


Assessment of Healthy Lifestyle Behaviour in Medical Students Using the SMILE-C Criteria: A Cross-Sectional Study

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Abstract

Introduction: A healthy lifestyle plays a vital role in reducing the risk of chronic diseases and promoting overall well-being. The Short Multidimensional Inventory Lifestyle Evaluation (SMILE) is a validated tool used to assess multiple dimensions of lifestyle behavior. The SMILE-C criteria have demonstrated reliability in healthcare settings and have shown associations between physical activity levels and healthy lifestyle behaviors.

Objectives: To assess lifestyle patterns using the SMILE-C criteria and determine the prevalence of healthy lifestyle behaviors among third-year medical students at Rawalpindi Medical University.

Materials and Methods: This cross-sectional study was conducted at Rawalpindi Medical University, Rawalpindi, Pakistan. Data were collected from 191 third-year medical students using a Google Forms-based questionnaire adapted from the SMILE-C tool. Statistical analysis was performed using SPSS version 27. Non-parametric tests, including the Mann-Whitney U test, Kruskal-Wallis test, and Spearman correlation, were applied.

Results: Among the 191 participants, the median age was 21 years. A significant gender difference was observed in overall healthy lifestyle behaviors, with females demonstrating healthier practices than males ($p = 0.03$). No significant differences were found based on accommodation status or ethnicity. Moderate positive correlations were identified between social support and spiritual development, as well as between social support and restorative sleep.

Conclusion: Female medical students exhibited healthier lifestyle behaviors compared to males. Social support emerged as an important factor associated with spiritual well-being and sleep quality, highlighting the need for targeted lifestyle interventions in medical students.

Keywords: lifestyle patterns, SMILE-C tool, spiritual development, healthy lifestyle, physical activity.

Introduction

A healthy lifestyle lowers the risk of developing major chronic illnesses. It includes behaviors and habits that promote physical and mental well-being while reducing disease risk. Key components include regular physical activity, a balanced diet, adequate sleep, and stress management. The World Health Organization defines health as a state of complete physical, mental, and social well-being and recommends increased intake of fruits and vegetables, reduced consumption of fats, sugars, and salt, along with regular physical activity^{1,4}.

Medical education presents unique challenges, often exerting pressure on students' lifestyles. The academic workload, prolonged study hours, and clinical responsibilities frequently lead to unhealthy behavioral patterns, including poor dietary choices, reduced physical activity, and sleep disturbances³. Among university students, lifestyle factors have been shown to significantly influence physical fitness and psychological well-being².

The Short Multidimensional Inventory Lifestyle Evaluation (SMILE) is a validated tool used to assess multiple dimensions of lifestyle behavior. It provides a structured approach to evaluating health-related behaviors in student populations⁵. Studies in medical students have demonstrated that burnout, stress, and work engagement are closely associated with lifestyle choices and overall well-being³.

Globally, mental health disorders such as depression are highly prevalent among medical

students, with systematic reviews showing a significant burden in this population⁶. In Pakistan, similar concerns have been reported, with medical students exhibiting notable levels of psychological distress along with suboptimal lifestyle practices⁷.

Insufficient physical activity remains a major contributor to non-communicable diseases such as cardiovascular disease, diabetes, and hypertension⁴. Additionally, diet quality has been strongly linked with both physical and mental health outcomes, emphasizing the importance of nutritional balance in young adults⁸.

Sleep disorders are also highly prevalent among medical students, contributing to reduced academic performance and impaired quality of life. Poor sleep patterns are closely associated with overall health deterioration, reinforcing the importance of sleep hygiene education in this population^{3,6}.

Given the clinical workload, academic stress, and lifestyle challenges faced by medical students—particularly in Pakistan—this study aims to evaluate lifestyle determinants and behavioral patterns among students at Rawalpindi Medical University using the SMILE-C tool, thereby providing evidence-based insights for targeted lifestyle interventions.

Materials and Methods

This cross-sectional study was conducted at Rawalpindi Medical University, Rawalpindi, Pakistan. A convenience sampling technique was used. A questionnaire was adapted from a

previously published study⁹ after permission protocol that concluded the validity and reliability of the SMILE-C tool to assess the lifestyle modifications during the COVID-19 pandemic. Certain modifications were made after discussing with subject specialists. This questionnaire was shared among the third-year students of Rawalpindi Medical University, and responses were analyzed.

