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Comparative analysis of health behaviors among female university students: The impact of sports activity on psychological, physical, and nutritional dimensions

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Abstract: This study conducted a comparative analysis of health behaviors (psychological, physical, and nutritional) related to sports activity among female students at Mohamed Lamine Debaghine University Setif 2, using a descriptive research design, the study included 122 female students from, data were collected using a questionnaire measuring healthy lifestyle behaviors, Statistical analyses were performed using SPSS, including Mann-Whitney U tests to compare practitioners and non-practitioners of physical activity. The results revealed statistically significant differences in physical, psychological, and nutritional patterns related to practicing physical activity. Practitioners consistently demonstrated higher mean ranks across all three dimensions compared to non-practitioners. The psychological dimension showed the most pronounced difference ($U = 918.75$, $Z = 4.452$, $p < 0.001$), followed by the physical ($U = 1167.73$, $Z = 3.129$, $p = 0.002$) and nutritional dimensions ($U = 1165.50$, $Z = 3.243$, $p = 0.001$). These findings highlight the positive impact of regular physical activity on overall health behaviors among female university students. The study recommends implementing comprehensive physical activity programs tailored specifically for female students, integrating sports and exercise into the curriculum and campus life. Additionally, developing targeted interventions to address the psychological dimension is crucial, as it showed the most significant difference between practitioners and non-practitioners. This could include stress management workshops and mental health support services linked to physical activity.

Keywords: healthy lifestyle, physical activity, psychological health, physical health, nutritional health

Introduction

Individuals acquire a specific lifestyle and pattern from childhood within their family, influenced by their growth, culture, and health awareness. This may involve adopting a healthy lifestyle leading to good health or one that threatens it. Abandoning certain habits can become difficult as they become an integral part of an individual's life. For instance, studies have shown that children raised in families prioritizing physical activity and healthy eating are more likely to adopt similar behaviors, significantly enhancing their overall well-being and reducing the risk of chronic diseases later in life (Man et al., 2020).

In recent years, there has been an increased understanding of how these factors affect the health of female students facing challenges in the transition to higher

education. This transition may lead to neglecting health aspects and decreased levels of physical activity due to increased academic demands (Winpenny et al., 2020), making them more susceptible to adopting unhealthy lifestyles (Kotarska et al., 2021) due to changes in their daily routine, dietary habits, and physical activity levels. Moreover, studies have highlighted that female students in higher education often face barriers to engaging in physical activities due to time constraints and academic requirements, negatively affecting their health and mental well-being (Pedersen et al., 2021).

Previous research indicates that high-achieving female students tend to engage in relatively little physical activity due to academic pressures. The lack of participation in sports activities is a concerning indicator for female students, as physical and sports activities are associated with numerous benefits. Research suggests that physical activity is closely linked to subjective well-being, life satisfaction, and enhanced happiness through participation in sports activities (Wypych-Ślusarska et al., 2023). It also alleviates symptoms of depression and ongoing anxiety among female students and improves mood (Yang et al., 2023). In addition to mental health benefits, it works to improve physical health (Mhamed, 2024).

