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Original Article

Sleep and Brain Health: Knowledge, Beliefs, and Habits in the General Population

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Abstract

Background: Sleep is important for memory, learning, mood, and long-term brain health, but it is often overlooked. There are few studies in this area that address public awareness and attitudes toward sleep.

Objective: The present study aimed to evaluate the knowledge, beliefs, and self-reported practices related to sleep and brain health among adults from Sulaimani, Kurdistan Region, Iraq, and to examine the associations among these domains.

Methods: A cross-sectional study involving 458 adults aged 18 to 60. Participants completed a validated survey about their beliefs regarding sleep and brain health, their personal sleep patterns, and where they get their information. Descriptive and inferential analyses were conducted to determine patterns and demographic associations.

Results: Over 95% of participants were aware that sleep is important for memory, mood stability, and long-term brain health. Almost all participants recognized sleep as equally important for good health as diet and exercise. However, only 37% had a regular bedtime and woke at the same time daily, and two-thirds used screens in the hour before bed. One in five said they woke up refreshed. Gender was associated with regular sleep timing. Participants reported a variety of sources for sleep-related information, with social media being the most prevalent source (31%).

Conclusion: Residents of Sulaimani recognize the importance of sleep for brain health, but face challenges in putting this knowledge into practice. Public health interventions should not rely solely on education, but should incorporate evidence-based strategies such as establishing consistent sleep-wake schedules and reducing nighttime screen use to support the integration of healthy sleep patterns into daily life and improve adherence.

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1. Introduction:

Various cognitive, emotional, and behavioral functions such as attention, memory

consolidation, executive functioning, emotional regulation, and social behaviors

rely on sleep[1]. The brain processes its emotional experiences, strengthens memories, and washes away metabolic waste products that accumulate in the brain during waking hours [2]. Even when a full night's sleep is obtained, any interruption to our rest adversely affects our focus, decision-making, and learning proficiency [3,4]. In addition, prolonged sleep deprivation results in increased vulnerability to mood disorders such as anxiety and depression, with long-term neuropsychiatric consequences including dementia and Alzheimer's disease [5,6]. Despite growing scientific evidence demonstrating the critical role of sleep in mental and cognitive health, people continue to regard it as less important than other health-related factors such as nutrition and exercise [7]. One of the known factors associated with short and late sleep (especially among adults) is the increased use of electronic devices prior to bedtime [8]. Moreover, dysregulated sleep patterns are often determined by sociocultural norms, personal lifestyle choices, and inadequate public awareness, and they are frequently dismissed as one of the potential etiologies underlying emotional and cognitive impairment [9]. Despite being central to health overall, sleep is overshadowed by nutrition and physical activity in public health programs [10]. Societies like the American Academy of Sleep Medicine (AASM) have stressed the importance of sleep to health and the need for incorporating sleep health in medical, educational, and public health activities[11]. It is increasingly recognized that, as a modifiable exposure with broad consequences for health, the public health priority should be to promote better-quality sleep [12]. The cultural background also has a significant impact on sleep patterns and attitudes, with late-night socializing, large family gatherings, and traditional gender roles in Middle Eastern adults lead to delayed bedtimes and poor sleep quality that are associated with a negative mood and feelings of well-being [13,14].

Public awareness about the importance of sleep for brain health is noticeably absent in Iraq and the Middle East region, with most evidence from studies conducted on Western populations [14]. The urgent necessity for culturally relevant treatments is emphasized as sleep deficiency has now been classified as a health issue, directly impacting mental health, productivity, and cognitive processing [15]. Thus, this study aims to address this knowledge gap by examining the general population's awareness about brain health with special focus on what they know, believe, and practice in relation to sleep for the preservation of their brain health among Iraqis. By raising awareness of the importance of sleep to cognitive function, emotional well-being, and resilience as a basic (and modifiable) determinant, its goal is to inform culturally resonant public education. These results could inform public health interventions aimed at reducing morbidities associated with cognitive and affective dysfunction.

2. Methods:

2.1 Study Design and Setting:

This was a descriptive cross-sectional study, conducted in the general adult population of Sulaimani, Iraq. This study aimed to assess public awareness, attitude, and practice on sleep for brain health in Sulaimani. We sought to identify common misconceptions, areas of poor knowledge, and high-risk lifestyles, such as those of irregular bedtime schedules, excessive screen exposure before going to bed, and short sleep duration. These results will also help to determine if demographic variables such as age, education level, and occupational category are associated with awareness/sleep patterns. These results can help inform the development of culturally-specific health promotion campaigns, educational initiatives, and programs promoting sleep patterns to optimise cognitive and emotional functioning.

