

# Impact of Sleep on Critical Thinking and Emotional Intelligence

**Dr. Digvijay Rajesh Deshmukh<sup>1</sup>, Dr. Sabih Khan<sup>2\*</sup>, Dr. Tejal Sandip Rokade<sup>3</sup>, Dr. Prajakta Taksale<sup>4</sup>, Ashwini Mapari<sup>5</sup>, Sunny Agrawal<sup>6</sup>, Prem Renapurkar<sup>7</sup>, Pranjal Kamalnarayan Jaiswal<sup>8</sup>**

<sup>1</sup>BPT, MGM School of Physiotherapy, Chhatrapati Sambhajanagar, a constituent unit of MGMIHS, Navi Mumbai-410209, India. Email: [fencerdeshmukhd29@gmail.com](mailto:fencerdeshmukhd29@gmail.com). ORCID ID: 0009-0006-3917-5029

<sup>2\*</sup>MPT, Associate Professor, Department of Cardiovascular and Respiratory Physiotherapy, MGM School of Physiotherapy, Chh Sambhajanagar, A Constituent Unit of MGMIHS, Navi Mumbai. Email: [sabih.khan@mgmsop.edu.in](mailto:sabih.khan@mgmsop.edu.in). ORCID ID: 0000-0001-7908-5112

<sup>3</sup>BPT, MGM School of Physiotherapy, Chhatrapati Sambhajanagar, a constituent unit of MGMIHS, Navi Mumbai-410209, India. Email: [tejalroka02@gmail.com](mailto:tejalroka02@gmail.com). ORCID ID: 0009-0002-4509-7777

<sup>4</sup>MPT, Resident Cardiovascular and Respiratory Physiotherapy, MGM School of Physiotherapy, Chhatrapati Sambhajanagar, a constituent unit of MGMIHS, Navi Mumbai-410209, India. Email: [prajaktataksale69@gmail.com](mailto:prajaktataksale69@gmail.com). ORCID ID: 0009-0003-7267-8670

<sup>5</sup>BPT final year student, MGM School of Physiotherapy, Chhatrapati Sambhajanagar, a constituent unit of MGMIHS, Navi Mumbai-410209, India. Email: [amapari488@gmail.com](mailto:amapari488@gmail.com). ORCID ID: 0009-0002-0942-0282

<sup>6</sup>BPT Intern, MGM School of Physiotherapy, Chhatrapati Sambhajanagar, a constituent unit of MGMIHS, Navi Mumbai-410209, India. Email: [sunnyagrawal406@gmail.com](mailto:sunnyagrawal406@gmail.com). ORCID ID: 0009-0004-0773-4506

<sup>7</sup>BPT Intern, MGM School of Physiotherapy, Chhatrapati Sambhajanagar, a constituent unit of MGMIHS, Navi Mumbai-410209, India. Email: [premrenapurkar499@gmail.com](mailto:premrenapurkar499@gmail.com). ORCID ID: 0009-0004-8130-4029

<sup>8</sup>BPT final year student, MGM School of Physiotherapy, Chhatrapati Sambhajanagar, a constituent unit of MGMIHS, Navi Mumbai-410209, India. Email: [jaiswalpranjal75@gmail.com](mailto:jaiswalpranjal75@gmail.com). ORCID ID: 0009-0006-5133-9540

**\*Corresponding author: Dr. Sabih Khan, MPT, Associate Professor, Department of Cardiovascular and Respiratory Physiotherapy, MGM School of Physiotherapy, Chh Sambhajanagar, A Constituent Unit of MGMIHS, Navi Mumbai. Email: [sabih.khan@mgmsop.edu.in](mailto:sabih.khan@mgmsop.edu.in). ORCID ID: 0000-0001-7908-5112**

## Abstract

**Background:** Sleep is a critical physiological event that affects cognitive, psychological, and behavioural performance. Sleep that is sufficient promotes increased concentration, retention of information, and emotional control, but inadequate sleep has a direct impact on making decisions, focus, and psychological equilibrium.

**Objective:** For assessing the impact of sleep on critical thinking and emotional intelligence.

**Methodology:** Eighty individuals between 18 to 25 years were chosen based on selection criteria. Data were collected by utilizing proven assessment instruments - Pittsburgh Sleep Quality Index (PSQI), Schutte Emotional Intelligence Scale (SEIS), and Critical Thinking Questionnaire (CTHQ). The Spearman's rank correlation test was implemented to investigate the association between emotional intelligence, critical thinking, and sleep quality.

