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"Sleep Problems among School-Aged Children and the Impact of Electronic Device Use Before Bedtime: A Cross-Sectional Study in Aleppo, Syria"

Researchser:

Dr Aref Kawas

Consultant Paediatrician

Khalifa medical surgery complex

Doha Qatar

Dr Iman Khawam

Consultant Paediatrician

Primary Health Care Corporation

Doha Qatar

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Abstract:

Sleep is a fundamental component of children's physical and cognitive development. However, the growing prevalence of electronic device use before bedtime has raised concerns about its potential negative impact on children's sleep quality. This study investigates the relationship between bedtime screen exposure and sleep disturbances among school-aged children in Aleppo, Syria. Using a cross-sectional design, a structured questionnaire was distributed to 150 parents of children aged 6–14 years across public and private schools. The survey collected data on sleep patterns, electronic device usage before sleep, and related behaviors. The results revealed that over 58% of children had difficulty falling asleep, and more than 80% used electronic devices within one hour of bedtime, primarily mobile phones and tablets. Statistical analysis showed a significant correlation between longer screen time and poorer sleep quality, including increased sleep latency, shorter sleep duration, and frequent night awakenings. The findings highlight the urgent need for parental education and public health interventions to promote healthier digital habits and better sleep hygiene. The study contributes valuable data to an under-researched context and provides actionable recommendations for families, schools, and healthcare professionals in Syria.

1. Introduction

Sleep is one of the most essential physiological processes in childhood, playing a fundamental role in the development of physical health, emotional regulation, attention, learning, and memory consolidation (Mindell & Owens, 2015). According to the American Academy of Sleep Medicine, school-aged children (6–13 years) require 9 to 11 hours of sleep each night to function optimally (Paruthi et al., 2016). However, in recent years, a growing body of evidence has pointed to a global increase in sleep-related problems among children and adolescents, with many studies attributing a significant portion of this trend to the increased use of electronic devices, especially during evening hours (Hale & Guan, 2015).

Electronic screens—including smartphones, tablets, televisions, and gaming devices—emit blue light that has been shown to suppress melatonin secretion, a hormone responsible for sleep onset and circadian rhythm regulation (Carter et al., 2016). The stimulating content often consumed through these devices—such as video games, social media, or fast-paced videos—can also increase cognitive and emotional arousal, making it more difficult for children to wind down before bedtime. Moreover, screen time in the evening is associated with delayed bedtimes, reduced total sleep duration, and increased night awakenings (Lemola et al., 2015).

While these effects have been widely studied in Western contexts, there remains a lack of localized research in conflict-affected and resource-constrained regions such as Syria. Aleppo, in particular, has experienced significant sociopolitical and infrastructural challenges over the past decade. These challenges may further contribute to irregular routines, heightened psychological stress in families, and inconsistent parenting practices—all of which can exacerbate children's sleep issues. Furthermore, due to a lack of public awareness, parental supervision over children's screen usage may be limited, especially during the evening hours when families face competing demands.

Despite these pressing concerns, there is a noticeable gap in empirical data addressing how screen exposure before sleep affects Syrian children. Understanding this relationship is vital, not only from a clinical perspective but also from an educational and social one, as sleep disturbances in children are closely linked to poor academic performance, behavioral problems, emotional dysregulation, and long-term health consequences (Alfonsi et al., 2020).

This study, therefore, aims to assess the relationship between electronic device use before bedtime and the prevalence of sleep disturbances among school-aged children in Aleppo. The research seeks to explore behavioral patterns, sleep outcomes, and parental supervision practices, and to offer practical recommendations for improving sleep hygiene and digital literacy in families and schools. In doing so, the study contributes to both global and local efforts aimed at promoting child well-being in a digitally saturated world.

2. Objectives

Sleep is a foundational component of children's physical growth, cognitive development, emotional stability, and overall well-being. However, the increasing use of electronic devices—particularly during the evening and pre-sleep hours—has emerged as a major concern globally due to its potential to disrupt natural sleep patterns. This concern is even more pressing in urban areas of countries facing instability, such as Aleppo, Syria, where children's routines may already be under strain due to external stressors and limited resources.

