



Relationship Between Self-Perceived Sleep Quality, Healthy Eating, and Emotional Eating in Dance Students

Dans Öğrencilerinde Öznel Uyku Algısının Sağlıklı Beslenme ve Duygusal Yeme ile İlişkisi

✉ Jara Durán-Andrada, ✉ Félix Arbinaga

University of Huelva, Department of Clinical and Experimental Psychology, Huelva, Spain

Abstract

Objective: Dance practice has been linked to eating disorders and sleep-related problems. This study examined the associations between self-perceived sleep quality, healthy eating, and emotional eating among dance students.

Materials and Methods: The sample consisted of 114 participants. The instruments used were the Pittsburgh Sleep Quality Index, the composite scale of morningness, the Healthy Eating Index (HEI) for the Spanish population, and the eating and appraisal due to emotions and stress questionnaire.

Results: Overall, 80.7% of students reported poor sleep quality, and 72.8% required dietary changes to improve their diet. Participants with poor sleep quality showed significantly higher scores on the emotional eating scale-both total and subscale scores-than those with good sleep quality. Sleep disturbances, daytime dysfunction due to poor sleep, and the presence of nightmares were all associated with emotional eating. Although the number of hours slept was not related to emotional eating, it was associated with healthy eating. No significant differences in the HEI were found based on subjective sleep quality. Finally, students with a morning chronotype exhibited better diet quality than those with an evening chronotype.

Conclusion: These findings are discussed in the context of promoting conservatories as potential healthy environments.

Keywords: Dance, sleep, chronotype, students, emotional eating, healthy diet

Öz

Amaç: Dans pratiği, yeme bozuklukları ve uyku ile ilgili sorunlarla ilişkilidir. Bu çalışma, dans öğrencileri arasında öznel uyku algısı, sağlıklı beslenme ve duygusal yeme arasındaki ilişkileri analiz etmektedir.

Gereç ve Yöntem: Çalışma grubunda 114 dans öğrencisi yer aldı. Kullanılan ölçüm araçları şunlardır: Pittsburgh Uyku Kalitesi İndeksi, sabahçılık bileşik ölçeği, İspanyol nüfusu için Sağlıklı Beslenme İndeksi ve duygular ve stres nedeniyle yeme ve değerlendirme anketi.

Bulgular: Öğrencilerin %80,7'si düşük uyku kalitesi bildirmiştir ve %72,8'i daha sağlıklı bir diyetle ulaşmak için değişiklik yapmaları gerektiğini belirtmiştir. Düşük uyku kalitesine sahip öğrenciler, toplam puan ve alt ölçeklerde duygusal yeme açısından iyi uyuyanlara göre daha yüksek puan almıştır. Uyku bozuklukları, uykudan kaynaklanan gündüz işlev bozuklukları ve kabusların varlığı, duygusal yeme ile ilişkili bulunmuştur. Uyunan saat süresi ile duygusal yeme arasında bir ilişki bulunmazken, sağlıklı beslenme ile bir ilişki tespit edilmiştir. Öznel uyku kalitesine göre sağlıklı beslenme indeksi açısından istatistiksel olarak anlamlı bir fark bulunmamıştır. Son olarak, sabah kronotipi olan bireylerin akşam tiplerine göre daha iyi beslenme kalitesine sahip olduğu görülmüştür.

Sonuç: Sonuçlar, konservatuvarların potansiyel sağlıklı ortamlar olarak değerlendirilmesi bağlamında tartışılmıştır.

Anahtar Kelimeler: Dans, uyku, kronotip, öğrenciler, duygusal tüketim, sağlıklı beslenme

Introduction

The practice of dance has been shown to positively influence dancers' mental health and well-being (1-3). However, it also places considerable physical and cognitive demands on both students and professionals, making them susceptible to physical

fatigue, pain, psychological distress, injury, and school dropout (4,5). Among the most prevalent issues associated with dance are eating disorders (6) and sleep-related problems (7-9).

Sleep is strongly linked to physical activity levels (10,11). Furthermore, for dance students, the academic demands they face can compound their sleep issues, particularly towards

Address for Correspondence/Yazışma Adresi: Félix Arbinaga, University of Huelva, Department of Clinical and Experimental Psychology, Huelva, Spain

E-mail: felix.arbinaga@dpsi.uhu.es **ORCID-ID:** orcid.org/0000-0001-6649-1904

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the end of the semester (9,12). In terms of sleep-related issues, it has been reported that 35% of dancers attending primary health care centers and mental health services list psychological fatigue and sleep deprivation as their primary reasons for seeking medical assistance (13). Moreover, some studies indicate that 59.5% of dance students experience poor sleep quality, affecting 62.9% of women and 42.1% of men (7). It is important to recognize that the demanding nature of dance training and rehearsals does not allow for the maintenance of regular chronobiological patterns or a normal sleep-wake rhythm (8,9). Previous research (7) has shown that approximately half of professional ballet dancers scored above 5 on the Pittsburgh Sleep Quality Index (PSQI), indicating poor sleep quality, while 16.7% reported mean sleepiness scores exceeding the normal range.

