Unnes Journal of Public Health 14 (1) (2025)

Unnes Journal of Public Health

http://journal.unnes.ac.id/journals/ujph

Unlocking the Link: Sleep Deprivation and Cognitive Performance in Working-age Women - A Systematic Review

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Article Info

Article History:
Submitted September 27, 2024
Accepted January 6, 2025
Published February 28, 2025

Keywords:
sleep deprivation; cognitive performance; working women

DOI
https://doi.org/10.15294/ujph.v14i1.14246

Abstract

Background: Sleepdeprivation is a prevalent issue among working women, often resulting from a combination of professional, familial, as well as societal demands. **Objective**: This systematic review aims to summarize the body of research on the effects of sleep deprivation on cognitive function, focusing on working women in particular. **Method**: A comprehensive search was conducted across Pubmed, CINAHL, Scopus databases to locate pertinent studies released between January 2014 and January 2024. Research has examined the relationship between sleep deprivation and executive function, memory, attention, and decision-making, among other cognitive abilities. The chosen studies' methodological quality was assessed, and relevant data were located and compiled. **Results**: The results indicate that sleep deprivation has a major negative impact on working women's cognitive function, with deficiencies noted in a number of domains. Age, workload, and family obligations may also increase these effects. **Conclusion**: To develop targeted therapies that can lessen the detrimental impacts of sleep deprivation and improve the wellbeing of women in the profession, It is vital to have a comprehensive grasp of the effects of sleep loss on mental acuity.

INTRODUCTION

Sleep is a vital component of our daily routine and is necessary for our general health and well-being (Good Sleep for Good Health, 2021). On average, individuals allocate around one-third of their time engaging in this activity. Obtaining an adequate amount of high-quality sleep at appropriate intervals is just as crucial for existence as consuming food and drink (O'Callaghan et al., 2018). Deprived of sleep, an individual is unable to establish or sustain the neural connections in their brain that facilitate learning and the formation of new memories. Additionally, it becomes more challenging to keep focus and react swiftly (Memory & Sleep, 2018). Sleep has a significant impact on various tissues and systems in the body, including the brain, heart, lungs, metabolism, immunological function, mood, and disease resistance. Studies indicate that a persistent deficiency in sleep, or experiencing inadequate sleep quality, increases the risk of getting diseases like obesity, depression, diabetes, heart disease, and hypertension (Besedovsky et al., 2019). Complete sleep deprivation has detrimental effects on brain function, particularly the functions related to the frontal lobe, which is responsible for alertness, attention, decision making, and cognitive processes, as well as the thalamus. Sleep deprivation primarily leads to reduced inhibition of reaction, impaired decision making, limited divergent thinking, and compromised working memory, particularly affecting frontal lobe functioning (García et al., 2021). There are two basic types of sleep: non-REM sleep and rapid eye movement

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Open Access
pISSN 2252-6781
eSSN 2548-7604

(REM) sleep. Each remains associated with distinct patterns of brain waves and neuronal activity. Throughout a typical night, you experience multiple cycles between REM and non-REM sleep, with the REM episodes becoming longer and deeper as the morning approaches (Colten et al., 2006).

Sleep habits are subject to age-related changes, although there is considerable variation among persons of the same age (J. Li et al., 2018). Fatigue is one of the factor for sleep deprivation (Fandika & Sukendra, 2016). There is no universally applicable optimal number of hours of sleep that applies to every person being the same age. Infants typically involvement a substantial amount of sleepiness, ranging from 16 to 18 hours a day, which can significantly enhance their growth and development, particularly in regards to the brain. For teenagers and school-age children, 9.5 hours of sleep every night is the ideal quantity. Most individuals should aim for seven to nine hours of sleep per night (Chaput et al., 2018). Though, when individuals reaches age 60 and beyond, their nocturnal sleep tends to become shorter, lighter, and frequently disrupted by many awakenings. Elderly individuals are also more prone to consuming drugs that disrupt their sleep patterns (Gooneratne & Vitiello, 2014). Despite the fact that sleep is vital, about 25–50% of Americans are able to obtain the recommended 7-8 hours of sleep every night, and between 20–35% of individuals often struggle with sleep issues (Robbins et al., 2019). Global sleep estimates indicate that 10-40% of persons surveyed experience sleep difficulties, indicating that poor sleep health is a widespread problem both globally and locally (Chattu et al., 2018). Overall, individuals are experiencing a decrease in the amount of sleep they require as a result of extended work schedules and the accessibility of 24/7 entertainment and other pastimes. Some individuals believe they may compensate for lost sleep by sleeping more on weekends. However, depending on how severe their sleep deprivation is, this strategy may or may not be effective (Effects of Sleep Deprivation, 2023).

