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Theoretical Review

Diet and sleep among college student populations: a systematic review

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ABSTRACT

College students are at-risk for both poor diet and poor sleep. We aimed to systematically review the evidence regarding associations between diet and sleep health within this population. A comprehensive electronic search was conducted in PubMed, Embase, Scopus, Web of Science, and PsycINFO from the earliest possible date through February 6, 2026. A total of 57 studies representing 44 countries were retained; most were cross-sectional. There were 22 studies that examined dietary patterns in relation to sleep, generally showing that healthier diet patterns, including the Mediterranean Diet, were related to better sleep quality. Among 20 studies that examined individual foods or nutrients, there was evidence that fruits, vegetables, dairy, protein, and lower intake of sugar-sweetened beverages were linked to better sleep health, although some findings were mixed. Finally, 15 studies related meal timing to sleep quality, showing that breakfast skipping and later last meals were associated with poor sleep health. Overall, these studies reveal robust cross-sectional associations between diet and sleep among college students, but more longitudinal studies and randomized controlled trials are needed to evaluate directionality. Moreover, a key direction for future study is consideration of sleep and nutrition situated within the unique contexts of college settings and academic schedules.

1. Introduction

Sleep and diet are two modifiable health behaviors increasingly recognized as interdependent. Experimental studies show that insufficient or poor-quality sleep can disrupt appetite regulation [1], increase preference for energy-dense foods [2], and alter energy balance [3,4]. In turn, evidence is mounting that dietary quality and meal timing can influence circadian rhythms [5] and sleep quality and duration [6–10]. Studies in adult populations consistently report that greater adherence to healthier dietary patterns, such as the Mediterranean diet, is associated with more favorable sleep outcomes, including improved sleep quality and lower risk of insomnia [11–14]. However, much of the synthesized evidence comes from experimental designs and/or from general adult populations[15–21], and prior reviews have not examined the nature of these associations within younger adults in free-living settings, and specifically among college students.

Sleep and diet are foundational elements of health and well-being, yet college students may struggle to maintain healthy habits in both domains. Undergraduate college students are primarily composed of young adults between the ages of 18 and 24 years old. This emerging adulthood period is marked by increased autonomy over daily routines and is often accompanied by irregular schedules due to varying class times, high academic demands, and increased social and financial pressures [22]. The food and sleep environments are also unique. For example, healthy food access can be constrained by dining hall schedules, limited budgets, and late-night food availability [23,24]. Ideal sleeping conditions can be hampered by noisy or disruptive dormitory conditions and roommates [25]. Given these unique contextual and developmental features, findings regarding relationships of sleep and diet from general adult samples cannot be assumed to generalize directly to undergraduates. As an example, even well-described lifestyle factors related to poor sleep in general adult populations like alcohol and caffeine consumption are not always related to sleep quality in college populations [26,27]. Therefore, the aim of this review was to systematically evaluate the evidence on diet–sleep associations among undergraduate students living in residential colleges/university settings. We hypothesized that higher dietary quality would be associated with better sleep health among university students, reflecting the bidirectional relationships observed in other populations across the lifespan.

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Glossary of terms

COVID-19	Coronavirus disease of 2019
HEI	healthy eating index
MeSH	medical subject headings
NIH	National Institutes of Health
PRISMA	preferred reporting items for systematic reviews and meta-analyses
PSQI	Pittsburgh sleep quality index
USA-	United States of America

2. Methods

The design, conduct, and reporting of this systematic review followed the PRISMA 2020 guidelines.

2.1. Eligibility criteria

Studies were eligible if they examined the association between diet-related variables (such as dietary patterns, diet quality, eating behaviors, or timing of eating) and sleep outcomes (including sleep duration, sleep quality, insomnia, sleep latency, and related sleep parameters) among undergraduate college students (Supplemental Table 1). Given the cross-sectional design of most studies included, diet and sleep were analyzed both as exposures and outcomes, depending on the specific research questions and available data. However, since the majority of included studies evaluated diet as an influencing factor on sleep, we chose to present the results accordingly. Eligible study designs encompassed observational studies (cross-sectional, cohort, or case-control) as well as intervention studies, with no restrictions on publication year.

As this review focused on young adult populations, studies were excluded if they exclusively sampled non-traditional, or graduate student populations without a clear undergraduate sample. Studies were also excluded if the dietary variable was primarily alcohol consumption, caffeinated beverage consumption, dietary supplements, or physical activity without a separate analysis of diet or sleep. Given the focus on college students in residential college/university settings, we excluded studies that examined the impacts of COVID-19 or were conducted during lockdown periods. Studies assessing sleep exclusively in a controlled laboratory were also excluded. Only studies published in English or Spanish were considered; studies in other languages were eligible if an official English translation of the full text was available. There were no limitations on geographic location or year published. Conference abstracts, commentaries, and other non-peer-reviewed material were excluded.

2.2. Search strategy

A comprehensive electronic search was conducted in PubMed, Embase, Scopus, Web of Science, and PsycINFO. The final search was completed on February 6, 2026. Search strategies combined database-specific controlled vocabulary (e.g., MeSH terms) with relevant free-text keywords for three main concepts: (1) undergraduate or college students, (2) diet and related eating behaviors, and (3) sleep outcomes (Supplemental document 1). Search strings were adapted as needed for each database. Reference lists of all included articles were also manually screened to identify additional eligible studies.

2.3. Study selection

All identified records were imported into Covidence for screening and removing duplicates. Duplicate records were removed both automatically and manually. Title and abstract screening were conducted independently by two reviewers according to the pre-defined eligibility criteria. Full-text articles were then retrieved for all studies that were potentially relevant by at least two reviewers, and independently assessed for final inclusion. Any disagreements at either Title and abstract or full text screening were resolved through discussion until consensus was reached.

Reasons for full-text exclusion were recorded in detail, including incorrect exposures or outcomes, incorrect population, non-English or non-Spanish publication, or unavailable full text.

2.4. Data extraction

For each study, information was collected on the first author, publication year, country, study design, sample size, age range or mean age, sex distribution, and population characteristics. This information was added to a standardized Excel spreadsheet and was confirmed by at least two authors. Details on the diet variable (including the assessment tool used and whether diet was analyzed as an exposure or outcome) and the sleep variable (including the measurement method and whether sleep was treated as an exposure or outcome) were also recorded. Extracted data included the confounders considered in analyses, the statistical methods used, and the main results, including effect estimates and any subgroup or interaction analyses. Studies were additionally categorized according to the type of dietary variable examined (dietary patterns or diet quality, meal timing/frequency, or individual foods/nutrients).

2.5. Quality assessment

Methodological quality and risk of bias for each included study were assessed using the NIH Study Quality Assessment Tools for Observational Cohort and Cross-Sectional Studies and for Controlled Intervention Studies (https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools). Two reviewers independently scored each study, evaluating all items from the NIH Study Quality Assessment tool including clarity of research objectives, appropriateness of study population and sampling, exposure and outcome measurement validity, adequacy of statistical analyses, and handling of confounders. Each quality category was assigned a value of 'yes', 'no', 'cannot be determined', or 'not applicable'. Finally, each study received an overall subjective quality rating of "good," "fair," or "poor", with more weight given to study design, statistical analysis, and confounder adjustment. A third reviewer reconciled any differences in final quality assessment gradings between the two.