2.2 Study Population and Sampling:

The study sample area was restricted to adults aged between 18 and 60 years who were living in the Sulaimani governorate. Participants were recruited through convenience sampling between October and November 2025. The survey was distributed electronically, so only people with digital access and the knowledge to use it could participate. This may result in underrepresentation of certain groups, such as older people and residents in rural regions, may be underrepresented. Inclusion criteria for participants were: age 18–60 years; able to comprehend and answer the online survey questionnaires; and willing to give digital informed consent. Exclusion criteria included individuals who did not belong to the target age group, could not fill in the questionnaire by themselves, and had unanswered questions.

2.3 Sample Size:

The expected minimum sample size was computed using the standard formula: $n = (Z^2 \times p \times (1 - p)) / d^2$, where $Z = 1.96$ (95% confidence level), $p = 0.5$ (assumed proportion), and $d = 0.05$ (margin of error) [16]. This led to a total baseline sample of 384 participants. To account for a projected response rate of 10% non-responders, the final desired sample size was estimated to be around 422 respondents. However, 458 respondents completed the questionnaire and were eligible for inclusion, which was above the minimum required sample size. This increased the statistical power and external validity of the results.

2.4 Data Collection:

We developed a structured, self-administered questionnaire for this study utilizing available literature from the fields of public health, neuroscience, and sleep. The questionnaire was piloted on a small sample for clarity, readability, and time to complete, and content validity and face validity were appraised by an academic neuroscience expert. Feedback from

the pilot test was used to revise the last version. The final version of the survey was sent to participants online through Google Forms. Participation was not obligatory, and an electronic informed consent was obtained before the questionnaire. Confidentiality of data and anonymity of participants were preserved in all stages of the study.

2.5 Data Analysis:

Data were exported and analyzed in IBM SPSS (version 26) for analysis. Categorical data describing demographic characteristics, knowledge levels, attitudes, and practices (KAP) were analyzed using descriptive statistics. Categorical variables were described as frequencies and percentages, and continuous variables as means (and standard deviations) when applicable. Awareness scores were assessed based on the total number of correct answers to knowledge-based inquiries. A chi-square test was used to analyze the relationship of demographic characteristics with outcome variables, and the significance level was set as $p < 0.05$. Further analysis, including t-tests or ANOVA, was determined to be suitable for comparing mean scores among groups when applicable.

2.6 Ethical Approval:

Ethical approval for this study was obtained from the Kurdistan Technical Institute Ethics Committee (Approval No. 2460; 2 October 2025).

3. Results:

The demographic profile of the 458 respondents is shown in Table 1. The majority had a bachelor's degree (64.8%), were female (71.0%), and were between 18 and 30 years old (71.0%). Students made up the largest category by occupation (31.2%), followed by workers in the private sector (27.9%) and the government sector (22.1%). This suggests that the sample consisted predominantly of young, educated women, which may have influenced their knowledge and sleep patterns.

Table 1. Demographic Characteristics of Respondents (n = 458)

Demographic Variable	Categories	Frequency (%)
Gender	Female	325 (71.0)
	Male	133 (29.0)
Age Group	18–30	325 (71.0)
	31–40	101 (22.1)
	41–50	16 (3.5)
	51–60	16 (3.5)
Education Level	High school	41 (9.0)
	Bachelor's degree	297 (64.8)
	Postgraduate (Master's/Ph.D.)	120 (26.2)
Occupation	Government Sector	101 (22.1)
	Private Sector	128 (27.9)
	Student	143 (31.2)
	Self-Employed	31 (6.8)
	Unemployed	33 (7.2)
	Others ($\leq 2\%$ each)	22 (4.8)
Area of Residence	Rural	33 (7.2)
	Urban	425 (92.8)

Almost all participants demonstrated a high level of knowledge about sleep. They agreed that obtaining adequate sleep is critical for brain function (99.6%), influences memory and thinking (96.3%), controls emotions (96.7%), and guards against long-term brain

issues (95.9%). 95.4% of respondents agreed that getting enough sleep is important for learning and concentration. These results imply that participants had a good overall knowledge of the value of sleep (Table 2).