Working women were chosen for the study by the researchers because they were able to juggle the demands of raising a child and taking care of household tasks with their professional professions. Mothers who work from home and those who work outside the home but still carry out their maternal duties can be divided into two categories. Working women are the target audience for another reason: regardless of the time or situation, they are accountable for managing their household and providing for their spouse and children in addition to their professional responsibilities. Due to their need for everyday needs and their ambition for financial achievement, both parents frequently feel obligated to work. A highly competent woman may assert her right to engage in employment and generate her own income simultaneously (Tripathi et al., 2016). The working mother is a composite of these elements, simultaneously fulfilling the roles of managing the household and upholding her status as the primary breadwinner of the family. Insufficient sleep in employed women can have notable consequences on cognitive function, including attention, memory, decision-making, & problem solving skills (Dizaho et al., 2016). Studies suggest that sleep deprivation might result in reduced cognitive performance, hindering the capacity to focus, absorb information effectively, and remember memories (Khan & Al-Jahdali, 2023a).

The link between sleep deprivation and cognitive function among working women is significantly influenced by factors such as occupation and lifestyle behaviors (Zhang et al., 2023). The impact of sleep deprivation may vary across women of different age groups due to age-related alterations in sleep patterns and cognitive capacities (J. Li et al., 2018). Furthermore, the requirements and pressures linked to various professions can differ, affecting both the quality of sleep and cognitive performance. Engaging in activities such as physical activity, dietary choices, and using electronic devices before going to bed might impact the quality of sleep can, as a result, impact cognitive function (Sejbuk et al., 2022). Similarly, indisputably, the role of employed women has undergone transformation worldwide as a result of economic circumstances and societal expectations (Cardella et al., 2020) This has led to a situation where women who work face significant pressure to build a successful job while also maintaining a fulfilling personal life (Kalidasan et al., 2017). Consequently, the escalating workload is negatively impacting working women, resulting in less personal time and sleep deprivation, ultimately undermining their job effectiveness. The goal of the current study is to investigate how moms' cognitive capacities are affected by sleep deprivation (Sleep & Job Performance, 2021). The aim of this review study is to examine how sleep deprivation affects working women's cognitive abilities.

METHODS

Searching techniques

This systematic review was registered with

PROSPERO, the international prospective register of systematic reviews with the registration number: CRD42024617382. The selected databases were utilized throughout the entire data collection procedure. We conducted a search in PubMed, CINAHL, and Scopus. This inclusion encompassed articles published in English from January 2014 to January 2024. Logical operators and keywords were employed in the search to mitigate data saturation. It is essential to prove that a thorough and extensive search was conducted. MeSH terms that were used in the search. Search strategy involved (sleep deprivation [MeSH Terms]) AND ((cognitive performance [MeSH Terms] OR psychomotor performance [MeSH Terms])) AND (working women [MeSH Terms]). The PRISMA standards for reporting systematic reviews and meta-analyses were followed by the study (Page et al., 2021).

Inclusion & exclusion criteria

Studies explicitly examining the impact of sleep deprivation on women who are now employer's cognitive performance through quantitative methods were included in the inclusion criteria for this review. The research included in the analysis were done in many settings, including office environments, healthcare facilities, academic institutions, and other vocational situations. Only full-text papers that examined the impact of sleep deprivation, both acute and chronic, on cognitive function were deemed suitable for inclusion. Excluded from consideration were studies focusing on sleep deprivation's effects on cognitive performance among working women, research that has not been published, and systematic reviews. The study excluded articles that lacked empirical data, such as editorials, opinion pieces, comments, and reviews without original research. Reviews, abstract concepts, conference proceedings, correspondence, discussion, remarks, opinions, and book chapters were not included. Instead, we focused on studies that were relevant to our research issues and included either a comparison group or did not include one. We excluded papers that were not written in English. The chosen studies underwent a comprehensive quality review utilizing extensive criteria for critical evaluation. The PEO factors were considered to assess any potential impact on organ donation.