3. Results

3.1. Search results

The study selection process is summarized in the PRISMA flow diagram (Supplemental Fig. 1). A total of 2669 manuscripts were identified in the initial search, with 463 removed as duplicates. 2206 papers were screened by title and abstract by two reviewers with 1986 excluded at that stage. A final 220 papers were screened by full text against the inclusion and exclusion criteria. In total, 163 papers were excluded for a variety of reasons such as using an incorrect diet variable (N = 61) or sleep variable (N = 12), not reporting required results (N = 48), including the wrong study population (N = 16) or non-peer reviewed (N = 8, including 5 conference abstracts and 3 dissertations), and English versions (N = 8) or full text not available (N = 6). A final 57 papers remained for inclusion in the review.

3.2. Quality assessment results

Quality assessment results are available in Supplemental Table 2. Using the NIH Study Quality Assessment Tools for Observational Cohort and Cross-Sectional Studies and for Controlled Intervention Studies,

Table 1
Studies that examined dietary patterns or diet quality and sleep among college students.

Author, Year	Country	Design	Sample (N, age, % Female)	Diet Variable	Sleep Variable/s and Selected Descriptive Data (if reported)	Main findings
Abbaszadeh et al., 2021 [28]	Iran	Cross-sectional	N = 181; age range 18–25; 100% female	Nordic diet adherence score (modified FFQ)	Insomnia (ISI), daytime sleepiness (ESS), nocturnal sleep duration; 7.2 ± 1.4 h/night	No significant associations were observed between Nordic diet adherence and sleep outcomes
Aslan Çin & Yardimci, 2021 [29]	Iran	Cross-sectional	N = 179; age range 18–26; 100% female	HEI-2015 (diet quality); total energy intake	Sleep quality (PSQI); PSQI >5: 64.1%	Higher HEI was associated with better sleep quality in adjusted models; total energy intake was not associated with sleep quality
Bazyar et al., 2020 [30]	Iran	Cross-sectional	N = 245; age range 18–38; 100% female	168-item FFQ (past year); identified 4 dietary patterns (mixed, Western, healthy, high protein)	Sleep quality (PSQI, Persian version)	Mixed dietary and Western dietary patterns was associated with odds of better sleep quality. Healthy and high protein patterns were not significantly associated with odds of better sleep quality
Bazyar et al., 2021 [31]	Iran	Cross-sectional	N = 249; age range 18–35; 100% female	147-item semi-quantitative FFQ; DII calculated from 30 nutrients (Nutritionist IV software)	Sleep quality (PSQI, Persian version); PSQI ≥5: 73.5%	Higher DII scores were associated with poorer sleep quality in adjusted models
Bodur et al., 2021 [46]	Turkey	Cross-sectional	N = 710; mean age = 21.6 ± 1.4; 72.3% female	HEI-2015 (diet quality from 24-h recalls)	Social jetlag (MSF difference >1 h)	Social jetlag was associated with poorer adjusted diet quality (higher fat and lower fiber intake on non-school days)
Dakanalis et al., 2025 [47]	Greece	Cross-sectional	N = 5433; mean age 21.4 ± 2.5 years; 50.8% female	KIDMED (Mediterranean diet adherence)	Sleep quality (PSQI); PSQI >5: 30.6%	Poor sleep quality was associated with low Mediterranean diet adherence in adjusted model
Díaz et al., 2023 [34]	Spain	Cross-sectional	N = 191; mean age = 19.8 ± 1.5; 100% female	Mediterranean diet adherence (ADM questionnaire)	Sleep quality (PSQI); PSQI >5: 82%	Higher adherence to the Mediterranean diet was correlated with better sleep quality
Dumlu Bilgin et al., 2025 [48]	Turkey	Cross-sectional	N = 2124; mean age 21.3 ± 2.5 years; 1459 female (68.7%)	HEI-2020 (diet quality from 24-hr recall); Hedonic hunger via T-PEMS (Turkish Palatable Eating Motives Scale)	Sleep quality via PSQI ≥5: 80.6%; Chronotype via MEQ	No adjusted association between sleep quality and diet quality, but morningness chronotype positively associated with diet quality; poorer sleep quality was associated with increased hedonic eating motivation
Fernández-Medina et al., 2020 [36]	Spain	Cross-sectional	N = 334; mean age 21.8 ± 6.2; 79.6% female	PREDIMED (Mediterranean diet adherence)	Sleep quality (PSQI); PSQI mean ± SD: 6.66 (3.59)	Poor sleep quality was negatively correlated with lower adherence to the Mediterranean diet
Haghighatdoost et al., 2012 [37]	Iran	Cross-sectional	N = 410; age range 18–28; 100% female	168-item semiquantitative FFQ; diet quality indices calculated: HEI, DDS, DED, NAR, MAR	Nocturnal sleep duration (<6 h, 6–8 h, >8 h); Short sleepers <6 h: 35.1%	Compared to long sleep (>8 h), short sleep (<6 h) was associated with poorer diet quality, including higher total energy and carbohydrate intake, and lower fiber, fruit, whole grain, bean, and micronutrient intake
Haq et al., 2020 [49]	China	Cross-sectional	N = 695; age range 17–31; 67.2% female	Semi-quantitative FFQ; identified 3 dietary patterns (Western, Meat, Vegetables & Fruits)	Sleep duration; Short sleep duration (<6 h/day): 18.8%	Western and Meat dietary patterns were positively associated with odds of longer sleep duration. Vegetables & Fruits pattern were not associated with sleep duration in adjusted models
Karbasi et al., 2023 [39]	Iran	Cross-sectional	N = 159; mean age = 20.9 ± 1.7; 100% female	65-item validated FFQ; identified 2 dietary patterns (Western, Traditional) from PCA	Insomnia (ISI); ISI ≥8: 42.8%	Western dietary pattern was associated with higher odds of insomnia. There were no significant associations found for Traditional dietary pattern
Kawasaki et al., 2021 [40]	Japan	Cross-sectional	N = 218; mean age = 19.9 ± 1.6; 100% female	hPDI-J and uPDI-J scores (plant-based diet indices) derived from 14 food groups	Chronotype (MSFsc, MCTQ); subjective sleep quality	Later chronotype was associated with lower healthful plant-based diet quality and higher unhealthful plant-based diet quality in adjusted models

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Table 1 (*continued*)

