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## RESEARCH ARTICLE

### Assessment of Health-promoting Behaviors and Influential Factors in Undergraduate Students in Saudi Arabian Governmental Universities

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#### Abstract:

#### Background:

The identification of health-promoting behaviors is crucial for improving students' overall well-being. A total of 542 undergraduate students from five Saudi Arabian governmental universities were evaluated to assess health-promoting behaviors and explore the factors that influence these behaviors.

#### Methods:

A descriptive cross-sectional design with a convenience sampling technique was employed to select 542 undergraduate students. A scale of health-promoting lifestyle profile II (HPLP II) and sociodemographic factors were used to assess undergraduate students' healthy behaviors. Healthy behaviors of students were measured on a Likert scale of 1 to 4, with 1 being "never" and 4 being "always." Higher scores would indicate that a student engages in more health-promoting behaviors.

#### Results:

Undergraduate students had moderate scores ( $M = 123$ ) for health-promoting behaviors. Among the subscales of HPLP II, spiritual growth displayed the highest mean score ( $2.79 \pm 0.61$ ), while physical activity had the lowest ( $1.82 \pm 0.35$ ). Multiple linear regression showed significant fit ( $F = 8.57, p < .01$ ) and explained 6% of the variance in health-promoting behaviors. Family income, academic Grade point average (GPA), and smoking status were found to be significantly associated with health-promoting behaviors. The results suggest that students with low income ( $\beta = -0.10, p < .05$ ) were more likely to have lower health-promoting behaviors, while students with higher GPAs ( $\beta = 0.09, p < .05$ ) and non-smokers ( $\beta = 0.10, p < .05$ ) were more likely to have higher health-promoting behaviors.

#### Conclusion:

The study emphasizes the significance of enhancing behaviors that promote health in undergraduate students, especially in the dimensions of physical activity, coping with stress, and dietary habits.

**Keywords:** Health promotion, Undergraduate students, Patterns and trends, Physical activity, Healthy behavior, HPLP.

#### Article History

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## 1. INTRODUCTION

Health promotion activities help people take control of their health and improve their overall well-being. According to the World Health Organization (WHO), health promotion is characterized as a transformative process empowering individuals to assume responsibility for their well-being and actively enhance it [1]. Health promotion activities can take many forms, including promoting healthy eating habits, tobacco cessation, stress management, and interpersonal

support [2 - 4]. Participation in health promotion practices has been shown to have significant positive effects on both physical and mental health, including reductions in body weight, blood pressure, cholesterol levels, and the risk of chronic diseases such as cardiovascular problems and diabetes [3 - 7]. Additionally, consistent physical activity has been associated with a decreased likelihood of experiencing depression and anxiety [8, 9].

University students face an escalated susceptibility to developing poor health outcomes as a consequence of academic pressure [10], sedentary lifestyles [11, 12], unhealthy eating habits [13, 14], social factors [15], and the stress of the

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transition period [16]. These factors can make it difficult for university students to prioritize health promotion activities such as exercise and healthy eating. This can lead to an increased risk for chronic diseases and mental health issues [10, 12, 15 - 17]. The problem is further compounded by the COVID-19 lockdown, which has limited access to health promotion services and made it challenging for universities to promote their health [18 - 21]. Despite the widespread recognition of the advantages associated with health-promoting activities, several studies have uncovered evidence indicating that university students tend to adopt an unhealthy lifestyle. This highlights the need for increased attention and focus on this issue [22 - 24].

Although some research has been conducted on health-promoting behaviors among Saudi university students [24 - 27], this is an area that is still relatively understudied. For instance, a study by Almutairi *et al.* [26] found a lack of research on health-promoting behaviors among students in Saudi Arabian universities. Similarly, a study by Althumiri *et al.* [25] reported that there is a need for more research on the physical activity behaviors of Saudi undergraduate students. Therefore, identifying and examining behaviors that promote health among Saudi university students is an essential area of research. Such research can help inform the development of targeted interventions and health education programs that address the specific health behaviors of this population. By doing so, it is possible to promote healthy behaviors and prevent chronic diseases among Saudi university students. This study aims to assess health-promoting behaviors among Saudi undergraduate students, as well as explore the factors that influence these behaviors in Saudi Arabia.

