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Relationship between Mental Health and Memory Performance with the Mediating Role of Sleep in Healthcare Workers

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A B S T R A C T

Sleep and mental health are factors that can influence memory performance. This study seeks to explore the relationship between mental health and memory performance, with sleep acting as a mediator, among healthcare workers in Sistan and Baluchestan province. The research is applied in its purpose and employs a descriptive-correlational design. Data collection was conducted through fieldwork, utilizing a questionnaire comprising 36 questions to assess all research variables. The study population consists of 220 healthcare workers from Sistan and Baluchestan province, of whom 135 were selected as the final sample using Morgan's table. Hypotheses were tested using structural equation modeling, and the results were analyzed with SPSS and SmartPLS software. The findings revealed positive and significant relationships between mental health and memory performance, sleep and memory performance, and mental health and sleep among healthcare workers. Overall, the relationship between mental health and memory performance, mediated by sleep, was found to be positive and significant in this population.

Introduction

Healthcare workers are exposed daily to physical and psychological pressures stemming from medical care responsibilities, treatment duties, and direct interactions with patients, placing them at high risk of stress and exhaustion. These conditions can adversely affect their mental and physical health, as well as their professional efficiency. Furthermore, extended working hours and challenging environmental circumstances exacerbate difficulties in managing stress and enhancing memory performance for this group. Consequently, in workplace settings—particularly healthcare centers—employees encounter occupational pressures and patient care-related stress, which may negatively impact their mental health and cognitive functioning. Mental health, a critical determinant of workplace efficiency, is closely intertwined with memory, attention, and problem-solving capabilities. Within this context, sleep, as an essential physiological requirement, plays a pivotal role in bolstering cognitive performance and sustaining mental well-being (Almarzouki, et al., 2022). Studies suggest that insufficient or poor-quality sleep can diminish memory efficiency, impair decision-making, and hinder the ability to cope with daily stressors. Conversely, maintaining proper sleep among healthcare workers can enhance their mental health and cognitive abilities, ultimately improving the quality of services they deliver. Thus, sleep emerges as a vital mediating variable in the relationship between mental health and memory performance among healthcare workers.

The working years can represent a demanding phase in employees' lives. Many struggle to balance workplace demands, personal life, and concerns about job security in a competitive market (Kurnia, C., &

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Widigdo,, 2021). These challenges are particularly pronounced in high-pressure fields such as medicine or health-related professions. As a result, this group of workers is vulnerable to mental health difficulties throughout their careers (Gripshi, Rostami, & Pola, 2022).

These issues have sparked widespread interest among health professionals, researchers, and academics, who aim to investigate such challenges to mitigate the effects of these stressors on employee well-being (Desouky,et al., 2022). Sleep, a factor that has deteriorated in recent years largely due to shifts in behavioral and social patterns (Brinkmann, Reddy, & Sharma, 2018), is essential for human survival and significantly influences both physical and mental health. Moreover, sleep profoundly affects optimal cognitive functioning, including attention, memory performance, and perception (Grandner, et al., 2015). Memory, regarded as one of life's most critical components, serves as the brain's storage system, encompassing all past learning (Shukla, 2007). In essence, memory is a fundamental biological function crucial to survival. Advances over recent decades in identifying factors influencing memory and forgetting have offered valuable insights into memory enhancement (Stern & Alberini, 2013). However, further research is needed to deepen the understanding of the connection between memory performance and specific mental health conditions, such as depression, anxiety, stress, and insomnia. Additionally, sleep plays an essential role in emotional regulation and mental health maintenance (Tamir, et al., 2024). Prior studies have indicated that sleep disturbances may precipitate psychiatric conditions, including depression, anxiety, and psychological distress, even in individuals previously considered healthy (Dagher,et al., 2021).

