Article

Investigation of the Relationship Between Nursing Students' Worry Levels Regarding Climate Change and Sleep Quality

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Abstract: Climate change has an impact on the prevalence of insufficient sleep and sleep disorders. This study aimed to determine the levels of climate change-related worry and sleep quality among nursing students. This descriptive and cross-sectional study was conducted between August and September 2024. A total of 422 volunteer nursing students from seven universities in different regions of Turkey participated. Data were collected using the Personal Information Form, Climate Change Worry Scale (CCWS), and Pittsburgh Sleep Quality Index (PSQI). Statistical analyses included frequency, percentage, mean, standard deviation, Mann-Whitney U, Kruskal-Wallis, and Spearman correlation tests. The average CCWS score of the students was 33.22 ± 11.14, and the average PSQI score was 6.39 ± 3.46. Among the participants, 52.8% had poor sleep quality (PSQI ≥5). Gender, economic status, place of residence, climate change education, daily sleep duration, sleep latency, and smoking were identified as factors influencing CCWS and PSQI scores. A positive, moderate, and significant correlation was found between CCWS and PSQI scores($r=0.263$; $p<0.05$). Nursing students had moderate levels of climate change-related worry and poor sleep quality. Educational programs and awareness campaigns aimed at enhancing knowledge about climate change could empower students to take action, reduce their worry levels, and improve their sleep quality.

Keywords climate change; nurse; sleep; worry: student

1. Introduction

Climate change is a global issue that threatens both the planet and individuals' quality of life [1]. Rising temperatures, extreme weather events, and emissions affecting air quality have negative impacts on health [2], while factors such as extreme heat, air pollution, allergens, and environmental degradation pose serious threats [3],. This highlights the devastating effects of climate change on human health [4]. Climate change affects various health issues, including asthma, domestic violence, gastrointestinal diseases, vector-borne illnesses, preterm births, and heart diseases [5].. Its current or potential impacts can cause worry, fear, and stress in individuals [6] Climate change worry reflects an individual's emotional attachment to the issue and personal distress regarding its consequences [7]. Climate change worry can be particularly intense among young people [8]. This worry stems from expectations of significant future impacts and can lead to negative psychological responses in youth [9]. Excessive worry may hinder adaptation efforts, increasing stress and contributing to mental health issues such as depression, worry, suicide, substance abuse, and sleep disorders [10].

The negative effects of climate change on mental health may be linked to sleep problems [11]. Rising temperatures and extreme weather events can negatively impact sleep duration and quality. Climate change can also increase worry levels, leading to mental health issues [12]. While worry plays a crucial role in addressing climate change, there is limited information on the relationship between

climate change and sleep. Reviews in this field highlight gaps in the literature and the need for more qualitative and quantitative studies [13].

A study found that most nursing students were concerned about climate change, while some were unaware of its health effects [14]. It is emphasized that integrating climate change into the nursing curriculum is essential for educating future nurses and developing interventions against its health impacts [15]. Assessing nursing students' emotions on this issue may enhance healthcare professionals' ability to take effective preventive measures.

Despite the growing interest in the effects of climate change on mental health and climate worry, no previous study has summarized the relationship between climate change worry and sleep quality among nursing students. Therefore, a descriptive study was conducted to examine the relationship between nursing students' levels of climate change worry and sleep quality.

Research Questions:

1. What are the levels of climate change worry among nursing students?
2. Is there a relationship between nursing students' levels of climate change worry and other characteristics?
3. Is there a significant relationship between nursing students' levels of climate change worry and sleep quality?

2. Materials and Methods

2.1. Study Setting and Sampling

This study was conducted as a descriptive and cross-sectional research. The study population consisted of nursing students enrolled in the nursing departments of seven universities from different geographical regions of Turkey (N=4368). The sample included 422 nursing students who met the inclusion criteria. The sample size was determined using the known population sampling formula (95% confidence interval, 0.05 margin of error, and 0.5 event frequency). Inclusion criteria: Being 18 years or older, being a nursing student at selected universities in Turkey, volunteering to participate in the study, having effective communication skills. Exclusion criteria: Refusing to participate in the study, ıncomplete responses in data collection forms, leaving certain items on the form unanswered.

2.2. Data Collection Instruments

2.2.1. Personal Information Form

Prepared based on a literature review, this form consists of 19 questions collecting descriptive information such as age, gender, class level, and economic status [16,17].