A significant proportion of dancers experience disordered eating alongside sleep problems. When considering different dance styles, the prevalence of eating disorders has been found to range between 12% and 26.5% (14,15). In this regard, an analysis of a group of professional dance students revealed that 12% had a history of or a formal diagnosis of an eating disorder. Therefore, it appears that eating disorders are present across various dance disciplines (17).

In the field of dance, emotional eating has received limited attention despite its potential relevance, as it is often linked to compulsive eating patterns. This form of eating behavior involves food consumption driven by emotional cues—such as irritability, anxiety, or stress—as well as by external stimuli, including the smell or visual appeal of food (18). Consequently, emotional eating tends to involve excessive intake of food in response to negative emotional states, particularly anxiety, depression, and irritability (4).

Emotional eating is a common issue among individuals struggling to control their weight (19). Those who engage in emotional eating are particularly prone to consuming foods high in fat, sugar, and calories in response to negative emotional states (20). Research indicates an increased risk of developing metabolic disorders, such as diabetes and cardiovascular diseases, when emotional eating is combined with higher body weight (21,22). Similarly, these emotional eating patterns may serve as a precursor to potential binge-eating disorders, including food addiction (23). In this context, gender-related differences have been observed: in men, emotional eating is typically associated with body mass index and uncontrolled eating behaviors, whereas in women, a stronger correlation has been found with uncontrolled eating, anxiety, and poor sleep quality (24).

Research in the field of dance has not only focused on eating behavior disorders (14-16) but has also explored the energy requirements and sources necessary to achieve a healthy and optimal performance in ballet (25). In this regard, food consumption as an indicator of diet quality and a determinant of dancers' nutritional health has not received the attention it may require. Additionally, an association has been recognized between the intake of specific nutrients and an increased risk of developing diseases (26) or conversely, their potential protective effects (27).

The literature describes various methodologies for assessing overall dietary quality in individuals. Among these, evaluation systems such as the Diet Quality Index, the Diet Quality Index (28,29), and the Healthy Eating Index (HEI) (30,31) have been widely established. Specifically, the North American HEI (32) has been adapted for the Spanish population as the HEI-Spanish version (HEIS) (33). This index classifies an individual's diet into three categories: healthy, requiring modification, or unhealthy. Eating behavior and sleep problems are closely interrelated. Sleep disturbances have been associated with compensatory changes in eating behavior (34,35). Research shows that adolescents who report fewer hours of sleep (e.g., 6.5 hours per night) tend to display disinhibition traits related to the consumption of highly palatable foods rich in sugar, salt, and fat (36,37). Similarly, Parker et al. (38) found that both the duration and timing of sleep may be linked to eating behavior.

When examining chronotype and eating behavior, significant associations have also been observed (39). Evening chronotypes and individuals experiencing so-called social jetlag (SJL)—that is, evening types forced to adopt a morning-oriented schedule on working days—are linked to higher rates of obesity, poorer performance, greater depressive symptoms, and increased tobacco use (40,41). Evening chronotypes or individuals with SJL tend to skip breakfast more frequently and consume a greater proportion of their meals in the evening (42,43). They also display irregular mealtime patterns, which have been associated with obesity (40).

Within this context, the present study aims to examine the relationships between chronotype, self-reported perception of sleep characteristics and problems, and eating behavior among dance students. Based on previous research, three hypotheses were proposed. First, it was expected that dance students with poor sleep quality would score higher on the emotional eating scale than those with good sleep quality. Second, it was hypothesized that students with poor sleep quality would have lower diet quality scores, reflecting a greater need for dietary improvement, compared with those with good sleep quality. Finally, it was predicted that students with a morning chronotype would exhibit better diet quality than those with an evening chronotype.

Materials and Methods

Participants

Participants were recruited through non-probabilistic sampling, selecting individuals who met the following inclusion criteria: being of legal age; having studied dance for at least three years under the supervision of a teacher (thus excluding self-taught dancers); being enrolled in a conservatory course (elementary, intermediate, or professional level) or in a dance school-academy; and providing signed informed consent.

