



## Does health-related college major have an effect on health-promoting behaviors? Evidence from Iranian's staff

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### ABSTRACT

**Background:** Health-promoting behaviors and lifestyle changes can reduce the cost of health services, stress, and disease complications. This study examined the status of health-promoting behaviors and its influencing factors.  
**Methods:** This cross-sectional study was conducted on 171 staff members of Zanjan University of Medical Sciences, Iran, in 2023. The Persian version of the health-promoting lifestyle profile II questionnaire was used. Analyses were performed in R 4.3.2 software.

**Results:** Mean  $\pm$  SD age was  $37.67 \pm 7.58$  years. 83 % had the low levels of health-promoting behaviors, while 17.0 % had moderate levels. The physical activity and interpersonal relation had the lowest and highest scores. The most significant strong and weekly correlations was between health responsibility and physical activity with total score of health-promoting behavior scores ( $r = 0.81$ ,  $r = 0.66$ ). Staff with health-related college major performed better in the areas of nutrition, stress management, spiritual growth.

**Conclusion:** Health-related college major is the most important factor affecting health-promoting behaviors. Also, health responsibility is most related to these behaviors. Educational interventions should be done at the community level, regardless of people's field of study, to increase people's knowledge and awareness about risk factors and improve the level of health.

### 1. Introduction

According to the definition of the World Health Organization, "health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (Svalastog et al., 2017). Health behaviors are a set of activities that affect the health status and the risk of diseases. These health behaviors include high-risk behaviors and health-promoting behaviors (Jahangard et al., 2019). Health-promoting behaviors are one of the most important determinants of human health and empower people to control their own health and the society health. These behaviors are considered as a preventive factor of many diseases and affect the lifespan and their life expectancy (Bayati et al., 2018; Bieyabanie and Mirghafourvand, 2020). Health-promoting behaviors (such as physical activity, healthy eating, stress management, sleep hygiene, and healthy communication) and lifestyle changes can reduce the cost of health services, stress, and disease complications (Chahardah-Cherik et al., 2018; Ross et al., 2017). In Chudasama et al.'s study, the average life expectancy of men with the healthiest lifestyle is

7.6 years and for women is 6.5 years more than those who reported the lowest lifestyle score. The highest decrease in life expectancy in these people was related to smoking. At the age of 45, current smokers have a shorter life expectancy of about 5–6 years compared to non-smokers. Regular physical activity also increases life expectancy by 1 to 2.5 years compared to people who do not have regular physical activity (Chudasama et al., 2020).

Health-promoting behaviors have an effect on both communicable and non-communicable diseases. Non-communicable diseases such as cardiovascular diseases, diabetes, chronic respiratory diseases and cancers account for about 74 % of all-cause deaths worldwide. Behaviors related to lifestyle such as insufficient physical activity, smoking, harmful use of alcohol and unhealthy food consumption are among the risk factors of these diseases (Yenit et al., 2023). Unhealthy behaviors that manifest themselves in the form of high blood pressure, diabetes, obesity and other metabolic risk factors can cause premature death and jeopardize the achievement of sustainable development goals, which is a 33 % reduction in premature death from non-communicable diseases by

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2030 (Bermeo et al., 2023). The role of health-promoting behaviors in re-emerging infectious diseases such as tuberculosis has also been shown. Although tuberculosis is a disease related to immune dysfunction, healthy behaviors can improve the immune system. Low levels of health-promoting behaviors have been observed before diagnosis and during treatment of this disease (Tsai et al., 2016).

It has been done in different studies in different societies to investigate the status of these behaviors and the factors affecting them. Age, gender, health status, education level, marital status are among the factors that influence health-promoting behaviors (Hwang and Oh, 2020; Maglione, 2021; Rababa et al., 2021). Due to the fact that behaviors can be different in different societies and cultures, in this study we investigated the status of health-promoting behaviors among the employees of Zanjan University of Medical Sciences, which is one of the cities of Iran. Also, we investigated the factors affecting these behaviors. By knowing the current situation and the factors that affect the occurrence of these behaviors and making the research results available to the policy makers of the health system, it is possible to design and implement intervention programs to improve the existing situation.