The present study seeks to address a notable gap in local research by exploring the link between electronic device usage before bedtime and the occurrence of sleep-related problems in children attending primary and middle schools in Aleppo. In doing so, this study aims not only to generate data relevant to the Syrian context but also to contribute to the growing body of international literature on children's health in the digital age.

To ensure a structured and focused investigation, the following research objectives were established:

2.1. To determine the prevalence of sleep problems among school-aged children in Aleppo

This objective involves identifying how widespread sleep-related issues are within the study population. Key indicators include difficulty falling asleep, frequent awakenings during the night, insufficient total sleep time, and excessive daytime sleepiness. Recognizing the scope of the problem provides a foundation for addressing it in public health and educational strategies.

2.2. To assess the patterns, frequency, and duration of electronic device use before bedtime

This includes documenting how many children use screens (such as smartphones, tablets, computers, and televisions) within one hour before sleep, how long they spend on these devices, and what type of content they engage with (e.g., games, social media, videos, or educational material). Understanding these patterns is essential for identifying high-risk behaviors and possible intervention points.

2.3. To explore the relationship between screen time before bed and various sleep outcomes

This core objective seeks to evaluate the correlation between the use of electronic devices before sleep and measurable disruptions in sleep quality. These include delayed sleep onset, reduced sleep duration, fragmented sleep, and reported fatigue during the day. The study aims to determine whether there is a statistically significant association that may justify behavioral changes or policy recommendations.

2.4. To generate practical recommendations for parents, educators, and healthcare professionals

Based on the findings, the study will offer evidence-based guidelines to help caregivers and school staff reduce the negative impacts of screen time on children's sleep. This may involve promoting healthier bedtime routines, limiting screen exposure before bed, and raising awareness of the importance of sleep hygiene for children's mental and physical development.

2.5. To contribute to the academic and public health understanding of digital habits and child health in Syria

Given the scarcity of research from Syria in this field, particularly in post-conflict regions like Aleppo, the study seeks to serve as a reference for future investigations and to support public health policy and school-based interventions.

3. Methodology

This section outlines the research design, participants, instruments, data collection procedures, and analysis methods used in this study. A quantitative, cross-sectional approach was selected to examine the relationship between electronic device use before bedtime and sleep problems among school-aged children in Aleppo, Syria.

3.1. Research Design

The study employed a **quantitative, descriptive, cross-sectional survey design** to collect data from a sample of school children and their parents. This design is appropriate for assessing behavioral patterns, identifying correlations between variables, and capturing data at a specific point in time (Creswell & Creswell, 2018).

3.2. Study Setting and Population

The study was conducted in **Aleppo**, one of Syria's largest cities, which has witnessed significant social and infrastructural challenges in recent years. The target population included **school-aged children between 6 and 14 years old**, enrolled in both public and private schools in the city.

3.3. Sample and Sampling Technique

A total of **150 students** were selected using a **stratified random sampling technique** to ensure representation across:

- Gender (male/female)
- Age groups (6–9 years, 10–14 years)
- School type (public/private)

Parents or legal guardians of the children were asked to complete the questionnaire on behalf of their children. Participation was voluntary, and anonymity was guaranteed.

3.4. Instrumentation

Data were collected using a structured **self-administered questionnaire**, designed by the researcher based on previous validated studies (e.g., Carter et al., 2016; Mindell & Owens, 2015). The questionnaire was reviewed by two pediatric health experts for content validity and translated into Arabic to ensure clarity for parents.

The questionnaire consisted of three main sections:

1. **Demographic Data**
   Includes child's age, gender, grade level, type of school, and number of household members.
2. **Sleep Behavior Assessment**
   Covers bedtime routines, total sleep duration, night awakenings, difficulty falling asleep, and symptoms of daytime fatigue.
3. **Electronic Device Use**
   Assesses type(s) of devices used before bed, average screen time during the hour before sleep, type of content consumed, and parental supervision.

3.5. Data Collection Procedure

- Data were collected over a period of **three weeks in May 2025**.
- Informed consent forms were distributed to parents, along with the survey.
- Surveys were returned anonymously in sealed envelopes to maintain confidentiality.
- Children with known medical or psychological sleep disorders were excluded from the sample.

3.6. Data Analysis

Data were entered and analyzed using **Statistical Package for the Social Sciences (SPSS) version 26**. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize demographics and response patterns.