Engagement in regular aerobic activities has been thoroughly evidenced to markedly elevate the overall quality of life among female students. The World Health Organization, in its comprehensive guidelines, advocates for a minimum engagement of 150 minutes of moderate physical activity weekly. This recommendation emphasizes the paramount importance of nurturing both physical and mental well-being, a notion substantiated by a plethora of studies within the domain (Rogowska et al., 2020). Regular participation in physical activity has been consistently linked to enhanced peer relationships and improved academic performance—elements that are particularly critical during the pivotal transition to higher education (Bi et al., 2023). Intriguingly, the degree of physical activity among female students has been positively correlated with their overall sense of self-satisfaction and personal fulfillment. Additionally, various studies suggest a constructive relationship between the extent of physical activity and overall life satisfaction among students. Notably, it has been documented that physically active students report significantly elevated levels of satisfaction, energy, and positive emotional states when juxtaposed with their less active peers (Lu et al., 2022). In spite of this burgeoning corpus of evidence attesting to the irrefutable significance of physical activity in enhancing quality of life, a persistent knowledge gap prevails concerning the comprehensive understanding of health behaviors—spanning psychological, physical, and nutritional dimensions—and their interrelations with sports participation among female students at Algerian universities. This knowledge deficit may obstruct the formulation of effective intervention and support strategies tailored for these students. Therefore, this study aims to systematically compare the levels of health behaviors (psychological, physical, and nutritional) associated with sports activity among female students at the University of Mohamed Lamine Debaghine Setif 2. The primary objective is to elucidate the multifaceted influences of sports participation on the diverse health behaviors of female students, with a particular focus on comprehending the psychological, physical, and nutritional dimensions involved, while thoroughly

investigating various factors that may shape this intricate relationship. Gaining critical insights into this association will facilitate the development of effective programs explicitly aimed at promoting a healthier lifestyle among female students within the university milieu. Ultimately, this endeavor aspires to substantially enhance their overall quality of life and academic achievements. This study has thus generated the following pivotal research inquiries:

- Are there significant differences in physical health behaviors between female university students who regularly engage in sports activities and those who do not?
- Do female university students who participate in regular sports activities exhibit different psychological health behaviors compared to those who do not?
- Is there a significant difference in nutritional health behaviors between female university students who regularly practice sports activities and those who do not?

Materials and methods

Participants

The study sample comprised 122 female student athletes enrolled at the Sports Institute in Setif University for the 2024-2025 academic year. Participants were randomly selected from the female student population. The mean age of the participants was approximately 24 years old (± SD). This sample represents a group of young adult women actively engaged in sports-related studies and activities, providing insights into the health behaviors of female university students with a focus on physical education and sports science (Table 1).

Table 1. Research participants

		N	**Percentage**
Groups	Practitioner	75	61,74%
	Non-practitioner	47	38,52%

Instruments

The questionnaire, a crucial method for collecting research data, was employed in this study to gather information about health awareness related to sports activity among female students. The development of this instrument progressed through several stages to reach its final form. After a comprehensive review of previous studies and analysis of their tools, the researcher prepared a list of health awareness items to construct the questionnaire. The final version includes 42 items distributed across three main dimensions: Psychological Health Awareness, Physical Health Awareness, and Nutritional Health Awareness, with each dimension containing 10 items (items 1-10, 11-20, and 21-30 respectively). To ensure validity, the questionnaire was presented to a group of specialists for review. Based on their feedback, the wording of some items was modified, while the overall structure and main dimensions remained unchanged. This rigorous process resulted in a comprehensive and well-structured instrument designed to effectively measure health awareness related to sports activity among the target population (Table 2).

Table 2. Distribution of questionnaire items across dimensions

Dimension	Items	Number of Items
Physical Health Behavior	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	10
Psychological Health Behavior	11, 12, 13, 14, 15, 16, 17, 18, 19, 20	10
Nutritional Health Behavior	21, 22, 23, 24, 25, 26, 27, 28, 29, 30	10

The questionnaire items were formulated in a closed-ended format with three response options: Always (3), Sometimes (2), and Never (1). The performance score of the respondents is calculated by summing the ratings of the sample's responses to all questionnaire items to obtain the total score for each respondent. The respondent's score ranges from 30 to 90.

Study procedure

The research tool was developed through a comprehensive review of health behavior literature, resulting in a 30-item questionnaire distributed across three dimensions: physical, psychological, and nutritional health behaviors. To ensure content validity, the questionnaire was reviewed by a panel of specialists, leading to modifications in item wording while maintaining the overall structure. A pilot study was conducted with 25 female students to assess completion time and initial reliability. Following validation, the final questionnaire was administered to the main study sample of 122 female students (75 from sports department and 47 from non-sports departments).