An a priori power analysis was conducted using G*Power 3 to determine the required sample size. Results indicated that a minimum of 117 participants was needed to achieve 95% statistical power for detecting a medium effect size ($\alpha = 0.05$) in independent-samples t-tests. A total of 118 students

participated; three were excluded for having less than three years of formal dance instruction, and one for being under 18 years of age. The final sample consisted of 114 dance students, which provided adequate power (90%) and a significance level of $\alpha = 0.05$ to test the study hypotheses.

Instruments

To characterize the sample, an ad hoc interview was conducted to collect sociodemographic and educational data (gender, year of birth, weight, height, and level of education), as well as dance-related information. The dance-specific variables included years of formal training under the guidance of an instructor, number of days and hours per week dedicated to dance practice, place of study (conservatory, academy, or both), current level of study (elementary, intermediate, advanced, or school level), and dance specialty (classical, flamenco, contemporary, Spanish, urban, or other).

Subjective sleep quality was assessed using the PSQI (44) in its Spanish-adapted version (45). Buysse et al. (44) showed the predictive validity of the PSQI for identifying poor sleep quality, with a cut-off score of >5 yielding a sensitivity of 89.6% and a specificity of 86.5%. The instrument comprises 19 items grouped into the following components: (a) subjective sleep quality, (b) sleep latency, (c) sleep duration, (d) sleep efficiency, (e) sleep disturbances, (f) use of sleep medication, and (g) daytime dysfunction related to sleep. Each component is scored from 0 to 3, yielding a global score ranging from 0 to 21, with higher scores indicating (PSQI >5). In the present study, internal consistency for the total score was acceptable ($\alpha = 0.812$).

Chronotype was assessed using the composite scale of morningness (CSM) (46,47) in its Spanish-adapted version (48). This scale consists of 13 items that evaluate participants' typical wake-up and bedtime, preferred hours for physical and mental activity, and subjective alertness. The instrument yields a total score (CSM-total; lower scores indicate a stronger evening chronotype) and two subscales: general morningness (CSM-general) and alertness (CSM-alert). In the current study, internal consistency was satisfactory for CSM-total ($\alpha = 0.862$), CSM-general ($\alpha = 0.853$), and CSM-alert ($\alpha = 0.715$).

Diet quality was assessed using the HEIS (33), an adapted version of the North American HEI (32). The HEIS categorizes food into twelve groups: 1) fresh fruit, 2) meat, 3) eggs, 4) fish, 5) pasta, rice, potatoes, 6) bread and cereals, 7) vegetables, 8) legumes, 9) processed meats and cold cuts, 10) dairy products, 11) sweets, and 12) sugar-sweetened beverages. Each group is further classified into five consumption categories: 1) daily consumption, 2) three or more times per week but not daily, 3) once or twice per week, 4) less than once per week, and 5) never or almost never. To calculate the HEIS, each variable is rated on a scale of 0 to 10, with higher scores indicating greater adherence to the recommendations established by the Spanish Society of Community Nutrition (49). The total score is then classified into three categories: healthy (>80 points), needs modification (50–80 points), and unhealthy (<50 points).

Emotional eating was assessed using the questionnaire of eating and appraisal due to emotions and stress (EADES) (50), in its Spanish-adapted version (51). The questionnaire consists of 40 items, with nine items from the original version excluded during adaptation due to low factor loadings. Higher scores indicate a weaker association between eating behavior and negative emotional states. Responses are rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire yields a total score and three subscales, all of which demonstrated excellent internal consistency in this study: F1. Self-efficacy in emotion- and stress-related eating ($\alpha = 0.898$); F2. Self-confidence in emotion- and stress-related eating ($\alpha = 0.889$); and F3. Appraisal of resources and ability to cope ($\alpha = 0.913$). The overall Cronbach's alpha reliability coefficient for the total scale was 0.924.

Procedure

Data were collected in both paper and online formats. Paper-based data collection took place through visits to public conservatories and private dance academies. At the same time, the online data were gathered following contact with the management teams of conservatories and academies across the country. After agreeing to collaborate, administrators disseminated information about the study via social media and email invitations to students.

The online survey began with a detailed description of the study's objectives, legal and ethical terms, and assurances regarding the anonymity and confidentiality of responses. The study was approved by the Andalusian Ethics Committee of Biomedical Research (Huelva Evaluation Committee; Internal Code: 0423-N-23; Act: 06/23; dated: 20/06/2023). Participants were informed that their data would be used exclusively for research purposes, that participation was voluntary, and that they could withdraw at any time without penalty. Informed consent was required before proceeding with the questionnaire.

