behavior Inventory (HBI). The HBI includes the following four subscales: healthy habits, nutrition (HHN), preventive behavior (PB), positive adjustments (PA), and healthy practices (HP). Undergraduates' sample consisted of 25% Ukrainian students of PE faculty, 30% Polish PE students, and 45% Polish sample of other faculty's students. **Results:** Overall, the undergraduates were presented with a low level of the total HBI. Both Ukrainian and Polish PE students scored higher than their other faculties' peers in the Total HBI, HHN, PB, and PA scales. Women scored significantly higher than men in the Total HBI, HHN, and PB scales. The interaction between faculty and gender was also found in the total HBI, HNN, and HP scores. **Conclusions:** The Polish Health Education curriculum at universities should be improved to increase PE students' healthy behavior as future teachers. New health promotion programs should be implemented at campuses and universities to maintain and improve a healthy lifestyle among students. These health prevention programs' main aim is to motivate students, be more responsible for their health, engage more in physical activity, learn effective coping with stress strategies, and practice healthy eating habits and other wellness forms.

**Keywords:** health-related behavior, health-risk behavior, gender differences, physical education students, undergraduates

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## INTRODUCTION

Physical and mental health is related to a healthy lifestyle. Healthy behavior (HB) is defined as "personal attributes such as beliefs, expectations, motives, values, perceptions, and other cognitive elements; personality characteristics, including affective and emotional states and traits; and overt behavior patterns, actions and habits that relate to health maintenance, to health restoration and health improvement" [1]. Health-related behavior includes such practices and habits as moderate to a high level of physical activity, maintaining a healthy diet, appropriate duration time of sleep, psychological adjustment related to coping with stress, optimism, and care of the positive social relationship, as well as preventive behaviors, such as preventive examinations, following the doctor's instructions [2]. On the other hand, health risk behavior comprises sedentary behavior, excessive use and abuse of psychoactive substances (e.g., nicotine, alcohol, drugs), pathological use of computer or Internet, gambling, violence and aggressive behavior, or risk-taking sexual behaviors. An unhealthy lifestyle contributes to obesity, emerging major chronic diseases, increasing the risk of mortality, and higher healthcare costs [3, 4]. Research indicates that various categories of health-related behavior are interrelated [5].

Healthy habits may result from learning from parents and other family members, as well as from teachers and school peers [6]. Notably, an essential role in promoting HB plays physical education (PE) teachers, who should be modeling a healthy lifestyle in his/her student. However, research indicates that Polish PE teachers do not positively stand out from the general population in health-related behavior [7, 8]. The present study focuses on PE university students' healthy behavior in the comparison between Polish and Ukrainian samples.

The student lifestyle is usually related to a higher risk of unhealthy behaviors, such as excessive smoking, alcohol, and illicit substance use. Together with a high level of stress, sedentary behavior, and poor dietary habits, this behavior may overall contribute to poorer mental and physical health [9]. Research indicates that university students reported more psychological distress and engaged in fewer positive health behaviors across all health behaviors than the general population [2, 10]. Students of various faculties demonstrate a low level of healthy behavior [11]. Numerous studies indicated that Polish students of PE faculty showed rather unhealthy lifestyles and a higher risk of alcohol and drug use [12-15]. However, Litwic-Kamińska and Izdebski [16] showed that PE students practicing academic sports have higher healthy behavior levels. Also, Wells et al. [10] found that US undergraduate athletes consumed breakfast more frequently than students of other faculties. Radzimińska et al. [17] have examined healthy behavior in Polish students from such university faculties as physiotherapy, nutrition, logistics, and national security. Overall, the study found an average level of health-related behavior among students. However, the various categories of health-related behavior were even lower than in the general population. The other study [18] found a higher level of healthy behavior among physiotherapy faculty students compared to other faculties (e.g., tourism and recreation, PE, and pedagogy). Baumgart et al. [19] examined health behaviors among young people studying Physiotherapy. These students' mean scores were similar to the general population, without statistically significant differences between men and women. In contrast, some other studies found significant differences between male and female university students' healthy behavior [5, 17]. Women usually scored higher than men in health-related behavior.

