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Examination of the Relationship Between Attitudes Towards Healthy Nutrition and Sleep Quality: The Role of Lifestyle Factors

Bekir Erhan Orhan[1], **Buket Kararadağ**[2], **Walaa Alkasasbeh**[3], **Aydın Karaçam**[4]

AFFILIATIONS

[1]Istanbul Aydın University, Faculty of Sports Sciences, Istanbul, Türkiye
[2]Istanbul Aydın University, Faculty of Education, Istanbul, Türkiye
[3]The University of Jordan, School of Sports Science, Department of Physical Education, Amman, Jordan
[4]Bandırma Onyedi Eylül University, Faculty of Sports Sciences, Balıkesir, Türkiye

CORRESPONDENCE

B. E. Orhan, Istanbul Aydın University, Faculty of Sports Sciences , Beşyol Mah. İnönü Cad. No:38, Sefaköy-Küçükçekmece, 34295 Istanbul, Türkiye, *bekirerhanorhan@aydin.edu.tr*

Abstract

The relationship between lifestyle factors such as sleep quality and dietary habits has attracted growing interest due to their combined influence on overall well-being. Poor sleep quality has been linked to impaired cognitive functioning and emotional regulation, which may contribute to less healthy food choices, whereas a nutritious diet can support better sleep. This study examined the associations between sleep quality and attitudes toward healthy nutrition among adults living in Türkiye and explored how lifestyle factors (physical activity, smoking, alcohol consumption) relate to these variables. A convenience sample of 358 adults completed an online survey. Of the 358 survey responses collected, 346 were deemed valid and included in the final analysis after excluding 12 unsuitable entries. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), and attitudes were measured with the Attitudes Towards Healthy Nutrition Scale (ASHN). A weak negative correlation was found between sleep quality and attitudes toward healthy nutrition ($r=-0.205$, $p<0.001$), indicating that approximately 4% of the variance in nutrition attitudes was explained ($r^2=0.042$). Similar weak negative correlations were observed across the ASHN subdimensions. In addition, lifestyle factors were associated with both sleep quality and nutrition attitudes; notably, daily physical activity demonstrated a moderate association with ASHN ($\eta^2=0.108$). Public health initiatives that incorporate sleep hygiene education may be modestly associated with more positive nutrition-related attitudes, but the small effect size indicates that sleep should be considered only one minor component within broader, multifactorial interventions targeting diet, physical activity, emotional regulation, and other aspects of healthy living.

Keywords: *sleep health, diet quality, physical activity, health behaviours, exercise*

Introduction

The increasing awareness of the interplay between lifestyle factors and health outcomes has directed considerable attention to the relationship between attitudes towards healthy nutrition and sleep quality. The relationship between diet and sleep quality affects people uniquely because their special eating habits alongside sleep behaviours strongly affect their well-being (Abu Jamous et al., 2024; Hudson et al., 2007; Scarapicchia et al., 2015; Whatnall et al., 2020). Diet quality has been consistently linked with mental health outcomes, where healthier dietary patterns are associated with a reduced risk of depression and anxiety (Lassale et al., 2019; Li et al., 2017; Molendijk et al., 2018). Studies demonstrate that eating foods with many vitamins and minerals helps the body control sleep cycle rhythms and enhances sleep quality (Burrows et al., 2020; Dashti et al., 2015; Zuraikat et al., 2021). Eating can affect sleep patterns, thus making dietary influences on health more complicated (Ghani et al., 2022; St-Onge, 2017; Wilson et al., 2022). Dietary choices play an essential role in sleep quality because high-fat and high-sugar diets have been proven to cause deteriorating sleep quality (AlKasasbeh et al., 2024; Chaput et al., 2023; Dashti et al., 2015; Wilson et al., 2022).

Sleep quality has emerged as a crucial determinant of physical and psychological health, with poor sleep being closely linked to higher levels of psychological distress and impaired cognitive function (Dietrich et al., 2016; Freeman et al., 2017; Semsarian et al., 2021). Insufficient sleep and circadian misalignment contribute to obesity, demonstrating a complex interplay between sleep and dietary behaviours (Al-Khatib et al., 2017; Chaput et al., 2023; Konttinen, 2020). Furthermore, sleep deprivation can lead to increased appetite and caloric intake, particularly from high-calorie foods, exacerbating weight gain and metabolic disorders (Al-Khatib et al., 2017; St-Onge et al., 2012; Zuraikat et al., 2021).