### 1.1. Objectives of the Study

1. To assess the level of health-promoting behaviors among Saudi Arabian undergraduate students.

2. To Explore the factors that influence health-promoting behaviors among Saudi Arabian undergraduate Students.

## 2. MATERIALS AND METHODS

### 2.1. Study Design and Patients

The study utilized a predictive correlational cross-sectional design to evaluate the health-promoting behaviors among Saudi undergraduate students, as well as investigating the factors that influence these behaviors in Saudi Arabia. This study design is appropriate for understanding the current healthy behaviors and identifying potential predictors of health behaviors in a population where limited research has been conducted [28].

### 2.2. Sampling

The study employed a convenience sampling method to select undergraduate Saudi Arabian students. The inclusion criteria were being an undergraduate student in any Saudi Arabian program and agreeing to participate. However, individuals with disabilities or acute conditions that prevent them from practicing health-promoting activities were excluded from the study. The researchers used G\*Power

3.1.9.4 software [29] to estimate the required sample size for the study, which was 396 students with a significance level of 0.05 (two-tailed), an effect size of 0.2, and a power of 0.80. Additional students were invited and enlisted from five governmental universities in Saudi Arabia to count for the anticipated attrition rates. Of 865 students invited to complete the online survey, 542 responded, representing a response rate of approximately 63%. Regarding the place of university, the highest proportion of students sample (30.4%) attended universities in the Northern Region, followed by the Eastern Region (25.6%), the Central Region (23.1%), the Western Region (14.4%), and the Southern Region (6.5%).

### 2.3. Instrument

The study utilized the scale of HPLP II and sociodemographic factors (age, marital status, gender, family income, employment status, place of university, academic year, and academic GPA (scale ranges from 0.0 to 5.0) to evaluate the healthy behaviors of Saudi Arabian university students. The HPLP II, which was created by Walker *et al.* [30], comprises 52 questions that evaluate self-reported health-promoting habits in various areas such as spiritual development (9 questions), personal health responsibility and accountability (9 questions), interpersonal and social relationships (9 questions), nutritional habits (9 questions), physical activity (8 questions), and coping with stress (8 questions). Participants respond to each question by indicating how frequently they engage in the behavior (routinely, often, sometimes, never), with higher scores indicating healthier habits. The initial scale had an internal consistency of .94, while the subscales ranged from .79 to .87. The instrument's validity was established and confirmed for content, construct, convergent, and criterion-related factors [30, 31].

### 2.4. Data Collection

After a thorough evaluation, the Local Bioethics Committee granted their approval for this study, assigning it a distinct approval number (4-03-44). The researchers used an online survey created using Google Forms to collect data from participants. To make the survey easily accessible to students, a QR code and web link were distributed using email and popular social media platforms. Furthermore, a poster displaying comprehensive study details and an informed consent form were displayed on bulletin boards within the college departments of the universities. The data was collected during the fourth quarter of 2022, from October to December. Confidentiality and anonymity were upheld by securely keeping the data in a protected Google Drive account. Regarding the place of university, the highest proportion of students (30.4%) attended universities in the Northern Region, followed by the Eastern Region (25.6%), the Central Region (23.1%), the Western Region (14.4%), and the Southern Region (6.5%).

### 2.5. Statistical Analysis

The data collected was analyzed using SPSS version 25 [32] to provide a summary of the students' demographics and health-promoting practices. The study provided a description of continuous variables by presenting their means and standard

deviations, while categorical variables were illustrated using frequencies and corresponding percentages. Additionally, the study employed multiple linear regression analysis to examine the predictors of Saudi students' health-promoting behaviors from their sociodemographic and academic characteristics.

