Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Association between Dietary Patterns, Menstrual Problems, Sleep Quality, and Psychological Well-Being in Adolescent Girls

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ABSTRACT

Adolescence is a critical developmental stage characterized by significant biological, emotional, and psychological changes. This period is particularly important for adolescent girls, as their physical and mental well-being is strongly influenced by lifestyle factors such as dietary habits. The present study examined the relationship between food frequency and three major health outcomes: menstrual symptoms, sleep quality, and mental health among adolescent girls aged 13 to 19 years. A cross-sectional quantitative research design was employed, and data were collected from 202 female students in Sialkot through purposive sampling. Standardized assessment tools were used, including the Food Frequency Questionnaire (FFQ), Pittsburgh Sleep Quality Index (PSQI), Patient Health Questionnaire (PHQ-9), and Short-Form McGill Pain Questionnaire (SF-MPQ). Statistical analyses, including Pearson correlation and multiple linear regression, were conducted using SPSS version 25. The findings demonstrated a significant negative relationship between food frequency and health-related problems. Higher food frequency was associated with lower menstrual pain ($r = -.54$), fewer sleep disturbances ($r = -.50$), and reduced mental health problems ($r = -.48$). In addition, strong positive correlations were observed between sleep disturbances and menstrual symptoms ($r = .72$), as well as between sleep problems and mental health difficulties ($r = .82$). These results highlight the importance of integrated interventions focusing on healthy nutrition, proper sleep hygiene, and psychological well-being to improve the overall health of adolescent girls.

Keywords: Dietary Habits, Menstrual Cycle, Physical Health, Adolescents, Girls, Sleep Disturbances, Sialkot

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Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
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Introduction

Access to nutritious food is a fundamental human necessity and plays a significant role in maintaining both physical and psychological well-being. Dietary habits influence multiple dimensions of health, including sleep quality, menstrual health, emotional stability, and overall quality of life (Azimi, 2024). A balanced diet rich in proteins, vitamins, minerals, fiber, and healthy fats contributes to improved physiological functioning, hormonal regulation, and mental wellness. Healthy eating patterns may also protect individuals from psychological problems associated with hormonal fluctuations during the menstrual cycle. Dietary approaches such as the Dietary Approaches to Stop Hypertension (DASH) diet have been recognized for their effectiveness in preventing chronic diseases and promoting overall health and well-being (Johnson et al., 2022). Adolescence is a critical developmental period characterized by rapid physical growth, hormonal changes, cognitive development, and emotional transitions. During this stage, adolescent girls are particularly vulnerable to nutritional deficiencies, psychological stress, menstrual problems, and sleep disturbances. In higher educational settings, adolescent and young adult females frequently experience unhealthy dietary behaviors such as meal skipping, excessive fast-food consumption, and increased intake of sugary beverages and processed snacks. Research has shown that females experiencing menstrual disorders often consume greater quantities of sugar-sweetened foods, chocolates, and processed snacks, which may worsen physical discomfort and emotional instability (Güzeldere, 2024). Dietary habits refer to the regular patterns of food consumption, including meal timing, frequency, quantity, and food choices (Bo Dega, 2024). Healthy dietary practices are essential for supporting optimal physical and mental development during adolescence (Mosawy, 2024). Conversely, unhealthy dietary behaviors, including excessive intake of refined carbohydrates, saturated fats, and processed foods, combined with insufficient intake of omega-3 fatty acids and nutrient-dense foods, have been associated with depression, anxiety, stress, and premenstrual dysphoric symptoms (Sarris et al., 2015). Even small improvements in dietary behavior may significantly enhance health outcomes and overall quality of life (Mai et al., 2015). Cultural and religious beliefs also shape dietary behaviors. For example, Halal dietary practices in Islam and Kosher dietary laws in Judaism influence food selection and eating patterns (Keown, 2004). However, modernization and urbanization have promoted unhealthy eating trends characterized by fast-food consumption, irregular eating schedules, and nutritionally imbalanced diets (Heller & S., 2016). Such dietary patterns negatively affect immunity, concentration, emotional regulation, sleep quality, and psychological functioning. According to the World Health Organization (WHO), healthy nutrition is essential for growth, disease prevention, reproductive health, and psychological well-being. Obesity and poor nutritional practices among adolescent girls have emerged as important public health concerns affecting body image, reproductive health, and quality of life (Abbas, 2022). Furthermore, dietary patterns may influence the age at menarche and menstrual regularity, although causal mechanisms remain under investigation (Guo, 2024). Researchers frequently use Food Frequency Questionnaires (FFQs) to evaluate dietary patterns because they are practical and cost-effective for large populations despite limitations such as recall bias (Krause, 2015). Dietary patterns are clinically important because nutrients interact

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

synergistically or antagonistically in influencing health outcomes (Hu, 2002). Therefore, adopting healthy dietary habits through gradual lifestyle modifications may produce substantial long-term benefits.