Psychometric properties

Validity

To evaluate the instrument's validity, we computed the Pearson Correlation coefficient for many associations, including (item, total scores), (item, dimension), and (dimension, total scores), as presented in Table 3.

Table 3. Correlation coefficients between (item, total scores), (item, dimension), (dimension, total scores) for questionnaire

Physical Health Behavior		Psychological Health Behavior		Nutritional Health Behavior	
Items	R	Items	R	Items	R
01	0,686**	11	0,728**	21	0,382*
02	0,721**	12	0,656**	22	0,539**
03	0,699**	13	0,589**	23	0,676**
04	0,547**	14	0,698**	24	0,697**
05	0,698**	15	0,654**	25	0,412**
06	0,477**	16	0,690**	26	0,366*
07	0,511**	17	0,568**	27	0,541**
08	0,624**	18	0,686**	28	0,454**
09	0,617**	19	0,625**	29	0,775**
10	0,542**	20	0,573**	30	0,659**
Total score	0,901**	Total score	0,889**	Total score	0,923**

The analysis of the health behavior questionnaire reveals strong internal consistency and construct validity across Nutritional, Physical, and Psychological dimensions. Most items correlate well with their respective dimensions ($r > 0.5$), and each dimension strongly correlates with the overall questionnaire ($r > 0.88$). This

indicates that the questionnaire is a reliable and valid tool for assessing health behaviors, with the psychological dimension showing particularly strong correlations, except for item 16 (r = 0.102), which may need further examination.

Reliability

Split-Half Reliability

The scale was split into two halves (the first half of the items versus the second half of the items) after excluding certain statements, and the correlation coefficient between them was calculated. The researcher then used the Guttman equation to adjust the test length, which yielded a value of 0.863, indicating the reliability of the test. The Cronbach's alpha coefficient for the first half of the items was 0.913, and for the second half was 0.878.

Cronbach's Alpha

The reliability of the information processing scale was confirmed using Cronbach's alpha coefficient, which had a value of 0.939, indicating strong reliability of the scale.

Statistical Methods

Statistical analysis was conducted using IBM SPSS Statistics version 24. The Kolmogorov-Smirnov test was applied to evaluate the normality of data distribution. Given the non-normal distribution of the data, non-parametric tests were utilized for subsequent analyses.

To compare health behavior dimensions (physical, psychological, and nutritional) between sports activity practitioners and non-practitioners, the Mann-Whitney U test was employed. This test was selected for its suitability in analyzing non-normally distributed data and comparing two independent groups. The reliability of the health behavior questionnaire was assessed using Cronbach's alpha coefficient for each dimension and the overall scale, while correlation coefficients were calculated to ensure validity.

Results

To determine the differences between the two groups, the results were subjected to the Kolmogorov-Smirnov test for normality of distribution, where we found that Both groups show very low Sig values ($p < 0.05$), suggesting that neither group follows a normal distribution. This supports the decision to use non-parametric tests like the Mann-Whitney U test.

Table 4. Results of Mann-Whitney U Test for physical, psychological, and nutritional dimensions attributed to the practice variable

	Groups	N	Mean rank	U	Z	Sig
Physical	Practitioner	75	69.41	1167.73	3.129	0.002
	Non-practitioner	47	48.87			
Psychological	Practitioner	75	72.75	918.75	4.452	0.000
	Non-practitioner	47	43.55			

Nutritional	Practitioner	75	69.71	1165.50	3.243	0.001
	Non-practitioner	47	48.39			

Table 4 presents the results of Mann-Whitney U tests comparing health behaviors across physical, psychological, and nutritional dimensions between practitioners and non-practitioners of physical activity among female university students. The analysis reveals statistically significant differences between the two groups across all three dimensions. For the physical dimension, practitioners demonstrated a significantly higher mean rank (69.41) compared to non-practitioners (48.87), U = 1167.73, Z = 3.129, p = 0.002. This suggests that students who engage in physical activities tend to exhibit better physical health behaviors. The psychological dimension showed the most pronounced difference, with practitioners having a substantially higher mean rank (72.75) than non-practitioners (43.55), U = 918.75, Z = 4.452, p < 0.001. This indicates that physical activity participation is strongly associated with more positive psychological health behaviors. Similarly, in the nutritional dimension, practitioners displayed a higher mean rank (69.71) compared to non-practitioners (48.39), U = 1165.50, Z = 3.243, p = 0.001. This implies that students who practice physical activities are more likely to adopt healthier nutritional behaviors (Figure 1).