2.2.2. Climate Change Worry Scale (CCWS)

Developed by Stewart (2021) and adapted into Turkish by Gezer and İlhan (2021), this scale consists of 10 items rated on a 5-point Likert scale (Strongly Agree: 5 – Strongly Disagree: 1). The scale has two dimensions: Anxiety (items 1, 2, 3, 4, 5, 8, 10) and Helplessness (items 6, 7, 9), with score ranges of 7–35 and 3–15, respectively [6,9]. The reliability coefficient of the scale is 0.91, and the Cronbach's alpha coefficient for this study was calculated as 0.97. The total score range is 10–50, with higher scores indicating greater levels of worry.

2.2.3. Pittsburgh Sleep Quality Index (PSQI)

PUKI was developed by Buysse et al. in 1989 and adapted into Turkish by Ağargün et al. (1996) This scale provides information on sleep quality and types of sleep disturbances over one month. It has established internal consistency, validity, and reliability, with a Cronbach's alpha coefficient of 0.83. The scale consists of 24 questions, including 19 self-report items and 18 clinical information elements. Its subcomponents assess subjective sleep quality, sleep latency, sleep duration, habitual

sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. A score of 5 or below is considered "good" sleep quality, while a score above 5 indicates "poor" sleep quality [18,19].

2.3. Data Collection

This cross-sectional study was conducted between August 24 and October 31, 2024, in the nursing departments of seven universities from different geographical regions of Turkey. To determine the study group, universities with nursing departments in Turkey's seven geographical regions were first listed, and then one university from each region was selected using a simple random sampling method. The study population consisted of all nursing students studying at these seven universities (N = 4368; Source: 2024 YÖK Atlas Data, https://yokatlas.yok.gov.tr/lisans-anasayfa.php). The heads of the nursing departments of these universities were contacted via email to request permission to conduct the study at their institutions. All nursing departments granted permission for the study.

The sample size was calculated as 422 using the known population sampling formula (with a 95% confidence interval, 0.05 margin of error, and 0.5 event frequency). Data collection forms were created via Google Forms and sent to students who met the research criteria and were informed about the study protocol through their department heads via email. The study was concluded once the target sample size (422) was reached.

2.4. Data Analysis

The study data were analyzed using the SPSS 28.0 software. Descriptive statistics were calculated using frequencies and percentages for categorical data, and mean and standard deviation for continuous data. The Kolmogorov-Smirnov test was used for the normality test of continuous data. For data that did not show normal distribution, the Mann-Whitney U and Kruskal-Wallis tests were applied. When comparing more than two groups, Dunn's multiple comparison test was performed to determine which group the difference originated from, and decisions were made based on Bonferroni-corrected p-values. Spearman's Correlation Analysis was used to evaluate the relationship between variables, and statistical significance was accepted as $p < 0.05$.

2.5. Ethical Principles

This study was conducted in accordance with the principles of the Helsinki Declaration and approved by the Scientific Research and Publication Ethics Committee of Hakkari University (approval number: 2024/118-01). The purpose and methodology of the study were explained to the participants by the researcher, and informed consent for voluntary participation was obtained.

3. Results

The average age of the nursing students participating in the study was 21.82±1.95, with 73.9% being female. Among the students, 31% were in their third year, and 22% were studying in the Eastern Anatolia Region. Additionally, 68% of the participants reported their economic status as average, 73% lived in urban areas, and 77.3% resided in dormitories. Furthermore 24.4% smoked, 13.7% consumed alcohol (Table 1).

Table 1. Demographic characteristics of nursing students.

Variables		n	%
Age (Mean=21.82;SD =1.95)	18-21 age	232	55.0
	22-26 age	190	45.0
Gender	Woman	312	73.9
	Male	110	26.1

Class	1	95	22.5
	2	121	28.7
	3	131	31.0
	4	75	17.8
University's geographical region	Marmara Region	48	11.4
	Aegean Region	62	14.7
	Mediterranean Region	54	12.8
	Black Sea Region	49	11.6
	Central Anatolia Region	60	14.2
	Eastern Anatolia Region	93	22.0
	Southeastern Anatolia Region	56	13.3
Economic situation ıncome exceeds	Income >expenses	37	8.8
	Income =expenses	287	68.0
	Income < expenses	98	23.2
Residence	Rural	114	27.0
	City	308	73.0
Where he stays	At home with family	59	14.0
	State dormitory	326	77.3
	At home with friend	37	8.8
Smoking	Yes	103	24.4
	No	319	75.6
Alcohol use status	Yes	58	13.7
	No	364	86.3
Total		422	100

n: Number; %: Percentage; SD: Standard deviation.