Statistical Analysis

An a priori power analysis was conducted using G*Power 3.5 (52) to determine the minimum sample size required to test the study hypotheses. Descriptive statistics were calculated for all variables, including frequencies, percentages, means, and standard deviations (SDs). The Kolmogorov–Smirnov test was used to assess the normality of the distributions. For variables that did not meet the assumption of normality, non-parametric tests were applied—specifically, the Mann–Whitney U test and the Kruskal–Wallis test. Internal consistency reliability was evaluated using Cronbach's alpha (α). Effect sizes for the Mann–Whitney U test were estimated using the formula $r = Z/\sqrt{n}$, interpreted as follows: $r < 0.099$ (negligible), 0.10–0.299 (small), 0.30–0.499 (medium), and > 0.50 (large). Associations between categorical variables were analyzed using the chi-square (χ^2) test, with effect size estimated via Cramér's V (< 0.20 : small; 0.20–0.60: moderate; > 0.60 : large). All analyses were performed using the IBM SPSS Statistics software package, version 25.0 (IBM Corp., Armonk, NY, USA).

Results

The final sample consisted of 114 dance students, of whom 87.7% were women. Participants had a mean age of 23.87 years (SD = 5.47). Regarding dance specialization, 7.0% were studying classical dance, 43.9% flamenco, 13.2% contemporary dance, 20.2% Spanish dance, 11.4% urban dance, and 4.4% other styles.

Although the variables met the assumption of normality, non-parametric tests were applied due to the unequal sample sizes between male and female participants. Analysis of age revealed statistically significant differences by gender: male students (M = 28.29, SD = 8.84) were significantly older than female students (M = 23.25, SD = 4.56), $Z = -2.894$, $p = 0.004$.

The mean weight of the sample was 59.43 kg (SD = 9.61), and the mean height was 163.18 cm (SD = 16.56). As expected, significant gender differences were found for both variables, with men being generally heavier and taller than women (weight: $Z = -4.350$, $p < 0.001$; height: $Z = -5.471$, $p < 0.001$). Differences were also observed in educational level, $\chi^2(2,114) = 6.667$, $p = 0.036$, with women more likely to have completed university studies, whereas men were more likely to have completed secondary education (Cramér's $V = 0.242$).

Regarding dance-related characteristics, no significant gender differences were found in years of formal dance instruction, the frequency of rehearsals (days per week), or the hours dedicated to dance per week (see Table 1). However, women were more likely to study in conservatories, whereas men more often attended private dance schools (Cramér's $V = 0.241$).

Additionally, women tended to be enrolled in higher levels of training (Cramér's $V = 0.259$), and dance specialization differed significantly by gender: men more frequently specialized in urban dance, whereas women predominantly studied Spanish dance (Cramér's $V = 0.340$).

Analysis of the variables using the Kolmogorov-Smirnov test indicated that all distributions met the assumption of normality: subjective sleep quality (PSQI: $Z = 0.872$, $p = 0.563$), chronotype (CSM: $Z = 0.807$, $p = 0.533$), emotional eating (EADES: $Z = 1.312$, $p = 0.064$), and healthy eating (HEIS: $Z = 1.076$, $p = 0.197$). Table 2 presents the mean scores obtained on each of these instruments according to the gender of the dance students.

Regarding perceived sleep characteristics, a significantly greater proportion of women reported higher scores indicative of poor sleep quality, with a small effect size ($r = -0.23$). Overall, 80.7% of students presented poor sleep quality (PSQI >5). No significant gender differences were found in chronotype scores or in behaviors related to healthy eating. With respect to dietary patterns, 27.3% ($n = 31$) of students followed a healthy diet, 68.4% ($n = 78$) required some modifications to achieve a healthier diet, and 4.4% ($n = 5$) had an unhealthy diet.

However, significant differences emerged in emotional eating. Women exhibited lower total EADES scores-indicating a greater tendency to use food as an emotion-regulation strategy-with a small effect size ($r = -0.25$). Similar small effect sizes were observed for the subscales self-efficacy in emotion- and stress-related eating ($r = -0.24$) and self-confidence in emotion- and stress-related

Table 1. Training-related characteristics of the sample of dance students according to gender.