Scientific research reveals that sleep directly impacts dietary habits, although dietary habits also affect sleep patterns (Godos et al., 2021; Zuraikat et al., 2021). Inadequate sleep patterns often cause people to select unhealthy foods, intensifying sleep problems and forming a harmful cycle that negatively impacts their health (Huang et al., 2021; Fenton et al., 2021; Kline, 2014). This bidirectional relationship is evident in studies showing that poor sleep can increase cravings for high-calorie foods and lead to emotional eating, further impacting body weight and overall health (St-Onge et al., 2012; Penaforte et al., 2019; Van Strien & Koenders, 2014). Stress and anxiety serve as psychological and emotional factors that transmit signals between diet changes and disrupted sleep events, thus advocating for broad-based investigations of these behaviours (Goldstein & Walker, 2014; Konttinen et al., 2019; Richards & Specker, 2021).

The interplay between sleep quality and dietary habits is further influenced by various socio-demographic factors such as age, gender, and socio-economic status, which play a significant role in shaping both nutrition and sleep behaviours among different populations (Adams et al., 2017; Orhan et al., 2025; Whatnall et al., 2020). The stress on overall health will be affected by how socio-economic inequalities influence people's ability to access nutritious food along with proper sleep practices (Australian Bureau of Statistics, 2015; Hayes et al., 2019; World Health Organization, 2020). Furthermore, geographic variations also play a role, with differences in obesity prevalence and associated risk factors observed across different regions and populations (Gong et al., 2018; Samouda et al., 2018).

This study examines the relationship between sleep quality and attitudes toward healthy nutrition among adults living in Türkiye. Specifically, it aims (a) to investigate the association between global sleep quality and overall attitudes toward healthy nutrition, (b) to examine how sleep quality relates to specific sub-dimensions of attitudes toward healthy nutrition, and (c) to explore whether attitudes toward healthy nutrition differ according to key lifestyle factors such as physical activity, smoking, and alcohol consumption. By clarifying these relationships, the study seeks to provide a focused empirical basis for designing health promotion strategies that consider sleep, diet, and lifestyle as interconnected components of well-being.

Materials and methods

Relational research aims to determine whether two or more variables change together and, if they do, how this change occurs (Fraenkel et al., 2012). In this study, the relational research method, one of the quantitative research methods, was used. This method, used to examine whether two or more variables affect each other (Tekbıyık, 2023), was employed to investigate whether there is a relationship between individuals' sleep quality and their attitudes towards healthy nutrition.

Study group

A convenience sampling method was used in the study, and the sample consisted of individuals who voluntarily agreed to participate. In a convenience sampling approach, individuals included in the research are not selected randomly from a defined sampling frame; participation is limited to volunteers who respond to the researcher's announcement (Stratton, 2021). Therefore, a probabilistic selection process was not implemented in this study, no random sampling from the target population was conducted, and the representativeness of the sample remained limited. This is considered one of the methodological limitations of the research.

The sample size was determined in line with the recommendation of having 15–20 observations per independent variable for correlation analyses (Akbulut & Çapık, 2022), and the study aimed to reach more than 250 participants (Schönbrodt & Perugini, 2018). Responses were obtained from a total of 358 participants; after data cleaning, 12 unsuitable responses were excluded, and the analyses were carried out with 346 participants. The frequency and percentage distributions of participants' gender, educational level, employment status, health behaviours, and other demographic characteristics are presented in Table 1.

Table 1. Demographic characteristics of the participants

Demographic Information		f	%
Gender	Female	231	66.76
	Male	115	33.24
Educational Status	High School and below	232	67.05
	University and above	114	32.95
Employment Status	Employed	139	40.17
	Unemployed	207	59.83

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Table 1. Demographic characteristics of the participants

Demographic Information		f	%
Having an Athlete's License	Yes	185	53.47
	No	161	46.53
Regular Health Check-Ups	Yes	101	29.19
	No	245	70.81
Daily Physical Activity	None	36	10.40
	1-2 days per week	83	23.99
	3-4 days per week	147	42.49
	5-6 days per week	59	17.05
	Every day	21	6.07
Sleep Pattern	Regular	80	23.12
	Irregular	111	32.08
	Sometimes regular, sometimes irregular	155	44.80
Family History of Genetic Diseases	Yes	59	17.05
	No	236	68.21
	Does not know	51	14.74
Smoking Status	Never smoked	169	48.84
	Used to Smoke, but Quit	49	14.16
	Smokes less than 10 cigarettes a day	55	15.90
	Smokes 10 or more cigarettes a day	73	21.10
Alcohol Consumption	Never consumed	155	44.80
	A few times a month	163	47.11
	A few times a week	28	8.09

Data collection tool

The research used three data collection tools: the "Demographic Information Form" to gather information about individuals, the "Pittsburgh Sleep Quality Index (PSQI)," and the "Attitudes Towards Healthy Nutrition Scale (ASHN)".