Yakymenko et al. [20] report that the prevalence of poor health among Ukrainian young adults is much higher than in Western Europe. Pavlova et al. [21] also found that Ukrainian adolescents with low physical activity levels had a lower quality of life. On the other hand, Ukrainian university students have much better adherence to healthy lifestyle behaviors than Ukraine's adult population. Yakymenko et al. [20] reported a low percentage of overweight students (7.1%) and a relatively high level of physically active students, especially among males (74.7%). On the other hand, only 47.4% of surveyed students consumed a sufficient amount of fruits and vegetables, and only 45.5% consumed milk and dairy products daily. Bergier et al. [22] found in a large sample of Ukrainian students that the consumption of meals is more regular among male students than female students. Females more frequently avoided eating and worried about the loss of control overeating and significantly more often applied exercises to reduce body weight, while males to gain bodyweight. A more recent study [23] showed a significantly higher level of physical activity among students from Visegrad countries

(e.g., Hungary, Slovakia, the Czech Republic, and Poland) than in Ukraine. However, the level of physical activity and the amount of leisure time did not differentiate both groups. Overall, a lower level of physical activity was found in females compared to males.

### *Purpose*

Previous studies indicate that PE students show a similar level of health-related behavior to the general population. This result is not optimistic because we would expect future physical and health education teachers much higher levels of a healthy lifestyle. Moreover, the studies mentioned above have used different methods for assessing a healthy lifestyle. Thus, the results of this study cannot be compared with each other. Besides, most of the research was conducted concerning the selected dimension of a healthy lifestyle. A little is known about a broad spectrum of health-related behavior (e.g., healthy diet, preventive behavior, positive psychological adjustments, and healthy practices) among Polish and Ukrainian university students. Finally, the most interesting are potential differences in healthy behavior between Polish and Ukrainian PE students. However, to the best of our knowledge, different healthy behavior dimensions (apart from physical activity) have never been compared between Polish and Ukrainian PE students. This study's main aim is to examine healthy behaviors in undergraduate students of PE faculty from Ukraine and Poland in comparison to the control sample of students of other faculties. Gender differences will also be examined. We believe that the Polish and Ukrainian PE students' comparison may show the cross-cultural differences in attitude towards a healthy lifestyle. According to previous studies using the HBI [16, 19], we hypothesize that PE students present an overall moderate level of healthy behaviors (the Total HBI), and all scales of the HBI are positively interrelated. PE students will demonstrate higher scores in HB than undergraduates of Other Faculties (OF) [5, 24]. We assume that female students score higher in HB than male undergraduates [5, 18]. Additionally, we will explore cross-cultural differences between Ukrainian and Polish students of PE faculty for the first time.

## **MATERIAL AND METHODS**

### *Participants*

The participants were 564 undergraduates, including PE Ukrainian students (PEUK,  $n = 140$ , 25% of the total sample), PE Polish students (PEPL,  $n = 171$ , 30%), and the control sample (OFPL,  $n = 253$ , 45%) of Other Faculty's students from Poland (i.e., Automation and Robotics, Mechanical Engineering, Electrotechnics, IT Education, Civil Engineering and Sociology). The detailed information about the number of students in particular faculties is presented in Table 1. The age ranges between 18 and 41 years old ( $M = 22.05$ ,  $SD = 2.49$ ). Among participants prevailed males ( $n = 376$ , 67%).

### *Measure*

The Health Behavior Inventory (HBI) was developed by Juczyński [25]. The HBI is a self-reported questionnaire consisting of 25 statements describing various health-related behaviors. For each question, participants were asked to estimate the frequency of time they performed each behavior on a 5-degree Likert scale (1 = *Almost never*, 2 = *Rarely*, 3 = *From time to time*, 4 = *Often*, and 5 = *Nearly always*). The total score of the HBI is a sum of all answers, ranging from 24 to 120 points, and a higher total HBI score means a healthier behavior. The total HBI includes four subscales: Healthy Habits Nutrition (HHN; type of foods, well-balanced diet), Preventive Behavior (PB; health recommendations, health, and disease information), Positive Adjustments (PA; psychological factors, such as avoiding too strong emotions, stress, anxiety, and depressive situations), and Healthy Practices (HP; sleep habits, recreation, and physical activity).

According to the guidelines [26], the translation and cross-cultural adaptation processes were conducted for the Ukrainian version of the HBI. The Ukrainian version of the Health Behavior Inventory was conceptually equivalent to the Polish version. The questionnaire's reliability in the Polish version was satisfactory for the total HBI (Cronbach's  $\alpha = 0.85$ ) and acceptable for subscales, with Cronbach's  $\alpha$  ranging between 0.60 and .65 [25]. In the present study, the internal consistency was also satisfactory for the total HBI (Cronbach's  $\alpha = 0.82$ ) but lower for the HHN, PB, PA, and the HP subscales (with Cronbach's alphas of 0.74, 0.67, 0.58, and 0.49, respectively).