Study selection

The study selection process for our systematic review was meticulously structured and involved multiple stages to ensure rigor and comprehensiveness, with distinct roles assigned to different authors to minimize bias and enhance the accuracy of our findings. Initially, the primary screening of titles and abstracts was conducted independently by the first and second authors. This stage utilized MESH terms to efficiently filter out studies that did not meet the basic inclusion criteria, specifically those studies not addressing the impact of sleep deprivation on cognitive performance in working women.

Following the initial exclusion, the articles that passed the primary screening were then subjected to a secondary screening process, which was conducted by the fourth and fifth authors. This phase involved a more detailed examination of the abstracts and keywords to further refine the selection based on more specific research questions and comprehensive inclusion criteria. This step ensured that the studies retained for full review closely aligned with the objectives of our systematic review.

The remaining studies that emerged from the secondary screening were then comprehensively reviewed for their full texts. This in-depth review was designed to assess the detailed methodologies, populations studied, outcomes measured, and the overall relevance of each study. At this juncture, any disagreements or uncertainties that arose were resolved through discussions involving a third, neutral author. This author acted as a mediator to ensure that any biases from previous stages were addressed, and a consensus was reached on which studies were to be included in the final review.

Finally, the selected studies were moved to the data extraction phase, which was again handled by the first and second authors. Utilizing a standardized data extraction form, they independently extracted pertinent data from each study to ensure consistency and reliability of the information gathered.

This multi-step, multi-author process was critical for maintaining the high quality and relevance of the studies included in our systematic review. By involving different reviewers at various stages and using a consensus-driven approach for resolving disagreements, we aimed to enhance the objectivity and rigor of our study selection process.

Data extraction

In our methodology, the first and second authors independently collected the data from each report. Each author used a standardized proforma to gather essential information, including the study design, time period, participant characteristics, description of the intervention, find-

ings, and limitations. This parallel independent review process allowed each article to be assessed from two separate perspectives, thereby reducing the risk of individual bias. After the independent data extraction, both reviewers compared and discussed their findings to reconcile any discrepancies. This step was crucial in ensuring that data interpretation remained consistent and reliable across reviewers. If discrepancies could not be resolved through discussion, a third, senior author was consulted to provide an additional layer of adjudication, thus ensuring that any potential biases were effectively mitigated.

Quality and Bias Assessment

Publications are quantitatively assessed using the Newcastle-Ottawa Quality Assessment Scale (34) by allocating a s rating according to the selection, comparability, and exposure categories. Randomized controlled trials (RCTs) addressing several facets of trial design, conduct, and reporting were analyzed using the Cochrane Risk of Bias (35) tool. The checklist-based Joanna Briggs Institute tool (36) was utilized to evaluate the qualitative and quasi-experimental investigations.

Search Results

305 records were located following a Boolean search for relevant phrases. Because of this, there were only 132 records in CINAHL, 97 in Scopus, and 76 in PubMed. Fig. 1 displays the PRISMA flow diagrams that were produced. Some elements were eliminated because they were unrelated to the subject of the study. 305 records were located following a Boolean search for relevant phrases. Because of this, there were only 132 records in CINAHL, 97 in Scopus, and 76 in PubMed. Fig. 1 displays the PRISMA flow diagrams that were produced. Some elements were eliminated because they were unrelated to the subject of the study. Sixteen articles were excluded from the remaining twenty due to the absence of full-length papers for eleven of them, while five were classified as conference proceedings. Fourteen articles were selected for final review.

Synthesis of Results

The findings are consolidated in Table 1. The synthesis of results involved a convergent synthesis approach, where multiple outcomes were collected both before and after the intervention. The outcomes were assessed through self-reports, post-intervention questionnaires, and results centered on research inquiries. Specifically, sleep deprivation's effects on cognitive function among working women was discussed in three sections. The synthesis of results involved a convergent synthesis approach, which entailed collecting multiple outcomes both before and after the intervention. Results that were focused on the study objectives, as well as post-intervention questionnaires and self-reports, were used to evaluate these outcomes. In particular, the synthesis covered the three parts that demonstrate the effects of sleep loss on the cognitive performance of working women.