Pittsburgh Sleep Quality Index (PSQI)

The PSQI, developed by Buysse et al. (1989) to assess sleep quality, was validated and adapted to the Turkish language by Ağargün et al. (1996). The PSQI measures sleep quality across seven subcomponents: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. The PSQI has been used to evaluate sleep quality over the past month. The PSQI consists of seven components and 24 questions. Of these 24 questions, 19 are self-assessment questions, while the other five are to be answered by the participant's spouse or roommate. These five questions, which the spouse or roommate answers, are for clinical information purposes only and are not included in the score calculation. In this study, the five questions to be answered by the spouses or roommates were excluded from the research process. The self-assessment questions include various dimensions related to sleep quality. Each item is scored between 0 and 3 points, and the sum of the seven component scores constitutes the total PSQI score. The total score on the scale ranges between 0 and 21. A total PSQI score of ≤5 indicates good sleep quality, while a score of >5 indicates poor sleep quality. In the reliability study of the Turkish form of the scale, Cronbach's alpha internal consistency coefficient was calculated as 0.80 (Ağargün et al., 1996).

Attitudes Towards Healthy Nutrition Scale (ASHN)

The Attitudes Towards Healthy Nutrition Scale (ASHN) was developed by Tekkurşun Demir and Cicioğlu (2019). The ASHN consists of four factors and 21 items. The factors are named Information on Nutrition (IN), Emotion for Nutrition (EN), Positive Nutrition (PN), and Malnutrition (MP). The minimum score obtained from the ASHN is 21, and the maximum score is 105. A score of 21 indicates a very low attitude towards healthy nutrition, 23-42 indicates a low attitude, 43-63 indicates a moderate attitude, 64-84 indicates a high attitude, and 85-105 indicates an ideal, high attitude towards healthy nutrition.

When the analyses related to the scale were examined, the Kaiser-Meyer-Olkin (KMO) test result in the exploratory factor analysis was found to be 0.87, and the Bartlett Sphericity test's chi-square value was 5076.914 (df=476; p<0.001). The scale explains 57.79% of the total variance. It was found that the factor loadings of the factors in the measurement tool were higher than 0.40. The factor loadings of each item in the scale ranged between 0.41 and 0.95. In the results of the confirmatory factor analysis of ASHN, the fit index values obtained were $\chi2/df=1.71$, RMSEA=0.04, PGFI=0.74, PNFI=0.82, GFI=0.92, AGFI=0.90, IFI=0.98, NFI=0.95, and CFI=0.98. The internal consistency coefficient and the test-retest method examined the scale's reliability. Accordingly, the internal consistency coefficients were found to be 0.90 for IN factor, 0.84 for EN factor, 0.75 for PN factor, and 0.83 for MP factor. The reliability coefficient for the test-retest was calculated as 0.81, 0.79, 0.68, and 0.80, respectively. No item was removed due to the item analysis, and it was determined that all the items in the scale were distinctive. Additionally, it was found that the item-total correlation values ranged between 0.68 and 0.92. Based on all these analyses, it was concluded that the ASHN is a valid and reliable measurement tool that can be used to assess university students' attitudes towards healthy nutrition.

Data collection procedure and data analysis

The study data were collected using an online questionnaire prepared in line with the aim of the research and administered electronically. The scale items and the personal information form were transferred to the online environment, and the survey link was shared in various social media groups and communication networks accessible to the researcher. In the first part of the form, participants read and approved an informed consent text explaining the purpose of the study, the principle of voluntary participation, and confidentiality conditions; only after providing consent were they directed to the questionnaire. The data collection process resulted in a total of 358 completed forms. The IBM SPSS Statistics software (Version 27.0; IBM Corp., Armonk, NY, USA) was used to analyse the collected data. Before starting the analysis, the scores obtained from the scales were calculated and the assumptions of normality were examined. First, missing data and outlier analyses were performed to test the normality of the data set. As a result of these procedures, 12 data points were removed from the data set, and data analysis was initiated with 346 responses.

When the data were examined, the participants' mean Pittsburgh Sleep Quality Index (PSQI) score was 8.06 (SD=3.46). According to the total PSQI scores, 90 participants (26.01%) had good sleep quality, whereas 256 participants (73.99%) had poor sleep quality. The participants' mean attitude score toward healthy nutrition was 74.16 (SD=12.10), which falls within the high category. No participants had very low or low attitude scores. The participants' PSQI scores and ASHN are presented in Table 2.