Table 1. Sample characteristic

Faculties		n	%
Physical Education Faculty (Ukraine)	Physical Education	76	13.48
	Physical Rehabilitation	64	11.35
	Total	140	24.82
Physical Education Faculty (Poland)	Physical Education	143	25.35
	Physiotherapy	28	4.96
	Total	171	30.32
Other Faculties (Poland)	Automation and Robotics	41	7.27
	Electrotechnics	48	8.51
	Mechanical Engineering	22	3.90
	IT Education	26	4.61
	Civil Engineering	63	11.17
	Sociology	53	9.40
	Total	253	44.86

### Procedure

The cross-sectional study was performed concurrently in the Ukraine and Poland, during classes at University, with lecturers' consent. Students completed the HBI voluntarily and anonymously. Participants completed a paper-and-pencil inventory regarding general health behaviors. A research sample based on a convenient selection of available groups of students at the university. E-mails were sent to academic lecturers asking them to share a group of students (on 15 minutes) during their classes in order to conduct a survey. The research was conducted after mutual agreement with the lecturers of the time and place of research at the university, and with the consent of the students.

### Statistical analysis

The analysis of the reliability of the HBI scales was performed using Cronbach's  $\alpha$  coefficient. Descriptive statistical analysis included Mean (M), Standard Deviation (SD), and Kolmogorov-Smirnov  $d$  (KS-d) statistics. The two-way ANOVA was used to examine differences between gender (Women, Men) and faculty samples (PEUK, PEPL, and OFPL) in the HBI scales. The significant intergroup differences were assessed with the Fisher's Least Significant Difference (LSD) post-hoc test. Besides, partial eta-square was calculated for effect size. All statistical analysis was conducted by using the STATISTICA 13.1 software.

## RESULTS

The descriptive statistics and KS- $d$  revealed normal distribution and satisfactory properties for parametric tests in particular groups representing gender and faculty. The descriptive statistics, such as Range of scores (Min – Max), Means (M), Standard Deviations (SD), 95% of Confidence Intervals (CI), and Pearson's  $r$  correlation coefficients, are presented in Table 2. A positive correlation between all scales of the HBI was found, at a high level of significance ( $p < 0.001$ ). The outcomes were converted to the Sten scores to compare to the general population. The Sten scores indicate that most of the students have both low level (1-4 Sten scores;  $n = 262$ , 46%) and moderate level (5-6 Sten scores;  $n = 223$ , 40%) of health-related behavior, whereas the only 13% of undergraduates score highly (7-10 Sten scores;  $n = 79$ , 14%).

Table 2. Descriptive statistics for the total sample of undergraduates ( $N = 564$ )

HBI scales	Min	Max	M	SD	95% CI		Intercorrelation			
					LL	UL	Total HBI	HHN	PB	PA
Sten score	1	10	4.68	1.73	1.63	1.83				
Total HBI	33	117	75.28	12.44	11.75	13.21				
HHN	1	5	2.98	0.73	0.69	0.77	0.79***			
PB	1	5	3.03	0.78	0.73	0.82	0.80***	0.53***		
PA	1	5	3.43	0.61	0.57	0.65	0.70***	0.35***	0.45***	
HP	1	5	3.11	0.65	0.61	0.69	0.70***	0.43***	0.34***	0.36***

\*\*\* $p < 0.001$ .

Table 3. Means, Standard Deviations, and Two-Way ANOVA Statistics for health behavior

HBI Scales		Women		Men		Effect	F	df	$\eta_p^2$
		M	SD	M	SD				
Total HBI	PEUK	3.32	0.43	3.31	0.44	F x G	4.66**	2.557	0.02
	PEPL	3.21	0.53	3.16	0.49	G	7.15**	1.557	0.01
	OFPL	3.25	0.59	2.94	0.49	F	7.75***	2.557	0.03
HHN	PEUK	3.25	0.66	3.13	0.59	F x G	4.91**	2.557	0.02
	PEPL	3.08	0.71	2.98	0.74	G	14.22***	1.557	0.02
	OFPL	3.24	0.75	2.73	0.72	F	3.47*	2.557	0.01
PB	PEUK	3.43	0.65	3.45	0.60	F x G	2.44	2.557	0.01
	PEPL	3.11	0.77	2.96	0.78	G	5.24*	1.557	0.01
	OFPL	3.06	0.83	2.73	0.71	F	23.33***	2.557	0.08
PA	PEUK	3.47	0.53	3.53	0.50	F x G	0.92	2.557	0.00
	PEPL	3.50	0.63	3.54	0.57	G	0.01	1.557	0.00
	OFPL	3.40	0.62	3.29	0.65	F	4.68**	2.557	0.02
HP	PEUK	3.12	0.56	3.13	0.59	F x G	3.03*	2.557	0.01
	PEPL	3.14	0.64	3.16	0.55	G	2.15	1.557	0.00
	OFPL	3.30	0.73	3.01	0.70	F	0.11	2.557	0.00