**2.6. Ethical Consideration**

The bioethics institutional review board has authorized the study, as per the Helsinki Declaration [33], with an approval number of 4-03-44. The researcher used various measures to maintain the privacy and anonymity of the students. Every student was assigned a unique code number, and the information collected was reported in summary form. The submitted responses were dealt with through a protected electronic account. Before taking the Google form survey, all participants gave their electronic informed consent.

**3. RESULTS**

**3.1. Sociodemographic and Academic Characteristics of Participants**

The sample size was 542, with a mean age of 21.03 ± 1.43 years. Among the sample, 59.8% were female, and 40.2% were male. In terms of employment status, the majority of students (93.9%) were non-employed, with only 6.1% employed. The majority of students (81.9%) were single or divorced, with only 18.1% married. In terms of family income, most students (69.7%) had intermediate income (between 5000-10000 SAR), followed by high-income students (17.3%) and low-income students (12.9%). The majority of students (63.4%) were

enrolled in health or scientific sciences programs, with fewer students in humanistic sciences (25.5%) and information technology programs (11.6%). Regarding academic year, the highest proportion of students were in their third year (23.1%), followed by the second year (20.1%), the fourth year (17.2%), the first year (19.2%), the fifth year (10.7%), and the internship year (9.8%). In terms of academic GPA, the majority of students (61.6%) had a GPA lower than 4 out of 5, while 28.4% had a GPA higher than 4 out of 5. Finally, 19.4% of students reported being smokers, while 80.6% reported not smoking.

**3.2. Assessment of Health Responsibility Behaviors among Saudi Undergraduate Students**

According to the mean scores, the two most frequently reported health-promoting behaviors were " Discussing personal health concerns with healthcare professionals " (M=2.69) and " Asking healthcare professionals for advice on how to take better care of oneself " (M=2.59). This suggests that students are comfortable seeking advice and information from health professionals, which is an important aspect of responsible health behavior. "Seeking another opinion when unsure of a health provider's advice " was the third most frequently reported behavior (M=2.53), indicating that students are willing to seek another opinion when they have doubts about their healthcare provider's advice. On the other hand, " Reading or watching TV programs related to improving health" was the least frequently reported behavior (M=1.83), and " Reporting any unusual signs/ symptoms to a health professional" (M=1.90) (Table 1).

**Table 1. Descriptive statistics of Students' health-responsibility and physical health-promoting behaviors (N = 542).**

Variables	Mean	SD
<b>Health responsibility dimension (Total Subscale)</b>	<b>2.28</b>	<b>0.51</b>
Discussing personal health concerns with healthcare professionals.	2.69	1.12
Asking healthcare professionals for advice on how to take better care of oneself.	2.59	1.08
Seeking another opinion when unsure of a healthcare provider's advice.	2.53	1.01
Question health care professionals to comprehend their instructions.	2.39	0.97
Seek guidance or advice when needed.	2.39	1.10
Participate in educational programs on personal health care.	2.13	1.01
Examine your body at least monthly for any physical danger changes	2.04	1.06
Reporting health professionals about any unusual signs/ symptoms.	1.90	0.94
Reading or watching TV programs related to improving health.	1.83	0.88
<b>Physical activity (Total Subscale)</b>	<b>1.82</b>	<b>0.35</b>
Engage in physical activities for leisure (e.g., swimming and bicycling).	2.24	1.02
Participate in light to moderate physical activity (e.g., taking a sustained walk for 30-40 minutes) at least five times weekly.	2.07	0.84
Monitor pulse rate during exercise.	1.88	0.99
Perform exercises (stretching) at least 3 times per week.	1.83	0.93
Adhere to a planned exercise program.	1.67	0.67
Engage in strong exercise for 20 minutes or more at least three times /week.	1.66	0.57
Achieve target heart rate during exercise.	1.70	0.82
Incorporate physical activity into your daily routine (e.g., walking during lunch, taking stairs).	1.53	0.78

Note: <sup>a</sup> mean scores of HPLP II items ranged from 1 to 4, with a greater score indicating a higher frequency of health-promoting behaviors.