The link between sleep and memory performance is well-documented, with sleep occupying roughly one-third of human life. Various theories on sleep's purpose have been proposed, predominantly emphasizing homeostatic processes vital to physical, emotional, and cognitive well-being (Zielinski et al., 2016). The association between sleep and memory performance has been robustly validated in both animal models and human behavioral studies (Skourti, et al., 2023). Currently, one of the most notable consequences of sleep deprivation is its disruption of the brain's capacity to encode new information and consolidate memories. Short-term memory, often termed primary memory or temporary storage, is critical for briefly retaining information. In contrast, long-term memory can store vast quantities of data (Zeng et al., 2021). Yet, the distinction between these memory types lies not only in duration but also in their functional roles. Research demonstrates that both working memory and long-term memory depend on deep sleep phases (offline periods) to fulfill their functions. Hence, the significance of adequate nighttime sleep for optimizing both short-term and long-term memory performance is indisputable. Scientific evidence further confirms that sleep deprivation exerts numerous detrimental effects on memory performance (Lorestani et al., 2024).

Numerous global studies have explored the relationship between memory performance and sleep. Generally, these findings endorse a positive association between improved sleep quality and enhanced mental health (Alhusseini, et al., 2022), though some research suggests this relationship may be negative or absent (Al-Tayeb, et al., 2020). Such inconsistencies may stem from incomplete analyses of related factors potentially influencing the sleep-mental health nexus (Mehta, 2022).

This subject has garnered significant attention from researchers. For instance, Tahmasbi and Salehi (2024) examined the impact of functional exercises on cognitive performance and mental health in older adults, finding that such exercises significantly improved working memory and mental health, unlike the control group, which showed no notable change. Lorestani et al. (2024) investigated sleep deprivation's effects on students' memory performance, concluding that it reduced memory efficiency and disrupted cognitive functions. Ghasemi (2023) highlighted sleep's critical role in forming long-term memory and enhancing cognitive performance. Zhian and Malekiha (2020), analyzing sleep's influence on mental health through religious texts, found that adequate sleep reduces anxiety and boosts focus, while poor sleep weakens memory and increases aggression. Scott, et al. (2021), in a meta-analysis, demonstrated that better sleep quality alleviates depression, anxiety, stress, and psychotic symptoms. Rangtell et al. (2019) explored the gender-specific effects of one night of sleep deprivation on working memory, noting that it impaired both objective and subjective memory in men, but only objective memory in women. Ferrarelli, Ferrarelli et al. (2019) showed that enhancing slow-wave sleep improves working memory and could serve as a therapeutic approach for cognitive disorders. Ghrouz et al. (2019) studied physical activity, sleep quality, and mental health among students, revealing that poor sleep quality and low physical activity levels were significantly linked to anxiety and depression. Nevertheless, the relationship between mental health and memory performance, with sleep as a mediator, remains unresolved.

Thus, the interplay between mental health and memory performance holds substantial importance, particularly in high-stress environments like healthcare centers, where workers face ongoing psychological and professional pressures. Research underscores that sleep quality significantly impacts both mental health and memory. Specifically, inadequate or low-quality sleep can result in memory impairments, diminished information-processing capacity, and disruptions in daily decision-making. Furthermore, an individual's mental health influences cognitive processes such as short-term and long-term memory, with psychological issues like anxiety and depression adversely affecting sleep quality and memory performance. Within this framework, sleep, as a mediating factor, can significantly enhance the connection between mental health and memory performance, as sufficient and high-quality sleep supports psychological well-being and memory strengthening. Understanding these interrelationships can inform strategies to improve mental health and cognitive efficiency among healthcare workers. Accordingly, drawing on the literature reviewed, this study, as a practical and empirical endeavor, aims to address some of the existing gaps in this area. The researcher seeks to resolve this research problem by answering the central question: To what extent is the relationship between mental health and memory performance, with sleep as a mediator, among healthcare workers in Sistan and Baluchestan province?

Theoretical Foundations of the Research

Memory Performance

Memory, regarded as one of the most vital aspects of human life, serves as the brain's storage system. It encompasses everything an individual has learned in the past (Shukla, 2002). Memory can be best described as the mental capacity to retain and store information for later retrieval when needed. Delving deeper, memory consists of three primary types that collaborate to form stable information (Dagher, et al., 2021).

Our sensory memory enables us to retain sensory data—such as smells and sounds—even after the stimulus has faded. Short-term memory holds information for only a few seconds, whereas long-term memory allows us to store information for extended periods, sometimes even a lifetime (Eysenck, 2022). Researchers have consistently focused on factors influencing memory processing in humans, categorizing these factors into two broad groups: organic conditions, such as tumors, molecular abnormalities, neurological damage, deficiencies, and hyperactivity; and psychological-related disorders, encompassing mental and emotional states. Recent studies suggest that various mental health disorders, alongside daily habits and behaviors, play a significant role in memory performance and forgetting (Hussain & Griffith, 2018).