Among the students, 37.2% reported sleeping 6-7 hours per night, 6.9% stated that they did not have difficulty falling asleep, and 50.9% felt extremely hot more than three times while sleeping in the last month. Additionally, 35.8% of the students have received training/courses on climate change, 44.3% are aware of the effects of climate change on health, and 54% agree with the statement, 'Nurses have roles and responsibilities at both national and individual levels in reducing the effects of climate change.' Of these, 3% partially agree, and 31.5% completely agree. (Table 2).

Table 2. The students' sleep patterns and views on climate change (n=422).

Variables		**n**	**%**
Total sleep	Less than 4 hours	112	26.5
	4-5 hours	54	12.8
	6-7 hours	157	37.2
	8-9 hours	99	23.5
Falling asleep when going to bed?	None	29	6.9
	Sometimes	157	37.2
	Generally	187	44.3
	Often	49	11.6

How often were you extremely hot during sleep last month?	None	53	12.6
	Less than 1	91	21.6
	1-2 times	63	14.9
	More than 3	215	50.9
Have you received training/lessons on climate change?	Yes	151	35.8
	No	271	64.2
Do you know the effects of climate change on health?	Yes	187	44.3
	No	213	50.5
	Partially	22	5.2
Nurses have roles and responsibilities at both national and individual levels in reducing the effects of climate change.	I totally disagree	8	1.9
	I disagree	18	4.3
	I'm undecided	34	8.1
	I agree	229	54.3
	I totally agree	133	31.5

n: Number; %: Percentage.

Nursing students scored a total of 33.22 ± 11.14 on the CCWS; 23.64±7.92 from the anxiety subscale; It was found that he received 9.58 ± 3.32 points from the helplessness subscale and a total of 6.39±3.46 points from the PSQI (Table 3). In the study, the Cronbach's alpha values of the scales were 0.97 for CCWS, respectively; For PSQI it was found to be 0.72.

Table 3. Values related to the scale and its sub-dimensions.

Scale	Number of items	Min.	Max.	Mean±SD	Cronbach alpha
Anxiety	7	10	32	23.64±7,92	0.95
Despair	3	3	14	9.58±3,32	0.92
CCWS (Total)	10	14	45	33.22±11,14	0.97
PSQI	19	0	19	6.39±3,46	0.72

CCWS: From the Climate Change Worry Scale; PSQI: Pittsburgh Sleep Quality Index; SD: Standard deviation; Min.: Minimum; Max.: Maximum.

It was determined that there was a moderate positive relationship between the participants' mean score on the Climate Change Worry Scale (CCWS) and the mean score on the Pittsburgh Sleep Quality Index (PSQI) (r = 0.263, p<0.001) (Table 4). 52.8% of students have poor sleep quality according to PSQI.

Table 4. Relationship between CCWS and PSQI total score averages (n=422).

		CCWS	PSQI
CCWS	r	1.000	0,263**
	p		<0,001*
PSQI	r	0,263**	1.000
	p	<0,001*	
According to PSQI Cutoff Point		n	%

Poor Sleep Pattern (≥ 5)	223	52,8
Normal Sleep Pattern (< 5 points)	199	47,2

**Spearman correlation analysis; *p < 0.05.

In the study, women were more likely to fall asleep than men, those with poor economic conditions were more likely than those who were better, those living in the city were more likely than those living in rural areas, those who received education/courses on climate change were more likely than those who did not take education/courses, those who had less than 4 hours of sleep per day were more likely to fall asleep than those who slept 6-7 and 8-9 hours, those who slept more than those who slept 6-7 and 8-9 hours. It was determined that the mean PSQI and CCWS scores of those who could never fall asleep were significantly higher than those who did not have difficulty falling asleep, and of those who smoked than those who did not smoke (p<0.05). It was found that the PSQI total mean score of those living in the dormitory was significantly higher than those living in the family (p <0.05). Again, the PSQI total mean score of those living in a dormitory is higher than that of those living in a family, but the score difference is not significant (p>0.05) (Table 5).

Table 5. Comparison of sociodemographic characteristics.