	Total n = 114	Men 14 (12.3)	Women 100 (87.7)	Z Mann-Whitney U test	P
Years with teacher	12.99 (5.30)	14.64 (8.98)	12.76 (4.59)	-0.542	0.588
Days/week dancing	4.72 (1.22)	5.00 (1.11)	4.68 (1.23)	-1.009	0.313
Hours/week dancing	20.31 (11.73)	21.57 (13.41)	20.13 (11.53)	-0.251	0.802
Place of study				$\chi^2(2,114) = 6.608$	0.037
Conservatory	68 (59.6)	4 (28.6)	64 (64.0)		
Dance school	30 (26.3)	7 (50.0)	23 (23.0)		
Both	16 (14.0)	3 (21.4)	13 (13.0)		
Stage of training				$\chi^2(2,114) = 7.627$	0.022
Elementary-intermediate	53 (46.5)	8 (57.1)	45 (45.0)		
Higher	34 (29.8)	0 (0.0)	34 (34.0)		
School	27 (23.7)	6 (42.9)	21 (21.0)		
Dance specialty				$\chi^2(2,114) = 13.149$	0.022
Classical	8 (7.0)	1 (7.1)	7 (7.0)		
Flamenco	50 (43.9)	7 (50.0)	43 (43.0)		
Contemporary	15 (13.2)	0 (0.0)	15 (15.0)		
Spanish	23 (20.2)	0 (0.0)	23 (23.0)		
Urban	13 (11.4)	4 (28.6)	9 (9.0)		
Another	5 (4.4)	2 (14.3)	3 (3.0)		

Quantitative variables are expressed as M (SD); categorical variables as n (%).
SD: Standard deviation.

eating ($r = -0.19$). No significant gender differences were found for the appraisal of resources and ability to cope subscale.

When examining the relationships among the study variables (Table 3), significant correlations were observed between subjective sleep quality and emotional eating. A negative correlation indicated that PSQI was associated with greater reliance on food as an emotion-regulation strategy. However, subjective sleep quality did not show a significant relationship with healthy eating.

Regarding chronotype, the scores showed a positive correlation with emotional eating, indicating that students with more

morning-oriented tendencies were less likely to use food as an emotional regulator. Chronotype was also positively and significantly correlated with healthy eating, suggesting that dance students with a stronger morning orientation reported healthier dietary patterns and required fewer changes to improve their eating habits.

Correlational analyses between eating behavior and the sleep-related variables assessed by the PSQI revealed that neither hours spent in bed nor sleep efficiency were significantly associated with the emotional eating or healthy eating measures. However, sleep efficiency showed a marginally significant association with

Table 2. Scores on perceived sleep quality (PSQI), healthy eating index (HEIS), Chronotype (CSM), and emotional eating questionnaire (EADES) of dance students according to gender.

	Total n = 114	Men 14 (12.3)	Women 100 (87.7)	Z Mann-Whitney U test	P
PSQI	8.80 (3.78)	6.64 (2.67)	9.10 (3.82)	-2.403	0.016
PSQI categories				$\chi^2(1,114) = 0.047$	0.829
Poor quality	92 (80.7)	11 (78.6)	81 (81.0)		
Good quality	22 (19.3)	3 (21.4)	19 (19.0)		
CSM	31.56 (6.75)	30.36 (5.76)	31.73 (6.89)	-0.873	0.383
CSM-general	24.96 (5.28)	22.93 (4.45)	25.24 (5.79)	-1.639	0.101
CSM-alert	6.61 (1.81)	7.43 (1.70)	6.49 (1.81)	-1.817	0.069
EADES	138.00 (19.24)	151.14 (18.37)	136.17 (18.73)	-2.602	0.009
F1-EADES	40.54 (9.92)	47.14 (7.97)	39.62 (9.85)	-2.545	0.011
F2-EADES	29.88 (7.04)	33.21 (6.49)	29.41 (7.02)	-1.980	0.048
F3-EADES	67.59 (7.53)	70.79 (8.77)	67.14 (7.29)	-1.483	0.138
HEIS	70.73 (12.99)	67.79 (13.08)	71.15 (12.99)	-0.807	0.419
HEIS classification				$\chi^2(1,114) = 1.343$	0.247
Needs change	83 (72.8)	12 (85.7)	71 (71.0)		
Healthy	31 (27.2)	2 (14.3)	29 (29.0)		

Quantitative variables are expressed as M (SD); categorical variables as n (%).

PSQI: Pittsburgh sleep quality index, CSM: Composite scale of morningness, CSM-general: General morningness factor, CSM-alert: Alertness factor, EADES: Eating and appraisal due to emotions and stress questionnaire, F1-EADES: Self-efficacy in emotion- and stress-related eating, F2-EADES: Self-confidence in emotion- and stress-related eating, F3-EADES: Appraisal of resources and ability to cope, HEIS: Healthy eating index for the Spanish population, SD: Standard deviation.

Table 3. Pearson's bivariate correlations between subjective sleep characteristics and eating behaviors.