The data collection tool was the Short Multidimensional Inventory Lifestyle Evaluation-Confinement (SMILE-C). It is a self-report questionnaire used to assess lifestyle changes. It has 27 items, each scored using a 4-point Likert scale, and the final score is the sum of all questions (with some items being reverse-scored). The total score was obtained by summing individual item scores (ranging from 27 to 108), with higher scores indicating healthier lifestyle behaviors. Third-year MBBS students of Rawalpindi Medical University who were willing to fill the form were included, while students of other disciplines and years of study of Rawalpindi Medical University and those who didn't fill the form were excluded. 191 students participated in this study. The ethical principles were strictly followed while conducting the research. All the participants in the data collection procedure were asked for their consent before filling in the questionnaire. Participants were guaranteed complete confidentiality.

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 27. Data distribution was assessed using normality tests, which indicated a non-normal distribution of

variables. Consequently, non-parametric statistical tests were applied. The Mann–Whitney U test was used to compare lifestyle domains across gender, while the Kruskal–Wallis test was employed to assess differences among ethnic groups. Spearman's rank correlation coefficient was used to evaluate associations between lifestyle factors. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 191 participants were included in the final analysis. The sociodemographic characteristics of the study population are summarized in Table 1. The majority of participants were female (76.4%, $n = 146$). More than half of the students were day scholars (56.5%). Most participants belonged to the Punjabi ethnicity (88.5%), followed by smaller proportions of Pathan (3.7%), Gilgit (2.6%), Siraiki (1.6%), Sindhi (1.0%), and other ethnic groups (2.6%). The median scores and interquartile ranges (IQR) for lifestyle and health-related variables are presented in Table 2. The median score for bad eating habits was 2.50 (IQR = 1.00), indicating a moderate prevalence of unhealthy dietary practices within the study population. Spiritual development showed a median score of 1.00 (IQR = 1.00), suggesting relatively low to moderate levels across participants. Restorative sleep had a median score of 2.00 (IQR = 0.50), while social support also demonstrated a median score of 2.00 (IQR = 1.00), reflecting moderate levels of perceived support. Healthy lifestyle behaviors had a median score of 2.60 (IQR = 0.40), indicating

comparatively better engagement in positive lifestyle practices.

Table 1 *Sociodemographic characteristics*

Sociodemographic Variable	Category	Frequency	Percentage
Gender	Male	45	23.6%
	Female	146	76.4%
Student Status	Day Scholars	108	56.5%
	Hostellites	83	43.5%
Ethnicity	Punjabi	169	88.5%
	Pathan	7	3.7%
	Siraiki	3	1.6%
	Sindhi	2	1.0%
	Gilgit	5	2.6%
	Others	5	2.6%
Age	Median (IQR)		21.00 (25) –

Table 2: *Lifestyle and health-related factors*

Factors	Median (IQR)
Bad eating habits	2.50(1.00)
Spiritual development	1.00(1.00)
Restorative sleep	2.00(0.50)
Social support	2.00(1.00)
Healthy lifestyle	2.60(0.40)

Normality testing using the Kolmogorov–Smirnov test and Skewness–Kurtosis measures indicated that the data were not normally distributed. Consequently, non-parametric statistical tests were employed. The Mann–Whitney U test was used to assess differences across gender and accommodation status (day scholars vs. hostellers), while the Kruskal–Wallis test was applied to evaluate differences among ethnic groups. Spearman’s rank correlation

coefficient was used to examine associations between lifestyle and health-related variables. Statistical significance was set at $p < 0.05$. The association between gender and lifestyle-related variables is presented in **Table 3**. The Mann–Whitney U test was used to compare two independent groups (male and female), while the Kruskal–Wallis test was applied to compare more than two independent groups (ethnic categories). These non-parametric tests were

selected due to the non-normal distribution of the data. The Mann-Whitney U test revealed that females had higher mean ranks for restorative sleep (99.35) and healthy lifestyle behaviors (100.67) compared to males, whereas males demonstrated a higher mean rank for social support (99.76). However, statistical testing showed no significant gender-based differences in bad eating habits ($p = 0.88$), spiritual development ($p = 0.72$), restorative sleep ($p = 0.12$), or social support ($p = 0.59$). P-values were calculated using non-parametric

statistical tests, and associations between variables were assessed using Spearman's rank correlation coefficient. These findings indicate that gender did not play a significant role in influencing these factors within the study population. In contrast, a statistically significant difference was observed for healthy lifestyle behaviors ($p = 0.03$). Females demonstrated significantly higher engagement in healthy lifestyle practices compared to males, suggesting a gender disparity favoring females in the adoption of health-promoting behaviors.

Table 3: *Association of gender with variables*

Factors	Gender	Mean Rank	P-value
Bad Eating Habits	Male	94.97	0.88
	Female	96.32	
Spiritual Development	Male	93.73	0.72
	Female	96.70	
Restorative sleep	Male	85.13	0.12
	Female	99.35	
Social support	Male	99.76	0.59
	Female	94.84	
Healthy lifestyle	Male	80.83	0.03
	Female	100.67	

The Kruskal–Wallis test (applied because of more than 2 ethnic groups) revealed no significant differences in lifestyle patterns across different ethnic groups. This suggests that ethnicity did not have a statistically significant impact on bad eating habits, spiritual development, restorative sleep, social support, or healthy lifestyle behaviors within the sample.