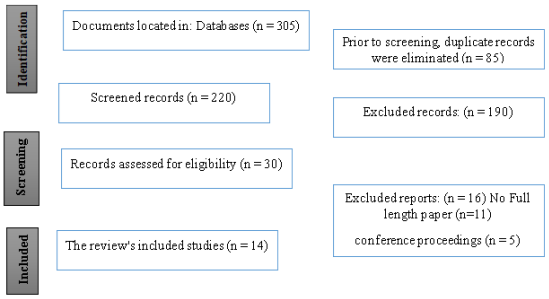

Figure 1. Prisma Flowchart

RESULT AND DISCUSSION

Studies conducted in various part of country addressing sleep deprivation and cognitive performance among working women reveal a noteworthy result, as highlighted in Table 1. Numerous articles within this frame of research underscore the heightened cognitive performance with sleep deprivation. Notably, investigations have been conducted specifically among working women have been explored across various part of the country.

The characteristics of the aforementioned studies were observed in the following countries: United States of America (Zimmerman et al., 2024a; Deater-Deckard et al., 2021), Canada (Santisteban et al., 2019), United States (Leerkes et al., 2021; Vanderlind et al., 2014; Arbour et al., 2020), Spain (García-Tudela et al., 2023), Turkey (Cakan & Yildiz, 2020), Netherlands (van Oostrom et al., 2018; Bottenheft et al., 2023a), China (Zhou et al., 2022; Deng et al., 2022), South Korea (Lee et al., 2020), and India (Kaliyaperumal et al., 2017). The majority of the research consisted of cross-sectional studies, with a limited number of survey and comparative studies. Sleep is an essential aspect of human functioning, particularly regarding cognitive performance. The offered research provides useful insights into the relationship within sleep deprivation and cognitive function among employed women. Here we deliver into the key findings.

Table 1. Summary of data extracted from selected studies

Author	Sample Size	Study Design	Key findings
E. Zimmerman et al., 2024 United States of America	65	Randomized crossover design	In the study, 65 participants (89% women, 52% non-White) with an average age of 35.9 ± 4.9 years completed all procedures. Beyond the advantages of practice, the performance on the List Sorting Working Memory task improved after the proper sleep condition. Despite practice, the cognitive performance after insufficient sleep did not reach the expected level and did not differ from the original baseline.
Santisteban et al., 2019 CANADA	93	Double-blind placebo-controlled randomized design	Lack of sleep that is persistent and progressive has a negative effect on an individual's performance on a working memory test. On tests measuring sustained attention, reaction inhibition, or decision making, however, it had no effect on performance.
Leerkes et al., 2021 United State	109	Cross Sectional Survey	Women with positive personality traits and higher working memory demonstrated a stronger ability to process infant cries that are focused on the needs of the infant. This, in turn, led to a greater intention to respond to the wailing of infants. Reduced cry response was associated with higher levels of self-oriented cry processing, and these findings were linked to emotion dysregulation and deficits in inhibitory control. Reduced desired reaction was associated with transient sleep deprivation.
Arbour et al., 2020 United State	4358	Cross Sectional Survey	Out of the total 753 midwives who participated in the survey (with a response rate of 17%), 268 of them answered the qualitative question on sleep. The study highlighted three primary themes: factors and difficulties that contribute to sleep deprivation; adverse effects of sleep loss; and coping methods employed by midwives to manage or alleviate sleep deprivation. Midwives have reported experiencing health and safety repercussions due to inadequate sleep, which include negative effects on their personal well-being, clinical mistakes, and errors in driving after being awake for an extended period of time.
García-Tudela et al., 2023 Spain	404	Cross Sectional Study.	The study comprised 404 healthcare workers, whose mean age was 40.4 ± 11.1 years. The bulk of participants (61.4%) were female, and 62.6% were drawn from hospital emergency rooms. Of all the employees, excessive tiredness affected 27.7% and poor sleep quality affected 65.3%. When it came to poor sleep quality, doctors were less likely to experience it than nurses, EMTs, and nursing assistants.
Cakan & Yildiz, 2020 Turkey	40	Comparative study	The addition of both whole- and half-night shifts caused problems with sleep length and quality, as well as melatonin cycle disturbances. Working through the night for extended periods of time had a number of negative effects, including decreased concentration ($P = 0.035$), a decrease in platelets in the blood ($P = 0.000$), and a decrease in estradiol levels ($P = 0.029$), but an increase in TNF-□ levels ($P = 0.000$) when compared to the control group. In addition, longer overnight work periods led to higher levels of IL-1□ before the shift began ($P < 0.001$) and higher levels of IL-6 during shorter overnight shifts ($P < 0.05$).