## 2. Method

This cross-sectional study (ethics code: IR.ZUMS.REC.1401.375) was conducted on administrative staff of Zanjan University of Medical Sciences who were outside of the hospital, treatment center, and health center and had no contact with patients. All staff who did not have a disability or incurable diseases and were informed and willing to participate in the study were considered. Data was gathered from April to July 2023.

First, the researcher explained the purpose of the study and after staff signed informed consent, they completed a demographic form and a health-promoting lifestyle profile II (HPLP II) questionnaire. Demographics includes age, gender, marital status, education level (bachelor, master/ Ph.D.), body mass index (BMI, kg/m<sup>2</sup>), and college major. We considered college fields at two levels: health-related college majors, and other. Medicine, Biology, Medical Librarianship, Biotechnology, Health Education, Environmental Health, Microbiology, Food Industries, Pharmacy, Biomedical Engineering, Midwifery, Public Health, Nursing, Psychology, Laboratory Sciences, and Health Professional were categorized as health-related college majors and Financial Management, Information Technology, Accounting, Chemistry, Sociology, English Language, and Statistics as other.

The HPLP II questionnaire was first developed in 1987 by Walker et al. It is designed to assess health-promoting behaviors (Walker et al., 1987). The 52-items questionnaire contains six subscales, and each item has a 4-point Likert scale: never (score 1), sometimes (score 2), often (score 3), and always (score 4). The validity and reliability of the Persian version of the HPLP II was checked by Hosseini et al. in 2011. They reported Cronbach's alpha 0.95 for the entire questionnaire and ranged from 0.70 to 0.81 for the six subscales (Mohammadi Zeidi et al., 2011).

The six subscales are *nutrition* 9 items (2, 8, 14, 20, 26, 32, 38, 44, 50), *physical activity* 9 items (4, 10, 16, 22, 28, 34, 40, 46), *health responsibility* 9 item (3, 9, 15, 21, 27, 33, 39, 45, 51), *stress management* 9 items (5, 11, 17, 23, 29, 35, 41, 47), *interpersonal relation* 9 items (1, 7, 13, 19, 25, 31, 37, 43, 49), and *spiritual growth* 9 items (6, 12, 18, 24, 30, 36, 42, 48, 52). The score for each subscale is calculated by summing the scores of related items, and the total score is calculated by summing of 52 items. In all subscales, the higher the score, the better the lifestyle. Because the six subscales had different number of questions, we also reported scores for each subscale ranging from 1 to 4 by dividing the subscale score by the number of questions. The total score, ranging from 52 to 208, was divided into three levels: low (below 150), moderate (150 to 201), and good (above 201) (Walker et al., 1987).

The normality of the total score of the health-promoting behaviors and its six subscales was assessed by Kolmogorov-Smirnov or Shapiro-Wilk tests. The health-promoting behaviors and its six subscales were

compared across demographic variables using independent T-test and one-way ANOVA. The heat map of Pearson correlation was used to show association between total score of the health-promoting behaviors with its six subscales. To assess the simultaneous effects of demographic variables on each subscale and the total score of health-promoting behaviors, we performed a multiple regression model with stepwise selection variables. In the stepwise selection model, the entry and removal P-values were 0.05 and 0.10, respectively. Analyzes were performed using R 4.3.2 software.

## 3. Results

Mean ± Standard Deviation (SD) age of 171 persons was 37.67 ± 7.58 in range from 24 to 59 years. According on Table 1, the majority of staff were in age group 35–44 years (43.3 %), female (62.0 %), married (73.7 %), with college major not related-health fields (54.4 %), and with graduate education (68.4 %). The minimum and maximum BMI were 15.29 and 55.85 with mean ± SD equal to 25.45 (3.97). About fifty-six percent of people was obese or over weight.

Table 2 includes mean ± SD, minimum and maximum of health-promoting behaviors. Based on the total score of health-promoting behaviors, 142 (83.0 %) persons had the low level of health-promoting behaviors. Only 29 (17.0 %) persons had moderate level of health-promoting behaviors and no one had high level of health-promoting behaviors. In Table 2, the mean ± SD of subscales is reported in scale 1–4 to compare different subscales. Among six subscales of health-promoting behaviors, *physical activity* and *interpersonal relation* had the lowest and highest score, respectively. Score of all six subscales of health-promoting behaviors was higher in people with moderate level (Fig. 1).