**3.3. Assessment of Physical Promoting Behaviors among Saudi Undergraduate Students**

It is essential to point out that the mean scores for all eight physical activity behaviors are relatively low compared to the means for other health-promoting behaviors in the study. This suggests that the respondents in this study may not engage in physical activity as frequently as they engage in other health-promoting behaviors. The two highest mean scores are for participating in recreational physical activities (M = 2.24) and engaging in light to moderate physical activity (M = 2.07), suggesting that respondents engage in these behaviors relatively frequently (Table 1).

The average scores of the rest of the items suggest that students do not frequently monitor their pulse rate during exercise (M = 1.88), Perform stretching exercises at least three times per week (M = 1.83), Adhere to a planned exercise program (M = 1.67), exercise strongly for 20 or more minutes at least three times per week (M = 1.66), or achieve their target heart rate during exercise (M = 1.70). The behavior with the lowest mean score is getting exercise through daily activities (M = 1.53), indicating that this behavior is the least frequent among all the listed behaviors (Table 1).

**3.4. Assessment of Nutritional Behaviors among Saudi Undergraduate Students**

The highest mean score was for "consuming breakfast" (M=2.72), suggesting that the majority of students consume breakfast regularly. The lowest mean score (M=1.81) was for "eating 3-5 servings of vegetables per day", indicating that most students do not consume enough vegetables. The mean

scores for "consuming 2-3 servings of dairy products per day" (M=2.65), "eating 6-11 servings of grain products per day" (M=2.48), and "consuming only 2-3 servings from poultry, meat, fish, eggs, beans, and nuts food group per day" (M=2.48) were moderate, indicating that most students engage in these behaviors to some extent (Table 2).

The mean scores for "limiting the intake of sweets and foods that contain added sugar" (M=2.18), "Examine the nutrient information, fat content, and sodium levels on food packaging by reading food labels" (M=1.89), "Select a diet with reduced saturated fat, and cholesterol" (M=1.92), and "eating 2-4 servings of fruit per day" (M=1.89) were low, indicating that most students do not engage in these behaviors frequently (Table 2).

**3.5. Assessment of Spiritual Healthy Behaviors among Saudi Undergraduate Students**

The mean scores for the items of the spiritual health dimension range from 2.44 to 3.14, with the highest mean score (M=3.14) observed for the item "I am optimistic about the future", and the lowest mean score (M=2.44) observed for the item "I feel a sense of connection with a higher power or force". Overall, the results suggest that students in the sample tend to have higher scores in the items related to personal growth, priorities in life, and seeking out new experiences and challenges, while having lower scores in items related to contentment, peace with oneself, and connection with a higher power or force. The variability in scores also indicates that some students exhibit these health-promoting behaviors more frequently than others (Table 2).

**Table 2. Descriptive statistics of students' nutritional and spiritual health-promoting behaviors (N = 542).**

Variables	Mean	SD
<b>Nutrition dimension (Total Subscale)</b>	<b>2.22</b>	<b>0.52</b>
Consume breakfast	2.72	1.06
Consume 2-3 servings of dairy products	2.65	1.07
Eat 6-11 servings of grain products	2.48	0.99
Consume only 2-3 servings of poultry, meat, fish, eggs, beans, and nuts food group per day	2.48	1.10
Limit intake of sweets and foods that contain added sugar	2.18	1.05
Examine the nutrient information, fat content, and sodium levels on food packaging by reading food labels.	1.89	0.89
Select a diet with reduced fat, saturated fat, and cholesterol.	1.92	0.75
Consume 2-4 servings of fruit per day	1.89	0.78
Consume 3-5 servings of vegetables per day	1.81	0.77
<b>Spiritual health dimension (Total Subscale)</b>	<b>2.79</b>	<b>0.61</b>
I am optimistic about the future.	3.14	1.01
I believe that my life has meaning and purpose.	2.92	1.09
I am experiencing positive personal growth and change.	2.91	1.05
I am aware of my priorities in life.	2.88	1.05
I seek out new challenges and experiences.	2.85	0.95
I am actively working towards achieving long-term goals.	2.72	0.95
I feel content and at peace with myself.	2.66	1.08
I find each day to be challenging and interesting.	2.59	0.91
I feel a sense of connection with superior power or force.	2.44	0.89

Note: \* mean scores of HPLP II items ranged from 1 to 4, with a greater score indicating a higher frequency of health-promoting behaviors.