To explore the relationship between screen time and sleep problems, **Pearson correlation coefficients** and **Chi-square tests** were used. A significance level of $\mathbf{p < 0.05}$ was considered statistically meaningful.

3.7. Ethical Considerations

The study adhered to ethical guidelines in accordance with the **Declaration of Helsinki**. Participation was voluntary, and parents were informed about the purpose of the research. No identifying personal data were collected. The research protocol was reviewed and approved by a local academic committee.

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4. Results

This section presents the findings of the cross-sectional survey conducted among 150 school-aged children in Aleppo, Syria. A total of 142 valid responses were collected, yielding a response rate of 94.7%. The analysis focuses on four primary domains: (1) demographic characteristics, (2) prevalence of sleep problems, (3) patterns of electronic device use before bedtime, and (4) statistical relationships between screen time and sleep disturbances. These findings are supported by graphical illustrations and data tables for clarity.

4.1. Demographic Characteristics

Table 1 summarizes the demographic composition of the sample. The children were fairly evenly distributed across gender and age groups, with a slightly higher proportion attending public schools.

Table 1: Demographic Data of the Study Sample

Category	Count	Percentage (%)
Males	77	54.2%
Females	65	45.8%
Age 6–9 years	68	47.9%
Age 10–14 years	74	52.1%
Public School	89	62.7%
Private School	53	37.3%

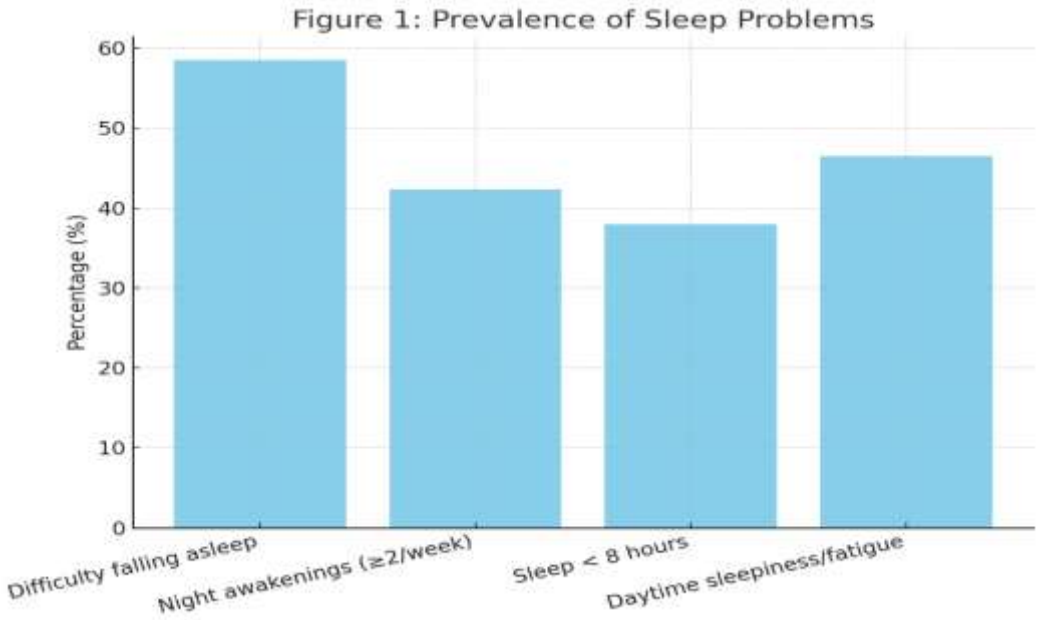
4.2. Prevalence of Sleep Problems

Sleep-related problems were common among the respondents (see Table 2 and Figure 1). The most frequently reported issue was difficulty falling asleep, experienced by more than half the sample.

Table 2: Prevalence of Sleep Problems among School-Aged Children

Sleep Issue	Count	Percentage (%)
Difficulty falling asleep	83	58.5%
Night awakenings (≥2 times/week)	60	42.3%

Sleep duration less than 8 hours	54	38.0%
Daytime sleepiness or fatigue	66	46.5%



These results suggest a high prevalence of sleep disturbances, warranting further investigation into potential behavioral or environmental causes.