Also, the correlation between different subscales and total score of health-promoting behaviors was plotted in Fig. 2. Except for the correlation between *physical activity* and *interpersonal relation*, there were positive significant correlation between different subscales and total score. The most significant strong and week correlations were between *health responsibility* and total score (r = 0.81) and *physical activity* and *spiritual growth* (r = 0.30). See (Table 3).

There were not significant differences in six subscales and total score of health-promoting behaviors by age groups, gender, education level and BMI. Single staff had better status in terms of *physical activity* and *spiritual growth*. Staff with health-related college major had higher score in *nutrition*, *stress management*, and *spiritual growth*. Also, total score of health-promoting behaviors was significantly higher in staff with study field as health professions education.

In order to investigate effective demographic characteristics on health-promoting behaviors, multiple linear regression with stepwise variable selection were performed for each of six subscales and total

**Table 1**  
Demographic characteristics in staff of Zanjan University of Medical Sciences, 2023.

Variable	Category	Frequency	Percentage
Age (years)	≤ 34	62	36.2
	35–44	74	43.3
	≥ 45	35	20.5
Gender	Female	106	62.0
	Male	65	38.0
Marital status	Single	45	26.3
	Married	126	73.7
	College major	Health professions education	78
	Other	93	54.4
BMI (kg/m <sup>2</sup> )	< 18.5	6	3.5
	18.5–25	70	40.9
	25–30	82	48.0
	≥ 30	13	7.6
Education	Bachelor	54	31.6
	Master/ Ph.D.	117	68.4

**Table 2**  
Mean ± SD, minimum, and maximum total score and six subscales of health-promoting behaviors in staff of Zanjan University of Medical Sciences, 2023.

Health-promoting lifestyle profile	Mean ± SD	Minimum	Maximum	In scale 1–4 Mean ± SD
Nutrition	20.68 ± 3.13	12.00	28.00	2.58 ± 0.39
Physical activity	17.71 ± 4.54	8.00	29.00	2.21 ± 0.57
Health responsibility	29.95 ± 4.81	14.00	43.00	2.48 ± 0.40
Stress management	12.01 ± 2.50	5.00	18.00	2.40 ± 0.50
Interpersonal relation	22.48 ± 3.99	12.00	31.00	2.81 ± 0.50
Spiritual growth	29.59 ± 4.98	16.00	39.00	2.69 ± 0.45
Total	132.23 ± 17.44	82.00	179.00	2.54 ± 0.33

SD: Standard Deviation

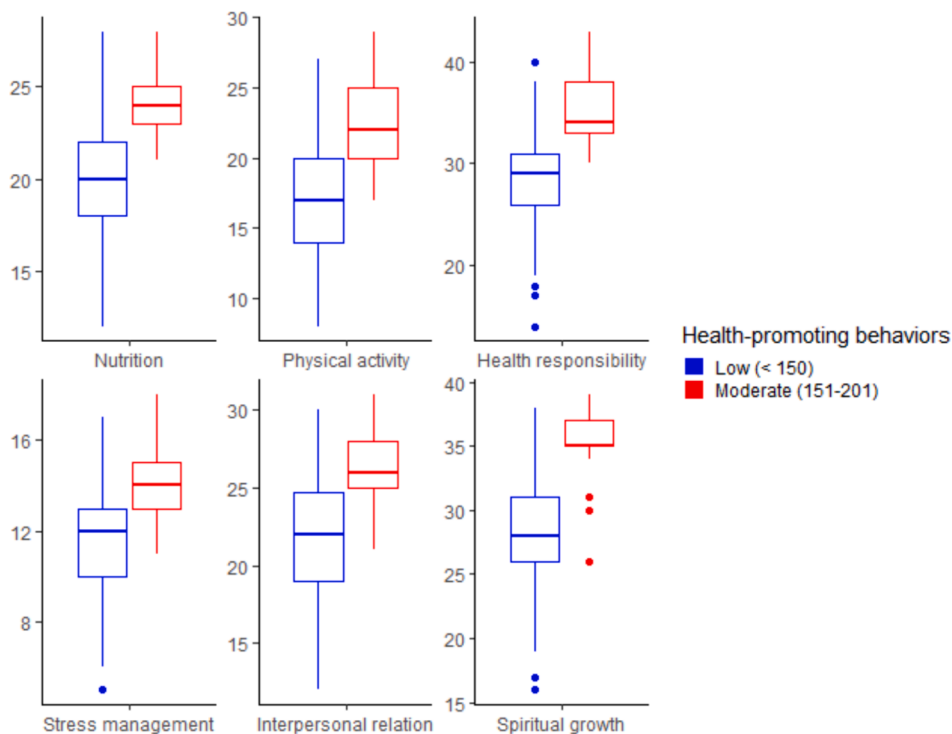
score of health-promoting behaviors (Table 4). On nutrition, stress management, spiritual growth, and total score of health-promoting behaviors, only the college major variable had impact, such that staff with health professions education had better score. Also, females with age more than 45 years old had better interpersonal relation, and single staff had higher physical activity score. On the other hand, there was not any significant demographic variables on health responsibility subscale.