Oostrom et al., 2018 Netherland	2587	Cohort Study	Compared to a sleep length of 7 or 8 hours, a sleep duration of 9 hours or more was found to have a statistically significant association with worse memory ($p = 0.02$), flexibility ($p = 0.03$), and general cognitive function ($p < 0.01$). In people who experience fatigue frequently, both insufficient and excessive sleep have been associated with a reduced ability to think clearly.
Zhou et al., 2022 China	3724	Cross sectional study	According to the study, the average CES-D8 score among Chinese teenagers was 4.27 (standard deviation: 3.11), indicating a 6.49% prevalence of depression. Teenagers who slept for fewer than six hours a night were 2.34 times more likely to exhibit symptoms of depression (OR = 2.34; 95% CI = 1.30, 4.24). On the other hand, teenagers who performed better than 75% on maths exams were more likely to be at a lower risk of experiencing depressive symptoms. Furthermore, there was a conflicting role for the cognitive function in modulating the effect of sleep duration on symptoms of depression. A 95% confidence interval spanning from 0.023 to 0.064 was used to compute the indirect effect, which came out to be 0.043.
Lee et al., 2020 South Korea	203082	Cross sectional study	Out of a total of 203,082 individuals, 35,892 (17.7%) were diagnosed with SCD and 4,373 (2.2%) experienced functional restriction associated to SCD. People with a PSQI score of more than five, which indicates they get poor quality sleep, are approximately twice as likely to have symptoms of subjective cognitive decline (SCD) and experience functional limitations linked to SCD. The chances ratio for functional limitations due to SCD is 2.405 with a 95% confidence interval of 2.158 to 2.681, while the odds ratio for SCD is 1.983 with a 95% confidence interval of 1.915 to 2.054. Furthermore, it was found that, compared to older adults, younger people were more severely impacted by the quality of their sleep in terms of subjective cognitive decline (SCD) and the functional restrictions that followed.
Vanderlind et al., 2014 United State	35	Cross sectional study	Path analyses revealed that higher levels of Self-reported insomnia and objectively measured sleep stability measurements were both significant predictors of decreased cognitive control in disengaging attention from unfavorable stimuli. Reduced cognitive regulation of unpleasant stimuli was then associated with heightened depressive symptoms during the second session. Disturbances in sleep patterns can potentially lead to higher levels of depression symptoms by affecting cognitive control.
Bottenheft et al., 2023 Netherland	101	Cross sectional study	Cognitive function is compromised by sleep loss. The control group's cognitive performance declines as a result of the social stress test. when it comes to the response inhibition task. However, participants who are sleep deprived show an improvement in performance on both tasks, rather than a decline. The estimates of mental effort, which are subjective, also demonstrate this antagonistic connection, suggesting that the social stressor reduced brain effort when they were sleep deprived.

Kaliyaperumal et al., 2017 India	100	Cross sectional study	According to ESS ratings, 69% of shift working nurses were found to have poor sleep quality. The Wilcoxon signed rank test was used to evaluate the cognitive performance. During night, 66% of nurses had a lower MoCA score (25.72) compared to the daytime level (26.81). Throughout the night, a significant proportion of individuals, specifically 32%, exhibited an increased frequency of mathematical errors. Additionally, it was discovered that 71% of the nurses performed worse throughout the night in the Stroop's colour test, 83% in the alertness test, and 68% in the memory tests. Consequently, there was a notable decline in cognitive function among shift-work nurses, with a statistically significant ($p<0.001$) drop.
Deater-Deckard et al., 2021 United States of America	241	Cross sectional study	It looked into the possible relationship between mother age, stress, and sleep in predicting cognitive functioning, since some forms of cognitive decline start in one's twenties and continue into later life stages. A study was carried out on 227 mothers from a diverse range of socioeconomic and geographic origins who had toddler-aged children living in their community. The women's ages ranged from 32.73 years on average to 5.15 years on standard. According to the study, shorter sleep duration, higher activity during sleep, and erratic sleep patterns from night to night were all associated with lower cognitive performance. However, there was no association between cognitive performance and higher levels of stress.
Deng et al., 2022 China	377	Cross Sectional Survey	The structural studies revealed that sleep deprivation exerts a substantial detrimental impact on working mothers' effectiveness at work. Moreover, persons experiencing sleep deprivation frequently exhibit subpar performance in the workplace. Furthermore, these employees are more prone to participating in workplace deviant behaviours. Furthermore, workplace deviance acts as a moderating element in the relationship between sleep deprivation and productivity at work.