HBI = Health Behavior Inventory; HHN = Healthy Habits Nutrition; PB = Preventive Behavior; PA = Positive Adjustments; HP = Healthy Practices; G = Gender; F = Faculty. PEUK = students PE faculty from Ukraine; PEPL = students of PE faculty from Poland; OFPL = students of other faculties from Poland. \* $p < 0.05$ , \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

The intergroup comparison in the HBI was conducted here using 2 (Gender: Women, Men) x 3 (Faculty: PEUK, PEPL, OFPL) two-way ANOVA. As it is shown in Table 3, the main effect for gender regards the Total HBI, HHN, and PB scales. The LSD posthoc test showed that Women scored significantly higher than men in these healthy behavior dimensions ( $p < 0.001$ ). The faculty's main effect was significant for the Total HBI, HHN, PB, and PA scales. The LSD posthoc statistics demonstrate that PEUK, PEPL, and OFPL differ significantly from each other ( $p < 0.001$ ). The interaction between faculty and gender was also significant in the Total HBI, HNN, and HP. The details of differences in the total HBI show in Fig.1. It is important to note that the effect size is not large in the ANOVA tests and ranges between 0.01 too 0.03 in most scales of the HBI. It is mean that gender and faculty explain a small percentage of the HBI variance. The largest effect size was found in the faculty, differences in the PB scale (equal. 08), but it is still a weak association.

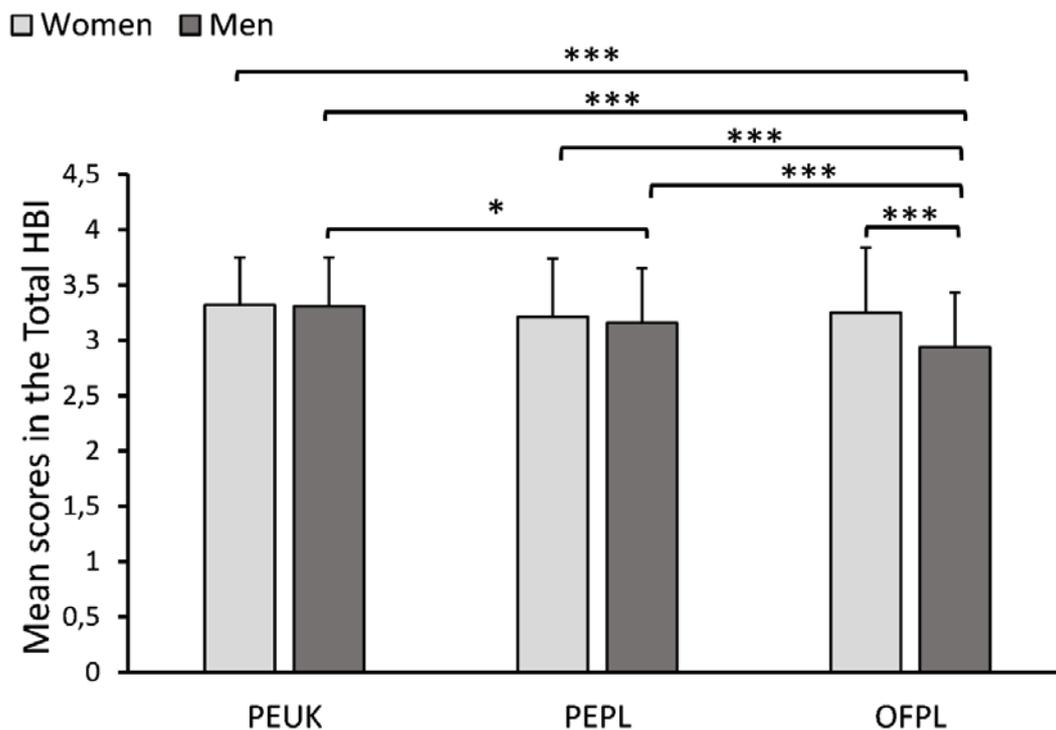


Figure 1. The Total HBI mean scores of the female and male undergraduates: PEUK = Physical Education Ukrainian students, PEPL = Physical Education Polish students, and OFPL = Other Faculties Polish students. The error bars are standard deviation. Significant differences between groups are highlighted by \* $p < 0.05$ , \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