Author, Year	Country	Design	Sample (N, age, % Female)	Diet Variable	Sleep Variable/s and Selected Descriptive Data (if reported)	Main findings
Masaad et al., 2021 [50]	UAE	Cross-sectional	N = 379; age range 18–30 (81% aged 18–21); 64.4% female	94-item FFQ (past year); servings/day calculated via ESHA; 37 food/nutrient parameters used to compute E-DII	Sleep quality (PSQI global and components); PSQI >5: 66%	No significant association between E-DII and global sleep quality. However, those with medium to high day dysfunction had higher mean E-DII scores compared to low day dysfunction
Naja et al., 2022 [43]	UAE	Cross-sectional	N = 503; mean age not reported; 81.5% female	KIDMED (Mediterranean diet adherence)	Sleep quality (PSQI); chronotype (MEQ); PSQI >5: 83.1%	In logistic regressions, higher adherence to the Mediterranean diet was associated with better sleep quality after adjusting for age and sex
Ramón-Arbués et al., 2021 [51]	Spain	Cross-sectional	N = 1055; mean age = 21.7 ± 5.2; 70.5% female	Spanish Healthy Eating Index (SHEI)	Insomnia (ISI, Spanish version); Insomnia: 43.1%	Insomnia severity was associated with lower SHEI scores in adjusted models
Ramón-Arbués et al., 2022 [45]	Spain	Cross-sectional	N = 868; mean age = 22.8 ± 7.5; 78.2% female	Spanish Healthy Eating Index (SHEI)	Sleep quality (PSQI, Spanish version); PSQI >5: 51.6%	Poor sleepers had lower SHEI scores; lower adherence to recommended intake of vegetable, fruit, dairy, lean meat, legume, sweet, and sugary soft drink was associated with poorer sleep
Ünal & Özenoğlu, 2025 [52]	Turkey	Cross-sectional	N = 750; mean age 20.7 ± 1.3; 60% female	KIDMED (Mediterranean diet adherence)	Sleep quality (PSQI, Turkish version)	Higher Mediterranean diet adherence was correlated with better sleep quality among females, but not males. No significant association was observed in adjusted models
Yamamoto et al., 2018 [53]	Japan	Cross-sectional	N = 155; age range 19–22; 49.7% female	Japanese Food Guide Score (DHQ)	Sleep quality (PSQI, Japanese version); average PSQI: 5.92 ± 2.96	Higher Food Guide Score was associated with better sleep quality and greater morningness when comparing the highest vs. lowest tertiles of the DHQ
Yao et al., 2024 [54]	China	Longitudinal (cross-lagged panel analysis; 2 waves, 3 months apart)	N = 807; mean age 20.79 ± 1.76 years; 67.5% female	Healthy eating habits (a composite score based on fruit, vegetable, and breakfast intake; scored 3-12).	Insomnia (assessed via the Youth Self-Rating Insomnia Scale [YSIS])	In the cross-lagged model, healthy eating habits at baseline (T1) associated with lower insomnia at follow-up (T2). However, insomnia at T1 did not significantly predict healthy eating habits at T2.
Yoshizaki & Togo, 2021 [55]	Japan	Cross-sectional	N = 82; mean age = 20.8 ± 1.3; 49% female	Diet quality (Japanese Food Guide Score) and food group intake (grains, eggs, sugar)	Chronotype (MSFsc via actigraphy); social jetlag (MSF weekend–weekday difference)	Later chronotype was associated with lower overall diet quality, greater grain consumption, and lower egg intake; greater social jetlag was associated with lower energy intake, lower grain consumption, and higher sugar intake in adjusted models
Yousefvand et al., 2025 [56]	Iran	Cross-sectional	N = 168; mean age = 21.98 ± 3.53; 100% female	Alternative Healthy Eating Index (AHEI) score (assessed via a 168-item FFQ); specific dietary components including fruit and polyunsaturated fatty acids (PUFAs)	Sleep quality (PSQI); PSQI ≥6: 39.3%; mean PSQI: 5.48 ± 3.06	No significant adjusted association between the overall AHEI score and sleep quality. Higher fruit intake and lower PUFA intake was associated with lower odds of poor sleep quality.

Abbreviations: ADM = Adherence to Mediterranean Diet (questionnaire); AHEI = alternative healthy eating index; BDHQ = brief-type self-administered diet history questionnaire; ESHA = Elizabeth Stewart Hands and Associates food processor software; ESS = Epworth sleepiness scale; DDS = dietary diversity score; DED = dietary energy density; DII = dietary inflammatory index; DQI-I = diet quality index-international; E-DII = energy-adjusted dietary inflammatory index; FFQ = food frequency questionnaire; HEI-2015 = healthy eating index 2015; hPDI-J = healthful plant-based diet index (Japanese version); ISI = insomnia severity index; KIDMED = Mediterranean diet quality index for children and adolescents; MAR = mean adequacy ratio; MCTQ = Munich chronotype questionnaire; MEQ = Morningness-eveningness questionnaire; MSFsc = Mid-sleep on free days, sleep-corrected; NAR = nutrient adequacy ratio; PCA = principal component analysis; PREDIMED = Mediterranean diet adherence screener; PSQI = Pittsburgh sleep quality index; PUFA = polyunsaturated fat; SHEI = Spanish healthy eating index; uPDI-J = unhealthful plant-based diet index (Japanese version); YSIS = youth self-rating insomnia scale.

about half of the included studies were rated as "good" quality (N = 27), about 40% were rated as "fair" quality (N = 22), and the remaining were "poor" quality (N = 8). Common areas of potential bias included exposures being measured only once over time and at the same time as outcome assessment, and lacking temporal order. For many studies, it was unclear if the participation rate was at least 50% and sample sizes were not often justified.

Table 2
Studies that examined meal timing/frequency and sleep among college students.