Mental Health

According to the World Health Organization (WHO), mental health is defined as "a state of well-being in which an individual realizes their own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to their community" (World Health Organization, 2004). While this definition marks a significant advancement by shifting away from conceptualizing mental health merely as the absence of mental illness, it raises several concerns and potential misunderstandings by identifying positive emotions and positive functioning as key components of mental health. Individuals with good mental health often experience sadness, displeasure, anger, or dissatisfaction, which are integral to a complete human life. Nevertheless, mental health is frequently perceived as an entirely positive emotional state characterized by happiness and a sense of mastery over one's environment (Lamers, et al, 2012).

Concepts utilized in numerous studies on mental health incorporate both central elements of the WHO definition—namely, positive emotions and positive functioning. Keyes (2014) identifies three components of mental health:

- Emotional Well-Being
- Psychological Well-Being
- Social Well-Being

Emotional well-being encompasses happiness, interest in life, and satisfaction. Psychological well-being involves liking most aspects of one's personality, effectively managing daily responsibilities, maintaining good relationships with others, and being content with one's life. Social well-being pertains to positive functioning and includes contributing to society (social contribution), feeling part of a community (social integration), believing that society is improving for all people (social actualization), and finding the way society operates meaningful (social coherence) (Galdersi, et al., 2015).

Sleep

Sleep represents an emergent set of numerous physiological processes under primarily neurobiological regulation that influence multiple physiological systems. It is a biological necessity for human life, alongside food, water, and air. Similar to food consumption—and unlike breathing—fulfilling this biological need requires voluntary behaviors (Gerstner, et al., 2017).

Although many of these behaviors are genetically and individually driven (e.g., it is not coincidental that most people prefer to sleep at night, and most humans stereotypically sleep lying down), there remains significant variation in sleep behaviors and practices. Consequently, sleep is also socially influenced, dictated by the environment, and subject to interpersonal and societal factors (Shao, et al., 2016).

Sleep occupies between 20% and 40% of the day for most humans. Even prehistoric evidence underscores the importance of sleep in human life. This is consistent with archaeological and historical accounts that highlight sleep's prominent and significant role even in early human societies. Sleep was a universal phenomenon that was unavoidable and thus integrated into social structures. As such, sleep evolved not only as a set of physiological processes but also became embedded in cultural-social frameworks. Therefore, the timing, environment, and constraints related to sleep varied across human societies between the poor and the rich, the powerful and the powerless, rural and urban populations, and so forth. As sociologist Simon Williams writes, "Where we sleep, when we sleep, and with whom we sleep are all important markers or indicators of social position, privileges, and prevailing power relations" (Cox, et al, 2016).

Upstream social and environmental influences on sleep are also complex and overlapping, involving numerous potential pathways. With this in mind, a social-ecological framework may be suitable for describing this relationship. The social-ecological model was initially developed to describe the intricate ways in which an individual's health-related behavior is a product of individual-level influences, but that the individual operates within the context of social structures of which they are a part, yet these structures exist externally to the individual (Grandner, 2022).

Research Hypotheses

Based on the theoretical framework outlined, the following hypotheses can be proposed:

- Hypothesis 1: There is a positive and significant relationship between mental health and memory performance, mediated by sleep, among healthcare workers in Sistan and Baluchestan province.
- Hypothesis 2: There is a positive and significant relationship between mental health and memory performance among healthcare workers in Sistan and Baluchestan province.
- Hypothesis 3: There is a positive and significant relationship between sleep and memory performance among healthcare workers in Sistan and Baluchestan province.
- Hypothesis 4: There is a positive and significant relationship between mental health and
- sleep among healthcare workers in Sistan and Baluchestan province.

Method

Participants and Procedure

In terms of research purpose, this study is applied, and in terms of classification by method, it is descriptive-correlational with a causal design. The study population consists of 220 healthcare workers from Sistan and Baluchestan province, of whom 135 were selected as the final sample using Morgan's table. The sampling method employed in this research, given its subject and nature, is simple random sampling.