Variables		CCWS Mean±SD	Test statistic	PSQI Mean±SD	Test statistic
Gender	Woman	33,95±10,94	14828[†]	6,66±3,34	14064
	Male	31,15±11,51	**p=0,012***	5,62±3,68	**p=0,02***
Age	18-21 age	33,96±10,96	19883[†]	6,68±3,68	20184[†]
	22-26 age	32,32±11,32	p=0,133	6,03±3,15	p= 0.057
Class	1	33,66±11,74	8,082[‡]	6,01±3,23	2,437[‡]
	2	32,26±11,44	p=0,674	6,22±3,68	p=0,059
	3	33,96±10,35		7,23±3,53	
	4	33,08±10,61		6,28±3,28	
Geographical region where the university is located	Marmara Region	31,64±11,83	0,926[‡]	6,00±2,61	7,692[‡]
	Aegean Region	35,12±10,04	p=0.777	7,03±3,60	p=0,315
	Mediterranean Region	33,68±10,56		6,51±3,20	
	Black Sea Region	32,55±11,73		6,55±3,93	
	Central Anatolia Region	33,48±11,19		6,72±3,71	
	Eastern Anatolia Region	32,72±11,48		5,74±3,63	
	Southeastern Anatolia Region	33,16±11,36		6,70±3,38	
Where she/he stays	At home with family[a]	31,45±11,53	4,785[‡]	5,57±2,75	3,723[‡]
	State dormitory[b]	33,71±10,94	p=0,091	6,61±3,56	**p=0,043***
	At home with friend[c]	31,59±12,14		5,67±3,35	**b>a**
Economic situation income exceeds	Income >expenses[a]	32,05±10,47	1,032[‡]	6,08±3,87	7,553[‡]
	Income =expenses[b]	32,48±11,34	**p=0,032***	6,15±3,38	**p=0,034***
	Income < expenses[c]	35,77±10,52	**c>a,b**	7,18±3,45	**c>a,b**
Residence	Rural	34,98±11,33	14779[†]	7,21±3,62	14496[†]
	City	32,57±11,02	**p=0,048***	6,08±3,35	**p=0,003***
Do you know the effects of climate change on health?	Yes[a]	34,73±10,09	**2,533[†]**	6,58±3,42	1,236[†]
	No[b]	31,92±11,82	**p=0,041***	6,25±3,54	p=0,561
	Partially[c]	32,95±11,72	**a>b**	6,04±2,99	

Received training on climate change?	Yes	34,29±9,82	16444[†]	6,64±3,40	20227[†]
	No	31,77±12,61	**p=0,021***	6,20±3,50	p=0,210
Total sleep	Less than 4 hours[a]	35,54±11,47	7,533[‡]	7,24±3,18	0,774[‡]
	4-5 hours[b]	34,55±10,57	**p=0,025***	7,07±3,54	**p=0,05***
	6-7 hours[c]	32,01±10,09	a>c, d	6,01±3,62	a>d
	8-9 hours[d]	31,73±12,29		5,75±3,27	
Falling asleep when going to bed	None[a]	7,68±3,96	6.812[‡]	7,68±3,95	-0,749[‡]
	Sometimes[b]	6,92±3,08	**p=0,004***	6,92±3,08	**p=0,04***
	Generally[c]	5,90±3,52	a>c	5,90±3,52	a>c
	Often[d]	5,73±3,68		5,73±3,68	
Smoking	Yes	35,99±10,41	13934[†]	7,19±3,82	13934[†]
	No	32,32±11,24	**p=0,004***	6,13±3,30	**p=0,007***
Alcohol use status	Yes	35,75±12,20	8262[†]	6,47±3,50	9747[†]
	No	32,81±10,93	p=0,62	5,87±3,15	p=0,226

CCWS: From the Climate Change Worry Scale; PSQI: Pittsburgh Sleep Quality Index;. †:Mann-Whitney U; ‡:Kruskal-Wallis H., *p < 0.05; a,b,c,d: was used to indicate differences between groups.

4. Discussion

This study examines the relationship between climate change worry and sleep quality among nursing students, as well as the impact of socio-demographic factors. While numerous studies have been conducted on the health effects of climate change, its impact on sleep has been less researched. The study reveals that climate change not only causes worry but also affects sleep duration and quality. This research is the first in this field and makes significant contributions to the literature.

In a study, more than half of nursing and midwifery students [20]; and in another field study, it was found that the majority of nursing students had poor sleep quality [21]. In this study, it was also determined that more than half of the students had poor sleep quality. These findings highlight that, despite sleep being a basic need, insomnia is a widespread and significant problem among university students.