The relationship between cognitive performance and sleep quality

Numerous research has shown a link between reduced cognitive function and sleep deprivation. Subjective assessments of cognitive performance are more significantly correlated with self-reported short sleep, exhaustion, and fatigue than with objective measures (Saksvik-Lehouillier et al., 2020). The study conducted by Cakan & Yildiz (2020) revealed that half-night shifts had a negative impact on sleep metrics and the melatonin rhythm. Additionally, these shifts disrupted blood cell turnover and led to elevated levels of leptin. Extended periods of working throughout the entire night resulted in many issues such as reduced levels of estrogen, heightened inflammatory reactions, and diminished visual focus. Collectively, the statistics indicate that night shifts, particularly those lasting the entire night, should be avoided or mitigating measures should be implemented (Potter et al., 2016).

In research done by Santisteban et al. (2019), its discovered middle-aged persons who slept for longer periods had lower cognitive performance in terms of memory, flexibility, and overall cognitive ability. The observation that individuals who sleep for extended periods of time have reduced cognitive function was validated in the case of adults who reported feeling unrefreshed. People who sleep for short periods of time as well as those who sleep for extended periods of time had decreased rate of cognitive function, while individuals who sleep for long durations also displayed less flexibility as compared to individuals who sleep for moderate durations (Ding et al., 2020). A study directed by Zhou et al., (2022) shown that insufficient sleep duration may elevate the likelihood of experiencing depressive symptoms, whereas improving cognitive function may lower the prevalence of depression symptoms among Chinese teenagers. The results showed that the amount of sleep had a direct detrimental effect on depression symptoms. On the other hand, it was discovered that sleep du-

ration had a strongly favorable indirect impact on depressed symptoms through cognitive function. This implies that cognitive performance has a competitive effect on the association between sleep length and depression symptoms (Wang et al., 2023). Sleep loss often led to a decline in cognitive performance and an increase in the amount of mental effort needed. In contrast, the specific impacts of a social stressor were not universal, since they had a positive effect on the cognitive functioning of sleep-deprived people (Bottenheft et al., 2023a).

A study carried out by Lee et al., (2020) indicated that inadequate sleep quality could potentially contribute to sudden cardiac death (SCD) and functional limitations associated with SCD. In addition, older persons may exhibit more resilience compared to younger ones when it comes to the effects of sleep quality on subjective cognitive decline and functional limitations associated with SCD (Kim et al., 2021). Vanderlind et al., (2014) discovered that sleep disruptions can lead to higher levels of depression symptoms via affecting cognitive control. Additionally, there may be a correlation between genetic variations in the CLOCK gene and the quality of sleep. A study directed by Zimmerman et al., (2024a) discovered that there is an intricate relationship between sleep and cognition. The study demonstrated that maintaining a constant and in healthy people, a consistent sleep pattern of at least 7 hours per night improves working memory and reaction inhibition. Findings of Leerkes et al., (2021) indicate that response to crying is influenced by emotion dysregulation, positive personality, executive function, and sleep. These factors are independent of one other and affect social cognition. An optimistic disposition and the capacity to retain a large amount of information in one's head enables the understanding and consideration of an infant's needs when processing their cries. The study accompanied by Santisteban et al., (2019) initiate that persistent partial-sleep deprivation has detrimental impact on performance in tests measuring working memory capacity. However, it does not have any effect on performance in tests measuring sustained attention, reaction inhibition, or decision making. The study's findings show significance of identifying the initial phase of cognitive decline, which happens prior to moderate cognitive impairment. Once cognitive decline becomes apparent, it may become challenging to carry out (Hugo & Ganguli, 2014).