The consistently lower p-values (all p < 0.05) across all dimensions provide strong evidence against the null hypothesis of no difference between the groups. These results support the alternative hypothesis that there is a significant relationship between physical activity practice and health behaviors across physical, psychological, and nutritional domains among female university students. As shown in the following figure.

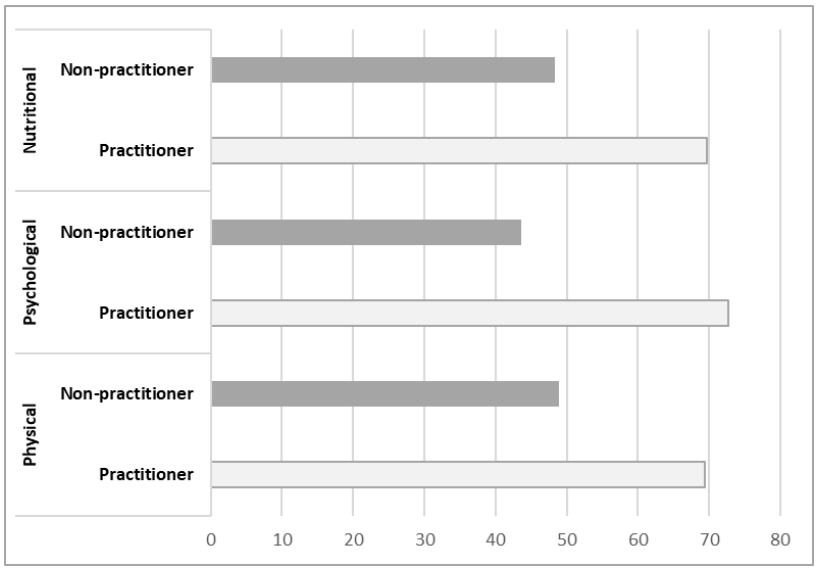

Figure 1. Histogram showed level of physical, psychological, and nutritional dimensions attributed to the practice variable

Discussion

This study aimed to investigate the impact of physical activity on health behaviors among female university students at Mohamed Lamine Debaghine University Setif 2. The research focused on three key dimensions: physical, psychological, and nutritional health behaviors. Using a Mann-Whitney U test, the study compared these behaviors between students who regularly engage in sports activities (practitioners) and those who do not (non-practitioners). The analysis revealed significant differences across all three dimensions, with practitioners consistently demonstrating higher mean ranks compared to non-practitioners. These findings provide valuable insights into the relationship between physical activity and overall health behaviors in the university setting, which will be discussed in detail in the following sections.

Table 3 indicates significant differences in the physical behavior dimension attributable to the variable of sports practice. The researcher attributes these study results to the fact that the majority of female students who practice sports possess a better physical pattern, which may reflect a greater concern for their physical and bodily health through their participation in various activities. These differences perhaps reflect the adoption of a generally healthy lifestyle by the practicing students. Regular physical activity improves physical health by enhancing various health indicators, such as blood pressure and cholesterol levels (Widiastuti et al., 2023). Additionally, exercise contributes to regulating heart rate and cardiorespiratory endurance. A study by Zhang & Min (2022) indicated that physical exercise improves heart and lung function. Sports activities also lead to fitness development and increased effectiveness of vital organs, allowing muscles, nerves, and vital systems to function efficiently. Sultoni et al. (2019) pointed out at the 2019 International Conference that regular physical and sports activities improve aerobic endurance with good oxygen absorption, thereby enhancing blood circulation, metabolism, and various body systems (Robbins & Gerszten, 2023).