Tools Used

In this study, to collect the necessary data and analyze the research findings, standardized questionnaires were used.

- Goldberg Mental Health Questionnaire

the Goldberg Mental Health Questionnaire was used to measure mental health, which was designed by Goldberg in 1972 and has been used and validated in Iran by Taghizadeh (2001). This questionnaire was designed to measure the general mental health of individuals. The version used in this study consists of 15 questions. The responses were scored based on the Likert scale and the total score of the questionnaire was used for data analysis. In previous studies, the reliability of this tool has been reported to be appropriate and its Cronbach's alpha value has usually been more than 0.80. In the present study, the Cronbach's alpha value of the Mental Health Questionnaire was obtained as 0.852, which indicates the appropriate reliability of the tool.

- sleep questionnaire

The Lynch et al. (2003) sleep questionnaire was used to measure the sleep status of employees. This questionnaire was designed to assess the status and quality of sleep and consists of 9 questions. The responses to this questionnaire were scored based on the Likert scale and the total score was used in statistical analyses. In previous studies, the reliability of this questionnaire was reported to be satisfactory and its Cronbach's alpha value was usually higher than 0.80. In the present study, the Cronbach's alpha value of the sleep questionnaire was calculated to be 0.893, which indicates a very good reliability of the instrument.

-Duneman and Carpenter Memory Performance Questionnaire

In order to measure memory performance, the Duneman and Carpenter Memory Performance Questionnaire, designed by Duneman and Carpenter in 1980, was used. This questionnaire was designed to assess memory performance in everyday activities and situations and includes 12 questions. The responses were scored based on the Likert scale and the total score of the questionnaire was used for data analysis. In previous studies, the reliability of this instrument was reported to be good and its Cronbach's alpha value was usually higher than 0.80. In the present study, the Cronbach's alpha value of the memory performance questionnaire was 0.861, indicating the desirable reliability of the instrument.

The validity of the questionnaire was assessed using convergent and divergent validity criteria specific to structural equation modeling. For reliability, the composite reliability (CR) method was used alongside Cronbach’s alpha, with a significance threshold for both indices set at a minimum of 0.7. Additionally, validity was examined using the average variance extracted (AVE) or convergent validity and divergent validity, with an acceptable AVE value of 0.50.

Results

Typically, the first criterion checked in reflective measurement models is reliability. Cronbach’s alpha is a classic index for reliability analysis. The acceptable value for Cronbach’s alpha varies according to different researchers. Some researchers accept a Cronbach’s alpha above 0.6 as indicating acceptable reliability, while others consider values above 0.7 as indicative of acceptable reliability. The results of the Cronbach’s alpha values for the main variables in the model are presented in Table 1. The second criterion employed to evaluate the reliability of the measurement model is composite reliability. This metric, introduced by Werts et al. (1974), offers an advantage over Cronbach’s alpha by assessing the reliability of constructs based on their inter-correlations rather than in absolute terms. The composite reliability (CR) of a construct is computed as a ratio, where the numerator represents the variance between a construct and its indicators, and the denominator comprises the variance of the construct with its indicators plus the measurement error. A CR value exceeding 0.7 signifies reliability, whereas a value below 0.6 indicates a lack of reliability (Davari & Rezazadeh, 2013). Table 1 presents the Dillon-Goldstein coefficients (composite reliability values). As evident from the table below, all values surpass 0.7, suggesting that the model exhibits strong composite reliability.

As demonstrated, the composite reliability values exceed 0.7, indicating satisfactory reliability for the research variables. Consequently, the measurement models possess favorable reliability. Following this, the validity of the measurement model was assessed through convergent and divergent validity tests. Convergent validity examines whether two instruments measuring the same concept exhibit a strong correlation. To evaluate convergent validity, Fornell and Larcker (1981) recommend using the average variance extracted (AVE) as a key indicator. An AVE value of at least 0.5 denotes adequate convergent validity, implying that a latent variable can, on average, account for more than half of the variance in its indicators.

As shown in Table 1, the AVE values for the latent variables exceed 0.5. Based on these results, it can be concluded that the model demonstrates desirable convergent validity. In partial least squares (PLS) analysis, Fornell and Larcker (1981) assert that the square root of the AVE for a variable should exceed its correlation with other variables in the study. At this stage, the square roots of the AVE values are calculated and subsequently inserted into the diagonal of the latent variable correlation matrix.