Table 2. PSQI and ASHN total scores of the participants

PSQI Score	f	%
0	2	0.6
1	2	0.6
2	8	2.3
3	17	4.9
4	28	8.1
5	33	9.5
6	31	9.0
7	38	11.0
8	40	11.6
9	31	9.0
10	31	9.0
11	28	8.1
12	16	4.6
13	16	4.6
14	11	3.2
15	7	2.0
16	5	1.4
17	2	0.6
TOTAL	346	100.0

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Table 2. PSQI and ASHN total scores of the participants

ASHN score	f	%
Moderate	78	22.54
High	198	57.23
Ideal	70	20.23
TOTAL	346	100

Note. PSQI – Pittsburgh Sleep Quality Index; ASHN - Attitudes Towards Healthy Nutrition Scale

Because the choice of statistical test can directly affect research results (Kul, 2014), the relevant assumptions were checked before deciding which tests to use. In this context, it was examined whether the scores obtained from the tests were normally distributed, whether variances were homogeneous, and whether the scores were obtained on at least an interval-scale level.

For the evaluation of the normality assumption, distribution plots of the data as well as skewness and kurtosis coefficients were examined. Skewness and kurtosis coefficients within the range of ±1 were taken to indicate that the data were compatible with a normal distribution. In addition, the similarity of the arithmetic mean, median, and mode values was considered supportive of normality. In all t-tests and one-way ANOVA analyses conducted in the study, Levene's test was used to evaluate the homogeneity of variances; when $p>0.05$, the homogeneity assumption was accepted as satisfied.

Based on the results of the normality tests, Pearson correlation analysis, independent samples t-tests, and one-way analysis of variance (ANOVA) were used in the data analysis. Following one-way ANOVA, Scheffé post hoc tests were applied to determine between which groups statistically significant differences occurred.

In the statistical analyses conducted in this study, the significance level was set at $p=0.05$. In studies examining effects, it is recommended to report effect sizes in addition to p values (American Psychological Association [APA], 2010). Accordingly, when interpreting the statistical results obtained in this study, effect size indices were considered alongside significance values.

Given the exploratory nature of this study and the large number of statistical tests, no formal correction for multiple comparisons (e.g., Bonferroni or FDR) was applied. Instead, effect sizes and patterns of association were emphasised rather than relying solely on p-values. Consequently, the risk of Type I error is increased, and statistically significant findings, particularly those with very small effect sizes, should be interpreted with caution.

To determine the effect of the independent variable on the dependent variable, Cohen's d effect size coefficient was calculated for independent samples t-tests, and eta-squared (η^2) effect size coefficients were calculated for one-way ANOVAs. Cohen's d values below 0.20 were interpreted as very small, between 0.20 and 0.50 as small, between 0.50 and 0.80 as medium, between 0.80 and 1.00 as large, and above 1.00 as very large effects. Eta-squared values below 0.01 were interpreted as very small, between 0.01 and 0.06 as small, between 0.06 and 0.14 as medium, and above 0.14 as large effects (Büyüköztürk, 2015; Cohen, 1988).

Ethical approvals for the research

In this study, the rules specified within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were followed, and actions listed under the title of "Acts Contrary to Scientific Research and Publication Ethics" were avoided. The Istanbul Aydın University Ethics Committee granted the ethical committee approval for this study with decision number 2023/08.

Results

A weak, negative relationship was found between participants' sleep quality and their attitudes toward healthy nutrition ($r=-0.205$, $p<0.001$; Table 3). A weak, negative relationship was also found between participants' sleep quality and EN ($r=-0.146$, $p=0.006$), PN ($r=-0.185$, $p<0.001$), and MP ($r=-0.156$, $p=0.004$) sub-dimensions. However, no significant relationship was found between participants' sleep quality and IN sub-dimension ($r=-0.072$, $p=0.182$).

Table 3. Correlations between PSQI and ASHN sub-dimensions

		ASHN	IN	EN	PN	MP
PSQI	Pearson r	-0.205*	-0.072	-0.146*	-0.185*	-0.156*
	P	<0.001	0.182	0.006	<0.001	0.004
	n	346	346	346	346	346

*Note. PSQI – Pittsburgh Sleep Quality Index; ASHN - Attitudes Towards Healthy Nutrition Scale; IN - Information on Nutrition; EN - Emotion for Nutrition; PN - Positive Nutrition; MP – Malnutrition; *Correlation is significant at the p<0.05 level*

A weak, negative relationship was found between participants' attitudes toward healthy nutrition and the components of the sleep quality index: subjective sleep quality, sleep disturbance, use of sleep medication, and daytime dysfunction (p<0.05; Table 4). However, no significant relationship was found between sleep latency, sleep duration, and habitual sleep efficiency components (p>0.05).