Author, Year	Country	Design	Sample (N, age, % Female)	Diet Variable	Sleep Variable/s and Selected Descriptive Data (if reported)	Main findings
Al-Jawarneh et al., 2025 [57]	Hungary	Cross-sectional	N = 385; 71.7% aged 18-24; 68.8% female	Frequency of breakfast skipping, late-night snacking, substituting snacks for main meals, heavy evening meals, irregular meal timing, short meal-to-bedtime intervals <3 h	Sleep quality (PSQI); PSQI >5: 51.7%	Frequent consumption of heavy evening meals, substituting snacks for main meals, and <3 h from meal-to-bedtime were significantly associated with higher odds of poor sleep quality.
Alotaibi et al., 2023 [58]	Saudi Arabia	Prospective cohort	N = 220; mean age 19.9 ± 1.7; 49.5% female	MMDS (as part of lifestyle composite)	Sleep duration (<7 h vs ≥ 7–8 h, self-reported); Short sleep duration <7 h: 59.1% (baseline)	Ramadan fasting was associated with improved diet quality but not with changes in sleep duration; prevalence of short sleep remained high
Chung et al., 2020 [59]	Australia	Cross-sectional	N = 793; age range 18–29; 74% female	Meal timing (last meal ≤3 h vs. >3 h before bed; sensitivity ≤2 h and ≤4 h)	Sleep onset latency, sleep duration, nocturnal awakenings (self-report)	Eating ≤3 h before bed associated with higher odds of nocturnal awakenings; no association with sleep latency or duration
Cui et al., 2025 [60]	China	Randomized controlled trial	N = 54; mean age ~20 years; 36 females (66.6%)	10-h Time Restricted Eating (TRE) window (between 8:00-20:00) for 8 weeks	Sleep quality (PSQI); baseline sleep scores were >5 in all trials, indicating poor sleep quality	A 10-h time restricted eating (TRE) intervention alone did not influence sleep quality compared to baseline, although a combined intervention of TRE and resistance training showed a tendency for improvement in sleep quality.
Durán-Agüero et al., 2016 [33]	Chile	Cross-sectional	N = 635; mean age = 22.0 ± 2.5; 86.4% female	Breakfast consumption	Sleep duration (<7 h vs. ≥7 h); Sleep <7 h: 57.1%	Sleeping <7 h associated with higher odds of overweight/ obesity
Elsahoryi et al., 2025 [61]	Jordan	Longitudinal (pre- to post-Ramadan fasting comparison)	N = 77; mean age 21.22 ± 2.04 years; 72.73% female	Ramadan fasting (diurnal intermittent fasting from dawn to sunset for 29 days) compared to usual eating habits	Sleep quality (PSQI).; mean PSQI score deteriorated from 5.73 ± 2.40 before fasting to 6.65 ± 3.08 during fasting	Ramadan fasting was associated with an adjusted decrease in overall sleep quality.
Faris et al., 2021 [62]	UAE	Cross-sectional	N = 498; age range 18–30; 62.9% female	Eating habits: breakfast skipping, late-night snacking, meal replacement, heavy meals, irregular timing	PSQI (Arabic/English); PSQI >5: 55%	Breakfast skipping, replacing meals with snacks, late-night snacking and irregular meal timing associated with higher odds of poor sleep
Ikram et al., 2024 [35]	Malaysia	Cross-sectional	N = 385; mean age = 22.1 ± 1.9; 81% female	Night eating behavior (≥25% kcal at night, after 11 p.m.); coffee, junk food, energy drink intake	Sleep quality (PSQI, Malay version)	There was a significant mean difference in sleep quality comparing coffee and non-coffee night studying, with coffee drinkers having worse sleep quality.
Ilkay, 2025 [63]	Turkey	Cross-sectional	N = 618; mean age 21.7 ± 2.8 years; 58.6% female	Eating jetlag (the shift in eating midpoint between weekdays and weekends), mean eating window, and breakfast frequency	Mean sleep duration (weekly), calculated from self-reported sleep onset and offset; overall mean sleep duration: 7.93 ± 1.20 h	Greater eating jetlag was significantly associated with shorter sleep duration; higher social jetlag was significantly associated with a longer mean eating window
Kayaba et al., 2021 [41]	Japan	Cross-sectional	N = 447; age range 18–27; 100% female	Self reported eating behaviors (meal timing, skipping breakfast/lunch/dinner, meal duration, weight gain)	Chronotype (MEQ, Japanese); insomnia (AIS); sleepiness (ESS)	Evening chronotype, compared to morning and intermediate type, had shorter sleep, more meal skipping, faster breakfast, later meals, and weight gain since university
Luz et al., 2024 [42]	Brazil	Cross-sectional	N = 162; mean age = 22.2 ± 5.2; 90% female	Meal timing (self-reported times for main and last meal)	Sleep quality (PSQI); chronotype; PSQI 5–10: 71%, PSQI >10: 12%	Meal timing was not significantly associated with sleep quality. Later dinner was related to later bedtime and evening chronotype
Mato & Tsukasaki, 2020 [64]	Japan	Cross-sectional	N = 1408; mean age = 21.3 ± 1.0; 39.7% female	Self-administered questionnaire; breakfast frequency, nutritional balance, fruit/veg intake, snacking	Self-reported sleep quantity and quality (5-point Likert)	Regular breakfast consumption was associated with greater odds of reporting enough sleep, earlier bedtimes, and better sleep quality
Peltzer & Pengpid, 2015 [65]	Multi-country	Cross-sectional	N = 20,222; mean age = 20.8 ± 2.8; 58.5% female	Single item on breakfast frequency	Sleep problems (self-report, last 30 d; binary yes/no); Prevalence of sleep problems: 10.4%	Breakfast skipping was associated with greater odds of sleep problems in adjusted models. In sex specific models, slightly stronger in females

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Table 2 (*continued*)

Author, Year	Country	Design	Sample (N, age, % Female)	Diet Variable	Sleep Variable/s and Selected Descriptive Data (if reported)	Main findings
Teixeira et al., 2018 [66]	Brazil	Cross-sectional	N = 721; mean age = 20.6 ± 3.0; 67.7% female	Breakfast skipping (≤2x/wk), meal timing, 24h recall (energy, macros)	Chronotype (Horne–Östberg); self-reported sleep duration, latency, debt, SJL	Eveningness associated with greater odds of skipping breakfast. Among breakfast skippers, eveningness was associated with higher caloric, carbohydrate, and fat intake and later meal times. SJL was not significantly associated with breakfast skipping
Xian et al., 2023 [67]	China	Cross-sectional	N = 660; 67.7% < 20 y; 71.7% female	Breakfast frequency (days/week)	Sleep quality (PSQI)	Breakfast consumption correlated with better sleep quality (lower PSQI scores). Evidence for possible mediation by chronotype and depressive symptoms

Abbreviations: AIS = Athens insomnia scale; ESS = Epworth sleepiness scale; Horne-Östberg = Horne-Östberg morningness-eveningness questionnaire; MEQ = morningness-eveningness questionnaire; MMDS = modified Mediterranean diet score; PSQI = Pittsburgh sleep quality index; SJL = social jetlag; TRE = time-restricted eating.

3.3. General characteristics of the included studies

A total of 57 studies with a sample size ranging from 54 to 20,222 were included in this systematic review. A total of 53,207 college students were represented from 44 different countries. Notably, one multi-country study had participants from 26 countries. Of the remaining studies, 20 countries were represented across diverse geographic regions: 5 countries from the Middle East and West Asia (Iran, Turkey, United Arab Emirates, Saudi Arabia, Jordan), 7 from Europe (Spain, Italy, Germany, Romania, Greece, Hungary, Poland), 2 from East Asia (Japan, China), 2 from South America (Brazil, Chile), 1 from Southeast Asia (Malaysia), 1 from North America (United States of America-(USA)), 1 from Africa (Uganda), and 1 from Oceania (Australia). The overall range of ages included was 17 to 38 years; among the studies that reported an average age, the overall unweighted mean age was 21.3 ± 1.0 years. Overall, 63.4% of study participants were female, with a total of 21 studies (37%) that were female-only or had study populations>75% female[28–45].

A total of 52 studies were cross-sectional, 4 were prospective cohort/longitudinal, and 1 was a randomized controlled trial. Self-reported sleep quality was the most common sleep parameter, with 33 studies evaluating sleep quality with the Pittsburgh sleep quality index (PSQI). Nine studies evaluated self-reported sleep duration only (or another self-reported single-question sleep measure), 7 studies evaluated insomnia symptoms (most used the Insomnia severity index), and 9 studies assessed chronotype or social jetlag. Some other measures included the Epworth sleepiness scale (2 studies), sleep debt (incongruence between preferred and actual sleep duration; 2 studies), self-reported sleep problems (1 item; 1 study), and self-reported daily sleep diaries (1 study). Two studies measured sleep objectively via actigraphy in addition to self-reported sleep quality through PSQI. Prevalence of poor sleep quality, as assessed by the PSQI (>5 or ≥6), varied considerably across studies, ranging from 14.6% to 84.5% (Tables 1–3). Studies that assessed insomnia used validated instruments (Insomnia severity index or Sleep and daytime habits questionnaire), with prevalence of insomnia symptoms ranging from 11.9% to 43.1%.