4.3. Electronic Device Use Before Bedtime

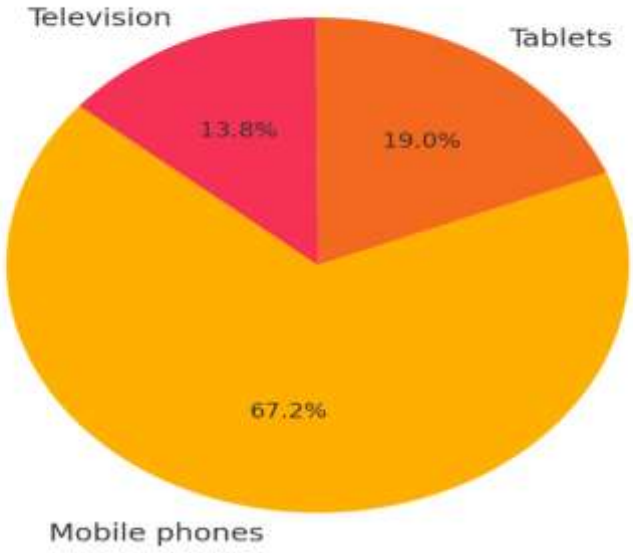
As shown in Table 3 and Figures 2–4, bedtime screen use was highly prevalent, with 81.7% of children using at least one device within an hour of sleep.

Table 3: Types of Electronic Devices Used Before Bedtime

Device Type	**Percentage (%)**
Mobile phones	67.2%

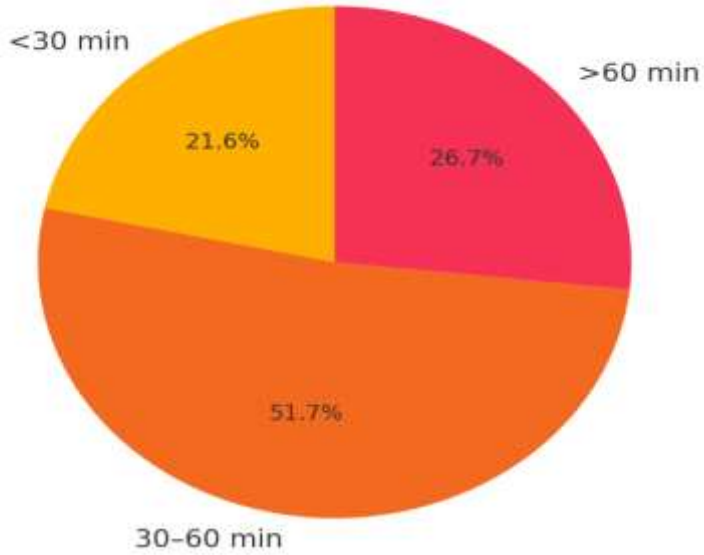
Tablets	19.0%
Television	13.8%

Figure 2: Types of Devices Used Before Sleep



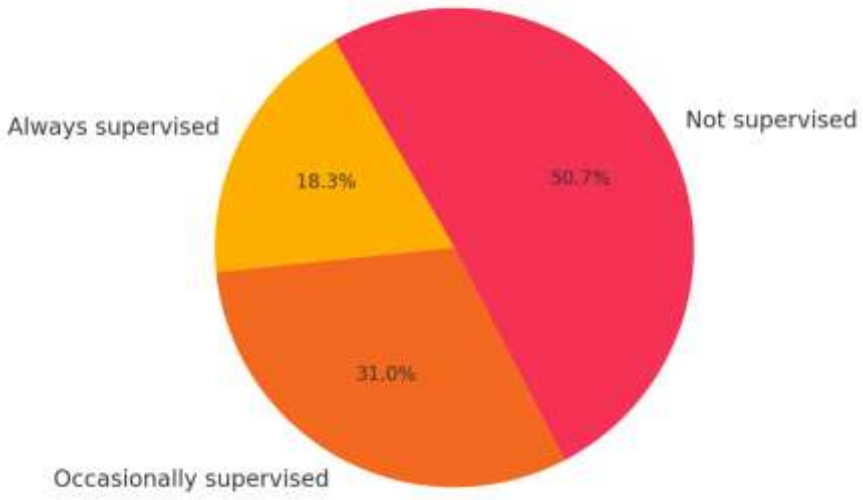
This chart shows that mobile phones are the most frequently used devices before bedtime among children (67.2%), followed by tablets and televisions.