Sleep Quality

Sleep quality is another essential component of health and well-being. Good sleep quality involves obtaining restorative sleep and awakening feeling refreshed and energized. Sleep consists of alternating rapid eye movement (REM) and non-REM cycles and is necessary for emotional regulation, cognitive functioning, memory consolidation, immune functioning, and physical recovery (Nelson, 2021). Emerging evidence indicates that dietary habits strongly influence sleep quality. The gut-brain axis theory suggests that the gut microbiome affects sleep regulation through neurotransmitter and hormone production (Carabotti, 2024). Diets high in processed foods, unhealthy fats, and refined sugars may contribute to chronic inflammation and hormonal disturbances that impair sleep quality (Cappuccio & Miller, 2017). Among adolescents, inadequate sleep is associated with poor academic performance, impaired concentration, emotional dysregulation, fatigue, and reduced quality of life (Nurunnabi, 2025). Studies indicate that healthier eating behaviors, including regular breakfast consumption and increased fruit and vegetable intake, are associated with improved sleep outcomes among adolescents (Storcksdieck Genannt Bonsmann & Hughes, 2018). In contrast, short sleep duration is associated with greater consumption of unhealthy snacks and dietary fats (Huang, 2025). Therefore, improving dietary habits may serve as an effective strategy for enhancing sleep quality and overall health.

Mental Health

Mental health is defined by the World Health Organization as a state of well-being in which individuals recognize their abilities, cope effectively with life stressors, work productively, and contribute positively to society. Mental health extends beyond the absence of illness and includes emotional, social, and psychological well-being. Adolescence represents a particularly sensitive stage for mental health because individuals develop emotional regulation, coping mechanisms, interpersonal skills, and self-identity during this period. Healthy nutrition, adequate sleep, and regular physical activity are essential protective factors for adolescent mental health (Alonso et al., 2004).

However, unhealthy lifestyles and poor dietary practices have contributed to increasing mental health problems globally. Mental disorders account for a significant proportion of the global burden of disease and disability (Ow, n.d.). Emotional stability, freedom from excessive anxiety, behavioral adjustment, and the ability to establish positive relationships are important indicators of mental health (American Psychological Association, 2023). Following the COVID-19 pandemic, increased levels of stress, anxiety, depression, and burnout have been reported among students and adolescents (News Rx Resources, 2022). Academic pressure, social expectations, unhealthy eating behaviors, and sleep disturbances may further contribute to psychological distress. Consequently, educational institutions are encouraged to develop supportive environments that promote mental well-being and reduce stigma

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associated with mental illness (Sigma Xi, 2024).

Menstrual Health

Menstrual health is an essential component of reproductive and overall health among adolescent females. Menstrual cramps, medically referred to as dysmenorrhea, involve painful uterine contractions during menstruation and affect a large proportion of adolescent girls (Krebs et al., 2019). Dysmenorrhea is primarily caused by elevated prostaglandin levels and hormonal fluctuations during the menstrual cycle (Proctor & Farquhar, 2006). Common symptoms include abdominal pain, backache, fatigue, nausea, bloating, and heavy menstrual bleeding. Severe menstrual pain may interfere with academic performance, daily functioning, and psychological well-being. Lifestyle factors such as poor dietary habits, obesity, stress, and physical inactivity may increase the severity of dysmenorrhea (Schaefers et al., 2019). Research suggests that diets rich in omega-3 fatty acids, vitamins B6 and E, probiotics, and dietary fiber may reduce inflammation and alleviate menstrual pain (Chen et al., 2018). Conversely, excessive consumption of processed foods, caffeine, sugary snacks, and saturated fats may aggravate menstrual symptoms (Mikulska et al., 2020). Adequate hydration and herbal beverages such as ginger and chamomile tea may also contribute to menstrual pain relief (Hawthorne et al., 2020). Overall, existing evidence demonstrates strong interconnections among dietary habits, sleep quality, mental health, and menstrual well-being among adolescent females. These findings emphasize the importance of multidisciplinary interventions focusing on nutrition education, healthy lifestyle behaviors, psychological support, and sleep hygiene to improve adolescents' physical, emotional, and reproductive health.

Literature Review

Maryam et al. (2025) conducted a study titled *How Dietary Habits Affect Menstrual Cramps, Sleep Quality, and Mental Health Issues* to examine the structural relationship between dietary habits, menstrual health, sleep quality, and psychological well-being among university students. The findings revealed that unhealthy dietary habits were significantly associated with severe menstrual pain, poor sleep quality, stress, anxiety, and emotional instability. Balanced dietary patterns, however, were linked with improved menstrual comfort, healthier sleep, and better psychological functioning. The study identified nutrition as an important modifiable factor influencing women's reproductive and mental health. Souza (2023) investigated sleep quality, pain perception, and nocturnal muscle cramps among individuals diagnosed with Charcot-Marie-Tooth disease (CMT). The findings demonstrated that individuals experiencing greater pain and fatigue also reported poor sleep efficiency and higher sleep disturbances. The study supported the bidirectional relationship between sleep and chronic pain, suggesting that poor sleep intensifies pain perception while persistent pain further disrupts sleep quality. Abreu (2021) analyzed six systematic reviews involving 86,961 participants to examine the relationship between dietary habits and sleep quality. The results showed that individuals classified as good sleepers consumed higher amounts of protein and lower amounts of carbohydrates and fats. The study concluded that dietary patterns significantly influence sleep quality and emphasized the need for randomized controlled trials to establish causal

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relationships. Maciel (2024) explored eating habits and eating behaviors among individuals with mental disorders. The study found that emotional eating, dietary restriction, uncontrolled eating, and food cravings were highly prevalent among participants and negatively affected their quality of life. Unhealthy dietary patterns were strongly associated with psychological distress and poor mental health outcomes.