Spearman's correlation in Table 4 demonstrated that a weak but statistically significant negative correlation was observed between bad eating habits and spiritual development ($r = -0.187$, $p = 0.01$). A moderate positive correlation was observed between spiritual development and social support ($r = 0.269$, $p < 0.001$), as well as restorative sleep and social support ($r = 0.252$, $p < 0.001$). No statistically significant correlations

were observed between healthy lifestyle behaviors and the other variables ($p > 0.05$).

Table 4 *Correlations among variables*

		Bad eating habits	Spiritual development	Restorative sleep	Social support	Healthy lifestyle
Bad eating habits	Correlation- coefficient	1.0	-0.187	-0.08	-0.08	-0.08
	P-value	.	0.01	0.23	0.25	0.22
Spiritual development	Correlation- coefficient		1.0	0.03	0.269	0.11
	P-value		.	0.06	0.000	0.12
Restorative sleep	Correlation- coefficient			1.0	0.252	0.09
	P-value			.	0.000	0.19
Social support	Correlation- coefficient				1.0	0.11
	P-value				.	0.11
Healthy lifestyle	Correlation- coefficient					1.0
	P-value					

Discussion

Maintaining a healthy lifestyle is essential for preventing chronic diseases and promoting overall physical and mental well-being, particularly among medical students who are exposed to significant academic stress and demanding schedules^(10,11) These stressors often contribute to unhealthy lifestyle behaviors, including poor dietary habits, inadequate sleep, and reduced physical activity.

In this study, lifestyle patterns were assessed using the SMILE-C tool, a validated multidimensional instrument for evaluating health-related behaviors^{12,13}. The findings demonstrated that female medical students exhibited significantly healthier lifestyle behaviors compared to males. This observation is consistent with recent studies, which suggest that female students are more likely to engage in health-promoting behaviors due to greater awareness and better self-care practices¹⁴.

In contrast, no statistically significant differences were observed among different ethnic groups with respect to lifestyle-related variables. This suggests that within this academic environment, ethnicity may not play a major role in determining lifestyle behaviors. Similar findings have been reported in recent literature, where environmental and institutional factors were found to have a stronger influence than ethnic background.¹⁵

A moderate positive correlation was observed between social support and spiritual development, indicating that students with stronger social networks may experience better psychological well-being (16). Additionally, a positive correlation was found between social support and restorative sleep, suggesting that supportive environments may contribute to improved sleep quality. These findings are supported by recent studies emphasizing the role of social relationships in promoting overall health and well-being^{17,18}

Furthermore, a weak but statistically significant negative correlation was identified between bad eating habits and spiritual development, suggesting that individuals with better psychological or emotional well-being may adopt healthier dietary practices. However, no significant association was observed between overall healthy lifestyle behavior and other individual variables, indicating that lifestyle patterns are influenced by multiple interacting factors. These findings are consistent with recent studies showing that medical students frequently experience poor sleep quality and

unhealthy lifestyle behaviors due to academic pressures, irregular routines, and increased screen time^{19,20}. Social support has been identified as a protective factor that can reduce stress and improve both mental health and lifestyle outcomes²¹

The study also confirmed a statistically significant gender difference in overall healthy lifestyle behaviors, with females demonstrating better outcomes. However, no significant differences were observed between day scholars and hostellers or among different ethnic groups, suggesting that shared academic and environmental factors may play a more dominant role.

This study has certain limitations. The use of a convenience sampling technique may limit generalizability. Additionally, the cross-sectional design prevents causal inference, and reliance on self-reported data may introduce response bias. Important determinants such as stress levels, physical activity intensity, and mental health status were not assessed in detail.²² Despite these limitations, this study provides valuable insights into lifestyle behaviors among medical students using a validated tool. The findings highlight the importance of promoting healthy lifestyle practices and emphasize the role of psychosocial factors, particularly social support, in improving overall well-being.

Future research should focus on longitudinal designs and evaluate the effectiveness of targeted interventions such as stress management

programs, physical activity promotion, and sleep hygiene education in improving health outcomes among medical students.

Conclusion

This study found that female medical students demonstrated healthier lifestyle behaviors compared to males, while ethnicity showed no significant association with lifestyle patterns. Positive correlations between social support, spiritual development, and restorative sleep emphasize the role of psychosocial factors in promoting healthy behaviors. These findings highlight the need for targeted interventions to improve lifestyle practices among medical students.

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