Table 4. Correlations between ASHN scores and PSQI components

		Subjective Sleep Quality	Sleep Latency	Sleep Duration	Habitual Sleep Efficiency	Sleep Disturbance	Use of Sleep Medication	Daytime Dysfunction
ASHN	Pearson r	-0.158*	-0.087	0.063	-0.044	-0.240*	-0.224*	-0.288*
	P	0.003	0.105	0.246	0.417	<0.001	<0.001	<0.001
	n	346	346	346	346	346	346	346

*Note. PSQI – Pittsburgh Sleep Quality Index; ASHN - Attitudes Towards Healthy Nutrition Scale; *Correlation is significant at the p<0.05 level*

According to the results of the independent samples t-test analyses (Table 5), significant differences were observed between participants' PSQI scores and their gender (p<0.05), as well as between participants' ASHN scores and both their employment status and regular health check-up status (p<0.05). When these findings are examined in terms of effect size, the difference in PSQI scores by gender (d=0.35) indicates that gender has a small effect on sleep quality. Similarly, the difference in ASHN scores by employment status (d=0.33) suggests that employment status has a small effect on attitudes toward healthy nutrition, whereas the difference in ASHN scores according to regular health check-up status (d=0.47) indicates an effect that is approaching a medium level on attitudes toward healthy nutrition.

In addition, the independent samples t-test analyses showed no significant differences between participants' PSQI scores and their education level, employment status, athlete licence status, or regular health check-up status (p>0.05), nor between participants' ASHN scores and their gender, education level, or athlete licence status (p>0.05).

Table 5. Independent samples t-test results for PSQI and ASHN scores by gender, education level, employment status, athlete licence status, and regular health check-ups

Scale	Variable		N	x̄	sd	df	t	p	d
PSQI	Gender	Female	231	7.66	3.192	194.73	-2.869	0.005*	-0.35
		Male	115	8.85	3.835				
ASHN		Female	231	74.86	12.20	344	1.520	0.129	-
		Male	115	72.77	11.83				
PSQI	Educational Status	High School and below	232	8.16	3.466	344	0.746	0.456	-
		University and above	114	7.86	3.454				
ASHN		High School and below	232	73.91	11.80	344	-0.550	0.583	-
		University and above	114	74.68	12.73				
PSQI	Employment Status	Employed	139	8.06	3.501	344	-0.001	0.999	-
		Unemployed	207	8.06	3.440				
ASHN		Employed	139	76.55	11.95	344	3.035	.003*	0.33
		Unemployed	207	72.57	11.95				

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Table 5. Independent samples t-test results for PSQI and ASHN scores by gender, education level, employment status, athlete licence status, and regular health check-ups

Scale	Variable		N	x̄	sd	df	t	p	d
PSQI	Having an Athlete's License	Yes	185	8.22	3.459	344	0.944	0.346	-
		No	161	7.87	3.461				
ASHN		Yes	185	75.00	12.30	344	1.378	0.169	-
		No	161	73.21	11.84				
PSQI	Regular Health Check-ups	Yes	101	7.79	3.302	344	-0.917	0.360	-
		No	245	8.17	3.523				
ASHN		Yes	101	78.10	13.17	194.73	3.717	<0.001*	0.47
		No	245	72.54	11.27				

*Note. PSQI – Pittsburgh Sleep Quality Index; ASHN - Attitudes Towards Healthy Nutrition Scale; *Correlation is significant at the p<0.05 level*

According to the results of the variance analysis for independent samples (Table 6), there is a significant difference between participants' PSQI scores and their sleep patterns, smoking habits, and alcohol consumption ($p<0.05$). When the findings are evaluated in terms of effect size, the difference in sleep pattern can be considered medium in magnitude ($\eta^2=0.094$), while the differences in smoking ($\eta^2=0.048$) and alcohol consumption ($\eta^2=0.020$) can be considered small. No significant difference was found between their physical activity levels and the presence of hereditary diseases in their families ($p>0.05$).

As a result of the post-hoc Scheffe test performed to determine the difference between the groups, differences ($p<0.05$) were found that the differences come from between individuals who sleep regularly and those who sleep irregularly or those who sometimes sleep regularly and sometimes irregularly, between individuals who never smoke and those who smoke more than ten cigarettes a day, and between individuals who used to smoke but no longer do and those who smoke ten or more cigarettes a day, between individuals who never consume alcohol and those who consume alcohol a few times a month.

According to the results of the variance analysis for independent samples, there is a significant difference between participants' ASHN scores and their daily physical activity, sleep patterns, and smoking habits ($p<0.05$). When the findings are evaluated in terms of effect size, the difference related to daily physical activity can be considered to have a medium effect ($\eta^2=0.108$), whereas the difference related to sleep pattern shows a small effect ($\eta^2=0.037$), and the difference related to smoking indicates a small and limited effect ($\eta^2=0.036$). No significant difference was found regarding the presence of hereditary diseases in the family and alcohol consumption ($p>0.05$).