**Table 3. Descriptive statistics of students' interpersonal health-promoting behaviors (N = 542).**

Variables	Mean	SD
<b>Interpersonal relations dimension (Total Subscale)</b>	<b>2.59</b>	<b>0.57</b>
Communicate emotions with close individuals	2.91	0.91
Express care and warmth towards others	2.85	0.89
Cultivate intimacy in personal relationships	2.82	1.02
Readily praise others for their accomplishments	2.79	1.07
Resolve conflicts through dialogue and compromise	2.80	0.99
Nurture meaningful connections with others	2.71	1.07
Spend time with close friends and companions	2.48	0.90
Seek support from trusted confidants	1.75	0.69
Develop a network of caring people for assistance and advice	2.21	1.00
<b>Stress Management dimension (Total Subscale)</b>	<b>2.45</b>	<b>0.50</b>
Acceptance of uncontrollable circumstances in my life	2.92	1.02
Concentrate on positive bedtime thoughts	2.87	0.94
Balance time between work-life	2.68	0.93
Managing workload to prevent fatigue	2.74	0.95
Take daily relaxation time	2.39	1.00
Using stress management techniques	2.51	0.98
Have adequate sleep	1.84	0.72
Have regular meditation or relaxation practice (for 15-20 minutes) daily	1.69	0.67

Note: \* mean scores of HPLP II items ranged from 1 to 4, with a greater score indicating a higher frequency of health-promoting behaviors.

### 3.6. Assessment of Interpersonal Relation Behaviors among Saudi Undergraduate Students

The highest mean scores are observed for "Communicate emotions with close individuals" (M= 2.91), "Express care and warmth towards others" (M= 2.85), and "Cultivate intimacy in personal relationships" (M= 2.82). This suggests that the students frequently engage in behaviors that promote emotional communication and connection with others. The mean scores for "Readily praise others for their accomplishments" (M= 2.79), "Resolve conflicts through dialogue and compromise" (M= 2.80), and "Nurture meaningful connections with others" (M= 2.71) are moderately high, indicating that the students also engage in these behaviors relatively frequently (Table 3).

The mean scores for "Spend time with close friends and companions" (M= 2.48) and "Develop a network of caring people for assistance and advice" (M= 2.21) are lower, indicating that the students engage in these behaviors less frequently. Finally, the lowest mean score is observed for "Seek support from trusted confidants" (M= 1.75), suggesting that the students infrequently seek support from people they trust (Table 3).

### 3.7. Assessment of Stress Management Behaviors among Saudi Undergraduate Students

The mean scores for the stress management dimension ranged from 1.69 to 2.92, with an overall mean of 2.48. This suggests that, on average, the students reported engaging in health-promoting behaviors related to stress management with moderate frequency. The item with the highest mean score was

"Acceptance of uncontrollable circumstances in my life" (M = 2.92), indicating that students are relatively more likely to accept situations that are beyond their control. The item with the second-highest mean score was "Concentrate on positive bedtime thoughts" (M = 2.87), indicating that students frequently engage in this behavior. The item with the lowest mean score was "Have regular meditation or relaxation practice (for 15-20 minutes) daily" (M = 1.69), indicating that students reported engaging in this behavior less frequently (Table 3).

### 3.8. Assessment of Total Health Promoting Lifestyle among Saudi Undergraduate Students

The mean score for the total health-promoting lifestyle profile scale (HPLP II) is 123.03 out of a possible range of 52 to 208, which suggests that, on average, Saudi undergraduate students engage in health-promoting behaviors at a moderate frequency. Overall, the results suggest that there is room for improvement in students' health-promoting behaviors, but there is also evidence of some positive practices.