Table 2. Participants' Knowledge about effects of Sleep on the Brain (n = 458)

Variable	Response	Frequency (%)
Getting enough sleep is important for the brain	No	2 (0.4)
	Yes	456 (99.6)
Not sleeping enough can affect memory/thinking	No	17 (3.7)
	Yes	441 (96.3)
Sleep helps control emotions/mood	No	15 (3.3)
	Yes	443 (96.7)
Poor sleep increases brain problems	No	19 (4.1)
	Yes	439 (95.9)
Deep sleep helps learning/focusing	No	21 (4.6)
	Yes	437 (95.4)

When asked about their average nightly sleep duration, just over half of the participants (51.5%) reported sleeping 7–8 hours, while about one-third (34.3%) reported 5–6 hours. A smaller proportion (12.2%) indicated sleeping more than 8 hours, and only 2.0% reported less

than 5 hours of sleep per night. These findings suggest that while most participants achieve the recommended 7–8 hours of sleep, a considerable proportion fall short of this duration (Figure 1).

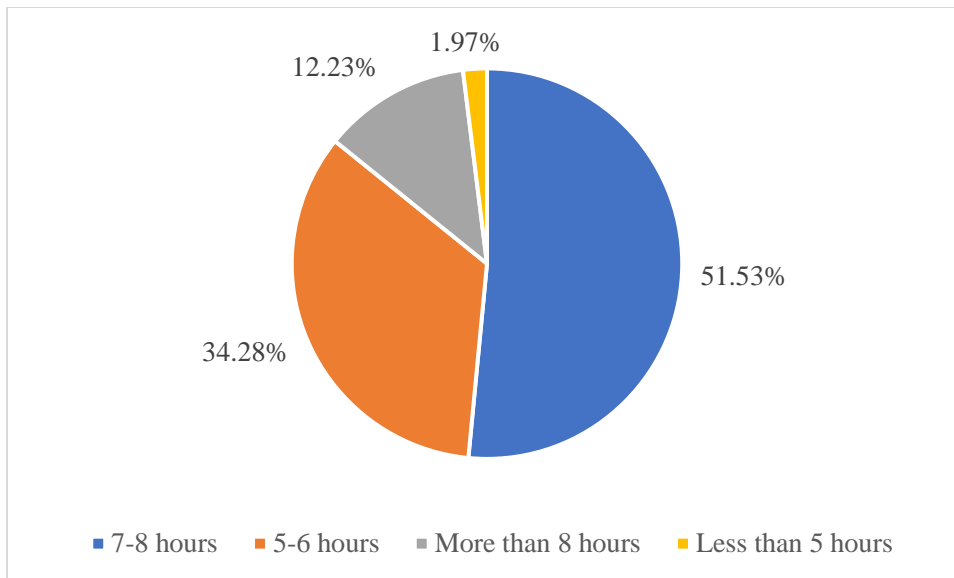


Figure 1 Average Nightly Sleep Duration of Participants (n = 458)

As presented in Table 3, the majority of participants demonstrated strong agreement with positive beliefs about sleep. More than four-fifths (85.6%) agreed or strongly agreed that 7–9 hours of sleep are necessary to function well, while only 3.1% disagreed. An even larger proportion recognized the importance of sleep routines for mental clarity and mood, with 94.3% expressing agreement and just 1.1% disagreeing. Similarly, 95.9% agreed that good sleep improves the ability to think clearly, and 95.9% also endorsed the belief that sleep is as important as diet and

exercise for brain health, with very few participants reporting disagreement (<1%). Across all items, neutral responses were relatively low (3.5–11.4%). The mean scores for these beliefs ranged between 4.33 ± 0.81 and 4.64 ± 0.57 , while all skewness values were negative, indicating that responses were clustered toward the higher end of agreement. As shown in Figure 2, most participants reported always using screens before bed (67.9%), followed by sometimes (30.6%), while only 1.5% never did so.

Table 3. Participants’ Thoughts and Beliefs about Sleep (n= 458)

Statements	Responses (%)			Skew	Mean \pm SD
	Agree/Strongly Agree	Neutral	Disagree/Strongly		
I need 7–9 hours of sleep to function well	85.59	11.35	3.06	-1.098	4.33 \pm 0.81
Sleep routines are important for mental clarity and mood	94.32	4.59	1.09	-1.345	4.55 \pm 0.64
Good sleep improves my ability to think clearly	95.85	3.49	0.66	-1.532	4.55 \pm 0.63
Sleep is as important as diet and exercise for brain health	95.85	3.93	0.22	-1.391	4.64 \pm 0.57