## DISCUSSION

The study compared healthy behaviors in three samples of undergraduates: students of PE faculty from Ukraine and Poland and a control group of students of other faculties at Polish universities. Overall, this study indicated that university students have lower levels of healthy behavior than the general population. It is not consistent with previous studies [16, 19], which showed rather average (or even above) scores in the Total HBI among university students in Poland. However, it is essential to note that previous research revealed systematically that the college and university student population presents an unhealthy lifestyle [9]. Some research performed in Poland also indicates that students' lifestyle is far apart from the recommendations of an expert in public health [11]. Thus, the inconsistency between these particular studies may be related to distinct measurement methods or the specific culture of the student sample.

The result of this study showed that the scales of the HBI are positively interrelated. It is consistent with the assumption and numerous previous research [5, 24]. Litwic-Kamińska and Izdebski [16] found the relationship between physical activity and other health behaviors among students of various faculties in Poland. The more frequently individuals undertake activity, the greater effort they put into proper nutrition and health prevention and display a more positive psychic attitude. It has also been proven that the social environment (the specialization of education) and gender modifies the lifestyle. The highest level of activity is presented by the group of sportsmen, the lowest – by the groups of pedagogy and information technology students. On the other hand, recent research [27] showed that university students who reported engaging in multiple health risk behaviors, especially high alcohol and cigarette/marijuana use, were also more likely to report poorer mental health.

The hypothesis that PE students will demonstrate higher scores on the HBI scales than undergraduates of other faculties is fully confirmed in this study. These trends were repeated in the HHN, PB, and PA scales. This result is consistent with some of the previous studies that indicate that

PE students, in particular, who participate in university sport, scored higher in the HBI than those undergraduates who studied at the other faculties [16, 18]. Palacz [18] has shown that students of physiotherapy faculty present the highest average level of the HBI compared to students of the tourism and recreation faculty. Moreover, a higher level of health-related behavior was associated with higher physical activity levels (PA). However, in contrast, some other research showed that PE students demonstrate rather anti-health than health-oriented lifestyle [11, 13].

As it was predicted, the study found gender differences in HB. Results indicate that female undergraduates score higher than males in the Total HBI and the HHN and PB scales. This result is consistent with previous studies performed in the student population [5, 16]. Palacz [18] also found a higher average rate of HBI in female physiotherapy students than male ones. The present study also found an interaction effect between gender and faculty in the Total HBI and the HNN and HP scales. It seems likely that faculty selection is stereotypically related to the traditional social roles of men and women. A systematic review indicates that females tended to be more health-conscious and engaged in preventive behavior [28]. Gender norms were recognized as one of the major social determinants of health and gender norms that may have implications for an individual's health behavior [29]. The relatively high prevalence of risky behaviors among undergraduate students suggests that risky behaviors are considered normative behavior in this population, particularly among men [30].

Ukrainian male PE students showed a higher level of the total HBI and HP scale than Polish PE students. The cross-cultural differences in four dimensions of HB were explored here for the first time between Ukrainian and Polish PE faculty students. Yakymenko et al. [20] demonstrated that the vast majority of Ukrainian university students have average Body Mass Index (BMI, 7.1% of respondents were overweight) and sufficient level of regular physical activity (at least 2.5 h per week), in particular among male students. Female university students were significantly less physically active than the male population. However, inadequate nutrition level (low daily milk consumption and improper level of fruit and vegetable consumption) was also noted in Ukrainian students. Zalewska-Puchała et al. [31] have examined healthy behavior among Ukrainian undergraduates as a prevailed group of international students undertaking education in Poland. The study results revealed that most of the Ukrainian adults studying at Polish universities participate in physical activity. Among Ukrainian PE students, participation in sports clubs beside PE classes is an essential part of building a healthy culture. Polish students of the other faculties exercise because of physical well-being and mental health. The motives of PA in Ukrainian students of different faculties include promoting healthy lifestyles and improving health and knowledge.