**Result:** The mean scores for PSQI were  $10.13 \pm 2.61$ , SEIS =  $77.23 \pm 21.78$  and CTHQ =  $57.82 \pm 16.69$ . According to Spearman's correlation analysis, a weak negative association between PSQI and SEIS ( $\rho = -0.189$ ,  $p = 0.090$ ) and an insignificant association between PSQI and CTHQ ( $\rho = -0.045$ ,  $p = 0.727$ ) indicated poor quality of sleep did not significantly affect critical thinking or emotional intelligence.

**Conclusion:** According to results better sleep habits may support emotional balance and mental functioning among physiotherapy students.

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## Introduction

Sleep is said to be one of the major constituents for all aspects of health, zest, ability to concentrate and work efficiency for all human beings as mentioned by WHO in 2004. Humans engage in roughly one-third of their lifetimes sleeping. It remains an essential necessity for every species of higher forms of life, even mankind, and failure to get enough has detrimental biological and psychological effects.<sup>[1]</sup> For mankind, sleeping habits are mainly determined by our internal diurnal functions which are driven by

biological events of the cycle of sleep-wake, in addition to environmental variables such as the amount of light and darkness throughout a span of 24 hours.<sup>[2]</sup> Sleep is clearly important for maintaining healthy functioning at multiple levels, such as basic concentration, psychological state, and a variety of intricate mental processes.<sup>[3]</sup> An endocrine gland, known as the pineal gland, is situated on the roof of the third ventricle in the posterior portion of the cranial fossa, beyond the blood-brain barrier.<sup>[4]</sup> It has a significant role in the

diurnal rhythm of waking and sleeping.<sup>[5]</sup> The pineal glands primary job is to produce and release the melatonin hormone, which governs the cycle of sleep and wakefulness.<sup>[6]</sup> Regular secretion of melatonin, is typically solely during the darkest hours of the day.<sup>[4]</sup> The diurnal regularity of pineal melatonin release indicates the processes that contribute to sleep-wake cycle regulation.<sup>[7]</sup>

The outcomes of lack of sleep are decision-making difficulties, a decline in focus on assigned activities, and the development of emotional, intellectual, and neurological conditions.<sup>[2]</sup> People who don't get enough sleep exhibit severe impairments in a number of cognitive functions, prominent among these being basic mental alertness, attentiveness, awareness, and focus. Additionally, there has been evidences that sleep deprivation may negatively impact a number of more complex cognitive functions, such as sophisticated choice-making, problem-solving, and impulse control.<sup>[8]</sup>

Critical thinking can be defined as the cognitive processes, techniques, and visualizations individuals employ to address challenges, take decisions, and acquire unfamiliar notions" in accordance with cognitive and psychological components.<sup>[9]</sup> Sleep is crucial for the integration of various memory kinds and supports perceptive inferential thoughts.<sup>[10]</sup>

Emotional Intelligence can be described as the capacity to identify, control, and react toward one's emotions as well as those of others as stated by Crystal Ott in her article named "Emotional intelligence: what is it?" Compared with conventional cognitive intelligence, emotional intelligence capabilities—such as awareness of oneself, interpersonal abilities, and effective coping skills—are linked to a number of good life outcomes.<sup>[11]</sup> It seems that a number of important brain areas, especially the amygdala, insular cortex, and ventro-medial prefrontal cortex, must work together to integrate emotional data with cognitive processes. These three areas of the brain make up the neurological framework that guides decision-making by integrating emotional experiences, prior knowledge, and conscious cognition.<sup>[8]</sup> Decreased sleep leads to deficiencies in decision-making, inhibiting, controlling emotions, ethical judgment, and reaction to frustration which are considered to be the main functions of emotional intelligence.<sup>[12]</sup>

## Materials and methods

### Participants

This 12-month study was carried out at the MGM Physiotherapy Rehabilitation and Fitness Centre in Chhatrapati Sambhajanagar. Upon receiving ethical permission, all participants were selected based on the inclusion criteria: ages between 18 to 25 years old, Pittsburgh Sleep Quality Index (PSQI) score of greater than 5, Critical Thinking Questionnaire (CThQ) score between 25 to 58, Schutte Emotional Intelligence Scale (SEIS) scores greater and equal to

33. Individuals were excluded from the study if they had a confirmed diagnosis of psychiatric or neurological conditions such as anxiety, depression, etc. Those who have already participated in research featuring similar topics. Both genders were allowed to participate. A total of eighty participants were recruited using the purposive sampling method.