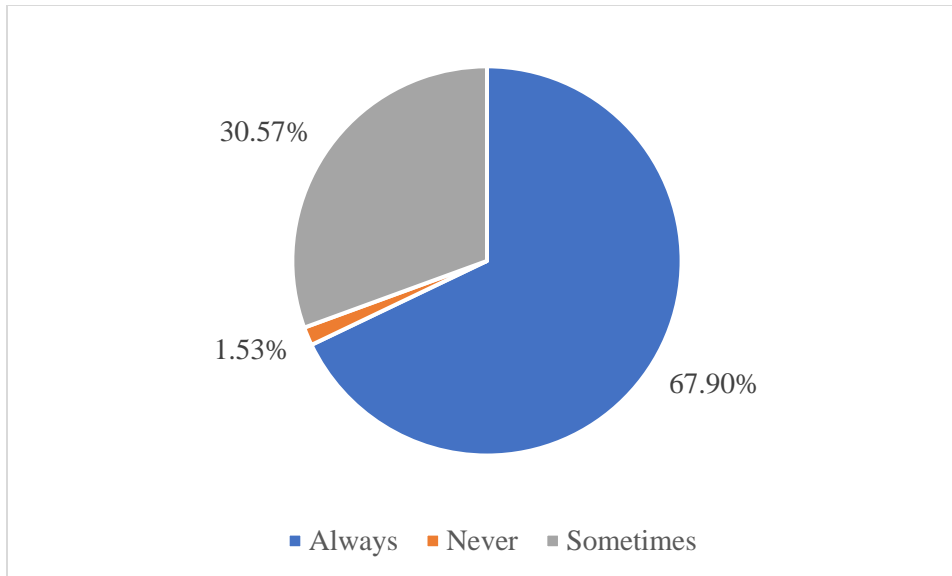


Figure 2 Frequency of Screen Use Before Sleep Among Participants (n = 458)

As shown in Figure 3, only 37% of participants reported going to bed and waking up at the same time each day whereas 63% did not have a regular sleep schedule. A further 54% of participants had difficulty falling asleep or symptoms suggestive of insomnia,

compared with 46%. Substantial sleep disturbances and problems with sleep initiation and maintenance appear to be frequent findings in the current sample, despite their high conviction about good sleep practices.

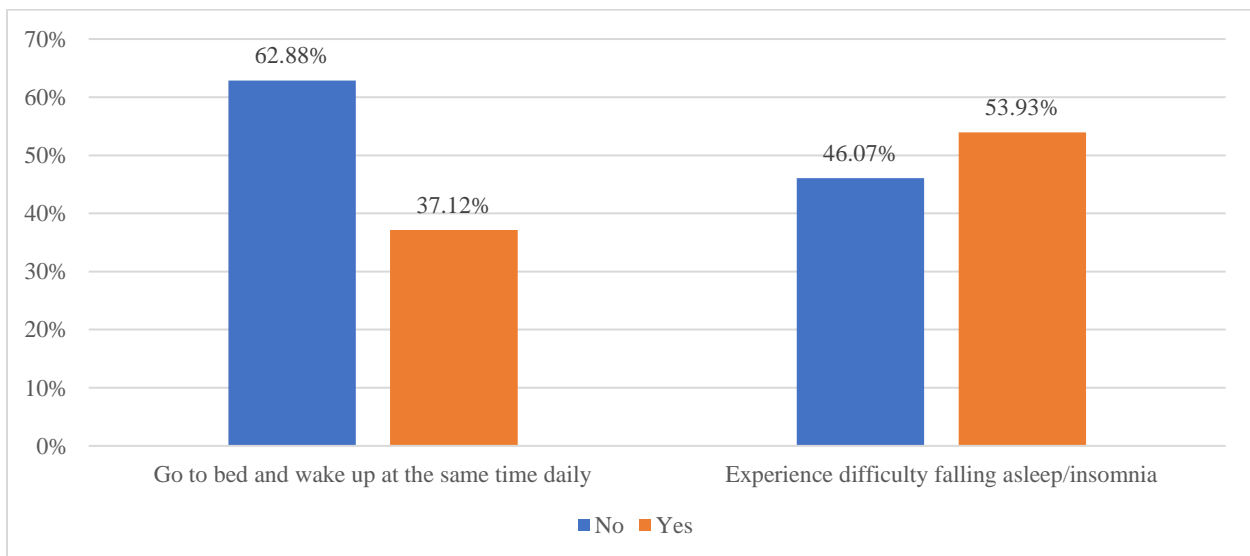


Figure 3 Participants' Sleep Habits and Practices

Most participants (64.6%) also had some days where they would feel mentally refreshed after sleep. By contrast, 20.5% indicated they always felt refreshed and 13.8% reported rarely experiencing this. The number of those

who didn't feel mentally refreshed having woken up was just 1.1%. This is to say that most participants did not consistently wake feeling refreshed, and by far the majority note they were not getting restorative sleep, as

indicated in Figure 4.