The cross-cultural differences may also be related to a different method of studying both PE and health education (HE) in Ukraine and Poland. Studies at the PE faculty can be started by those among Ukrainian high school graduates who have the most top grades in high school and pass the entrance examination (stress test). In contrast, Polish physical education faculties do not expect the candidates the best grades from high school or the fitness test's physical condition. Everyone willing may study PE at a Polish University. Both Polish and Ukrainian PE students participate in HE classes. However, the program is short and seems to be insufficient. In Ukraine, a unique course is required to conduct HE in primary and secondary schools. These specialistic HE courses are organized with high quality and use modern, innovative teaching methods (financed by European Union projects). Thus, Health Education is taught in Ukrainian schools at a very high level, and the process of learning is under control, systematic monitoring, and evaluation. Current PE students in Ukraine participated in these high-quality health education classes. It may explain higher scores in the HBI among Ukrainian students when compared to Polish PE undergraduates. On the other hand, Polish PE students do not have to take additional courses to become a HE teacher. There is also a lack of national monitoring that regards the efficacy of health education in Poland.

The study research demonstrates a need for the implementation of special programs of health promotion and health education in all fields of study, including Physical Education. A recent study [32] showed that the mutual learning program of physical education might improve students' physical and mental fitness in Ukraine. Universities seem an ideal setting for implementing health promotion programs to motivate students to be more responsible for their health, engage more in physical activity, and practice healthy eating habits and other wellness forms [33]. Calamidas and Crowell [34] showed that guided assignment to identify students' perceptions of negative behaviors, the

consequences of the behaviors, and positive alternative behaviors to adopt, may play a pivotal role to engage in health behavior change. Such healthy behaviors as regular physical exercise and better eating habits should be supported by friends and family, internal motivation, and goal-setting. Universities must facilitate this process by providing helping services targeted at those with the highest risk and developing training to improve coping skills.

Baranowski et al. [35] evidenced that improving health education teachers' wellness by increasing their health knowledge, motivating and enhancing their skills to promote students' behavior change, and improving their health role-modeling has an impact on both teacher and student health. The research suggests that interventions targeting specific student groups with similar patterning of multiple health-risk behaviors are necessary, and greater emphasis should be placed on supporting health-protecting practices of diet, physical activity, and sleep [36]. The results of the study by Shannon et al. [37] suggest that the promotion of autonomy motives and enhanced perceived behavioral control may offer the opportunity to facilitate effective self-management of mental health among students. The study [38] highlighted the importance of consulting college students when developing healthy eating interventions across the campus (e.g., labeling healthy food options and information campaigns) and considering individual-level factors and socio-ecological aspects analysis. Monitoring and prioritization of effective strategies is the only way to improve university student health [39].

Bíró et al. [40] postulate that examination of a future public health professional among students should be the priority in health science. A better understanding of public health students' health and its determinants is necessary to improve counseling services and tailor them to demand [41]. The fundamental goal of health education and health promotion is to shape healthy habits in students from the youngest age, which will lead to well-being and mental and physical health throughout life. PE teachers' role in the broad area of health education, promotion, and prevention is particularly of value in Poland [42]. A physical education teacher in Poland should present theoretical knowledge, competencies, and skills necessary to promote health education at primary and high schools. Thus, research on PE undergraduate students' health-related behavior should be conducted systematically to monitor and change healthy behavior among future PE teachers, who will be modeling a healthy lifestyle in children and adolescents. Recent research [43] among both Ukrainian PE students and teachers found that the developed model of five blocks and their components (the diagnostic, professional, analytical, and corrective stages and tasks to each of them) is effective in the sample of four Ukrainian Universities. Thus, the Polish Staff of PE educators at universities should cooperate with Ukrainian PE instructors and lecturers to implement the most effective research-based strategies.

## CONCLUSIONS

Early adulthood seems to play a crucial role in shaping individual patterns of healthy lifestyles. A health-promoting lifestyle is an essential determinant of health status and is recognized as a significant factor for the maintenance and improvement of health. Unfortunately, the present research indicates that the level of a healthy lifestyle is alarmingly low among university students, even in those who will teach health education in the future. There is a need to improve the health education curriculum at Polish universities, using evidence-based practice. The special HE programs and advanced specialistic HE training should be implemented among PE students as well. This kind of program was used in Ukrainian schools and have shown high effectiveness. Systematic monitoring and evaluation of the efficacy of Health Education in primary and secondary schools would help develop the HE curriculum at universities. Both Polish and Ukrainian universities should conduct interventions directed at specific groups of students to improve students' health behavior.

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