As a result of the post-hoc Scheffe test performed to determine the difference between the groups, differences ($p<0.05$) were found between those who never do physical activity and those who do physical activity three to four days a week, five to six days a week, and every day, and between those who do physical activity one to two days a week and those who do physical activity three to four days and five to six days a week, individuals who sleep regularly and those who sleep irregularly, as well as between those who sleep irregularly and those who sometimes sleep regularly and irregularly, those who smoked for a period and no longer smoked, and those who smoked ten cigarettes or more a day.

Table 6. ANOVA results for participants' PSQI scores and ASHN scores based on daily physical activity, sleep patterns, presence of hereditary diseases in the family, smoking, and alcohol consumption

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Table 6. ANOVA results for participants' PSQI scores and ASHN scores based on daily physical activity, sleep patterns, presence of hereditary diseases in the family, smoking, and alcohol consumption

Scale		Variable	N	x̄	sd		Sum of Squares	df	Mean Square	F	Sig.	η²	Significant Differences Between Groups (Scheffe)
PSQI	Daily Physical Activity	None	36	8.83	3.427	Between Groups	48.485	4	12.121	1.203	0.401	-	-
		1-2 times a week	83	8.34	3.542	Within Groups	4080.359	341	11.966				
		3-4 times a week	147	7.79	3.401	Total	4128.844	345					
		5-6 times a week	59	8.10	2.998								
		Every day	21	7.38	4.642								
		Total	346	8.06	3.459								
ASHN		None	36	65.89	9.322	Between Groups	5462.269	4	1365.567	10.330	0.000*	0.108	1-3, 4, 5 2-3, 4, 5
		1-2 times a week	83	70.71	10.909	Within Groups	45079.341	341	132.197				
		3-4 times a week	147	75.76	10.891	Total	50541.610	345					
		5-6 times a week	59	77.86	13.136								
		Every day	21	80.43	15.734								
		Total	346	74.16	12.104								
PSQI	Sleep Patterns	Regular	80	6.44	2.950	Between Groups	386.199	2	193.099	17.697	<0.001*	0.094	1-2, 3 2-3
		Irregular	111	9.32	3.570	Within Groups	3742.645	343	10.912				
		Sometimes Regular, Sometimes Irregular	155	7.99	3.276	Total	4128.844	345					
		Total	346	8.06	3.459								
ASHN		Regular	80	75.84	14.161	Between Groups	1878.734	2	939.367	6.621	0.002*	0.037	1-2 2-3
		Irregular	111	70.77	10.621	Within Groups	48662.876	343	141.874				
		Sometimes Regular, Sometimes Irregular	155	75.73	11.512	Total	50541.610	345					
		Total	346	74.16	12.104								
PSQI	Hereditary Disease in Family	Yes	59	8.58	3.292	Between Groups	21.267	2	10.633	0.888	0.412	-	-
		No	236	7.91	3.516	Within Groups	4107.577	343	11.975				
		Not Sure	51	8.14	3.388	Total	4128.844	345					
		Total	346	8.06	3.459								
ASHN		Yes	59	75.88	11.987	Between Groups	217.677	2	108.839	0.742	0.477	-	-
		No	236	73.89	12.285	Within Groups	50323.933	343	146.717				
		Not Sure	51	73.45	11.420	Total	50541.610	345					
		Total	346	74.16	12.104								
PSQI	Smoking Habits	Never Smoked	169	7.56	3.357	Between Groups	196.897	3	65.632	5.709	<0.001*	0.048	1-4 2-4
		Used to Smoke, but Quit	49	7.31	3.362	Within Groups	3931.947	342	11.497				
		10 or more cigarettes a day	55	8.62	3.291	Total	4128.844	345					
		Less than 10 cigarettes a day	73	9.29	3.557								
		Total	346	8.06	3.459								
ASHN		Never Smoked	169	75.27	12.597	Between Groups	1830.939	3	610.313	4.285	0.005*	0.036	2-4
		Used to Smoke, but Quit	49	77.67	11.689	Within Groups	48710.671	342	142.429				
		Less than 10 cigarettes a day	55	71.73	12.178	Total	50541.610	345					
		10 or more cigarettes a day	73	71.08	10.195								
		Total	346	74.16	12.104								

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Table 6. ANOVA results for participants' PSQI scores and ASHN scores based on daily physical activity, sleep patterns, presence of hereditary diseases in the family, smoking, and alcohol consumption