Talekar (2022) examined the association between dietary habits and menstrual disorders among adolescent girls in Navi Mumbai, India. The findings revealed that more than half of the participants experienced moderate menstrual pain, while unhealthy dietary behaviors such as fast-food consumption and meal skipping were significantly associated with menstrual disorders. Statistical analysis demonstrated a strong positive relationship between unhealthy dietary patterns and menstrual health problems. Fontanellii et al. (2023) investigated eating behaviors among female medical students during different menstrual phases. Emotional and compulsive eating behaviors were associated with hormonal fluctuations, increased cortisol secretion, and reduced serotonin levels. Participants reported greater consumption of sweets, chocolates, and processed foods during the luteal phase. Dysmenorrhea and premenstrual symptoms were strongly associated with increased intake of high-fat and sugary foods. Zehra (2022) studied the prevalence of premenstrual syndrome (PMS) among adolescent girls in Hyderabad, India. The findings showed that nearly half of the participants experienced moderate to severe PMS symptoms. Significant associations were observed between PMS severity, stress levels, and high-calorie food consumption. Naik (2024) examined the relationship between diet diversity, sleep quality, and PMS symptoms among young adult women. The results indicated that poor sleep quality was significantly associated with greater PMS severity. More than half of the participants reported poor sleep quality, emphasizing the importance of healthy sleep behaviors in menstrual health management. Naraoka (2023) investigated dietary and lifestyle factors associated with menstrual pain among Japanese women aged 20–39 years. Women with severe menstrual pain consumed lower amounts of fish, vitamin D, vitamin B12, and animal protein, while consuming greater amounts of sugar, ramen, and ice cream. These participants also experienced higher levels of anxiety, fatigue, irritability, and depressive symptoms. Jeong (2023) explored the effects of sleep patterns on menstrual pain and PMS symptoms among South Korean adolescent girls during the COVID-19 lockdown period. Poor sleep quality, delayed sleep onset, and short sleep duration were significantly associated with greater menstrual symptom severity. The study highlighted the importance of sleep hygiene for adolescent menstrual health. Malik (2024) investigated the relationship among sleep hygiene, sleep quality, and mental health among university students. The findings revealed that students with healthier sleep practices and better sleep quality demonstrated more positive mental health outcomes. Similarly, irregular menstrual cycles were associated with poor sleep quality and daytime dysfunction among teenage girls. Ifraimov (2024) examined the associations among food insecurity, diet quality, sleep quality, and mental well-being. Individuals experiencing food insecurity reported poorer sleep quality, higher stress levels, and reduced mental well-being. In contrast, regular consumption of fruits, vegetables, and nuts was associated with improved sleep satisfaction and psychological health. Bahrampour (2023) explored

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dietary patterns, sleep quality, and mental health among overweight and obese women in Tehran, Iran. Unhealthy dietary patterns characterized by frequent fast-food consumption and sugary beverages were significantly associated with poor sleep quality. Rajaselin (2021) investigated the effects of hot water intake during menstruation on menstrual cramps among women with regular menstrual cycles. The findings demonstrated that regular hot water intake reduced menstrual pain and improved psychological well-being. Ribas Filho (2023) examined the relationship between dietary habits and anxiety levels among adolescents in Bangladesh. Greater fruit and vegetable consumption was associated with lower anxiety levels, whereas skipping breakfast and consuming fast food were linked with higher anxiety symptoms. Sen (2024) and Ciołek (2023) reported that adherence to anti-inflammatory diets and regular meal patterns reduced menstrual pain, whereas highly processed foods increased menstrual discomfort. Similarly, Lefebvre et al. found that hormonal fluctuations during menstruation influence appetite, food cravings, and eating behaviors, particularly increasing cravings for carbohydrate-rich foods to improve serotonin production and mood regulation. Collectively, the reviewed literature demonstrates strong interconnections among dietary habits, menstrual health, sleep quality, and psychological well-being. Healthy dietary practices appear to improve sleep quality, reduce menstrual discomfort, and promote emotional stability, whereas unhealthy eating patterns contribute to sleep disturbances, psychological distress, and menstrual complications. These findings highlight the need for educational programs and multidisciplinary interventions aimed at promoting balanced nutrition, healthy sleep hygiene, and psychological support among adolescent girls.