### Study Design and Procedure

This was a cross-sectional observational study. Participants were enrolled based on the selection criteria. After receiving ethical approval, the researchers contacted enrolled participants and gave them an organized questionnaire set that included a demographic data sheet, an informed consent agreement, Pittsburgh Sleep Quality Index Scale, the Schutte Emotional Intelligence Scale, the Critical Thinking Questionnaire. Participants received a thorough explanation of the research project's goals, significance, and methods prior to their signed informed agreement. The participants answered the given outcome measures questionnaire set. The researchers computed the result and examined the information regarding the connection amongst sleep, emotional intelligence, and critical thinking.

### Outcome Measures

The set of questionnaires included are frequently utilized, validated instruments that measure sleep quality, emotional intelligence, and critical thinking.

#### Pittsburgh Sleep Quality Index Scale

It is a self-administrative, systematic questionnaire designed to evaluate sleep disruptions as well as quality over the course of one month. It has seven sections and 19 objects, with a total score that ranges from 0 to 21. A decreased sleep quality is indicated by higher scores; scores above five indicate substantial disturbances in sleep.<sup>[13]</sup>

#### Schutte Emotional Intelligence Scale

It is a self-assessment test that is used to evaluate emotional intelligence. Greater scores indicate better emotional intelligence. It has 33 items. The scale assesses how emotions are perceived, understood, controlled, and used.<sup>[14]</sup>

#### Critical Thinking Questionnaire

It is a validated self-report tool designed to evaluate a person's capacity for critical thought. Using organized items, it assesses important elements like evaluation, assessment, inference, and logic. Stronger critical thinking abilities are indicated by scores that are higher.<sup>[15]</sup>

#### Sample Size

With a level of confidence of 95%, a Z value of 1.96, a 5% margin of error ( $E = 0.05$ ), and an anticipated population variability of 50% ( $P = 0.5$ ), the sample size was determined using a conventional procedure. It was calculated that 100 would be the bare minimum sample size (N) needed. The corrected sample size, which was rounded down to eighty participants and incorporated into the study, was estimated to be roughly 79.5.

### Statistical Analysis

IBM SPSS version 24 will be the software used to analyze the data after it has been uploaded to Microsoft Excel. For quantitative variables, the mean and SD will be computed, while for categorical variables, percentages. In addition, information will be shown in visual representations such as bar diagrams, etc. Statistical significance will be determined by a P-value of less than 0.05. Spearman's rank correlation analyses were used because the results of the analysis showed an abnormal distribution.

### Ethical Consideration

All procedures were executed in compliance with the MGM - Ethics Committee for Research on Human Subjects' ethical standards. Before being recruited, all the participants gave signed language specific informed consents.

### Results

Eighty participants were enrolled into the study. The mean and SD for PSQI was  $10.13 \pm 2.61$ , demonstrating that participants' total sleep quality was inadequate. Scores for CThQ were  $57.82 \pm 16.69$  and for SEIS were  $77.23 \pm 21.78$  as represented in Table 1.

**Table 1: Mean and Standard Deviation for different outcome measures**

| Variables  | Mean    | Standard Deviation |
|------------|---------|--------------------|
| PSQI Score | 10.1375 | 2.611              |
| CThQ       | 57.825  | 16.698             |
| SEIS       | 77.2375 | 21.782             |

Shapiro – Wilk test was utilized to find if the data complies to Gaussian distribution of the data among the outcome measures and is presented in the Table 2.

**Table 2: Shapiro-Wilk test for Gaussian distribution of data**

| Variable   | W Statistic | p-value   |
|------------|-------------|-----------|
| PSQI Score | 0.954       | 0.0057    |
| CThQ       | 0.920       | 0.000094  |
| SEIS       | 0.885       | 0.0000029 |

For every variable, the significance level is significantly less than 0.05. This indicates that the scores for PSQI, CThQ, and SEIS are not distributed evenly. Therefore, in order to do additional data examination, non-parametric testing was employed namely, Spearman's rank correlation test as mentioned in Table 3.