The relationship between sports practice and health has never been as strong as it is now. Sports practice is a means for a better healthy life, and health should be a goal maintained by sports practitioners. A study showed that regular exercise improves heart and circulatory functions, reducing the risk of cardiovascular diseases such as atherosclerosis and coronary artery disease (Indrakumar & Silva, 2024). Furthermore, studies indicate a positive relationship between health awareness and physical activity, emphasizing the importance of physical activity in developing a better understanding of body functions and capabilities. In the same context, research results in young athletes found a significant positive relationship between body awareness and physical activity levels, suggesting that increased physical activity enhances individuals' awareness of their bodies (Asan, 2023). Moreover, female students have a better perception of the concept of health, therefore they tend to engage more in physical activities to promote healthy lifestyles (Bademli & Lök, 2018). The educational level of the students has made them realize that practicing various types of physical activities contributes to reducing the risks of chronic diseases such as cardiovascular diseases and diabetes (Oja et al., 2024).

Contrary to our findings, Dorado & Racca (2019) reported no significant link between healthy lifestyle knowledge and actual dietary and physical activity behaviors. This inconsistency may stem from methodological variations between the studies. The results also differ from those of Sadeghi et al. (2023), observed no significant correlation between healthy lifestyle practices and abdominal obesity in male participants. However, for female participants, they noted that each one-point increase in healthy lifestyle score corresponded to a 0.65 cm reduction in waist circumference. Suggesting that gender or hormonal factors may play a role in the relationship between healthy lifestyle and physical pattern.

Table 3 indicates significant differences in the psychological behavior dimension attributable to the variable of sports practice. The researcher attributes these study results to the fact that the majority of female students who practice sports possess a better psychological pattern. These differences are particularly evident in levels of anxiety, depression, and self-esteem. This improved psychological pattern may reflect the impact of physical activity on various psychological aspects. Studies indicate that regular physical activity contributes to improving mood and reducing levels of anxiety and depression (Hoffmann et al., 2022). This is due to the fact that practicing various types of sports activities contributes to the secretion of endorphins, which are responsible for improving the mood of female students. Previous studies suggest that exercising with sufficient intensity and duration increases circulating beta-endorphin levels, enhancing cognitive abilities and mental well-being through multiple mechanisms such as increased cerebral blood flow and mood modification (Pujari, 2024).

Physical activity promotes mental health through neurological and biochemical mechanisms, including increased production of neurotrophic factors and neurotransmitters that improve mood (Strasser & Fuchs, 2015). In the same context, previous studies indicate that regular physical activities, including aerobic exercises, resistance training, and mind-body activities, can enhance sleep quality and address disorders such as insomnia, sleep apnea, and sleep-related movement disorders (Giannaki et al., 2024). Furthermore, engaging in physical activity increases feelings of achievement and self-efficacy, enhancing self-esteem and self-confidence. Research confirms that physically active interventions can lead to improvements in cognitive functions and cognition in general for all age groups (Mazur & Bulski, 2024), reinforcing the idea that physical activity positively contributes to self-efficacy and self-respect. Results showed a strong relationship between high levels of physical activity and improved cognitive function among students (Tarigan et al., 2022), suggesting that regular exercise can alleviate cognitive decline in female students. Moreover, developing social skills through sports participation is particularly beneficial for female students who practice sports. Additionally, adolescents with strong social skills are more likely to engage in health-promoting behaviors such as regular physical activity and healthy eating (Rajkumari et al., 2021), which is essential for building self-esteem. This is due to the various sources of social support that female students receive, whether from family or peers. The results of this study differ from those of Martland et al. (2024) regarding the effects of exercise and physical activity on mental health, depression severity, burnout, traumatic stress, and fatigue. Exercise or physical activity did not appear to reduce anxiety symptoms, which may

be due to the academic pressures surrounding female students. The study conducted by Ahn & Kim (2022) confirms that transitioning to a regular exercise routine for inactive university students can be challenging and may not lead to immediate psychological benefits. This suggests that the relationship between physical activity and psychological well-being is not direct and can be influenced by individual circumstances such as cultural norms of the society.