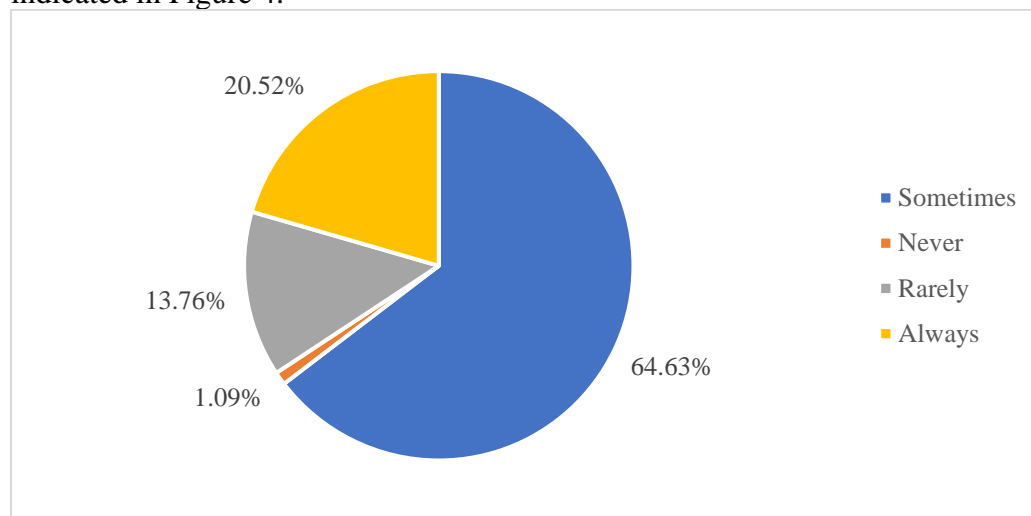


Figure 4 Participants' Perceived Mental Refreshment After Sleep

The relationship between demographic characteristics, knowledge, attitudes, and sleep patterns was analyzed using the chi-square test (Table 4). Because over 95% of all participants deemed sleep important for memory, emotional regulation, and brain health, there were no gender-, age-, or education-specific effects on knowledge answers. The association between education and attendance at the sleep workshop (16.2%) was statistically significant, as was the association with regular bed/wake hours

(37.1%). Education was also the only group significantly affected by interest in participation in awareness programs (77.3%). A notable correlation existed between gender and the consistency of bed-wake timing ($p = 0.042$), suggesting that sleep patterns varied between males and females. Although demographics did not influence knowledge and attitudes, gender did influence sleep patterns, specifically bed-wake regularity ($p = 0.042$).

Table 4. Associations Between Demographic Variables and Sleep-Related Awareness and Behaviors (n= 458)

Variable	Comparison Variable	χ^2 approx ¹	df ²	p-value	Interpretation
Gender	Awareness Score (Low/Medium/High)	4.25	2	0.119	Not significant
Age Group	Awareness Score (Low/Medium/High)	3.87	6	0.696	Not significant
Education Level	Awareness Score (Low/Medium/High)	7.92	4	0.093	Not significant
Occupation	Awareness Score (Low/Medium/High)	9.56	8	0.297	Not significant
Area of Residence	Getting enough sleep is important	2.34	1	0.126	Not significant
Area of Residence	Not sleeping enough affects memory	3.02	1	0.082	Not significant
Area of Residence	Sleep helps control emotions	2.80	1	0.094	Not significant
Area of Residence	Poor sleep increases brain problems	3.60	1	0.058	Marginal

¹ Chi-square

² Degrees of freedom

Area of Residence	Deep sleep helps learning	3.80	1	0.051	Marginal
Gender	Need 7–9 hours’ sleep	0.87	4	0.932	Not significant
Gender	Sleep routines important	1.02	3	0.797	Not significant
Gender	Good sleep improves thinking	1.45	4	0.835	Not significant
Gender	Sleep as important as diet/exercise	0.76	3	0.855	Not significant
Age Group	Average hours of sleep	5.68	3	0.128	Not significant
Gender	Use screens before sleeping	2.96	2	0.228	Not significant
Gender	Go to bed/wake up at same time	4.12	1	0.042	Significant
Gender	Difficulty falling asleep/ insomnia	1.88	1	0.171	Not significant
Gender	Feel mentally refreshed	3.45	3	0.327	Not significant
Education	Main source of sleep info	12.76	7	0.077	Not significant
Education	Attended workshop/session	9.85	1	0.002	Significant
Education	Interested in awareness session	11.24	2	0.004	Significant

As illustrated in Figure 5, participants reported a wide range of sources for sleep information, with social media being the most common (31.0%). The second important source was healthcare professionals, i.e. doctors and pharmacists (22.5%), followed by online websites (17.0%) and lectures and academic courses (15.3%). Comparatively, relatively few reported family (5.9%), books (5.7%), television (1.3%) or friends (1.3%) as primary sources of information. These results

underscore the influence of social media and healthcare professionals on participants’ sleep knowledge.