Research Design

The present study employed a quantitative cross-sectional research design to investigate the relationships among dietary habits, menstrual cramps, sleep quality, and psychological well-being among adolescent girls. A cross-sectional approach was considered appropriate because it allows researchers to collect data from participants at a single point in time and examine associations among multiple variables simultaneously. This design is widely used in psychological and public health research because it is economical, time-efficient, and suitable for identifying patterns and relationships within a target population.

Participants

The target population of the study consisted of adolescent female students aged 13 to 19 years enrolled in schools and colleges in Sialkot, Pakistan. Participants were recruited from various public and private educational institutions. Adolescence was selected as the focus of the study because it is a critical developmental period characterized by hormonal changes, emotional fluctuations, dietary irregularities, sleep disturbances, and menstrual health concerns. Only female students who fell within the specified age range and voluntarily agreed to participate were included in the study.

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Inclusion Criteria

Female students aged 13–19 years
Students enrolled in schools or colleges in Sialkot
Participants willing to provide informed consent
Participants able to understand and complete the questionnaires

Exclusion Criteria

Participants diagnosed with severe neurological or psychiatric disorders
Participants suffering from chronic medical illnesses that could significantly affect sleep, diet, or menstrual health
Incomplete questionnaires or missing responses

Sample Size

The sample size was determined based on previous literature and similar quantitative studies conducted on dietary habits, menstrual health, sleep quality, and mental health among adolescents. A sufficient sample was selected to ensure adequate statistical power for correlation and regression analyses.

Sampling Technique

The study used a purposive sampling technique to recruit participants. Educational institutions in Sialkot were approached, and female students who met the inclusion criteria were invited to participate voluntarily. Purposive sampling was considered appropriate because it enabled the researchers to specifically target adolescent females experiencing menstrual cycles and relevant lifestyle factors associated with the study variables. All eligible participants were given an equal opportunity to participate in the research.

Measures

Food Frequency Questionnaire (FFQ)

The Food Frequency Questionnaire (FFQ) is a standardized dietary assessment instrument designed to evaluate the frequency of consumption of specific foods and beverages over a defined period of time. The FFQ was widely popularized by researchers such as Gladys Block and Walter Willett and is commonly used in nutritional and epidemiological research. The questionnaire assesses eating patterns by including categories such as fruits, vegetables, grains, dairy products, meat items, beverages, fast foods, and snacks. Participants indicate how frequently they consume each food item using response options ranging from “never” to “more than once per day.” The FFQ is considered a practical and cost-effective instrument for evaluating long-term dietary behaviors in large populations.

Pittsburgh Sleep Quality Index (PSQI)

The Pittsburgh Sleep Quality Index (PSQI) was developed by Buysse et al. (1989) to assess sleep quality and sleep disturbances over a one-month period. The PSQI contains 19 self-report items grouped into seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each component is scored on a scale

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http://amresearchreview.com/index.php/Journal/about

ranging from 0 to 3. The total global score ranges from 0 to 21, with higher scores indicating poorer sleep quality. A global score greater than 5 indicates clinically significant sleep disturbance. The PSQI has demonstrated satisfactory reliability and validity across diverse populations.

Patient Health Questionnaire (PHQ-9)

The Patient Health Questionnaire (PHQ-9), developed by Spitzer, Williams, and Kroenke (1999), is a self-administered screening instrument used to assess depressive symptoms and overall mental health status. The scale consists of nine items corresponding to the diagnostic criteria for major depressive disorder outlined in the Diagnostic and Statistical Manual of Mental Disorders (DSM). Participants rate the frequency of symptoms experienced during the previous two weeks using a four-point Likert scale ranging from 0 (“not at all”) to 3 (“nearly every day”). Total scores range from 0 to 27, with higher scores indicating greater severity of depressive symptoms. The PHQ-9 is widely recognized as a reliable and valid measure of psychological distress and depression.

Short-Form McGill Pain Questionnaire (SF-MPQ)

The Short-Form McGill Pain Questionnaire (SF-MPQ), developed by Melzack (1987), is a standardized instrument used to assess pain intensity and quality. The SF-MPQ includes 15 pain descriptors categorized into sensory and affective dimensions of pain. Participants rate each pain descriptor using a four-point intensity scale ranging from 0 (“none”) to 3 (“severe”). The questionnaire is widely used in clinical and research settings to measure pain experiences, including menstrual pain and dysmenorrhea. The instrument demonstrates strong psychometric properties and is considered suitable for adolescent populations.

Procedure

The instruments selected for the present study were based on the research objectives and variables, including dietary habits, menstrual cramps, sleep quality, and mental health. Prior to data collection, permission for the use of standardized scales was obtained from the respective authors wherever required. Formal approval to conduct the study was also obtained from the Department of Psychology of the researchers’ institution. Following institutional approval, the researchers visited various schools and colleges in Sialkot to collect data. Permission was obtained from the administrative authorities of the participating institutions before initiating the research process. Participants were informed about the objectives, significance, and voluntary nature of the study. Female students who agreed to participate were provided with informed consent forms and questionnaires. Participants were assured that their responses would remain confidential and would be used solely for research purposes. The questionnaires required approximately 45–60 minutes to complete. Upon completion of data collection, all responses were coded and entered into the Statistical Package for the Social Sciences (SPSS), Version 25, for statistical analysis.