#### 4. Discussion

This study was conducted on 171 staff of Zanjan University of Medical Sciences in Iran with the aim of determining the status and influencing factors on health-promoting behaviors.

According to the results, none of the participants in the study had high health-promoting behaviors. Eighty-three percent of people had low health-promoting behaviors and 17 percent had moderate. Various

factors affect the state of health-promoting behaviors that persons perform to promote health. In our study, among the measured variables, only the college major had an effect on the total score, and people with health related college majors had a higher health-promoting behavior score than others. Various studies have been conducted in the world to investigate the status and factors affecting health-promoting behaviors, both in healthy people and in different groups with different diseases. The questionnaire used in all these studies is similar and measures the behaviors related to different dimensions of physical, mental, social and spiritual health, which are considered under the definition of health according to the definition of the World Health Organization (Svalastog et al., 2017). In a study conducted in America among low-income people referring to comprehensive health centers, the average total score of health-promoting behavior was 122.47 ± 25.18, which is lower than the total score obtained in our study (Maglione, 2021). Different results have been seen in other studies. In some of them, this score was higher (Fashafsheh et al., 2021a; Hardan-Khalil, 2020; Park and Oh, 2021) and in some studies it was lower (Siboni et al., 2018; Rababa, Ali and Alshaman, 2021) than the score in our study. In Masjouidi et al.'s study, which investigated the health-promoting behaviors of pregnant women, a similar total score regarding health-promoting behaviors was observed (Masjouidi et al., 2022). In some studies, health promoting behavior has been measured in specific groups such as nursing students or health ambassadors or in patients with different diseases (Bayati et al., 2018; Fashafsheh et al., 2021b; Hwang and Oh, 2020; Park and Oh, 2021). In a study conducted on medical students, they had a higher health-promoting behavior score (Fashafsheh et al., 2021b). Similar to our results, in the study of Weber et al., which was conducted in Germany on students with different college majors, it was seen that medical students were more than twice as likely as other sciences such as economics, computer science, and law were aware of climate change health effect (Weber et al., 2023). This shows that people who study in fields related to health sciences have more awareness about the health risk factors and finally it affects health behaviors (Mohammadi et al., 2023). Health-oriented educational programs improve health behaviors and reduce the use of health services and getting a disease. Health-oriented



**Fig. 1.** Box-plot six subscales of health-promoting behaviors by categories of total score of health-promoting behaviors in staff of Zanjan University of Medical Sciences, 2023.