Only 16.2% of participants had previously attended a sleep health workshop, while 83.8% had not. However, future interest was considerably higher, with 47.8% willing to attend an awareness session and 40.4% responding “maybe,” indicating strong potential demand for such programs (Figure 6).

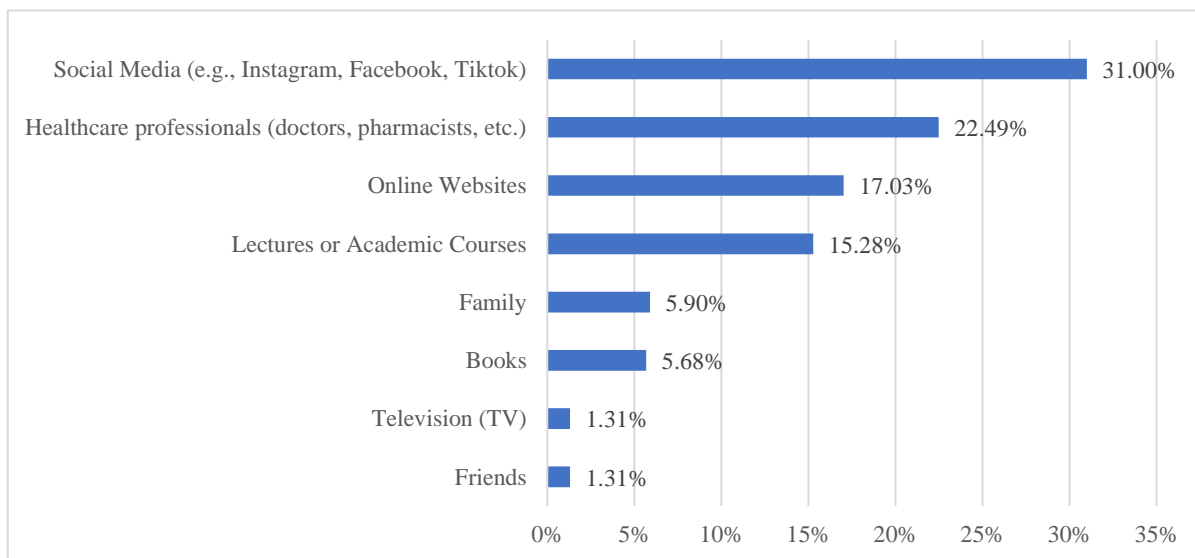


Figure 5 Participants' Main Source of Information about Sleep (n = 458).

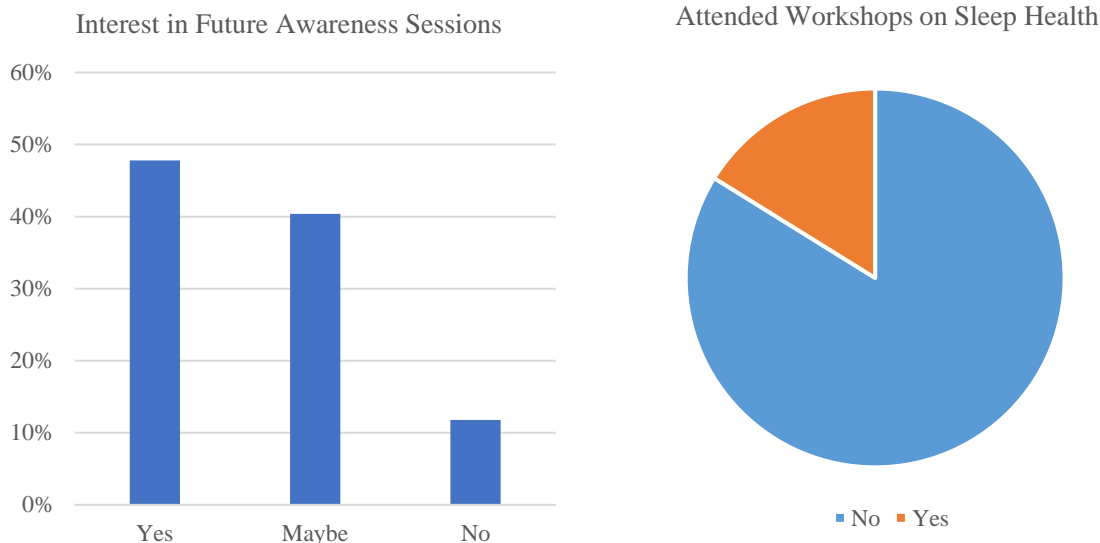


Figure 6 Past Attendance and Future Interest in Sleep Health Programs among Participants (n = 458).