Table 1- Cronbach’s Alpha Values/ AVE values.

Variable	Cronbach’s α > 0.7	Result	CR > 0.7	Result	AVE > 0.5	Result	Employees' Sleep	Mental Health	Memory Performance
Mental Health	0.852	Confirmed	0.884	Confirmed	0.663	Confirmed	0.814		
Sleep in Employees	0.893	Confirmed	0.909	Confirmed	0.601	Confirmed	0.643	0.775	
Memory Performance	0.861	Confirmed	0.887	Confirmed	0.699	Confirmed	0.663	0.617	0.836

As observed in the correlation matrix of the variables, the square root of the Average Variance Extracted (AVE) values, located on the diagonal of the correlation matrix, exceeds the correlation coefficients of each variable with the others. This indicates that the model demonstrates satisfactory divergent validity.

Data Analysis and Findings

The significance level of the Kolmogorov-Smirnov test for all research variables is less than 0.05 (5%). Consequently, the null hypothesis is rejected, indicating that the distribution of the research variables is non-normal. Therefore, the data in this study are non-normally distributed. As a result, Partial Least Squares (PLS) and non-parametric tests will be employed to confirm or reject the hypotheses.

Before examining the overall relationships between variables using structural equation modeling, the pairwise relationships among the research variables were first analyzed using the Pearson correlation test. The results of the Pearson correlation analysis are presented in Table 2.

Table – 2 Pearson Correlation Test Results Among Research Variables.

Independent Variable	Dependent Variable	Error Level	Significance Level	Correlation Coefficient
Mental Health	Employees' Sleep	0.01	0.000	0.540
Mental Health	Memory Performance	0.01	0.000	0.487
Employees' Sleep	Memory Performance	0.01	0.000	0.496

As shown in Table 2, the significance levels for all variables are below 0.05. Thus, with a 99% confidence level, it can be concluded that a significant relationship exists between the independent and dependent variables in all cases. Furthermore, since the correlation coefficients are positive and close to 1, it can be inferred that there is a strong correlation between the variables, such that a change in one variable is likely to result in a corresponding change in the other.

Hypothesis Testing

To investigate the effects of the research variables, this study utilized the Smart-PLS software and the structural equation modeling (SEM) approach. The model was evaluated in two stages: standardized estimation and significance testing.