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), Version 25. Descriptive and inferential statistical analyses were conducted to examine

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Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

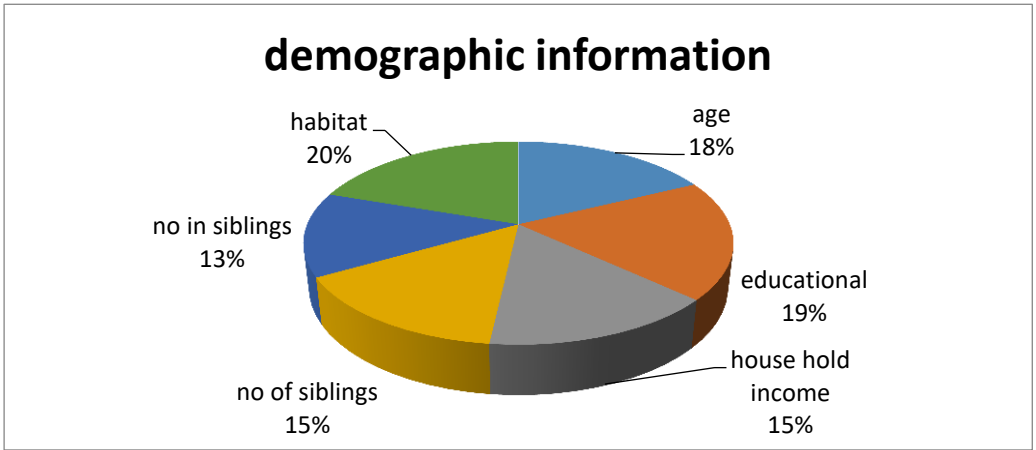
demographic characteristics and relationships among the study variables. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated for all demographic and study variables. Pearson product-moment correlation analysis was performed to assess relationships among dietary habits, menstrual cramps, sleep quality, and mental health variables. The results demonstrated that food frequency was negatively correlated with menstrual pain ($r = -.54$), sleep disturbances ($r = -.50$), and mental health problems ($r = -.48$), indicating the protective role of healthy dietary practices ($p < .01$). Sleep disturbances showed strong positive correlations with mental health problems ($r = .82$), menstrual pain ($r = .72$), sleep quality difficulties ($r = .72$), and room-sharing conditions ($r = .65$). Mental health problems were significantly associated with all study variables, particularly sleep quality ($r = .78$) and menstrual pain ($r = .74$), suggesting strong relationships among psychological well-being, physical symptoms, and lifestyle behaviors. Statistical significance was determined at the .05 level.

Ethical Considerations

The study was conducted in accordance with ethical principles and guidelines for research involving human participants. Prior to data collection, permission to use the standardized instruments was obtained from the original authors where necessary. Administrative approval was also obtained from the heads and management authorities of the participating educational institutions. Participants were fully informed regarding the objectives, procedures, benefits, and voluntary nature of the study. Informed consent was obtained from all participants prior to participation. Confidentiality and anonymity were strictly maintained throughout the research process. No personally identifiable information, such as names or identification numbers, was recorded on the questionnaires. Participants were informed that they had the right to withdraw from the study at any stage without any penalty. Furthermore, all collected data were stored in a secure and password-protected environment accessible only to the research team to ensure participant privacy and data protection. The study ensured that no physical or psychological harm was caused to participants during the research process.

Results

This section provides the main statistical findings of the study, using descriptive statistics, Pearson product-moment correlation, linear regression, and mediation analysis by SPSS (version 25). The analysis comprises calculating means, standard deviations, and correlations to test relationships among demographic characteristics and variables.



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Print ISSN 3007-3189

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Figure 1.1 Descriptives

Figure 1.1 presents the demographic characteristics of the participants included in the study. The results indicate that habitat represented the largest proportion of the demographic variables (20%), followed by educational level (19%) and age (18%). The number of siblings and household income each accounted for 15% of the sample characteristics, whereas birth order/no in siblings constituted the smallest proportion (13%). Overall, the distribution suggests that participants varied across multiple demographic domains, providing a relatively balanced representation of the sample characteristics.

Table1.1

Pearson Correlations Among Food Frequency, Sleep Trouble, Room Sharing, Sleep Quality, Menstrual Pain, and Mental Health

Variable	1	2	3	4	5	6
1. Food Frequency	—					
2. Sleep Trouble	−.50**	—				
3. Room Sharing	−.46**	.65**	—			
4. Sleep Quality	−.47**	.72**	.58**	—		
5. Menstrual Pain	−.54**	.72**	.59**	.70**	—	
6. Mental Health	−.48**	.82**	.64**	.78**	.74**	—

Note. N=202. P < .01 (2-tailed).