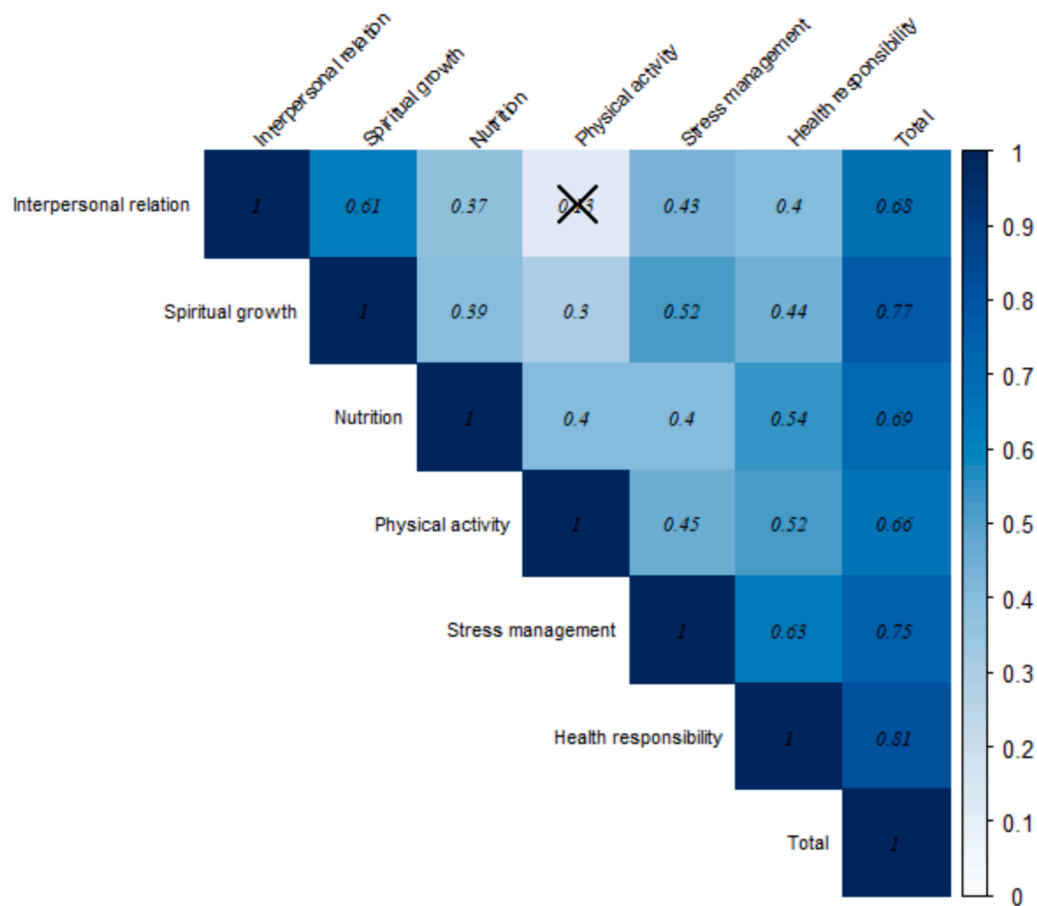


Fig. 2. Heat map of Pearson correlation coefficients between six subscales and total score of health-promoting behaviors in staff of Zanjan University of Medical Sciences, 2023.

educational programs can be transferred from trained people to family and friends in a domino way and create positive effects on them (Tabrizi et al., 2024). When we do health-oriented educational interventions for people, we can change people’s awareness, attitudes and unsafe behaviors to take actions that do not harm health (Mohammadi et al., 2023).

Bae et al. have shown that one of the factors that can influence health promoting behaviors is health literacy, and health literacy is a strong predictor of teachers’ health behavior. (Bae and Yoon, 2021). By increasing teachers’ health literacy, health-related behaviors such as the use of healthy foods, physical activity, health responsibility, and interpersonal relationships increase. Increasing the knowledge and awareness of teachers and professors, by increasing the level of health literacy and influencing the education of students, can ultimately affect the overall health of individuals and society. Also, such an effect has been seen in health ambassadors. Health ambassadors are people from within the community, who encourage healthy living habits in people and ultimately improve the community health. Educational interventions can increase health-promoting behaviors by increasing the level of health literacy of these people (Cedenilla et al., 2014). Health literacy has been reported as a determinant of self-management, and the results of a systematic review conducted in middle-aged women showed that women with more health literacy challenges had lower levels of variables related to health self-management, such as health care, illness prevention, and health promotion (Lee and La, 2024).