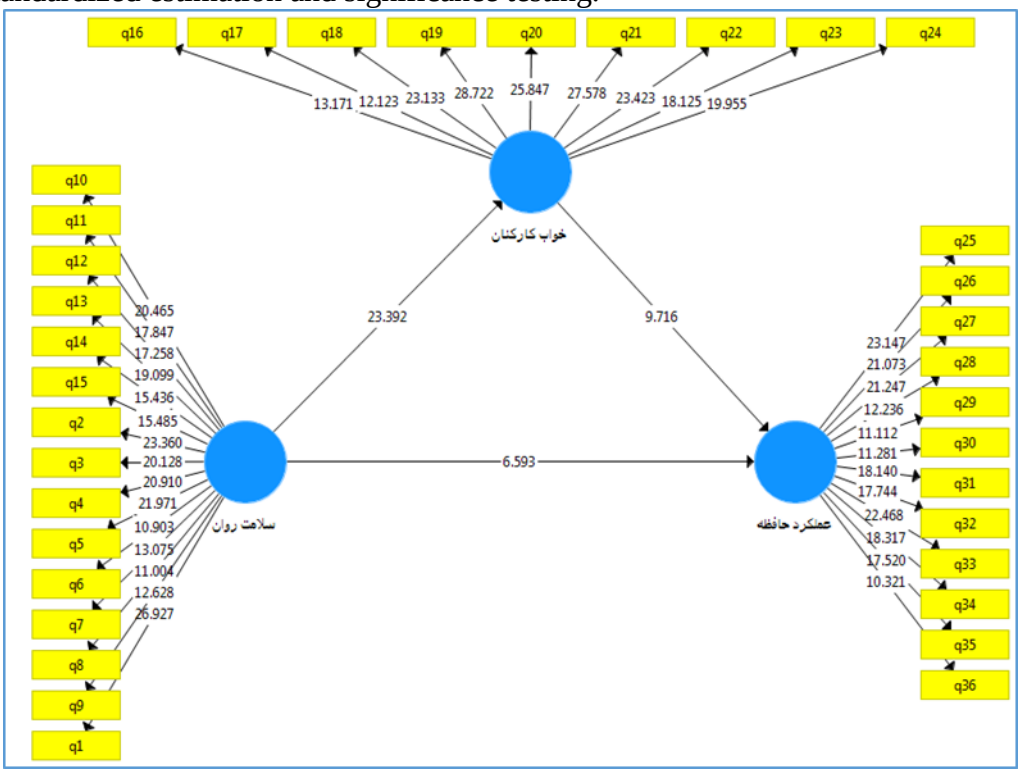

Figure 1. Software output in the significance mode.

Figure 1 illustrates the conceptual model of the study in the significance mode for the research variables. In the significance mode, for a hypothesis to be supported, the t-statistic must fall outside the range of -1.96 to +1.96. If the t-statistic lies within this interval, the hypothesis will be rejected.

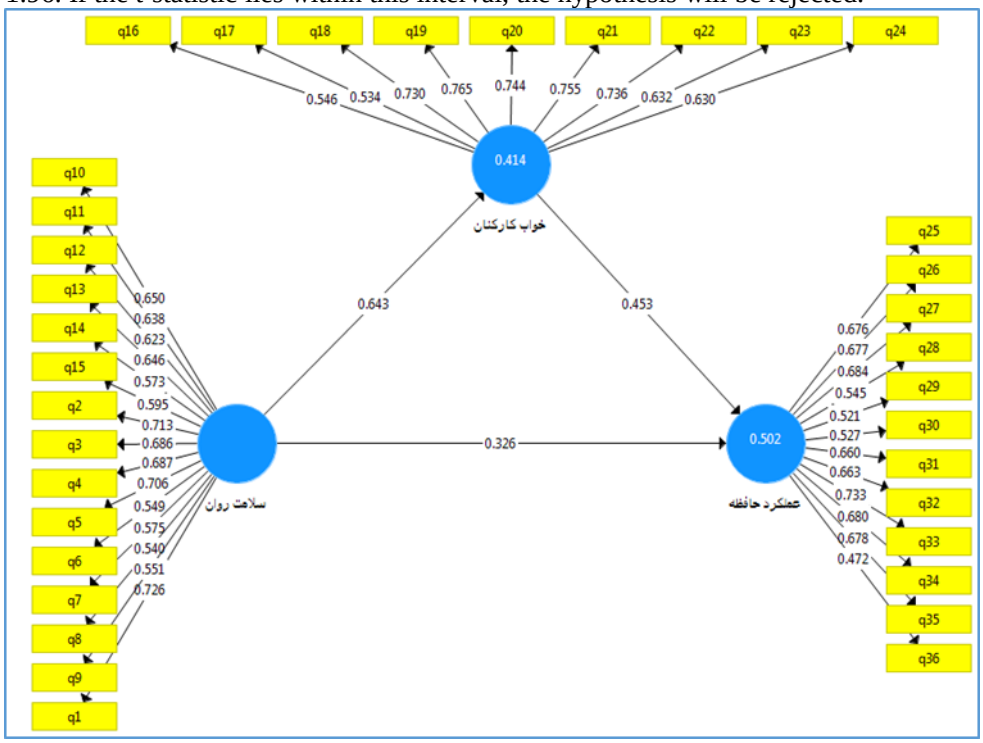

Figure 2. Software output in the standard mode.

Figure 2 illustrates the conceptual model of the research in its standardized form for the study variables. In this standardized state, the magnitude and direction (positive or negative) of the impact of the independent variable on the dependent variable are determined.

The path coefficients, along with their significance values, are reported in Table 7. Using the results from this table, the research hypotheses can be evaluated. The results for the mediating hypothesis are also presented in the table below.

Table 3-Results of Research Hypotheses.