### 3.9. Exploring Factors Influencing Health-promoting Behaviors among Undergraduate Students in Saudi Arabia

The overall multiple linear regression model had a statistically significant F-value of 8.57 ( $p < .001$ ), indicating that the model as a whole was a good fit for the data. The adjusted R-squared value of the model was 0.06, indicating that approximately 6% of the variance in students' health-promoting behaviors could be explained by the sociodemographic and academic variables included in the model (Table 4).

**Table 4. Standard multiple linear regression analysis predicting students' health-promoting behaviors from the academic and sociodemographic characteristics (N = 542).**

Variable	B	95% CI	$\beta$	t	p
Age	0.76	[-0.46, 1.97]	0.06	1.22	0.22
Gender (1=Male, 2=Female)	-1.12	[-4.40, 2.16]	-0.03	-0.67	0.50
Marital Status (1=Single/divorced, 2= Married)	0.89	[-3.45, 5.22]	0.02	0.40	0.69
Employment status (1=Yes, 2= No)	0.92	[-5.86, 7.69]	0.01	0.27	0.79
Income of family	-	-	-	-	-
D1 (Low income)	-5.71	[-10.37, -1.06]	-0.10	-2.41	0.02*
D2 (High income)	5.54	[1.38, 9.70]	0.11	2.61	0.009**
Reference group (Intermediate income)	-	-	-	-	-
Academic GPA (1= < 4, 2= > 4 out of 5)	3.48	[0.30, 6.66]	0.09	2.15	0.03*
Smoking (1= Yes, 2= No)	4.45	[0.39, 8.50]	0.10	2.15	0.03*

Note: \* P value < .05, \*\* P value < .01, b, unadjusted regression coefficient; SE, the standard error of the coefficient;  $\beta$ , adjusted regression coefficient; t, the t-value for the coefficient; D, dummy variable; and CI, the 95% confidence interval for the coefficient.

Family income was significantly associated with health-promoting behaviors, with low-income students having lower health-promoting behaviors compared to intermediate-income students ( $\beta = -0.10$ ,  $p = 0.02$ ), while high-income students had higher health-promoting behaviors ( $\beta = 0.11$ ,  $p = 0.009$ ). Academic GPA and smoking status were both significantly associated with health-promoting behaviors. Students with a higher GPA had higher health-promoting behaviors compared to those with a lower GPA ( $\beta = 0.09$ ,  $p = 0.03$ ). Students who are non-smokers had higher health-promoting behaviors compared to smokers ( $\beta = 0.10$ ,  $p = 0.03$ ). According to the results, age, gender, marital status, and employment status are not statistically significant predictors of health-promoting behavior (Table 4).

#### 4. DISCUSSION

The current study found that the engagement in health-promoting behaviors among Saudi undergraduate students is moderate, as indicated by a mean score of 123.03 on the HPLP II scale. Recent literature on the healthy behaviors of undergraduate students in Saudi Arabia supports the current study's findings [34 - 36]. For instance, a recent study conducted among Saudi Arabian undergraduate medical students found that the students had moderate engagement in physical activity, healthy eating habits, and stress management behaviors [34]. Similarly, another study in Saudi Arabia found that university students' engagement in health-promoting behaviors was moderate, with higher scores observed for spiritual, interpersonal relations, and stress management dimensions [24]. The moderate mean score among Saudi undergraduate students in the current study was also in agreement with previous international studies [23, 37, 38]. This consistency suggests that undergraduate students' engagement in health-promoting behaviors is moderate across various cultural and geographic contexts.

The spiritual growth subscale of the HPLP II achieved the highest score in this study, confirming previous studies' findings [24, 39], which also reported high scores for spiritual growth among the Saudi undergraduate population. This may be due to Saudi society's strong cultural and religious values, which place significant emphasis on spiritual development. However, physical activity among Saudi undergraduate

students received the lowest score in this study, which is a common trend observed among young populations worldwide, as indicated in studies by Gurusamy, Amudhan [38] and Reyes-Molina, Alonso-Cabrera [12].