3.4. Dietary patterns and quality

Overall, 22 studies evaluated sleep in relation to dietary patterns or quality, and 16 used a predefined dietary index or quality measure (Table 1). There were 5 studies examining the Mediterranean diet, 9 that used a population-specific healthy eating index (US-based healthy eating index, HEI, and the Japanese food guide score were the most common), and 2 studies used a dietary inflammatory index. Among 12 studies that used predefined dietary indices and evaluated sleep quality through the PSQI, all but 3 [48,52,56] found an association in the expected direction with diet, such that higher adherence to a healthier diet pattern was related to higher sleep quality, whether a global sleep quality score or at least one of the individual components of the PSQI [29,31,34,36,43,45,46,50,53]. Similarly, 1 study of Iranian students found that self-reported lower nocturnal sleep duration was associated with poor diet quality, measured through the HEI [37]. There were 3 studies of insomnia, including one of the few longitudinal studies [54]. In this study, a higher composite healthy eating score at time 1 predicted lower insomnia symptoms at time 2 in a cross-lagged model; moreover, the opposite direction of insomnia symptoms at time 1 leading to lower eating scores at time 2 was not found. The 2 cross-sectional studies were mixed, with one reporting an association between higher diet quality (Mediterranean diet and HEI) with lower insomnia scores [51], and the other reporting no associations between the Nordic diet and multiple insomnia-related outcomes, including insomnia severity index, Epworth Sleepiness Scale, and self-reported nocturnal sleep hours [28]. Four studies examined chronotype and/or social jetlag, each finding that later chronotype and/or social jetlag were associated with lower overall diet quality (HEI or Japanese Food Guide Score) [40,46,48,55].

Three studies used data-driven methods to identify dietary patterns, with two from Iran [30,39] and one from China [49]. Each study had a unique set of dietary patterns identified, but all of them had a more “Westernized” diet along with a healthier diet pattern. None of the “healthier” patterns were associated with sleep measures in any of the studies. Across them all, the Westernized pattern was related to sleep but in a distinct manner. In the Iranian studies, higher adherence to the Western pattern was associated with worse sleep quality and higher insomnia [30,39]. In a sample of Chinese medical students, higher adherence to the Western pattern was associated with longer sleep duration [49].

3.5. Meal timing and/or frequency

Fifteen studies evaluated meal timing and/or frequency in relation to sleep (Table 2). The sleep measures examined included sleep quality (7 with PSQI, 3 with other single-item indicators of sleep quality or problems), self-reported sleep duration only (1 study), insomnia (2 studies) and chronotype or social jetlag (2). Three studies strictly focused on breakfast consumption [33,65,67], and three studies focused on the last eating events of the day/night [35,42,59]. The remaining studies had a more comprehensive focus on timing and skipping frequency of meals throughout the day (including Ramadan fasting) [41,58,60,62,64,66]. One study was a randomized controlled trial of time-restricted eating

Table 3
Studies that examined individual foods or nutrients and sleep among college students.

Author, Year	Country	Design	Sample (N, age, % Female)	Diet Variable	Sleep Variable/s and Selected Descriptive Data (if reported)	Main findings
Alafif & Alruwaili, 2023 [68]	Saudi Arabia	Cross-sectional	N = 311; mean age 21.45 ± 23.11; 72.3% female	Food frequency (fruits, vegetables, sugar, fried foods); self-reported diet type (IF, keto, MD, etc.)	PSQI items (sleep duration, latency, subjective quality, timing); Poor or very poor sleep quality: 28.3%	Longer sleep associated with greater vegetable intake; better sleep quality with higher fruit intake. No significant associations between sleep duration and other food items (ex. Carbs, fast food, coffee)
Alkhatatbeh et al., 2021 [69]	Jordan	Cross-sectional	N = 1000; mean age 20.87 ± 2.69; 63.3% female	Dairy calcium intake (mg/day from milk, cheese, yogurt, labanah)	Insomnia (ISI, Arabic version); ISI 15–28: 15.6%	Lower dairy calcium intake associated with greater insomnia symptoms in adjusted models
Boozari et al., 2021 [70]	Iran	Cross-sectional	N = 395; mean age 22.79 ± 3.9; 51.8% female	147-item FFQ; daily sugar and SSB intake (g/day)	Sleep quality (PSQI); sleep duration (<6, 6–8, >8 h); PSQI ≥6: 40.8%	Poor sleep quality correlated with higher SSB intake; no association with sleep duration.
Demirer & Samur, 2024 [32]	Turkey	Cross-sectional	N = 420; age range 19–24; 80.2% female	dAGEs (24h recall; kU/day, residual method)	Sleep quality (PSQI, Turkish version)	Poorer sleep quality associated with higher intake of dietary AGEs
Domaradzki, 2025 [71]	Poland	Cross-sectional	N = 418; age range 18–25 years; 219 female (52.4%)	16-item FFQ; Feature-selection analytic process used to determine which foods best distinguished poor sleepers from good sleepers	PSQI >5: 14.6% males; 45.2% females	Higher consumption of vegetables, curd cheese and wholegrain bread, and lower consumption of fast food, fried meals, sweetened beverages and energy drinks predicted belonging to good sleep category
Gianfredi et al., 2018 [72]	Italy	Cross-sectional	N = 117; mean age 23.7 ± 4.8; 70.1% female	23-item FFQ of foods in Mediterranean diet	Insomnia symptoms (Sleep and Daytime Habits Questionnaire); Insomnia symptoms: 18.8%	Higher intake frequency of meat, fish, coffee, and sweets associated with higher odds of insomnia symptoms. Higher consumption of whole bread and pasta associated with lower insomnia symptoms.
Hajianfar et al., 2021 [38]	Iran	Cross-sectional	N = 142; mean age 21.07 ± 1.53; 100% female	117-item FFQ; zinc intake (<8 vs ≥ 8 mg/day, Nutritionist IV)	Sleep quality (PSQI)	Zinc intake below 8 mg/day associated with odds of more sleep disorders, shorter sleep duration, and greater daytime dysfunction in adjusted models
İnan & Özçelik, 2025 [73]	Turkey	Cross-sectional	N = 472; ages 19-29; 378 females	Dietary Phytochemical Index (DPI) based on a 24-h dietary recall	PSQI >5: 84.5%	Being in the highest DPI tertile was associated with lower adjusted odds of poor sleep quality
Kahlhöfer et al., 2016 [74]	Germany	Cross-sectional	N = 132; mean age 23.3 ± 3.7; 52.3% female	German FFQ (DEGS; macro intake as % energy)	Actigraphy (7–14 d; sleep efficiency, duration); PSQI; PSQI >5: 76% of women; 70% of men	In males, higher fat and lower carbohydrate intake associated with poorer sleep efficiency; no associations in females.
Kiggwe et al., 2024 [75]	Uganda	Cross-sectional	N = 403; mean age 21; 51.1% female	Adapted FFQ (8 local fruits; frequency)	Self-reported sleep duration (semester, holiday, weekend)	Longer sleep duration associated with lower fruit intake, especially apples and mangoes.
Knowlden et al., 2018 [76]	USA	Cross-sectional	N = 270; mean age 19.76 ± 1.49; 57.4% female	Modified FFQ (34 items grouped into 11 categories)	PSQI; PSQI >5: 48.9%	Higher protein and dairy intake associated with better sleep quality in adjusted models, while empty calorie intake was associated with poorer sleep quality
Naito et al., 2021 [77]	Malaysia	Cross-sectional	N = 1017; mean age 20.71 ± 1.47; 51.0% female	Dietary habits (snacks, fruits, vegetables, sugared coffee/tea, soft drinks, fast food)	Self-reported sleep duration; <7 h = sleep deprived, 58.1%	Sugared coffee/tea intake associated with greater odds for sleep deprivation; fast food intake associated with lower odds of sleep deprivation
Ordóñez et al., 2024 [78]	Chile	Cross-sectional	N = 1079; average age 21.75 ± 2.56; 80.26% female	Individual frequency of healthy and unhealthy eating habits (assessed via a questionnaire based on Chilean dietary guidelines)	Sleep quality (PSQI); PSQI >5: 73.68%	Daily breakfast consumption, lower salt intake, and lower alcohol intake was associated with lower odds of inadequate sleep quality.
Özdişli & Yıldız, 2021 [79]	Turkey	Cross-sectional	N = 248; age range 18–32; 54.4% female	1-day dietary record (energy, protein, fat, SFA, fiber, vitamins, minerals)	Sleep quality (PSQI); sleep duration (hours); PSQI ≥6: 59.7%	Longer sleep negatively correlated with lower saturated fat intake; better sleep quality correlated with higher sodium intake.
Pop et al., 2021 [44]	Romania	Cross-sectional	N = 403; mean age 21.21 ± 4.56; 80.4% female	Custom questionnaire (cereals, fruits, veg, dairy, meat, sweets, fast food, water)	Self-reported sleep duration (hours/night; naps); Mean sleep duration: 6.71 ± 1.52 h/night	Longer sleep duration correlated with fewer fast-food meals.
Rutter & Waring-Paynter, 1992 [80]	USA	Cross-sectional	N = 115; mean age 20.0 ± 3.4; 54.8% female	Pre-bedtime food intake (milk, sweet food; frequency 0–7 d/wk)	Self-reported sleep duration (≤6 h, ≥9 h); sleep satisfaction scale	Among long sleepers, greater milk and sweet intake correlated with higher sleep satisfaction. No group level mean differences between