The impact of sleep loss on work performance:

Contemporary society relies on the uninterrupted functioning of a wide range of essential services. Consequently, the prevalence of a 24 hour culture, characterized by night shift work labour, lengthier and more erratic workdays, reduced sleep duration, is increasing worldwide (Harknett et al., 2020). Many professionals, including medical workers, commonly endure sleep loss and subsequent disruption of their circadian rhythm. Following 8-hours of labour, a person's output & concentration diminish, while the likelihood of weariness and cognitive errors rises. As a result, working during the night and working long hours that limit the possibility for sleep are linked to decreased health and safety in the workplace (Goel et al., 2013). This process involves several factors, including age, shift work schedule, variations in the quantity and quality of sleep, disruptions in sleep, a shorter amount of sleep during the day than at night, weariness and drowsiness, and recurrent stress brought on by the circadian system's desynchronization (Boivin et al., 2022). Healthcare workers working in hospital emergency departments had a twofold increased chance of experiencing poor sleep quality and drowsiness compared to emergency healthcare professionals working outside of hospitals. Physicians have a lower likelihood of experiencing poor sleep quality and tiredness compared to nurses, nursing assistants, and EMTs, who have nearly double the risk (García-Tudela et al., 2023). Shift working nurses experienced lower cognitive function. Their little sleep and reduced vigilance during the day were the reasons given for this. Shift work has substantial cognitive hazards that can impact the work performance of nurses (Kaliyaperumal et al., 2017).

Midwives faced many obstacles in obtaining sufficient sleep. These obstacles included hard work hours, a lack of institutional sleep assistance, attitudes that were dominated by men, and circumstances in their lives that interfered with their sleep. In addition to having an effect on the midwife's own health, sleep deprivation can lead to clinical mistakes and mistakes made when driving after a prolonged period of awake time (Arbour et al., 2020). A study steered by Deater-Deckard et al., (2021) discovered that frequent nighttime awakenings, along with heightened exposure to stressors, significantly adversely affected the performance of older women. In younger women, late-night activities were associated with diminished performance under high stress conditions. However, for those with lower stress levels, staying up late was connected with improved performance (Herawati & Gayatri, 2019). Women's responsibilities in the workplace have

undergone global changes as a result of economic and social variables. Working women face significant pressure to excel in their professional endeavors while simultaneously maintaining a substantial degree of engagement in their domestic responsibilities. As a consequence of mounting professional and familial obligations, individuals have limited personal time, leading to sleep deprivation that diminishes job efficiency (Deng et al., 2022). Consequently, three primary categories of research are behavioral, psychological, and situational mechanisms. Sleep deprivation is a situational antecedent that is positively associated with workplace misbehavior. This relationship is explained by the psychological process. This component, in turn, has a detrimental impact on the behavioral outcome known as individual workplace performance (Welsh et al., 2018).

The findings of this study underscore the significant impact of sleep deprivation on cognitive performance among working women, a concern that has garnered increasing attention in contemporary research. The detrimental effects of insufficient sleep on various cognitive domains—including memory, attention, decision-making, and problem-solving—are well-documented. For instance, a study demonstrated that participants subjected to sleep reduction exhibited impaired working memory performance compared to those with adequate sleep (Zimmerman et al., 2024b). Research indicates that total sleep deprivation negatively impacts brain functions linked to the frontal lobe, essential for alertness and cognitive processes (Costa & Pereira, 2019). The findings regarding the reciprocal relationship among sleep, cognitive performance, and depression Zhou et al., 2022; Wang et al., (2023) are robustly supported by studies such as Regier et al. (2013). Sleep disturbances have been shown to contribute to depressive symptoms, which subsequently impair cognitive function. The buffering role of cognitive performance in mitigating depressive symptoms aligns with findings from McKinnon et al. (2019), indicating that cognitive resilience may moderate the negative impacts of sleep deprivation on mental health.

Comparative analyses reveal that the adverse effects of sleep deprivation vary across different occupational settings and demographic groups. For example, healthcare professionals, particularly those working night shifts, are susceptible to cognitive impairments due to disrupted sleep patterns. Studies reported that sleep deprivation leads to decreased function and impaired cognitive performance, emphasizing the need for adequate rest among medical staff (Khan & Al-Jahdali, 2023b). These findings are consistent with earlier research indicating that sleep loss impairs alertness and vigilance, which are critical in high-stakes professions (Killgore & Weber, 2014). The findings underscore the unique challenges faced by working-age women, particularly in balancing professional and familial responsibilities. This dual burden, which often leads to chronic sleep deprivation, is consistent with Uddin et al (2021) who observed that work-family conflict exacerbates sleep disturbances and cognitive impairments. The disproportionate impact of night shifts on women, as highlighted by Ganesan et al (2019) who identified circadian misalignment as a critical factor impairing performance in shift workers.