Figure 3: Average Screen Time Before Bed



This figure indicates that the majority of children (51.7%) use electronic devices for 30–60 minutes before going to sleep, while 26.7% exceed 60 minutes and 21.6% use them for less than 30 minutes.

Figure 4: Parental Supervision of Device Use



This chart illustrates that more than half of the children (50.7%) were not supervised during screen use before bedtime. Only 18.3% were always supervised, while 31.0% were occasionally monitored.

- Used electronic devices before bedtime: 116 students (81.7%)
- Device types:
  - Mobile phones: 67.2%
  - Tablets: 19.0%
  - Television: 13.8%

- Screen time before bed:
  - Less than 30 minutes: 21.6%
  - 30–60 minutes: 51.7%
  - More than 60 minutes: 26.7%
- Parental supervision:
  - Always supervised: 18.3%
  - Occasionally supervised: 31.0%
  - Not supervised: 50.7%

These findings highlight the ubiquity of evening screen exposure and the limited role of parental monitoring.

4.4. Relationship Between Screen Time and Sleep Problems

Statistical analysis revealed strong associations between screen exposure duration and reported sleep difficulties. The key relationships are presented below:

- Children who used screens for more than 60 minutes before bed were 2.1 times more likely to report difficulty falling asleep ($p < 0.01$).
- Pearson correlation analysis showed a moderate negative correlation between screen time and total sleep duration ($r = –0.45$, $p < 0.05$).
- Chi-square analysis revealed significantly higher rates of night awakenings in children using mobile phones or tablets before bed ($\chi^2 = 11.27$, $p = 0.004$).

These results support the hypothesis that increased screen exposure prior to sleep is associated with reduced sleep quality and duration.

5. Discussion

The findings of this study provide important insights into the sleep patterns of school-aged children in Aleppo, Syria, and the potential impact of electronic device usage before bedtime. The results confirm what has been observed in international literature: that the use of screens before sleep is significantly associated with sleep disturbances in children.

5.1. Interpretation of Key Findings

One of the most notable findings is that over **58% of children** in the sample had difficulty falling asleep, and **more than 80%** reported using electronic devices in the hour before bedtime. These numbers are consistent with prior research by Hale and Guan (2015), who found that screen use before sleep delays sleep onset and reduces overall sleep duration in children and adolescents.

In this study, a **statistically significant relationship** was observed between increased screen time and reduced sleep quality. Children who used screens for more than one hour were significantly more likely to experience:

- Difficulty falling asleep
- Night awakenings
- Shorter total sleep duration

These findings support Carter et al. (2016), who concluded that screen exposure, particularly blue light emitted from devices, suppresses melatonin production, delays circadian rhythms, and disrupts normal sleep cycles.

5.2. Cultural and Local Context

Aleppo, like many cities in Syria, has faced years of conflict, displacement, and disruption of daily routines. As a result, children's sleep schedules may already be irregular. The increased dependence on digital devices for education,

entertainment, and even emotional escape may further complicate sleep hygiene. Unlike in more stable societies, the role of stress and insecurity should also be considered in evaluating sleep health in this population.

Moreover, **50.7% of parents** in the sample did not supervise their children's screen use before bed, highlighting a critical gap in awareness. Many parents may not be fully informed about the negative effects of screen exposure on sleep. This underscores the need for public health education focused on media literacy and bedtime routines.

5.3. Implications for Practice

The findings have several practical implications:

- **Parents and caregivers** should be advised to limit children's screen time before bedtime and establish consistent sleep routines.
- **Schools and pediatricians** can play a proactive role by educating families about the importance of sleep hygiene.
- **Policy makers and NGOs** operating in post-conflict areas like Aleppo should consider including child sleep health in broader mental health and child protection programs.

5.4. Limitations of the Study

While the study offers valuable insights, it also has limitations:

- The data relied on **parent-reported questionnaires**, which may introduce bias or inaccuracies.
- The sample was limited to three schools in Aleppo and may not be representative of all Syrian children.
- The study did not directly measure screen light exposure or melatonin levels, which could have strengthened the findings.

5.5. Recommendations for Future Research

Future studies should consider:

- Using objective sleep tracking tools (e.g., actigraphy).
- Expanding the sample to include children from rural areas and refugee populations.
- Investigating the psychological factors (e.g., trauma, anxiety) that may interact with screen use and sleep.