In the present study, the scores of six subscales related to health-promoting behaviors were calculated. Interpersonal relationships had the highest score and physical activity had the lowest score among different domains. Among the demographic variables, different age groups, education level, and BMI had no effect on overall health-

promoting behaviors and its different domains. Also, women have better interpersonal relationships, single people have higher physical activity and spiritual growth. People with degrees in health-related majors, had healthier nutrition, better stress management, better spiritual growth, and as mentioned earlier, the total score of health-promoting behavior was higher. In many studies conducted on health-promoting behaviors, physical activity has been reported to have the lowest score in different communities and in different groups (Maglione, 2021; Park and Oh, 2021; Rababa et al., 2021; Samiei Siboni et al., 2021). In low-income people referring to American comprehensive health service centers and a community-based study in Southern California, the lowest score was related to physical activity, and age and education level affected the total score and subscales. People with younger age and higher educational level have better health –promoting behaviors (Hardan-Khalil, 2020; Maglione, 2021). The reason for the observed difference can be attributed to the studied population. Due to the easy access, our study was conducted on the employees of the University of Medical Sciences and the participants in this study had a bachelor’s degree or higher, and even if the level of education has an effect on health promotion behavior, the relationship between educational level and health-promoting behaviors could not show itself due to the studied population.

Physical activity score in our study was only related to marital status. Single people have more time to do physical and sports activities. Married people are busier with housework and growing up and raising children and will have less time for physical activity. Contrary to this study, in the study conducted in Jordan and in Brazil, the score of physical activity in married people was higher than that of single people, the reason for this difference is probably due to the cultural difference in different societies and needs further study on the marital status and

**Table 3**

Mean ± SD and results of compare six subscales and total score of health-promoting behaviors by demographic characteristics in staff of Zanjan University of Medical Sciences, 2023.

Variable	Category	Nutrition	Physical activity	Health responsibility	Stress management	Interpersonal relation	Spiritual growth	Total
Age (years)	≤ 34	20.66 ± 3.18	18.63 ± 3.98	30.35 ± 4.31	12.45 ± 2.20	22.50 ± 4.33	29.89 ± 5.10	134.48 ± 16.53
	35–44	20.59 ± 3.10	17.28 ± 4.28	29.38 ± 4.66	11.72 ± 2.48	21.92 ± 4.03	29.05 ± 4.62	129.95 ± 16.35
	≥ 45	20.89 ± 3.18	16.97 ± 5.72	29.49 ± 5.88	11.86 ± 2.96	23.66 ± 2.97	30.20 ± 5.51	133.06 ± 20.87
Test statistics	–	0.10	2.08	0.76	1.55	2.29	0.80	1.19
P-value+	–	0.902	0.128	0.468	0.214	0.104	0.451	0.306
Gender	Female	20.99 ± 3.07	17.59 ± 4.58	30.27 ± 4.55	12.16 ± 2.43	23.02 ± 3.79	29.56 ± 4.83	133.59 ± 16.40
	Male	20.17 ± 3.18	17.89 ± 4.50	28.91 ± 5.12	11.77 ± 2.30	21.61 ± 4.17	29.65 ± 5.26	130.00 ± 18.93
Test statistics	–	1.68	–0.42	1.82	0.99	2.26	–0.11	1.72
P-value*	–	0.096	0.678	0.071	0.322	0.025	0.910	0.192
Marital status	Single	21.20 ± 2.89	18.87 ± 3.62	29.91 ± 3.96	12.53 ± 2.15	22.69 ± 4.74	30.87 ± 5.21	130.00 ± 16.71
	Married	20.49 ± 3.20	17.29 ± 4.77	29.70 ± 5.09	11.82 ± 2.60	22.41 ± 3.70	29.13 ± 4.83	130.86 ± 17.56
Test statistics	–	1.31	2.29	0.25	1.64	0.35	2.02	2.99
P-value	–	0.193	<b>0.024</b>	0.800	0.103	0.724	<b>0.045</b>	0.086
College major	Health professions education	21.19 ± 3.21	18.44 ± 4.29	30.24 ± 4.55	12.42 ± 2.25	22.33 ± 4.10	30.47 ± 4.85	135.10 ± 16.92
	Other	20.25 ± 3.01	17.10 ± 4.68	29.34 ± 5.00	11.67 ± 2.65	22.61 ± 3.90	28.85 ± 4.99	129.82 ± 17.60
Test statistics	–	1.99	1.94	1.22	1.99	–0.46	2.15	3.96
P-value	–	<b>0.049</b>	0.055	0.224	<b>0.048</b>	0.649	<b>0.033</b>	<b>0.048</b>
BMI (kg/m <sup>2</sup> )	< 25	20.32 ± 3.18	17.43 ± 4.41	29.00 ± 4.79	11.92 ± 2.74	22.16 ± 4.30	29.67 ± 5.33	130.50 ± 19.44
	≥ 25	20.97 ± 3.07	17.93 ± 4.66	30.36 ± 4.76	12.08 ± 2.30	22.75 ± 3.73	29.53 ± 4.71	133.61 ± 15.64
Test statistics	–	–1.35	–0.70	–1.85	–0.40	–0.96	0.19	1.34
P-value	–	0.176	0.483	0.066	0.673	0.338	0.851	0.248
Education	Bachelor	20.43 ± 2.94	18.11 ± 4.33	29.63 ± 4.62	12.00 ± 2.51	22.72 ± 3.69	29.93 ± 4.61	132.81 ± 15.81
	Master/ Ph.D.	20.79 ± 3.22	17.52 ± 4.64	29.81 ± 4.91	12.02 ± 2.50	22.38 ± 4.13	29.44 ± 5.15	131.96 ± 18.21
Test statistics	–	–0.72	0.79	–0.23	–0.04	0.53	0.60	0.09
P-value	–	0.475	0.431	0.818	0.967	0.599	0.551	0.766