Hypotheses	β	t-value	P-value	Status
Hypothesis 1: **The relationship between mental health and memory performance, with the mediating role of sleep among healthcare center employees, is positive and significant.**	0.292	9.409	p < 0.05	Confirmed
Hypothesis 2: **The relationship between mental health and memory performance among healthcare center employees is positive and significant.**	0.326	6.593	p < 0.05	Confirmed
Hypothesis 3: **The relationship between sleep and memory performance among healthcare center employees is positive and significant.**	0.453	9.716	p < 0.05	Confirmed
Hypothesis 4: **The relationship between mental health and sleep among healthcare center employees is positive and significant.**	0.643	23.392	p < 0.05	Confirmed

Model Fit

One of the fundamental differences between LISREL and Partial Least Squares (PLS) lies in the inadequacy of existing fit indices for models estimated using PLS. Although current PLS algorithms report fit statistics, such as Bentler and Bonett's Normed Fit Index, these are predicated on the assumption that model parameters are estimated to minimize the difference between the observed and reproduced covariance

matrices—an assumption not satisfied in PLS. However, Tenenhaus et al. (2005) proposed a global fit index to evaluate the overall fit of the model.

According to Tenenhaus et al. (2005), the GOF index in PLS models offers a practical solution for assessing overall model fit, functioning similarly to fit indices in covariance-based methods. It can be utilized to evaluate the validity or quality of the PLS model as a whole. The GOF index ranges between 0 and 1, with values closer to 1 indicating superior model quality. However, it should be noted that this index does not assess the fit of the theoretical model to the collected data in the same manner as chi-square-based indices in LISREL. Instead, it evaluates the model's overall predictive ability, specifically whether the tested model successfully predicts the endogenous latent variables.

Table 4- Indices for Latent Variables.

Variables	R^2	Communality
Employees' Sleep	0.414	0.325
Mental Health	-	0.312
Memory Performance	0.502	0.298
Average	0.458	0.311

$$GOF = \sqrt{\overline{0.311} \times \overline{0.458}} = 0/377$$

The GOF index ranges between 0 and 1, with Tenenhaus et al. (2005) suggesting that values of 0.01, 0.25, and 0.35 represent weak, moderate, and strong model fit, respectively. With a calculated GOF of 0.377, the research model exhibits strong fit.

Additional tests to assess the quality of the measurement and structural models include the Cross-Validated Communality (CvCom) and Cross-Validated Redundancy (CvRed) indices:

- Cross-Validated Communality (CvCom): This index measures the ability of the path model to predict observable variables through their corresponding latent variables. For the overall measurement model, the average of this index is computed, and a positive value indicates adequate quality. Values of 0.02, 0.15, and 0.35 correspond to low, moderate, and high quality, respectively.
- Cross-Validated Redundancy (CvRed): In evaluating the quality of the structural model, values above zero signify desirable predictive ability. Values of 0.02, 0.15, and 0.35 reflect weak, moderate, and strong predictive power, respectively. The obtained values for this index demonstrate that, for the variables in this model, the index is both desirable and strong.

Table 5- Results of Measurement and Structural Model Quality Tests.

Variable	CV Com (1-SSE/SSO)	CV Red (1-SSE/SSO)
Employees' Sleep	0.325	0.164
Mental Health	0.312	-
Memory Performance	0.298	0.180
Average	0.311	0.172

The results from Table 5 indicate that the Cross-Validated Communality (CvCom) for the research model is 0.311, and the Cross-Validated Redundancy (CvRed) is 0.172. These values confirm the desirable quality of the presented model.

Discussion

The findings of this study align with a growing body of research that highlights the critical relationship between sleep quality and mental health among healthcare workers, particularly nurses. The overall moderate sleep quality observed among the participants, as indicated by the global PSQI scores, reflects the challenges nurses face in maintaining healthy sleep patterns. Similar results have been reported by Zheng et al. (2021), who found that medical workers, including nurses, experienced significant sleep disturbances during the COVID-19 pandemic, which were closely linked to elevated levels of anxiety and depression.