6. Conclusion and Recommendations

6.1. Conclusion

This study investigated the prevalence of sleep problems and the impact of electronic device use before bedtime among school-aged children in Aleppo, Syria. The results revealed a strong association between screen exposure—especially within the hour before sleep—and various sleep disturbances, including difficulty falling asleep, shorter sleep duration, and increased nighttime awakenings.

The high rate of screen use (over 80%) before bedtime, coupled with a low level of parental supervision, points to a critical public health concern. These findings are in line with international literature, yet they hold special importance in the Syrian context, where children are already exposed to environmental stressors due to ongoing instability.

In conclusion, the study supports the hypothesis that electronic device use before bed has a negative impact on children's sleep quality and quantity. Addressing this issue is essential for promoting better academic performance, emotional regulation, and overall health among children.

6.2. Recommendations

Based on the study findings, the following recommendations are proposed:

For Parents and Families:

- Limit children's screen time, especially within one hour of bedtime.
- Encourage non-digital bedtime routines such as reading, storytelling, or quiet music.
- Maintain consistent sleep and wake times, even on weekends.
- Supervise and monitor children's device use in the evening.

For Schools and Educators:

- Incorporate awareness sessions for parents and students on healthy digital habits and sleep hygiene.
- Coordinate with school counselors to identify students who may be at risk of sleep-related problems.

For Healthcare Professionals:

- Include sleep behavior assessment in regular pediatric check-ups.
- Educate families about the biological effects of blue light on melatonin production and circadian rhythms.

For Policymakers and NGOs:

- Develop public awareness campaigns on child digital health and safe screen practices.
- Include child sleep health in post-conflict recovery programs focused on mental and behavioral health.

Final Note

Sleep is not a luxury—it is a necessity for healthy development. As technology becomes increasingly embedded in children's lives, society must adapt by promoting balanced, informed, and protective approaches to screen use, particularly in vulnerable communities like Aleppo.

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"مشكلات النوم لدى الأطفال في سن المدرسة وتأثير استخدام الأجهزة الإلكترونية قبل النوم: دراسة مقطعية في حلب، سوريا"

إعداد الباحثان:

د. عارف قواس

د. إيمان خوام

الملخص:

يُعدّ النوم عنصرًا أساسيًا في النمو البدني والمعرفي للأطفال. ومع ذلك، فإن الانتشار المتزايد لاستخدام الأجهزة الإلكترونية قبل النوم أثار مخاوف بشأن تأثيره السلبي المحتمل على جودة النوم لدى الأطفال. تستكشف هذه الدراسة العلاقة بين التعرض للشاشات قبل النوم واضطرابات النوم لدى الأطفال في سن المدرسة في مدينة حلب، سوريا. وباستخدام تصميم دراسة مقطعية، تم توزيع استبيان منظم على 150 من أولياء أمور الأطفال الذين تتراوح أعمارهم بين 6 و14 عامًا في المدارس العامة والخاصة. جمع الاستبيان بيانات حول أنماط النوم، واستخدام الأجهزة الإلكترونية قبل النوم، والسلوكيات المرتبطة بذلك. أظهرت النتائج أن أكثر من 58٪ من الأطفال يواجهون صعوبة في النوم، وأن أكثر من 80٪ يستخدمون الأجهزة الإلكترونية خلال الساعة التي تسبق النوم، وخصوصًا الهواتف المحمولة والأجهزة اللوحية. وقد أظهر التحليل الإحصائي وجود ارتباط معنوي بين طول مدة استخدام الشاشات وضعف جودة النوم، بما في ذلك زيادة مدة الاستغراق في النوم، وقصر مدة النوم، والاستيقاظ المتكرر ليلًا. تؤكد النتائج على الحاجة الملحة لتثقيف الوالدين وتنفيذ تدخلات صحية عامة لتعزيز العادات الرقمية الصحية وتحسين نظافة النوم. وتُقدّم هذه الدراسة بيانات مهمة في سياق لا يحظى بالكثير من الأبحاث، إلى جانب توصيات قابلة للتطبيق موجهة للأسر والمدارس والمهنيين في القطاع الصحي في سوريا.