This review adds depth by linking these challenges to broader societal pressures and structural inequalities, calling for systemic interventions to address the compounded effects of professional and domestic responsibilities on women's sleep and cognitive health.

When compared with existing literature, the current findings reinforce the established link between sleep deprivation and diminished cognitive function. Research has shown that sleep loss affects various cognitive domains, including working memory and executive functions Kusztor et al., (2019). Additionally, studies have demonstrated that sleep deprivation impairs attention and motor tracking, paralleling the effects of alcohol intoxication (Grossman & Rosenbloom, 2016).

The review emphasizes the role of biological disruptions, such as changes in melatonin levels and inflammatory responses Cakan & Yildiz (2020), in mediating the relationship between sleep deprivation and cognitive decline. These findings are supported by Chellappa et al who demonstrated that circadian misalignment triggers physiological changes detrimental to cognitive function (Chellappa et al., 2019). Moreover, the association of the CLOCK gene with sleep quality and cognitive outcomes aligns with genetic studies, highlighting individual variability in susceptibility to sleep disturbances (Y. Li et al., 2021).

Psychologically, the review highlights how stress mediates the effects of sleep deprivation on cognitive performance. This is consistent with Bottenheft et al who observed that stress amplifies the cognitive deficits caused by poor sleep quality (Bottenheft et al., 2023b). The bidirectional relationship between sleep, depression, and cognition further underscores the complex interplay of biological and psychological factors (Zhou et al., 2022; Wang et al., 2023).

Interventions such as flexible work schedu-

les, fatigue management programs, and sleep education initiatives have shown promise in mitigating the adverse effects of sleep deprivation. For instance Wickwire et al demonstrated that optimizing shift schedules and providing sleep health education improved both cognitive performance and workplace safety (Wickwire et al., 2017).

Furthermore, the health and safety implications associated with sleep deprivation are substantial. Chronic sleep loss has been linked to an increased risk of neurodegenerative diseases, such as Alzheimer's, underscoring the importance of adequate sleep for long-term cognitive health. In occupational contexts, sleep deprivation can lead to decreased productivity and increased errors, posing risks not only to the individual but also to public safety. sleep deprivation is a multifaceted issue with significant implications for cognitive performance and workplace productivity, particularly among working-age women. Addressing this challenge requires a holistic approach involving individual, organizational, and societal interventions. This discussion not only validates the results but also situates them within the broader literature, paving the way for targeted strategies to mitigate the adverse effects of sleep deprivation.

Strength and Limitation

This systematic review synthesizes findings from diverse geographical regions and research contexts, providing a global perspective on the impact of sleep deprivation on cognitive performance in working-age women. The review includes cross-sectional, longitudinal, and survey-based studies, offering a well-rounded understanding of the topic from both observational and experimental perspectives. However, the included studies vary in methodological rigor, with some relying on self-reported measures of sleep and cognitive performance, which may introduce bias and reduce reliability. While this is a strength for addressing a targeted demographic, the lack of comparative data with men limits insights into whether findings are gender-specific or broadly applicable. The interaction between work-related stress, sleep deprivation, and cognitive outcomes is discussed but could benefit from deeper analysis, particularly in relation to specific occupational settings.

CONCLUSION

This systematic review highlights the critical relationship between sleep deprivation and cognitive performance in working-age women, underscoring its significant implications for both individual well-being and workplace productivity. The findings demonstrate that sleep deprivation adversely affects key cognitive functions, including memory, attention, and executive control, with disproportionate impacts on women due to societal and occupational pressures. Moreover, the interplay between sleep duration, psychological stress, and workplace performance emphasizes the complexity of these effects.

The review provides valuable insights into biological and psychological mechanisms, such as circadian disruptions, hormonal changes, and stress pathways, which mediate the effects of sleep deprivation. It also identifies vulnerable populations, such as shift workers and healthcare professionals, who face heightened risks. These findings reinforce the urgent need for targeted interventions, including workplace policies that promote sleep health, flexible schedules, and public health campaigns to raise awareness about the importance of adequate sleep.

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