Scale	Variable		N	x̄	sd		Sum of Squares	df	Mean Square	F	Sig.	η²	Significant Differences Between Groups (Scheffe)
PSQI	Alcohol Consumption	Never Consumed	155	7.53	3.425	Between Groups	81.627	2	40.813	3.459	0.033*	0.020	1-2
		A few times a month	163	8.54	3.393	Within Groups	4047.217	343	11.799				
		A few times a week	28	8.18	3.732	Total	4128.844	345					
		Total	346	8.06	3.459								
ASHN		Never Consumed	155	73.81	12.500	Between Groups	378.327	2	189.164	1.293	0.276		-
		A few times a month	163	75.01	11.490	Within Groups	50163.282	343	146.249				
		A few times a week	28	71.21	13.212	Total	50541.610	345					
		Total	346	74.16	12.104								

*Note. PSQI – Pittsburgh Sleep Quality Index; ASHN - Attitudes Towards Healthy Nutrition Scale; N – number of participants; x̄ – mean; sd – standard deviation; df – degrees of freedom; F – F-test value; Sig. – significance level (p-value); η² – eta squared (effect size); *Indicates significance at the p<0.05 level.*

Discussion

The current study explored the relationship between individuals' sleep quality and attitudes toward healthy eating, revealing several significant but weak correlations. These findings align with previous research identifying a connection between sleep patterns and various health behaviours, including dietary choices and physical activity. This discussion section provides a detailed interpretation of the results, considers the implications of the findings, and suggests potential directions for future research.

The study found a weak negative correlation between sleep quality and healthy eating attitudes (r=0.205, p<0.05). Although the strength of this relationship is small, it is consistent with existing literature, which suggests that poor sleep can lead to impaired cognitive functioning and emotional regulation, thereby influencing dietary behaviours. Poor sleep quality has been associated with increased cravings for high-calorie foods and decreased motivation for maintaining healthy eating habits (Akhlaghi & Kohanmoo, 2023; Yang & Tucker, 2021). The findings of this study support these assertions, as individuals with lower sleep quality reported less favourable attitudes toward healthy eating. However, it is essential to note that the variance explained by sleep quality about healthy eating attitudes was small, suggesting that while sleep quality plays a role, other factors are likely more influential in shaping dietary attitudes. It is important to stress that the observed associations were small in magnitude, explaining approximately 4% of the variance in attitudes toward healthy nutrition. From a public-health perspective, sleep quality is only one minor factor among many that contribute to how individuals feel and think about healthy eating. Improving sleep alone is therefore unlikely to produce large changes in dietary attitudes or behaviour. However, it may form one modest element within broader, multi-component interventions that also target diet, physical activity, stress management, and the wider social environment. Stress, emotional well-being, socio-economic status, and access to healthy foods may also significantly affect attitudes toward nutrition (Cardoso et al., 2020; Nagy-Pénzes, Vincze, & Bíró, 2020). Future studies should consider a broader range of factors to capture a more comprehensive understanding of what influences dietary attitudes.

A more granular analysis of the relationship between sleep quality and the sub-dimensions of healthy eating attitudes revealed several interesting patterns. Significant negative correlations were found for the EN, PN, and MP sub-dimensions, but not for IN. This finding suggests that poor sleep quality may significantly impact individuals' emotional and behavioural relationships with food rather than their cognitive understanding of nutrition. In other words, individuals who experience poor sleep might know what constitutes a healthy diet but struggle to implement this knowledge due to emotional and behavioural barriers, such as stress or mood swings associated with lack of sleep (O'Connor et al., 2022; Yeo et al., 2024). This finding adds an important dimension to the existing body of literature, as it suggests that sleep interventions targeting emotional regulation may improve sleep quality and individuals' ability to make healthier food choices. Emotional eating and stress-induced food consumption are well-documented phenomena, and the connection between sleep and these behaviours warrants further exploration (Pensgaard et al., 2023; Wiss, Avena, & Gold, 2020).

When the individual components of sleep quality (e.g., subjective sleep quality, sleep disturbances, daytime dysfunction) were examined, the results showed that daytime dysfunction had the strongest negative correlation with attitudes toward healthy eating (r=-0.288, p<0.05). This finding is particularly noteworthy as it suggests that the impact of poor sleep on daytime functioning (e.g., fatigue, difficulty concentrating) may be a key factor in explaining the connection between sleep and unhealthy eating patterns (Chaput et al., 2022; Gomes et al., 2023). This aligns with the notion that poor daytime functioning due to sleep deprivation can lead to lower energy levels, reduced self-control, and a reliance on convenience foods, which are often less healthy (Gooderham, 2024; Stover et al., 2023). Improvements in sleep quality, particularly through daytime dysfunction reduction, would boost individuals' capability to maintain healthier eating patterns (Amato et al., 2024; Bovenzi et al., 2024).