Table 1.1 shows the relationships between six variables: food frequency, sleep trouble, room sharing, sleep quality, menstrual pain, and mental health. All the correlations are statistically significant at the p < .01 level, meaning the observed relationships are unlikely to be due to chance. Food frequency is negatively correlated with all other variables. This means that individuals who eat more frequently tend to report fewer sleep problems, less likelihood of sharing a room, better sleep quality, less menstrual pain, and better mental health. The strongest negative relationship is with menstrual pain (r = –.54), followed by sleep trouble (r = –.50) and mental health (r = –.48). Sleep trouble is strongly positively correlated with mental health problems (r = .82), suggesting that more sleep difficulties are associated with worse mental health. It also shows strong correlations with sleep quality (r = .72), menstrual pain (r = .72), and room sharing (r = .65), indicating that these issues often co-occur. Room sharing is positively associated with sleep trouble (r = .65), sleep quality (r = .58), menstrual pain (r = .59), and mental health difficulties (r = .64). This suggests that

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http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

sharing a room might be related to a greater number of physical and psychological stressors. Sleep quality correlates positively with sleep trouble (r = .72), menstrual pain (r = .70), and mental health (r = .78). These relationships indicate that poorer sleep quality is linked to more menstrual discomfort and worse psychological well-being. Menstrual pain is also positively related to mental health problems (r = .74), reinforcing the link between physical pain and psychological distress. It is similarly associated with sleep trouble and sleep quality. Mental health is highly correlated with all other variables, particularly sleep trouble and sleep quality. This pattern highlights that mental health is closely intertwined with physical symptoms, living conditions, and health behaviors like eating frequency.

Overall summary

Overall, the table reveals a consistent pattern where better food habits are linked to better health outcomes, while issues like poor sleep, menstrual pain, and shared living conditions are interconnected and associated with poorer mental health.

Table 2.1 Linear Regression Analysis Predicting Food Frequency from Menstrual Pain, Sleep Quality, Sleep Trouble, Bed Sharing, and Mental Health

Predictor	B	SE	β	*t*	*p*	95% CI for B
Constant	0.10	2.29	—	0.04	.966	[–4.42, 4.62]
Mental health	0.01	.004	.008	2.50	.012	[0.002, 0.018]
Sleep trouble	–.28	.005	–.310	–5.74	.001	[–0.38, –0.19]
Bed sharing	0.66	.009	.407	7.08	.001	[0.48, 0.85]
Sleep quality	0.21	.010	.100	2.14	.034	[0.02, 0.40]
Menstrual pain	–.12	.004	–.181	–3.29	.001	[–0.19, –0.05]

Note. *B* = unstandardized coefficient; *SE* = standard error; *β* = standardized beta coefficient.

$p < .05$ indicates statistical significance.

Table 2.1 presents regression analysis examined how mental health, sleep trouble, bed sharing, sleep quality, and menstrual pain predict food frequency. The constant, or intercept, was not statistically significant, indicating that the baseline level of food frequency when all predictors are zero does not provide meaningful information. Mental health had a small but statistically significant positive effect on food frequency. This suggests that better mental health is associated with slightly more frequent eating, although the effect size is very small. Sleep trouble showed a significant negative relationship with food frequency. Participants who reported more sleep-related difficulties tended to eat less frequently. This was one of the stronger effects in the model, indicating that poor sleep may disrupt eating habits. Bed sharing had a strong and significant positive association with food frequency. Individuals who share their bed or sleeping space were more likely to report eating more frequently. This could be due to various contextual or lifestyle factors that come with shared sleeping environments. Sleep quality was also positively related to food frequency. People who experienced better sleep quality tended to eat more often, although this effect was relatively small. Menstrual pain had a significant negative impact on food

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http://amresearchreview.com/index.php/Journal/about

frequency. Those experiencing higher levels of menstrual discomfort reported eating less frequently. This finding suggests that physical pain or discomfort may suppress appetite or disrupt normal eating routines.

Overall summary

Overall, bed sharing, sleep trouble, and menstrual pain had the most substantial associations with food frequency. Better sleep and less pain appear to support more consistent eating habits, while sleep difficulties and menstrual pain may reduce food intake. Mental health also plays a role, though its effect is minimal in comparison.