	1	2	3	4	
(1) PSQI	1				
(2) CSM	-0.083/0.383	1			
(3) EADES	-0.335/ <0.001	0.323/ <0.001	1		
(4) HEIS	0.140/0.138	0.313/0.001	0.104/0.138	1	
	Hours in bed	Sleep efficiency	Sleep duration	Sleep disturbances	Daytime dysfunction
HEIS	-0.165/0.079	-0.126/0.180	-0.224/0.017	-0.008/0.931	-0.077/0.418
EADES	-0.003/0.974	0.090/0.342	0.046/0.629	-0.413/<0.001	-0.486/<0.001
F1-EADES	0.025/0.792	0.177/0.060	0.129/0.172	-0.325/<0.001	-0.364/<0.001
F2-EADES	0.056/0.553	0.031/0.741	0.075/0.428	-0.308/0.001	-0.387/<0.001
F3-EADES	-0.093/0.324	-0.033/0.728	-0.123/0.193	-0.340/<0.001	-0.400/<0.001

Values are presented as r/p (Pearson's correlation coefficient/significance).

PSQI: Pittsburgh sleep quality index, CSM: Composite scale of morningness, EADES: Eating and appraisal due to emotions and stress questionnaire, F1-EADES: Self-efficacy in emotion- and stress-related eating, F2-EADES: Self-confidence in emotion- and stress-related eating, F3-EADES: Appraisal of resources and ability to cope, HEIS: Healthy eating index for the Spanish population.

the self-efficacy in emotion- and stress-related eating factor. While self-reported hours of sleep were not significantly related to emotional eating, they were negatively and significantly correlated with healthy eating, suggesting that students who reported longer sleep durations tended to have less healthy diets and required more dietary modifications.

In contrast, both sleep disturbances and daytime dysfunction due to poor sleep were significantly correlated with emotional eating, but not with healthy eating. These correlations were negative and highly significant, indicating that greater sleep disturbances and more pronounced daytime dysfunction were associated with a stronger tendency to use food as an emotional coping mechanism, both in the total emotional eating score and across all subscales.

Table 4 presents the scores obtained on the instruments assessing eating behaviors according to the presence of nightmares during the past month, as measured by the PSQI. Dance students who reported not experiencing nightmares during this period showed less reliance on food as an emotional regulator compared to those who experienced nightmares less

than once per week. Significant differences were found in the total EADES score, with a small effect size ($r = -0.28$), and in the appraisal of resources and ability to cope factor, which showed a medium effect size ($r = -0.43$). However, no significant differences were observed in the self-efficacy in emotion- and stress-related eating or self-confidence in emotion- and stress-related eating subscales.

Furthermore, the presence of nightmares did not appear to be related to healthy eating scores, as no statistically significant differences were found between students who reported experiencing nightmares and those who did not.

Table 5 displays the scores obtained by dance students on the instruments assessing eating behaviors and chronotype according to subjective sleep quality. Students categorized in the poor sleep quality group reported greater use of food as an emotional regulator. Specifically, significant differences were observed in the total EADES score (medium effect size, $r = -0.35$), as well as in the self-efficacy in emotion- and stress-related eating (small effect size, $r = -0.27$), self-confidence in emotion- and stress-related eating (medium effect size, $r =$

Table 4. Contingency table of emotional eating (EADES) and healthy eating index (HEIS) scores by the presence of nightmares in the past month (PSQI).

	Presence of nightmares (past month)			Z Mann–Whitney U test	p
	Total 114	No nightmares 22 (19.3)	< once per week 92 (80.7)		
EADES	138 (19.24)	148.41 (17.429)	135.52 (18.909)	-2.959	0.003
F1-EADES	40.54 (9.92)	42.82 (8.867)	40.00 (10.128)	-0.967	0.334
F2-EADES	29.88 (7.04)	31.77 (7.380)	29.42 (6.929)	-1.682	0.093
F3-EADES	67.59 (7.53)	73.82 (6.021)	66.10 (7.108)	-4.582	<0.001
HEIS	70.73 (19.99)	69.46 (13.739)	71.04 (12.872)	-0.223	0.824

Quantitative variables are expressed as M (SD); categorical variables as n (%).

PSQI: Pittsburgh sleep quality index, CSM: Composite scale of morningness, EADES: Eating and appraisal due to emotions and stress questionnaire, F1-EADES: Self-efficacy in emotion- and stress-related eating, F2-EADES: Self-confidence in emotion- and stress-related eating, F3-EADES: Appraisal of resources and ability to cope, HEIS: Healthy eating index for the Spanish population, SD: Standard deviation.

Table 5. Contingency table of composite scale of morningness (CSM), emotional eating (EADES), and healthy eating index (HEIS) scores by good/poor sleep quality (PSQI).