The study found that gender was a significant predictor of sleep quality, with men reporting worse sleep quality than women. Biological, psychological, and lifestyle factors may explain this gender difference. For instance, hormonal fluctuations, stress, and differences in sleep hygiene practices may contribute to gender disparities in sleep quality (Andersen et al., 2023; Curtis et al., 2024; Rodríguez-Aragón et al., 2024). However, no significant differences in sleep quality were observed based on education level, employment status, or athletic licensing. These findings suggest that these socio-demographic factors do not strongly influence sleep quality in this sample.

One of the study's most significant findings was the role of lifestyle factors—namely physical activity, smoking, and alcohol consumption—in sleep quality and healthy eating attitudes. Regular physical activity was associated with better sleep quality and more positive attitudes toward healthy eating, which is consistent with the extensive literature on the benefits of exercise for both physical and mental health (Mantzorou et al., 2023; Rassolnia & Nobari, 2024; Trajković et al., 2023). The pattern in which attitudes toward healthy nutrition form part of a wider lifestyle profile aligns with previous findings showing that these attitudes are associated with exercise addiction among physically active individuals (Orhan et al., 2024). This finding underscores the importance of promoting physical activity to improve overall health behaviours, including sleep and nutrition. Similarly, smoking and alcohol consumption were negatively correlated with sleep quality and healthy eating attitudes. This is consistent with previous research that links smoking and excessive alcohol consumption with poorer sleep and unhealthier dietary patterns (Doak et al., 2023; Faris et al., 2023). The fact that these lifestyle factors were significant predictors highlights the need for public health interventions targeting smoking cessation, alcohol moderation, and increased physical activity to improve sleep quality and dietary habits (Chai et al., 2024; Mace et al., 2024).

The findings of this study have several practical implications for public health interventions. Given the interconnectedness of sleep quality, physical activity, and dietary behaviours, interventions aimed at improving one aspect of health (e.g., sleep hygiene) could have spillover effects on other behaviours, such as healthier eating and increased physical activity (Chevance et al., 2022; Ranby et al., 2023). For instance, sleep education programs that teach individuals how to improve their sleep quality could also incorporate stress management and emotional regulation lessons, enhancing individuals' ability to maintain healthy eating habits (Irish et al., 2015; Leonidis et al., 2021). Additionally, the findings suggest that interventions should be tailored to address emotional and behavioural aspects of eating rather than focusing solely on cognitive knowledge. The combination of low sleep quality and impaired emotional management usually prevents people from sticking to their healthy eating plans despite knowing the health advantages (Benjamins et al., 2021; Brytek-Matera, 2021).

Despite its valuable contributions, this study has several limitations. Although the sample size was adequate for statistical analysis, it may not represent the broader population, which limits the generalizability of the findings. All variables were assessed through self-report questionnaires, which are subject to recall bias, social desirability effects, and inaccuracies in self-perception (e.g., of sleep quality or health attitudes); objective measures of sleep (such as actigraphy) and more detailed dietary assessments (such as food diaries or 24-hour recalls) would allow stronger inferences in future research. A further conceptual limitation is that the ASHN assesses attitudes toward healthy nutrition rather than actual dietary intake or objectively observed eating behaviour; the findings therefore pertain to how participants think and feel about healthy eating, not to what they actually eat in daily life. Attitudes and behaviours are related but not identical, and future research should combine attitudinal measures with detailed dietary assessments to clarify how sleep quality is linked to concrete eating patterns. Multivariable adjusted analyses controlling for potential confounders such as socioeconomic status, chronic health conditions, perceived stress, or use of sleep medication were not conducted. Some relevant variables were either not measured or were not available in sufficient detail, and the study was designed primarily as an exploratory analysis of bivariate relationships. As a result, the observed associations between sleep quality and attitudes toward healthy nutrition may be partially or wholly explained by unmeasured confounding factors; future studies should incorporate richer information on sociodemographic, clinical, and psychosocial characteristics and use multivariable models to obtain more robust estimates. Another area for future research is the exploration of variables that may mediate or moderate the relationship between sleep and dietary attitudes, such as psychological well-being, stress levels, or access to healthy food options, and longitudinal studies that track changes in sleep and dietary behaviours over time would provide greater insight into the causal direction of these relationships.

Conclusions

In conclusion, this study highlights the intricate relationship between sleep quality and attitudes toward healthy eating, with lifestyle factors such as physical activity, smoking, and alcohol consumption playing key roles. While the correlations observed in this study were weak, the findings underscore the importance of addressing sleep quality as part of holistic health interventions to improve dietary behaviours. Future research should continue to explore the underlying mechanisms linking sleep and diet, emphasizing emotional regulation and lifestyle modifications.

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Conflict of Interest
The authors report no conflict of interest.

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