4. Discussion

The present study describes the knowledge, beliefs, and practices of sleep in adults living in Sulaimani (Iraq) and shows the association between awareness and practice. According to findings, participants had a good level of knowledge of the importance of sleep for brain health, with more than 95% recognizing it as useful for memory, emotional regulation, and long-term neurological protection. This widespread recognition is consistent with several recent studies reporting high public awareness of sleep's importance for overall health [17,18]. However, the findings suggest a considerable gap between knowledge and behaviour, as sleep was reported to be irregular by many participants, pre-bedtime screen exposure periods were high, and feelings of mental refreshment upon waking were low. The high pre-bedtime screen exposure observed in this study may be attributed to several factors. First, the widespread use of digital devices for both work and leisure often leads to increased screen time before bed. Additionally, many individuals may not fully recognize the impact

of screen light on melatonin production and the circadian rhythm. Psychological factors, such as the need to unwind with engaging content, and external pressures, like work demands or social expectations, can also contribute to prolonged screen exposure. Despite awareness of sleep's importance, these habits may contribute to irregular sleep patterns.

According to the demographic information of 458 respondents who completed satisfactorily, young and educated women constituted the majority of subjects. Given that (71.0%) of the participants were female and aged 18-30, the results may reflect sleep patterns and health behaviours characteristic of this subpopulation. The high level of education, i.e., approximately two-thirds with a bachelor's degree, may influence the health literacy and awareness of sleep patterns.

The high prevalence of students (31.2%) in the study can be considered as an indicator that academic pressure may lead to poor sleep quality, similar to what was reported by Turki M et al. (2023) [19], identifying insomnia in students as a leading contributor to scores of

stress and sleep disruptions. Moreover, the high proportion of participants from urban areas (92.8%) would result in environmental sleep disruption due to noise and light pollution. This is also consistent with the findings from Martins AJ et al. (2020) [20], where a worse sleep quality was observed in urban areas.

The findings from this study clearly illustrated that the students' perceptions were positively augmented in relation to the importance of sleep for brain function. Almost everyone (99.6%) agreed that getting enough sleep is important for brain health, with overwhelming consensus when it comes to memory (96.3%), emotional control (96.7%), long-term brain health (95.9%), and learning and focus ability (95.4%). This suggests that the participants are not insensitive to the psychological cost of sleep, as well as to its affective value. These findings are consistent with those of Ahmed N. Et al (2017) [21], who conducted a study among medical students in Western Canada. Since the lack of sleep can cause brain health problems as well as improvements when it comes to learning, attention, and mood. Walker's research also shows that those who place an emphasis on sleep do better in school and have more emotional control, which complements this work that highlights the importance of deep sleep in learning and focusing. According to the survey, (51.5%) of respondents get 7-8 hours' sleep per night, in line with the optimal duration for sleep. But a portion (34.3%) sleep 5–6 hours, supporting the idea that many do not enjoy healthy sleep across the world [22]. Only 12.2% sleep more than eight hours, and 2.0% sleep less than five hours, with the range in patterns being considerably broad. These findings are also consistent with those of Hirshkowitz et al. (2015) [23], where a significant percentage of adults also do not sleep enough due to lifestyle decisions. Similarly, Cappuccio et al. (2010) [24] reported that individuals with the shortest

sleep duration were associated with a higher risk of various health-related diseases, suggesting that achieving 7–8 hours of sleep is beneficial.

The results revealed that two-thirds of respondents (63%) did not go to bed and get up at consistent times; 37% did have consistent in-bed and out-of-bed times. Both of these inconsistent sleep-wake schedules are concerning as they have been related to inadequate and fragmented sleep. Moreover, over half of the participants (54%) reported difficulty falling asleep or had insomnia, again reiterating the large percentage of sleep-related problems among respondents. The present findings are in accordance with those reported by Hirshkowitz et al. (2015) [23], who found that both irregular timetable and negative sleep behaviors influenced low quality of sleep, even though subjects were conscious about the importance of having enough time for sleeping. Similarly, Zhu J. Et al (2024) [25] stated that even though adults are aware of the importance of good sleep, because most do not adhere to regular schedules, they are often affected by some kind of sleep disturbance or suffer from insomnia, which cannot be overemphasized.