In the study, a moderate level of climate change worry was identified among nursing students. This finding is consistent with the study by Mat et al. (2024) [22]. Moderate levels of concern can increase with personal experiences and may drive the search for solutions to environmental issues by prompting information-seeking and behavioral changes [23]. It was concluded that nursing students are open to learning about the issue and that their advocacy roles can be strengthened through education.

The study found that women had lower sleep quality and higher levels of climate change worry compared to men. The literature supports these findings, indicating that women tend to be more worry about climate change [24]. This difference is thought to be linked to women's caregiving responsibilities, risk-avoidance tendencies, social status, and financial resources.

In this study, no significant relationship was found between age and sleep quality or climate change worry. Similarly, Ergün et al. (2017) found no relationship between age and sleep quality, while Tümer et al. (2024) reported no association between age and climate change worry [17,20]. However, Aydemir (2022) stated that adolescents experience higher climate change worry compared to adults [25]. Concerns about the future may increase climate change worry among young people. Further research on this topic is needed.

The study found that students living in dormitories had lower sleep quality and higher climate change worry; however, this difference was not statistically significant. Previous research also indicates that dormitory environments reduce sleep quality due to crowded living conditions while enhancing sustainability awareness by providing a space for information sharing [24,26]. These

findings highlight the impact of dormitory environments on sleep quality and climate change worry levels.

The study shows that lower income levels are associated with poorer sleep quality and higher climate change worry. Additionally, the literature highlights that the sleep quality of low-income individuals varies with nighttime temperatures and that economic conditions influence responses to climate change [11,27]. These findings indicate that socioeconomic factors play a significant role in determining sleep quality and worry levels.

The study found that students living in urban areas had significantly lower sleep quality and significantly higher climate change worry compared to those in rural areas. Similarly, previous research has shown that poor sleep quality is more prevalent among adults living in cities and that urban life contributes to environmental worry [28,29]. These differences highlight how environmental factors and living conditions shape perception.

In this study, students who were aware of the health effects of climate change experienced greater climate change anxiety than those who were not, but no difference was found in their sleep quality. The literature indicates that nurses generally approach climate change from a local perspective and often lack sufficient knowledge on the subject [30,31]. This underscores the importance of incorporating the health effects of climate change into nursing education.

The study found that students who received climate change education experienced higher levels of climate change anxiety compared to those who did not, but there was no difference in their sleep quality. Similarly, previous research has shown that students who received education on the topic had higher levels of climate change anxiety [17]. These findings highlight that climate change education can enhance nurses' ability to advocate for and implement health solutions.

The study shows that most students do not get enough sleep, with 20% sleeping less than 4 hours, and that students who sleep less experience poorer sleep quality and higher climate change anxiety. Similar results were found in the study by Albqoor and Shaheen (2020), which emphasized that inadequate sleep is common among university students and that awareness-raising education could be beneficial [32].

The study found that students who smoke have poorer sleep quality and higher climate change anxiety. These findings support the literature on the negative effects of smoking on sleep [33]. However, this differs from a previous study (Hokka et al., 1999), which indicated that environmentally conscious young people tend to avoid risky behaviors [34]. The difference may be due to the geographical and climatic conditions of the participants.

The study found that more than half of the participants reported feeling excessively hot more than three times a week. Increased nighttime temperatures, which impair sleep quality and lead to inadequate sleep, are supported by the literature [11,12]. These findings emphasize the importance of considering climate factors in improving public health and sleep quality.

The study found no significant relationship between class level, geographical region, alcohol consumption, and sleep quality or climate change anxiety. The literature also indicates that there is no relationship between class level and sleep quality [16]. The effect of alcohol on sleep varies depending on individual differences [24]. Studies in this area are limited, and further research is needed.

The study shows that as climate change anxiety increases, sleep problems also rise among students. The literature suggests that mental health issues related to climate change may be associated with sleep, and extreme weather events could trigger sleep disorders [35,36] . These findings support the idea that climate change anxiety may be linked to the severity of insomnia.

5. Conclusions

The research shows that climate change anxiety affects sleep duration and quality. Climate change anxiety has a moderate and negative impact on students' sleep quality, and factors such as gender, economic status, living environment, climate change education, sleep duration, sleep onset latency, and smoking have a significant effect on anxiety levels.

Future studies may explore ways to mitigate the negative effects of climate change anxiety on sleep health. Nursing students can be encouraged to collaborate with experts from other disciplines working on climate change and contribute to global sustainability research. Supporting sleep health may help individuals cope with their climate-related concerns.

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