±: One-way ANOVA.

\*: Independent T-test.

SD: Standard Deviation.

**Table 4**

Results of multiple linear regression with stepwise variables selection in order to assessing effect demographic characteristics on health-promoting behaviors in staff of Zanjan University of Medical Sciences, 2023.

Model	Dependent variable	Independent variable	Category	Regression coefficient	95 % confidence interval		P-value
					Lower	Upper	
1	Nutrition	College major	Health professions education	0.94	0.01	1.89	0.049
2	Physical activity	Marital status	Single	1.57	0.03	3.12	0.046
3	Health responsibility	–	–	–	–	–	–
4	Stress management	College major	Health professions education	0.76	0.01	1.51	0.048
5	Interpersonal relation	Gender	Female	1.43	0.22	2.64	0.021
		Age	More than 45	1.51	0.05	2.97	0.043
6	Spiritual growth	College major	Health professions education	1.63	0.13	3.12	0.033
7	Total	College major	Health professions education	5.28	0.04	10.53	0.048

physical activity level (Cavazzotto et al., 2022; Rababa et al., 2021).

Although it was seen in the results of most studies that the score of physical activity has the lowest score in health-promoting behavior, the analyzes performed in the present study showed that physical activity has the lowest correlation with the total score of health-promoting

behaviors, and health responsibility has the highest correlation. This is an important point that has not been mentioned in other studies, and it shows if people are responsible for their health and take care of their health, they will show healthier behaviors. Taking responsibility for health helps us to think about the causes of disease and their role in

disease prevention (Traina et al., 2019). Although people should play an important role in maintaining their health, they should not be fully responsible for it. Society should also help promote health and prevent diseases. Air pollution control, health education, food and drug safety, disease surveillance, etc., all must be improved by communities and the health system (Resnik, 2007).

## 5. Conclusion

Finally, according to the results, health-related college major is the most important factor affecting health-promoting behaviors. Also, health responsibility is most related to these behaviors. Educational interventions should be done at the community level to increase people's knowledge and awareness about risk factors and improve the level of health, so that ultimately the health of individuals and communities can be improved.

## CRedit authorship contribution statement

**Farzaneh Karamitanha:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Investigation, Data curation, Conceptualization. **Farzane Ahmadi:** Writing – review & editing, Writing – original draft, Supervision, Software, Methodology, Investigation, Formal analysis, Data curation. **Hamidreza Fallahabadi:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Investigation, Conceptualization.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Data availability

Data will be made available on request.

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