(continued on next page)

Table 3 (*continued*)

Author, Year	Country	Design	Sample (N, age, % Female)	Diet Variable	Sleep Variable/s and Selected Descriptive Data (if reported)	Main findings
						dietary variable and sleep satisfaction
Silva et al., 2016 [81]	Brazil	Cross-sectional	N = 204; mean age 21.6 ± 3.9; 55% female	FFQ (8 food groups; servings/day)	Chronotype (MSF, MCTQ); SJL (mid-sleep diff); sleep debt (preferred–actual sleep)	Later chronotype associated with higher meat intake; SJL with lower bean intake; sleep debt associated with higher dairy/beverage intake and lower cereal/pasta intake.
Yılmaz & Arslan, 2024 [82]	Turkey	Cross-sectional	N = 968; age range 18–30; 67.4% female	dTAC (24h recall; FRAP)	Sleep quality (PSQI); PSQI >5: 72.3%	Compared to low and medium tertiles, higher dietary antioxidant capacity had better sleep quality (high mean PSQI scores)
Zhang et al., 2024 [83]	China	Cross-sectional	N = 1793; mean age 20.7 ± 1.6; 63.6% female	Fruit and vegetable intake frequency (assessed via the Health Promoting Lifestyle Profile II)	Meeting the sleep guideline of 7-9 h per night (assessed via PSQI); 70.3% of participants met	Meeting the sleep guideline correlated with higher fruit intake but not vegetable intake.
Zhong & Huang, 2026 [84]	China	Micro-Longitudinal study (28-day diary)	N = 120; mean age 20.75; 70% female	Daily water intake, sugar-sweetened beverage intake, and overeating, measured via self-reported daily diaries	Sleep quality, duration, and sufficient sleep, measured via self-reported daily diaries (adapted from the PSQI)	Sufficient sleep (7-9 h) was significantly associated with less overeating at the between-person level. At the within-person level, sufficient sleep was independently associated with higher daily water intake. Sleep duration and sleep quality did not have direct significant effects on dietary behaviors, but were indirectly associated with overeating through the mediating role of positive affect.

Abbreviations: dAGEs = dietary advanced glycation end-products; DEGS = German health interview and examination survey (dietary module); DPI- dietary phytochemical index; dTAC = dietary total antioxidant capacity; FFQ = food frequency questionnaire; FRAP = ferric reducing antioxidant power database; IF = intermittent fasting; ISI = insomnia severity index; kU = kilounits per day; MCTQ = Munich chronotype questionnaire; MD = Mediterranean diet; MSF = mid-sleep on free days; PSQI = Pittsburgh sleep quality index; SJL = social jetlag; SFA = saturated fatty acids; SSB = sugar-sweetened beverages.

[60].

The consumption of breakfast was associated with better sleep quality, earlier sleep timing, or adequate sleep duration in six studies [41,62,64–67], and one study reported no association between breakfast skipping and sleep duration in a model adjusted for overweight/obesity, sex, and physical activity [33]. Later mealtimes of other meals, especially dinner and the last meal of the day, and late-night snacking were related to later chronotype in two studies [41,66] and lower sleep quality in most [35,59,62], but not all studies [42]. For example, a study of Australian students found that eating ≤3 h before bed was related to higher odds of nocturnal awakenings [59], and another found that coffee consumption while studying was associated with lower sleep quality [35]. A study of students from the UAE additionally found that replacing meals with snacks was associated with worse sleep quality [62].

A few other studies examined changes in timing or duration of eating. For example, a Turkish study reported that greater eating jetlag, meaning a shift in eating timing on weekends compared to weekdays, was associated with worse sleep quality [63]. Two studies examined sleep and dietary habits during Ramadan fasting; while one found no statistically significant changes in sleep duration [67], another reported a significant decrease in overall sleep quality during the fasting period [58]. Finally, a randomized controlled trial of time-restricted eating among 58 female college students with overweight/obesity found that restricting to a 10-h eating window (any 10-h window between 8:00 a.m. and 8:00 p.m.) for 8 weeks was not associated with a significant change in PSQI score compared to the control condition [60].

3.6. Individual foods and nutrients

Overall, there were 20 studies that examined individual foods or nutrients in relation to sleep (Table 3). Ten studies examined individual foods in relation to sleep duration or quality, with one of these studies examining chronotype and social jetlag as its primary focus. Most studies examined usual intake frequency of key food groups hypothesized to be associated with sleep, including fruits, vegetables, meat, fish, snacks, sugar-sweetened and/or caffeinated beverages, water, and dairy. Longer sleep duration (or meeting sufficient sleep guidelines of 7-9 h) was associated with lower sugar-sweetened and caffeinated beverage intake [77], less overeating [84] and fewer fast food meals [44]; as well as higher milk [80], water [84], fruit [83] and vegetable [68] intake. In contrast, one Ugandan study [75] that specifically examined intake of fruit reported that longer sleep duration was associated with lower overall fruit intake, and longer weekend sleep was specifically related to lower apple and mango intake. Another set of contrasting findings from a Brazilian study showed that sleep debt was related to higher milk and dairy products and lower cereal/pasta intake [81]. Finally, a Malaysian study found that fast food intake was associated with lower sleep deprivation [77].