**Table 3: Spearman's rank correlation test**

| Independent Variable | Dependent Variable | Spearman rank correlation | p-value |
|----------------------|--------------------|---------------------------|---------|
|----------------------|--------------------|---------------------------|---------|

|            |      | n coefficient (p) |       |
|------------|------|-------------------|-------|
| PSQI Score | CThQ | -0.045            | 0.727 |
|            | SEIS | -0.189            | 0.090 |

The results of the spearman's rank correlation test stated that relationship between PSQI and CThQ was near zero, meaning no useful connection was found between sleep quality and cognitive thought habits. Although not statistically substantial ( $p > 0.05$ ), the slightly negative association among PSQI and SEIS indicates that poorer emotional intelligence (SEIS) scores are marginally correlated with higher PSQI scores (poor sleep quality). Thus, these findings imply that the research participant's emotional intelligence and cognitive thought patterns were not significantly impacted by variations in sleep quality.

### Discussion

This investigation examined the possibility that there is a quantifiable correlation between physiotherapy students' emotional intelligence and critical thinking depending on their sleep quality. Given an overall age of  $21.96 \pm 1.53$  years, 80 students ranging in age from 18 to 25 took part. The responses from the participants aggregated PSQI values showed that they frequently did not get enough sleep. Meanwhile, moderate amounts of emotional and cognitive reasoning were observed in the average scores for emotional intelligence and critical thinking.

Spearman's rank correlation test indicated that critical thinking capabilities and the quality of sleep did not significantly correlate. The weak association indicates that these participant's critical problem-solving and reasoning abilities were not significantly impacted by variations in their sleeping habits. A comparable small and insignificant negative correlation among emotional intelligence and the quality of sleep was found, suggesting that while decreased emotional intelligence test results were generally associated with decreased quality of sleep, the relationship did not prove sufficiently substantial to be of statistical importance.

The lack of a substantial connection across critical thinking and the quality of sleep raises the possibility of educational background, knowledge, and learning setting have a greater impact on physiotherapy students' cognitive capacity for reasoning than either the amount of sleep or quality altogether. These outcomes correspond with the findings presented by Agyapong-Opoku F, et al. (2025)<sup>[16]</sup>, which found no connection across young people's sleep habits and making decisions

preferences. Higher-order cognitive operations may continue to be influenced indirectly by the impact of sleep with mild effects on mental vigilance, concentration, and weariness.

The detected decline in emotional intelligence is consistent with past studies emphasizing the importance of sleeping for the regulation of emotions. According to research by Killgore et al. (2008) <sup>[8]</sup> and Abdali et al. (2019) <sup>[17]</sup>, social reactivity, managing stress, and emotional regulation are all negatively impacted by inadequate sleep. There is neurophysiological proof suggesting that sleep disturbance impairs processing of emotions by interfering with connectivity within the limbic zones, especially the amygdala, and the prefrontal cortex. Empathy, emotional intelligence, and emotional equilibrium—all skills are necessary for successful patient engagement in physiotherapy practice which may be diminished by such alterations.

Licata et al. (2024) <sup>[18]</sup> identified control of emotions as an intermediary connecting the quality of sleep and psychological health, highlighting the mutually beneficial relationship of sleeping and the regulation of emotions. Sleep disruptions may additionally impact emotional efficiency, and inadequate control of emotions may make them worse. In the current investigation, regardless of an evident pattern, the association failed to achieve statistical importance, which may be explained by substantial deficiencies in both emotional intelligence and the quality of sleep.

Critical thinking and emotional regulation skills are essential for scientific reasoning, collaborative work, as well as handling patients across physiotherapy education and clinical practice. Lack of sleep can impair decision-making, empathy, and focus, all of which are vital for evaluation and planning of interventions. The observations made imply that enhancing the quality of sleep might continue to have useful advantages for students' psychological balance and professional conduct even when the results did not show statistically important associations.

In support of this viewpoint, Jiménez-Picón et al. (2021) <sup>[19]</sup> found that mindfulness and emotional regulation-oriented programs improve psychological health as well as emotional intelligence, with additional advantages for sleep quality and efficiency. Therefore, including instruction on sleeping habits, stress management techniques, and emotional intelligence training in physiotherapy education system may help students succeed academically and become competent professionals over time.

## Conclusion

The results of this research revealed a lack of statistically substantial association involving emotional intelligence, critical thinking, and the

quality of sleep. Nonetheless, a slight inverse relationship across emotional intelligence and low quality of sleep was seen. This suggests that improved sleep practices could help physiotherapy students maintain emotional equilibrium and cognitive performance. The participants involved in this study can enhance their general wellness, mental well-being, and professional aptitude by promoting sound sleep habits and upholding an evenly distributed academic burden.

## Conflict of interest

With respect to this research project, the contributors declare they have no competing interests.

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