	PSQI			Z Mann–Whitney U test	p
	Total 114	Good quality 22 (19.3)	Poor quality 92 (80.7)		
CSM	31.56 (6.75)	35.68 (6.011)	30.58 (6.574)	-3.120	0.002
EADES	138 (19.24)	150.96 (13.45)	134.91 (19.19)	-3.742	<0.001
F1-EADES	40.54 (9.92)	45.68 (6.69)	39.32 (10.20)	-2.857	0.004
F2-EADES	29.88 (7.04)	34.36 (6.18)	28.80 (6.84)	-3.641	<0.001
F3-EADES	67.59 (7.53)	70.91 (6.20)	66.79 (7.64)	-2.769	0.006
HEIS	70.73 (19.99)	70.23 (10.33)	70.85 (13.60)	-0.266	0.790
HEIS classification				$\chi^2_{(1,114)} = 1.118$	0.290
Needs change	83 (72.8)	18 (81.8)	65 (70.7)		
Healthy	31 (27.2)	4 (18.2)	27 (29.3)		

Quantitative variables are expressed as M (SD); categorical variables as n (%).

PSQI: Pittsburgh sleep quality index, CSM: Composite scale of morningness, EADES: Eating and appraisal due to emotions and stress questionnaire, F1-EADES: Self-efficacy in emotion- and stress-related eating, F2-EADES: Self-confidence in emotion- and stress-related eating, F3-EADES: Appraisal of resources and ability to cope, HEIS: Healthy eating index for the Spanish population, SD: Standard deviation.

-0.34), and appraisal of resources and ability to cope (small effect size, $r = -0.26$) factors.

No significant differences in healthy eating patterns were found between students reporting good versus poor sleep quality. However, those in the good sleep quality group exhibited significantly more morning-oriented chronotypes than those in the poor sleep quality group, with a large effect size ($r = -0.55$).

Discussion

The present study aimed to examine the relationships between self-reported sleep perception—specifically subjective sleep quality and chronotype—and eating behaviors among dance students, focusing on both healthy eating and the use of food as an emotional regulation strategy.

The first hypothesis proposed that dance students with poor sleep quality would exhibit higher scores on the emotional eating scale than those with good sleep quality. The findings supported this hypothesis: students in the poor sleep quality group demonstrated significantly greater use of food as an emotional regulatory mechanism. This association was evident in both the total EADES score and across its three subscales—self-efficacy in emotion, stress-related eating, self-confidence in emotion, and appraisal of resources and ability to cope.

These findings align with previous evidence in the general population indicating that poor sleep quality is associated with problematic eating behaviors (34,35,38). Similarly, prior research has indicated that poor sleep quality is closely linked to impaired emotional regulation (53) and compensatory changes in eating behavior (34). Assuming a bidirectional relationship between sleep difficulties and emotional distress (54), it appears that individuals with low sleep quality often exhibit dysregulated and impulsive eating patterns as a strategy for emotional control (55)—even from very early ages (56).

Regarding sleep duration, no significant relationship was found between sleep duration and behaviors associated with emotional eating among dance students. However, this finding contrasts with prior research showing that shorter sleep duration is linked to poorer emotional and behavioral functioning (57). Insufficient sleep has been associated with alterations in the maturation of brain structures—particularly the prefrontal cortex—which negatively impacts executive functioning and inhibitory control in adolescents (58). Sleep-deprived adolescents are therefore more likely to experience difficulties in emotional regulation and an increase in behavioral impulsivity (58). Moreover, short sleep duration has been associated with increased sensitivity to others' negative emotions, a higher likelihood of experiencing negative affect, and a reduced capacity to express and experience positive emotions (57).

Dance students have shown clear relationships between emotional eating and sleep disturbances, as well as with daytime dysfunction due to inadequate sleep. These findings are consistent with previous research in the general population, which suggests that adolescents experiencing sleep difficulties are more likely to face emotional stress, thereby increasing the risk of emotional eating (55). This relationship may be

explained by the fact that emotional eating often emerges as a coping response to feelings of depression, anxiety, and loneliness (59), emotions commonly linked to poor sleep quality and sleep-related difficulties (60).

It is important to note that the presence of nightmares is strongly associated with negative affective states and psychological distress (61-63), and, in this study, showed significant relationships with emotional eating. Dance students who reported experiencing nightmares in the past month displayed greater use of food as an emotional regulation strategy compared to those who had not experienced nightmares. This relationship was evident in both the total EADES score and the appraisal of resources and ability to cope factor. However, no significant differences were found in healthy eating scores.