There were fewer studies between food groups and sleep quality or chronotype, although the foods identified were similar to those of sleep duration. For example, there was an association between better sleep quality and higher fruit intake in a study of undergraduate Saudi Arabian students [68]. Two additional studies [76,80], including the oldest study in our systematic review [80], reported that higher consumption of “healthy dairy” (milk, cottage cheese, and yogurt) or milk alone were associated with indicators of better sleep quality. One study used machine-learning to evaluate the foods most important for distinguishing good from poor quality sleep, finding that more frequent consumption of vegetables, curd cheese and wholegrain bread, and lower consumption of fast food, fried meals, sweetened beverages and energy drinks were most relevant [71]. In the study that focused on chronotype and social jetlag of Brazilian students, later chronotype was related to higher meat intake while social jetlag was associated with lower bean intake [81]. Finally, one Italian study examined intake of 23 food groups and insomnia, showing that meat, fish, coffee, and sweets

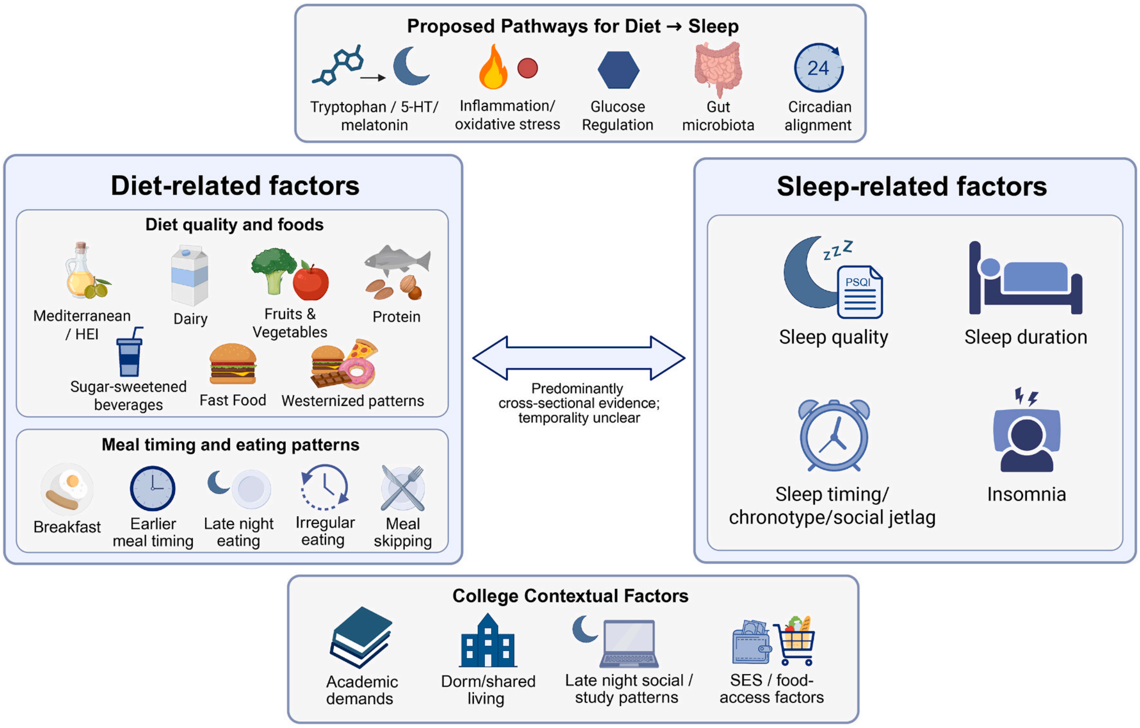

Fig. 1. Summary of findings from 57 studies on diet and sleep in college students.
HEI = healthy eating index; SES = socioeconomic status
Created in BioRender. Almahasneh, N. (2026) https://BioRender.com/0cpzdxp.

intake was associated with higher insomnia symptoms whereas higher whole bread and pasta intake were related to lower insomnia symptoms [72].

Eight studies examined individual macronutrients or micronutrients as the primary nutritional variables (Table 3), with sleep quality or duration as the primary sleep measures in all but one (which examined insomnia). Regarding macronutrient intake, higher total fat intake and saturated fat were associated with lower actigraphy-assessed sleep efficiency [74] and shorter sleep duration [79] among German and Turkish students. In the German study, associations with fat were found only among males; similarly, lower carbohydrate intake was associated with lower sleep efficiency also among males, with no associations reported among females [74]. A US study found that higher healthy protein intake (fish, chicken, game, nuts) was related to higher sleep quality [76]. Regarding micronutrients, calcium (from dairy foods) was associated with lower insomnia symptoms [69], and lower zinc intake was associated with lower sleep quality [38]. The previously mentioned study of Turkish students found higher sodium intake was related to better sleep quality [79], which is in direct contrast to findings from a Chilean study [78]. Three studies [32,73,82], all from Turkey, used nutrient intakes to compute dietary scores, including the dietary total antioxidant capacity, daily estimated advanced glycation end products (which are formed from high temperature cooking of sugars and proteins, and are contributors to inflammation), and the dietary phytochemical index in relation to sleep quality measured via PSQI. Collectively, these studies found that higher dietary total antioxidant capacity and higher dietary phytochemicals were each associated with better sleep quality [73,82] whereas higher estimated daily advanced glycation end products were linked to lower sleep quality [32].

In several of the studies that evaluated dietary patterns or quality (Table 1 and section 3.4), individual foods or nutrients were additionally examined. Most findings were congruent with the above studies, reporting positive associations between higher sleep quality, earlier chronotype, or lower social jetlag with higher protein [45], higher polyunsaturated fat [56], dairy [45], fruits and vegetables [37,45], fiber [37,46], legumes [37,45] grains [37,55], and lower sugar [55].

4. Discussion

Within this systematic review, which encompassed 57 studies investigating diet-sleep associations among undergraduate students from 44 countries, two overarching findings were identified (illustrated in Fig. 1). These results emerged consistently across studies conducted in the Middle East, Europe, Asia, and the Americas, with no evident differences attributable to geographic regions or cultures. First, higher diet quality, measured as adherence to the Mediterranean diet or through other population-specific diet quality metrics (e.g., HEI), was associated with better sleep quality, most commonly assessed through the PSQI. The individual foods that were most consistently associated with good sleep quality were dairy, fruits and vegetables, and protein sources, while sugar-sweetened beverages were related to lower sleep quality and later sleep timing. Second, breakfast consumption and earlier meal timing throughout the day was repeatedly linked to more favorable sleep outcomes, including longer sleep duration, earlier sleep timing, and lower probability of poor sleep quality. Finally, while there were several convergent findings across these studies of college students, there were also some inconsistencies. For example, fast food consumption and "Westernized" diet patterns showed conflicting associations; four studies found these types of meals/patterns were related to poorer sleep [30,39,44,71], while two studies showed the opposite [49,77].