Discussion

The present study examined the relationship among dietary habits, menstrual pain, sleep quality, and mental health among adolescent girls aged 13 to 19 years. The findings revealed significant associations among all study variables, indicating that dietary habits play an important role in adolescents' physical, emotional, and reproductive well-being. Overall, healthier dietary patterns were associated with reduced menstrual pain, fewer sleep disturbances, and improved mental health outcomes. The correlation analysis demonstrated that food frequency was negatively associated with menstrual pain, sleep disturbances, and mental health problems. These findings suggest that adolescents who maintain healthier and more regular eating habits are less likely to experience severe dysmenorrhea, sleep difficulties, and psychological distress. The strongest negative association was observed between food frequency and menstrual pain, indicating that balanced dietary intake may reduce the severity of menstrual cramps. These findings are supported by previous research showing that diets rich in fruits, vegetables, fish, whole grains, and omega-3 fatty acids contribute to reduced inflammation and hormonal balance, thereby alleviating dysmenorrhea symptoms (Kazemi et al., 2015; Harel et al., 1996). Similarly, vegetarian diets and higher fruit consumption have previously been associated with lower prevalence of menstrual pain (Barnard et al., 2000; Sabbah et al., 2020). The findings also revealed a significant relationship between dietary habits and sleep quality. Adolescents with healthier food habits experienced fewer sleep problems and better sleep quality. This supports earlier studies reporting that regular breakfast consumption and greater intake of fruits and vegetables are associated with healthier sleep patterns among adolescents (Park et al., 2012; Tanaka et al., 2018). In contrast, unhealthy dietary behaviors such as excessive intake of sugary foods, caffeine, and processed snacks have been linked with insomnia, poor sleep quality, and shorter sleep duration (Chaput et al., 2016; Khan et al., 2020). Nutritional deficiencies and irregular eating patterns may disrupt hormonal regulation and circadian rhythms, thereby negatively affecting sleep quality. The study further demonstrated that healthier dietary habits were significantly associated with better mental health outcomes. Adolescents with more balanced dietary patterns reported lower levels of psychological distress, depression, and emotional difficulties. These findings are consistent with previous literature suggesting that unhealthy diets characterized by high sugar, fast food, and processed food consumption are strongly associated with anxiety, depression, stress, and poor emotional well-being among adolescents (Jacka et al., 2010; Lee et al., 2019). In contrast, nutrient-rich diets may improve brain

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Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

functioning, emotional regulation, and neurotransmitter production, ultimately supporting positive mental health (O'Neil et al., 2014). An important finding of the present study was the strong interrelationship among sleep disturbances, menstrual pain, and mental health problems. Sleep trouble demonstrated a particularly strong positive association with mental health difficulties, indicating that adolescents experiencing sleep problems are more vulnerable to stress, anxiety, and emotional instability. Similarly, menstrual pain was positively associated with poor sleep quality and psychological distress. These findings support the biopsychosocial understanding of adolescent health, where physical symptoms, sleep disturbances, and emotional problems interact with one another. Previous studies have similarly reported that insomnia, depressive symptoms, stress, and dysmenorrhea frequently coexist among adolescent girls (Kim & Lee, 2018; Chen et al., 2021). Chronic pain and poor sleep may increase physiological stress responses, hormonal dysregulation, and emotional vulnerability, thereby worsening psychological functioning. The regression analysis provided additional insight into factors influencing dietary habits. Sleep trouble and menstrual pain emerged as significant negative predictors of food frequency, suggesting that adolescents experiencing poor sleep and menstrual discomfort are more likely to skip meals or exhibit irregular eating patterns. Menstrual pain may reduce appetite and interfere with daily activities, whereas sleep deprivation may disrupt appetite-regulating hormones and eating routines (Nguyen-Rodriguez et al., 2009). Conversely, better sleep quality positively predicted healthier food frequency patterns, indicating that adequate restorative sleep may encourage healthier lifestyle behaviors. Interestingly, bed-sharing or room-sharing conditions positively predicted food frequency. This finding may reflect the role of family environments, household routines, and shared social behaviors in influencing dietary practices. Adolescents living within supportive family systems may have more structured meal patterns and healthier lifestyle habits. Previous research has shown that family support and household organization positively influence adolescent nutrition and sleep behaviors (Caldwell et al., 2015). Mental health also demonstrated a statistically significant relationship with food frequency, although the effect size was comparatively small. This finding may indicate that some adolescents respond to emotional stress through altered eating behaviors such as emotional eating or increased snacking. However, because the effect size was limited, mental health may contribute less strongly to food frequency when compared with sleep disturbances and menstrual discomfort. The statistical significance of the findings suggests that the observed relationships are unlikely to have occurred by chance. However, interpretation should extend beyond p-values to include effect sizes, theoretical relevance, and consistency with previous literature. The moderate-to-strong correlations observed in this study indicate meaningful behavioral and psychological associations rather than merely statistically detectable relationships. Therefore, the findings provide valuable evidence regarding the interconnected nature of dietary habits, menstrual health, sleep quality, and psychological well-being among adolescent girls.

Conclusion

The present study concluded that dietary habits are significantly associated with menstrual health, sleep quality, and psychological well-being among adolescent girls.

Annual Methodological Archive Research Review
http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Healthier and more regular eating patterns were linked with reduced menstrual pain, fewer sleep disturbances, and improved mental health outcomes. In contrast, unhealthy dietary behaviors were associated with increased dysmenorrhea, poor sleep quality, and greater psychological distress. The findings further demonstrated strong interrelationships among menstrual pain, sleep disturbances, and mental health problems, indicating that these factors collectively influence adolescents' overall well-being. Sleep trouble and menstrual pain emerged as important predictors of irregular eating habits, whereas better sleep quality was associated with healthier dietary behaviors. Overall, the study highlights the importance of balanced nutrition, healthy sleep behaviors, and supportive living environments in promoting adolescent girls' physical, emotional, and reproductive health. The findings emphasize that adolescent health should be approached through a multidimensional perspective that considers nutritional, psychological, and lifestyle factors simultaneously.