Table 3 indicates significant differences in the dietary behavior dimension according to the variable of sports practice. The researcher attributes the results of this study to the level of nutrition-related culture among female students who practice sports, with most of them following a dietary program to maintain their health. This is due to the risks associated with modern foods containing chemical substances. Studies have shown that a large number of athletes recognize the importance of nutritional guidance, with many expressing a desire for professional nutritional support to improve their diets and enhance performance (Boumosleh et al., 2021). This reflects that female students have become more aware of the nutritional aspect. The researcher also notes the role of social media and technological advancements in raising the level of nutritional awareness in society, especially among those who exercise regularly. A study by Boidin et al. (2021) showed that nutrition education programs significantly improve dietary intake and knowledge among athletes to maintain health. This is attributed to the educational level of female students, which plays a role in their attitudes towards proper and healthy nutrition. Female students who practice sports are concerned with consuming a balanced, healthy diet due to its effect on the body's organic systems. Nutritional needs for sports are highly sensitive due to physiological changes that occur in female students, such as hormonal fluctuations associated with the menstrual cycle, which affect nutritional requirements (Jiménez-Casquet et al., 2024). A balanced diet in its components helps provide energy to the body for good physical performance (Göbel, 2023), including proteins that play a role in cell regeneration and carbohydrates as essential nutrients that provide energy for our bodies and recovery processes in athletes (Fleming & Al-Zubaidi, 2023).

It is also known that a balanced diet not only nourishes the body but also aids in recovery and injury prevention for female students (Rupasinghe et al., 2023). The social environment surrounding athletes can have a significant impact on their dietary behavior. Female students who practice sports are often in environments that encourage the adoption of healthy habits. Social and cultural factors drive women to closely monitor their health, especially in the context of sports participation (Ramón-Arbués et al., 2021). Results from a study by Lee et al. (2022) indicated strong positive correlations between nutrient-rich food, performance motivation, and mental well-being.

Conclusions

Physical sports activity plays a pivotal role in promoting a healthy lifestyle, significantly impacting an individual's physical, psychological, and nutritional aspects, such as sleep quality, stress levels, dietary patterns, and physical fitness indicators. Considering that a healthy lifestyle and adherence to healthy habits

prevent future health problems, the ultimate goal of engaging in physical activities is to help all members of society reach their optimal physical and health levels. Committing to an athletic life will influence, in one way or another, the determination of a healthy lifestyle from the physical, psychological, and nutritional perspectives for the individual.

Therefore, there is an urgent need to conduct follow-up studies to evaluate the impact of sports activity on healthy lifestyles among female university students, as they represent an important segment of society and are at a critical age for forming sustainable healthy habits. From this standpoint, the current study aims to understand the role that physical sports activity plays in determining the healthy lifestyle of female university students, with the goal of contributing to the development of effective health programs that promote physical activity among them. The current study recommends that universities implement comprehensive physical activity programs tailored specifically for female students, integrating sports and exercise into the curriculum and campus life. It is crucial to develop targeted interventions addressing the psychological dimension, as it showed the most significant difference between practitioners and non-practitioners, including stress management workshops and mental health support services linked to physical activity. Additionally, creating awareness campaigns highlighting the benefits of regular physical activity on nutritional behaviors and overall health for female university students is essential. Establishing partnerships between university sports departments and health professionals can provide holistic support for students' physical, psychological, and nutritional well-being. Finally, conducting longitudinal studies to assess the long-term impact of sustained physical activity on health behaviors and academic performance among female university students is recommended to further understand and improve their overall health and academic success.

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