4.1. Studies of diet patterns, quality, and individual foods/nutrients

The emergent finding of higher quality diets being associated with improved sleep quality among college student populations is consistent with previous findings in general adult populations [6,16]. Importantly, one study utilizing cross-lagged analysis found that higher diet quality predicted prospective sleep quality in college students, but not the other way around [54]. Moreover, the individual food items and dietary patterns identified are further supported by proposed biological mechanisms through which diet may influence sleep [85]. Notably, foods containing or serving as precursors to melatonin, tryptophan, and serotonin (including fruits, vegetables, fish, nuts, and dairy) are regarded as key contributors to sleep initiation and maintenance due to their roles in neurochemical regulation. Furthermore, many of these foods possess antioxidative and anti-inflammatory properties, which have been implicated in supporting both brain health and sleep quality [86, 87]. Additionally, foods that promote metabolic and gut health, such as those rich in fiber and whole grains, may facilitate improved sleep quality through the stabilization of blood glucose levels [88] and the promotion of a healthy gut microbiota [89], respectively. Taken together, these findings suggest that both overall dietary quality and specific food components may exert meaningful influence on sleep health of college students through multiple, complementary physiological pathways. Nonetheless, it is important to point out most papers reviewed were cross-sectional and survey-based, and thus we can only speculate on the exact mechanisms.

In contrast, foods that promote overconsumption, higher saturated fat and sugar content, and caffeine are often linked to worse quality sleep and insomnia in the general adult literature [6,8,16,90,91]. Although some studies identified in the literature review agreed with these proposed directions, some were in direct contrast. For example, one study reported longer sleep duration among students who consumed more fast food [77]. Similarly, individual studies identified unexpected directions of associations with sodium with sleep quality [79], and Westernized diet pattern [49]. The authors of one of the studies suggested the conflicting finding with fast food may reflect contextual factors, such as students who frequently ate out having more discretionary time, which in turn allowed for longer sleep [77]. Another related possibility to explain these associations could be residual confounding by socioeconomic status. Students with greater financial means or access may be more likely to purchase takeout and discretionary snack foods [92], and also have access to things that improve sleep (e.g., own bedroom or apartment instead of shared living spaces, more free time if they do not have to work to earn money, etc.). However, it is important to note that the inconsistent findings often arose in lower-quality or smaller-scale studies, suggesting that issues with measurement or selection bias could also be a factor. Moreover, some studies have shown that lower socioeconomic status is associated with lower diet quality among college students [93]; these associations very likely depend on the geographical and cultural settings of the colleges themselves.

4.2. *Studies of meal timing*

Multiple studies demonstrated that later meal timing and irregular eating patterns, including skipping meals, were related to poorer sleep quality, later chronotype, or social jetlag. These associations have also been documented in general adult populations [7]; however, it is particularly noteworthy considering that such dietary behaviors are more prevalent among college students, where social engagements and late-night academic activities frequently lead to inconsistent and delayed eating times. The underlying mechanisms for these associations may be related to circadian misalignment. Specifically, consuming meals at irregular intervals or outside the biological daytime may disrupt the circadian system, resulting in phase shifts that negatively affect sleep onset and quality [94]. Additionally, late-night eating may contribute to gastrointestinal discomfort, further impairing sleep quality [95]. It is also important to consider the likely bidirectional nature of these relationships; evidence suggests that poor sleep quality during the preceding night may increase the probability of skipping breakfast the following day [96]. Social jetlag in young adult populations has also been linked to worse dietary quality [97], presumably due in part to the consumption of lower-quality late-night foods during weekend nights. It is worth pointing out that the one randomized controlled trial of a restricted 10-h eating window did not report improvements in sleep quality over an 8-week period, but this was a small study with only 15 participants in the TRE experimental group [60]. Collectively, these findings highlight the complex and cyclical interplay between meal timing, eating/snacking patterns, and sleep health in collegiate populations.

4.3. *Limitations and future directions*

There were some key limitations, highlighting areas for future study. First, all but a few studies were cross-sectional, limiting our ability to draw causal inferences. Although the majority of studies framed their papers on the role of diet to affect sleep, and one cross-lagged study reported an association in this direction [54], reverse causation cannot be ruled out. While it is true that poor diet may contribute to poor sleep, insufficient or poor-quality sleep could also promote unhealthy eating behaviors, and there is a strong literature base to support this directionality [2,4,15,17]. Second, although academic demands play a key role in student life, very few studies explicitly accounted for exam schedules, coursework load, or study year in their analyses. A distinct opportunity exists to assess how changes in diet and sleep across an academic year, or from one year to the next—particularly as living arrangements and class schedules fluctuate—may be interrelated. Such studies have been conducted to examine impacts of changes in sleep on weight gain during the freshman year [98], but diet was not examined. Third, very few studies in our review utilized tailored dietary or sleep habit questionnaires to understand sleep and diet characteristics that may be highly specific to these college populations, such as roommate sleeping arrangements, eating in dining halls, lack of access to grocery stores, consumption of foods or drinks during late-night studying, etc. It is important to note that we did not include studies that had a specific focus on caffeinated beverages such as energy drinks, since that deserves its own systematic review. A fourth limitation in the studies identified was an overall lack of consideration for possible sex-specificity. More than one-third of studies (38%) were women-only or with study populations >75% female [28–45], thus the findings from these studies may be female-specific. However, most studies, including those with more equal proportions of males to females, did not stratify analyses by sex. In the few that did, associations were sometimes observed only among males, such as links between macronutrient intake and sleep efficiency [74]. Future research should therefore be powered to detect sex differences and report stratified findings explicitly. Additional limitations include reliance on self-reported diet and sleep measures, and lack of consideration of some important contextual components of the college experience not only in the sleep and diet measures but in the potential confounders considered as well. Finally, one of the limitations of the review process itself was that we did not register the study prospectively in PROSPERO because we had not decided whether to include studies conducted during COVID-19. A future systematic review of studies conducted during COVID-19 could ascertain whether associations of diet and sleep differed among college student populations during that period.

4.4. *Conclusions*

In summary, the findings indicate that plant-based dietary patterns, breakfast consumption, and higher intakes of fruits, vegetables, dairy, and protein are consistently linked to more favorable sleep outcomes among undergraduate students, whereas sugar-sweetened beverages, fast foods, and late-night eating were often, but not always, linked with worse sleep outcomes. Future research should prioritize longitudinal and experimental studies to clarify directionality and mechanisms. Incorporating objective measures of sleep, repeated dietary assessments, and attention to sex differences will strengthen the evidence base. Additionally, accounting for contextual factors such as exam periods, housing arrangements, and socioeconomic status may provide a more comprehensive understanding of how college environments shape both

Practice Points

1. Higher-quality diets, especially including higher fruit, vegetable, and dairy consumption, were associated with better quality sleep among college student populations in diverse settings.
2. Earlier timing of eating of all meals throughout the day and less late-night eating and snacking behaviors, were linked to better sleep quality.

Research Agenda

1. Current findings rely primarily on cross-sectional analyses; hence, more longitudinal investigations are needed.
2. Randomized controlled trials, ideally using wearable technology in addition to self-reported sleep quality, are needed to evaluate causality and directionality of the relationships between diet and sleep.
3. Sex differences in associations between diet and sleep among college populations, and whether they are driven by biological or socio-cultural influences, should be more closely examined.
4. The unique context of residential college living situations and the within- and between-semester schedule changes that may impact both sleep and diet represent an opportunity for study.

sleep and diet. Interventions targeting modifiable behaviors such as meal timing and breakfast consumption appear promising but should be tested in well-designed trials tailored to student populations.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work the authors used ChatGPT-4.1 in order to revise some grammar and style. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

Conflicts of interest

There are no conflicts of interest to disclose.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.smrv.2026.102306.

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