This study conducted an in-depth examination of the interaction between mental health and memory performance, with sleep acting as a mediating factor among employees in healthcare centers. Mental health has been recognized as a significant factor influencing both memory performance and sleep quality in healthcare workers. While these factors have been discussed separately in previous research, this study specifically investigated the positive relationship between mental health and memory performance, mediated by sleep, in healthcare center employees. Similar results have been reported by Enayatian(2024) According to the results of the research, to reduce emotional exhaustion in the nursing profession,attention should be paid to cognitive fatigue. Tahmasbi and Salehi (2024) examined the impact of functional exercises on cognitive performance and mental health in older adults, finding that such exercises significantly improved working memory and mental health, unlike the control group, which showed no notable change. Lorestani et al. (2024) investigated sleep deprivation's effects on students' memory performance, concluding that it reduced memory efficiency and disrupted cognitive functions. Ghasemi (2023) highlighted sleep's critical role in forming long-term memory and enhancing cognitive performance. Soltanifar et al. (2023) discovered that mindfulness training significantly improved sleep quality and mental health among students preparing for university entrance exams. Alzahrani (2023) The study underscores the strong relationship between sleep quality and mental health among nurses, with poor sleep quality significantly linked to higher anxiety and depression levels. These findings highlight the need for targeted interventions to improve sleep quality and mental health support in healthcare settings, particularly for nursing staff who are vulnerable to these issues. Yusefi(2022) The participants had high mental health disorders, and their sleep quality seems unfavorable. Liu et al. (2022) Sleep disturbance and mental health problems were positively correlated among HCWs. Particularly in the COVID-19 pandemic, more attention should be given to this issue. Zheng et al. (2021), who found that medical workers, including nurses, experienced significant sleep disturbances during the COVID-19 pandemic, which were closely linked to elevated levels of anxiety and depression. According to the research findings, there is a positive and significant relationship between mental health and memory performance, with sleep playing a mediating role among healthcare center employees. Thus, a positive and meaningful relationship exists between mental health and memory performance in these employees, and sleep quality, as a mediating variable, either strengthens or weakens this relationship. In this context, the design and implementation of a combined intervention program is recommended. This program could include stress management training, sleep improvement techniques (such as sleep hygiene and meditation), and cognitive exercises, which may simultaneously enhance mental health, sleep quality, and memory performance among healthcare workers.

Limitations

The data may have been collected through self-reporting by employees, which can introduce personal biases and reduce the accuracy of the results.

Suggestions

Future studies could explore the impact of environmental factors (such as workspace and physical working conditions) and social factors (such as family or social support) on the relationship between mental health and sleep. Additionally, it is recommended that the current research be extended to other relevant populations, such as the elderly.

Conclusion

Furthermore, the relationship between mental health and memory performance in healthcare center employees is positive and significant. This hypothesis suggests that optimal mental health is associated with improved memory performance in healthcare workers, such that individuals with more stable psychological states exhibit better abilities in processing, storing, and retrieving information. This relationship may stem from reduced stress, improved focus, and increased cognitive capacity under optimal psychological conditions. To address this, the design and implementation of an intelligent monitoring system for mental health and cognitive performance is recommended. This system could provide personalized interventions based on individual data analysis (such as sleep patterns, stress levels, and cognitive efficiency), thereby improving mental health and enhancing memory performance in healthcare workers. Additionally, the relationship between sleep and memory performance in healthcare center employees is positive and significant. This hypothesis indicates that the quality and quantity of sleep directly affect memory performance in healthcare workers, with optimal sleep leading to better consolidation and retrieval of information. Conversely, sleep disturbances can result in reduced cognitive capacity, slower information processing, and impaired decision-making. To address this, the creation of short-term rest areas in the workplace and the education of employees on sleep hygiene

techniques—such as reducing electronic device usage before bedtime and maintaining regular sleep schedules—are recommended. These measures can improve sleep quality and enhance memory performance. Moreover, the relationship between mental health and sleep in healthcare center employees is positive and significant. This hypothesis suggests that an individual's mental health directly influences their sleep quality, with those in better psychological states experiencing deeper and more regular sleep. Conversely, stress, anxiety, and depression can lead to sleep disturbances and reduced sleep quality. To address this, the establishment of regular psychological support programs in the workplace—such as psychological counseling and mindfulness exercises—along with education on sleep hygiene techniques, is recommended. These initiatives can help reduce stress and anxiety among healthcare workers and improve their sleep quality.

Acknolewgment

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conflict of interest

the authors have no any conflict of interest.

data productivity

Organizational employees in various organizations can use the research results.

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