The second hypothesis proposed that students with poor sleep quality would obtain lower diet quality scores—indicating a greater need for dietary modifications—than those reporting good sleep quality. This hypothesis was not supported, as no statistically significant differences in the HEI were observed between students with poor and good sleep quality. In this regard, previous literature has suggested that poor sleep quality may be related to the type of food consumed (38). Specifically, individuals experiencing low sleep quality—often associated with emotional distress—are more likely to consume highly palatable foods rich in sugar, salt, and fat (64). Accordingly, adolescents with poor sleep quality often exhibit greater disinhibition in the consumption of such palatable foods (36,37).

No differences in diet quality were observed between dance students with poor and good sleep quality, regardless of hours spent in bed, sleep efficiency, sleep disturbances, or daytime dysfunction due to sleep. However, contrary to expectations, a negative relationship emerged between total sleep hours and diet quality. This finding contradicts previous evidence suggesting that shorter sleep duration is a marker for the development of unhealthy eating habits (38,59), with young adults often adopting unhealthy eating behaviors (65). Shorter sleep duration has also been associated with increased consumption of foods high in sugar and fat (66) as well as with a higher risk of obesity (19,59).

The third hypothesis proposed that dance students with a morning chronotype would have better diet quality than those with an evening chronotype. The data obtained from the present sample confirmed this prediction. These findings are consistent with previous research demonstrating significant associations between chronotype and eating behavior (39). Evening chronotypes and individuals experiencing what is known as SJL have been linked to less healthy diets, higher rates of obesity, poorer performance, and greater mood disturbances (41). They also tend to skip breakfast more frequently, consume a greater proportion of their meals in the evening (42,43), and maintain irregular eating schedules (40). Moreover, differences in nutrient intake have been reported according to chronotype (67,68), with individuals experiencing SJL showing higher overall caloric and fat intake (69).

Given the impact that sleep and eating problems have on both dance students and professionals, it would be valuable to analyze the role conservatories could play in promoting health by including sleep hygiene and nutrition programs in their training curricula. Such initiatives could help transform these institutions into genuinely health-promoting environments. In this sense, fostering a holistic educational approach is essential—one that not only emphasizes physical and technical preparation but also supports the development of psychological and lifestyle factors that are critical to students' professional and personal well-being.

Study Limitations

This study presents several limitations that should be addressed in future research. First, its correlational design precludes establishing causal relationships among the variables examined. Second, although the self-report questionnaires used demonstrated adequate validity and reliability, such instruments are inherently subject to potential biases and measurement limitations.

Future studies should aim to expand the sample size, particularly by increasing the number of participants within each dance specialty, as different modalities may entail distinct physical and psychological demands. Achieving a more balanced gender representation would also enhance generalizability, given the underrepresentation of male students in the current sample. It is additionally important to account for the influence of cultural context and students' expectations regarding their dance practice—whether oriented toward leisure, fitness maintenance, or professional training.

Further research should control for levels of physical activity and training intensity, as these factors are closely linked to both sleep characteristics and eating behaviors. Conducting longitudinal studies across an entire academic year would help identify stressors associated with fluctuations in sleep and eating patterns, particularly during periods of high academic or rehearsal demands. Combining subjective and objective sleep measures (e.g., actigraphy) and analyzing the specific composition of students' diets in relation to sleep outcomes would provide a more comprehensive understanding of these interactions. Finally, incorporating additional variables—such as career aspirations, professional goals, injury history, and years of dance experience—would strengthen the external validity and generalizability of future findings.

Conclusion

The findings indicate that a high proportion of dance students experience poor sleep quality and require dietary adjustments to achieve a healthier diet. Students with poor sleep quality reported greater use of food as an emotional regulation strategy compared to those with good sleep quality, and sleep disturbances were significantly associated with emotional eating. No statistical differences were observed in the HEI according to subjective sleep quality. Finally, students with a morning chronotype exhibited better diet quality than those with an evening chronotype.

Ethics

Ethics Committee Approval: The study was approved by the Andalusian Ethics Committee of Biomedical Research (Huelva Evaluation Committee; Internal Code: 0423-N-23; Act: 06/23; Date of approval: 20/06/2023).

Informed Consent: Informed consent was required before proceeding with the questionnaire.

Footnotes

Authorship Contributions

Surgical and medical practices: J.D.-A., F.A., Concept: J.D.-A., F.A., Design: J.D.-A., F.A., Data Collection or Processing: J.D.-A., F.A., Analysis or Interpretation: J.D.-A., F.A., Literature Search: J.D.-A., F.A., Writing: J.D.-A., F.A.

Conflict of Interest: No conflict of interest was declared by the authors.

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