The current study found that Saudi university students have unhealthy habits regarding physical activity and nutrition (poor dietary habits). The current results were slightly lower than previous national and international studies conducted during the COVID-19 outbreak [19, 21, 27, 34, 40], indicating a need to incorporate physical activities and nutrition education into the curriculum to help students cope with the pandemic's consequences. By educating students about the importance of regular physical activity and healthy eating habits, universities can help students develop healthy habits they can maintain throughout their lives [26, 35, 40].

The study's finding that students reported lower scores on health responsibility and stress management subscales is also concerning. High-stress levels can negatively impact mental and physical health, increasing the risk of chronic diseases like hypertension, obesity, and diabetes [10, 12, 16, 17]. The importance of incorporating class sessions to teach health responsibility techniques and stress-reducing methods cannot be overstated, as students need to learn how to manage stress effectively to enhance their overall health and wellness [41, 42].

The current study findings suggest that family income, academic GPA, and smoking status were all significant predictors of healthy behaviors among Saudi university students. Low-income students had lower health-promoting behaviors compared to intermediate-income students, whereas high-income students had higher health-promoting behaviors. Several studies have also found similar results in different settings [34, 39, 43]. For example, a study conducted in Iran found that family income and smoking habits were significant health-promoting behavior predictors among medical university students [43]. Likewise, a study conducted in Saudi Arabia found that socioeconomic status, including family income, was associated with health behaviors among university students [34].

Low-income students may encounter various obstacles that hinder their ability to participate in health-promoting

behaviors. These challenges can include limited availability of nutritious food choices, a lack of affordable fitness facilities, and the need to balance work and family obligations [39, 43]. On the other hand, high-income students may have more opportunities and resources to engage in health-promoting behaviors, such as access to high-quality gym facilities and healthier food options [43]. Universities can implement targeted interventions to promote healthy behaviors among low-income students to address these disparities, such as providing reasonable healthy food options, promoting physical activity programs accessible to all students, and providing smoking cessation resources and support. These interventions can help to reduce the barriers faced by low-income students and promote health equity on campus.

One of the main limitations of this study is its design (cross-sectional), which makes it challenging to establish a definitive causal relationship between the identified predictors and health-promoting behaviors. To address this limitation, future research employing longitudinal designs and mixed-methods approaches is necessary to examine the direction of causality and explore the underlying mechanisms. Another limitation of the study is its reliance on a convenience sampling technique, which may limit the generalizability of the findings.

## CONCLUSION

The current study found that Saudi undergraduate students have moderate engagement in health-promoting behaviors, with higher scores in spiritual growth and lower scores in physical activity and coping with stress. These findings are consistent with previous studies conducted nationally and internationally. The study also identified family income, academic GPA, and smoking status as significant predictors of students' health-promoting behaviors. The study suggests that universities should incorporate physical and nutrition education into the curriculum, introduce stress-reducing methods, and provide targeted interventions that promote healthy behaviors among low-income students to reduce health disparities and promote health equity on campus.

## ABBREVIATION

**HPLP II** = Health-promoting Lifestyle Profile II

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The bioethics institutional review board has authorized the study with an approval number of 4-03-44.

## HUMAN AND ANIMAL RIGHTS

No animals were used in this study. All research procedures were followed in accordance with the ethical standards of the Helsinki Declaration of 1975, as revised in 2013.

## CONSENT FOR PUBLICATION

Informed consent was obtained from all participants.

## STANDARDS OF REPORTING

STROBE guidelines were followed.

## AVAILABILITY OF DATA AND MATERIALS

The data sets analyzed during the current study are available from the corresponding author [F.A.] upon request.

## FUNDING

None.

## CONFLICT OF INTEREST

The author declares no conflict of interest, financial or otherwise.

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