The disparity between knowledge and practice that we found in this study reflects evidence from around the world indicating that awareness does not bring about healthy action. For example, Sun et al. (2024) found that healthcare workers had good awareness of sleep patterns but poor practices of sleep, and this was similar to the findings from our participants [26]. Similarly, Saintila et al. (2025) found that the problem of physical inactivity and sleep quality was common among people who had basic knowledge of sleep patterns [27]. In our study, fewer than two-fifths (37%) of individuals reported a stable bed/wake time, and more than two-thirds engaged in watching digital devices before sleep, which are behaviors strongly associated with delayed sleep onset and

deteriorated sleep quality [8,28]. In addition, 20% awakened already refreshed most nights when conscious (which is not very good). Such results emphasize the importance of cultural attitudes, lifestyles, and ever-use of technology over actual knowledge in real sleep habits [29,30].

Demographic analyses revealed further nuances. There were no statistically significant associations between knowledge scores and age, gender, or level of education, but there were some plausible correlations. Educational level was associated with participation in workshops and willingness to participate in awareness meetings as well; therefore, a high educational level would probably make people more receptive to structured interventions. Females were also less likely to have regular bed and wake times, repeating a trend seen in studies that highlighted gender-related sleep problems in ME groups [13,31]. Trends for marginal associations of where people lived with beliefs about poor sleep and brain health suggest that cultural or environmental influences might contribute to perceptions, which should be explored in larger, more balanced samples.

As to the sources of sleep information as presented in Figure 5, social media (31.0%) was the most used source, followed by healthcare professionals (22.5%), online websites (17.0%), and academic courses (15.3%). Other sources, such as television and books, were cited less often. These findings highlight the growing popularity of sources. The current study illuminates the expanding influence of social media and health care providers as stakeholders in the understanding of sleep. On the one hand, social media may enable rapid access to information, though most commentators are still questioning the source and accuracy as well as relevance (Chen J. et al 2021) [32]. Expert advice, together with social media, may improve sleep education.

This represents both an opportunity and a

challenge, as the use of social media (31.0%) and healthcare professionals (22.5%) as preferred sources of information may act as a bridge to other sources. Social media, in particular, can serve as a powerful platform for health education; however, due to the potential spread of misinformation, it can also act as a double-edged sword rather than being solely beneficial. As nearly half (45%) of the sample expressed interest in an awareness program, and it was estimated that pharmacists would naturally intervene on social media to disseminate awareness using pre-campaign evaluators, their participation would optimally be at a higher level, enhancing content legitimacy and promoting evidence-based behavior change.

These results highlight a critical need for sleep health education: only 16.2% of the participants reported participating in a workshop. However, there is a strong interest in future programs, with 47.8% willing to participate. This highlights an unmet demand for sleep health education, which is critical for addressing sleep-related health disorders. Targeted campaigns could raise public knowledge about sleep patterns. Future studies should address barriers to participation and personalize content for varied groups to enhance program impact.

Limitations:

The strengths of this study included the relatively large sample, which included different demographic characteristics, and had a wide generalizability in the context of Sulaimani. However, limitations should be acknowledged. The use of convenience sampling and survey administration online could have resulted in oversampling of younger, more urban, and more educated respondents and underrepresentation of older adults and those who live in rural areas. There is also a potential for recall or social desirability bias with self-report, particularly for the sleep constructs. Finally, because of the

cross-sectional nature of the study, it is not possible to draw any causal inferences between knowledge, attitudes, and practices.

Recommendations

The results highlight the need to go beyond awareness generation and develop appropriate culture-specific implementation for healthy sleep practices. Public health campaigns should utilize newer forms of dissemination, including social media, while still being reinforced by expert oversight for misinformation control. In schools, universities, and community-based health programs, sleep education could be integrated into curricula, while in workplaces or clinical settings, educational sessions might be provided. It is recommended that future work extend the findings of this study by utilizing longitudinal and interventional research designs to investigate how specific strategies impact sleep pattern change, particularly within underrepresented demographic subgroups.

Conclusion:

The results of this study demonstrated that adults in Sulaimani have good knowledge about sleep and brain health, memory, emotional regulation, and cognitive functions. Nevertheless, there is clearly a knowledge gap since late sleep times, use of screens before bed, and rarely feeling rested were frequently reported. Workshop participation and interest in awareness programs were highly determined by education, while gender affected the regularity of sleep schedule. The most common information source on sleep was social media, which created opportunities for health promotion as well as misinformation. These results suggest the necessity of culturally-based interventions rather than simply raising awareness. Health promotion efforts should utilize social media, but run the channels professionally. Therefore, further studies with an intervention design to

assess and improve the educational program across diverse populations are recommended.

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Conflicts of Interest: None

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