Recommendations

The findings of the present study provide several directions for future research to further explore the complex relationships among dietary habits, menstrual cramps, sleep quality, and mental health. Although the current study offers important insights into adolescent health, its sample primarily consisted of school and college female students aged 13 to 19 years, which may limit the generalizability of the findings to broader populations. Future studies should therefore include more diverse groups, such as university students, working adults, and individuals with physical disabilities or chronic health conditions, to better understand how these variables interact across different populations and developmental stages. Future research should also investigate potential mediating and moderating factors that may explain the relationships among dietary habits, menstrual health, sleep quality, and psychological well-being. Variables such as stress, physical activity, hormonal fluctuations, body mass index, socioeconomic status, family environment, and emotional coping strategies may help clarify the underlying mechanisms through which dietary behaviors influence menstrual pain, sleep disturbances, and mental health outcomes. In addition, longitudinal research designs are recommended to examine how these relationships change over time. Such studies could provide valuable insights into the developmental progression of dietary behaviors, sleep patterns, menstrual symptoms, and mental health across adolescence and adulthood. Longitudinal approaches may also help establish causal relationships that cannot be determined through cross-sectional research designs.

Cross-cultural studies are another important area for future investigation. Dietary practices, sleep behaviors, and perceptions of menstrual and mental health vary across cultures, religions, and social contexts. Expanding research into different cultural settings would provide a broader understanding of whether the observed relationships are universal or influenced by sociocultural factors.

Furthermore, future studies should explore gender-specific, hormonal, and disability-related influences on these variables. Examining the experiences of individuals with disabilities or chronic illnesses may offer important insights into unique challenges related to nutrition, sleep, menstrual health, and psychological well-being. Such research could contribute to more inclusive and representative health literature.

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http://amresearchreview.com/index.php/Journal/about
Volume 4, Issue 3 (2026)

Online ISSN 3007-3197
Print ISSN 3007-3189

http://amresearchreview.com/index.php/Journal/about

Finally, future researchers are encouraged to develop and evaluate intervention programs aimed at promoting healthy dietary habits, improving sleep quality, reducing menstrual discomfort, and enhancing mental health. Nutritional counseling, school-based health education programs, sleep hygiene interventions, and psychological support services may be particularly beneficial for adolescents and other vulnerable populations. Rigorous evaluation of these interventions through experimental and clinical studies would help determine their effectiveness in improving overall physical and emotional well-being.

Study Implications

The findings of the present study highlight the significant role of dietary habits in influencing menstrual cramps, sleep quality, and mental health among adolescent girls. These findings have important implications for healthcare, education, psychology, nutrition, and public health. The study demonstrates that healthy dietary behaviors are closely associated with reduced menstrual pain, improved sleep quality, and better psychological well-being, emphasizing the importance of nutrition as a key factor in adolescent health. However, since the study primarily focused on female school and college students aged 13 to 19 years, the findings may not fully represent the experiences of other populations, such as university students, working women, or individuals with disabilities and chronic health conditions. Therefore, future health initiatives and interventions should consider the unique experiences and needs of diverse groups when designing dietary and wellness programs. The findings also suggest that promoting healthier dietary practices may serve as an effective strategy for improving multiple aspects of health simultaneously. Nutritional interventions focused on balanced diets, regular meal patterns, increased consumption of fruits and vegetables, and reduced intake of processed and sugary foods may help alleviate menstrual discomfort, improve sleep patterns, and support emotional stability. Such interventions could contribute significantly to enhancing the overall quality of life among adolescent girls and other vulnerable populations. Another important implication of the study is the need for greater nutritional education and awareness programs within schools, colleges, healthcare institutions, and community settings. Educational campaigns focusing on healthy eating behaviors, sleep hygiene, menstrual health, and mental well-being may help adolescents develop healthier lifestyle habits from an early age. Providing accessible nutritional guidance and healthcare support is particularly important for underserved populations, including individuals with disabilities and those from low socioeconomic backgrounds. The study further highlights the importance of interdisciplinary collaboration among nutritionists, psychologists, healthcare providers, educators, disability specialists, and public health professionals. Such collaborative efforts are essential for developing comprehensive and inclusive intervention programs that address the interconnected nature of dietary habits, menstrual health, sleep quality, and mental health. Integrating nutritional counseling and mental health support into school and community healthcare services may improve preventive care and overall adolescent well-being. Additionally, the findings may contribute to policy development and public health planning by encouraging the integration of nutritional support programs into adolescent healthcare services and educational institutions. Policymakers and

Online ISSN 3007-3197
Print ISSN 3007-3189
http://amresearchreview.com/index.php/Journal/about

healthcare authorities may utilize these findings to promote school-based nutrition programs, menstrual health awareness initiatives, and mental health support services tailored to adolescents' needs. Finally, the study provides a foundation for future research aimed at exploring the complex relationships among dietary habits, menstrual health, sleep quality, and mental well-being across different cultural, environmental, socioeconomic, and ability-related contexts. Further investigation into these

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