

Original Research

The Effects of Sleep Quality on the Course Success Levels of the Students of Music Department “Sleep Hygiene for Musical Memory”

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Abstract

Study objective: Sleep disturbances that are thought to be related to bad sleep hygiene are especially high among students of university and higher education institutions. In this study, we aimed at identifying the relationship between the subjective sleep quality and academic performance levels of students of music department.

Methods: A total of 132 volunteer students participated in the study [M/F, 70/62; Mean age (\pm SD), 23.5 ± 3.2 years]. Sleep quality was evaluated with Pittsburgh Sleep Quality Index (PSQI). Mean course success of students was evaluated by their academic transcripts. On a scoring system of 5, a grade point average (GPA) of (mean \pm SS): 2.3 ± 0.5 or above was defined as academic success. The GPAs of students with good and poor sleep qualities were compared, while comparing the sleep qualities of students who succeeded and failed academically.

Results: Of the 132 volunteers, 44 (33.3%) had good sleep quality, 88 (66.6%) had poor sleep quality. The students with good sleep quality ($n=44$) had higher GPA (GPA: 2.9 ± 0.7) ($p=0.007$). Among the students who had academic failure (GPA: 2.2 ± 0.5) ($n=31$) 90.3% had bad sleep quality. Of the students with good academic performance (GPA: 2.4 ± 0.4) ($n=101$), 59.4% had bad sleep quality ($p=0.003$). Academic failure associated with poor sleep quality was 6.38 higher when compared to academic failure associated with good sleep quality (Odds Ratio= 6.378, 95% CI= 1.818-22.376).

Conclusion: Among the students of Music Department, those who failed academically had significantly low subjective sleep quality. We think that, by providing training on sleep hygiene and information on sleep health, sleep quality of this student group can be improved and associated academic performance can be increased.

ABBREVIATIONS

GPA: Grade Point Average, **EEG:** Electroencephalography, **fMRI:** functional Magnetic Resonance Imaging, **MIUP:** Music Instructor Undergraduate Programs, **PSG:** Polysomnography, **PSQI:** Pittsburgh Sleep Quality Index, **REM:** Rapid Eye Movement, **NREM:** Non Rapid Eye Movement.

INTRODUCTION

In human physiology, especially for the functioning of the central nervous system, there needs to be healthy interaction and organism specific balance between wakefulness and sleep periods. Sleep is a physiological need during which the response of the brain to environmental stimuli decreases in a reversible manner. The inadequacy or absence of this need negatively influences the interaction in the neuronal networks and pathways of the brain which are responsible for wakefulness (1-2). Night-day rhythm and sleep rhythm affect human behavior. The sleep rhythm consists of NREM (Non Rapid Eye Movement;

calm, synchronized sleep, deep wave sleep) and REM (Rapid Eye Movement; mobile, desynchronized, paradoxical sleep) stages of sleep that follow one another for duration of 90-120 minutes with repetitions throughout the night. When brain and learning are taken into consideration, NREM sleep strengthens motor functions throughout the night while REM sleep strengthens sensory functions and memory (1-5). Sleep disturbance is a common health complaint of young adults. With determinants of sleep being sleep demand and timing of sleep, behavioral factors that influence rhythmic patterns become important. The amount of sleep the previous night combined with daytime activity is believed to be sufficient to drive the body to a state of high sleep propensity (6). Behavioral factors that influence sleep rhythm can be maintained by following the rules of sleep hygiene: (a) Sleep is an activity to be performed during night time. (b) Bedroom is only for sleeping; there should not be books, electronic devices, and TV or cell phones around. (c) Every individual has different sleep duration unique to himself; this is different for each individual like fingerprints are. The individual should know

and understand this and perform sleep activity within the given intervals including the weekends. (d) If the individual does not respect her sleep times, she is confronted with daily or weekly sleep burden problems (like not being able to wake up during weekends). (e) For sleep disorder related problems frequently observed in the society like snoring, sleep apnea, restless leg syndrome, patients need to apply to sleep centers for diagnosis and treatment because these problems impair the sleep quality of an individual as well as his/her bed partner. (f) The individual should engage in exercise and social programs to spend quality time during wakefulness. (g) The individual should develop the awareness that together with the sunset sleep time approaches (1, 7).

Education is necessary for the development of cognitive psychology in relation to learning physiology and these take many years (8). Practical studies concerning how education should be delivered are ongoing and recent studies demonstrate that music education strongly improves the intellectual, social and creative potentials of children (9). Music education furthermore develops speaking, reading, attention, concentration and empathy skills (10-11). By employing techniques like fMRI (functional Magnetic Resonance Imaging) and EEG (Electroencephalography), researches try to better understand what happens in the brain during music education (12). For example, these techniques help us understand that music education makes neural connections stronger, increases the amount of gray matter, results in better information processing, enables higher Intelligence Quotient (IQ) scores, improves motor coordination, memory and attention functions (12-13). Sleep rhythm (NREM-REM) that regulates human behavior and has similar benefits of music education for brain; this motivated us to try to better understand the relationship with academic success and sleep quality of students getting music education. With the aim of understanding this relationship in detail and considering that programs for vocational music education would be more distinguishing, we chose students of Music Instructor Undergraduate Programs (MIUP). The main reason for choosing these schools' students was that they had a program in which perceptual and motor skills (such as musical memory) were used prominently. MIUP are composed of many courses that have cognitive and kinesthetic content allowing for analyzing the relationship between sleep and academic performance of students from different perspectives. When we analyze the content of Musical Hearing Writing Reading course, we see that the topics are very comprehensive (the generation of sound and its basic characteristics, perception of sound, tone, chord, tempo, bar, scale, tone, mode, solfege, write a rhythm and melody dictation etc.) (14-16) in the context of this course, the teaching of several theoretical and practical basic information and skills are aimed at. Piano instruction process is one of the most important courses of MIUP; it is defined as a multidimensional and complex process that entails the development of cognitive, perceptive and kinesthetic skills (17). With the pedagogical formation courses included in MIUP curriculum, the students are provided with teachings of profession related information and skills; in the context of music field courses, they learn how to teach the information and skills they have acquired. From a general perspective, in order for a student to succeed in the MIUP program, she needs to be mentally, cognitively and physically

healthy throughout the whole training-education process and she needs to cover all courses as well as all extracurricular work with utmost concentration and attention. In this regard, MIUP makes it possible to analyze the effects of sleep quality on academic performance from a broader perspective. We hypothesize that sleep disturbances of the MIUP students, where perceptual and motor skills are used prominently compared to other university students, can directly affect the academic performance.

METHODS

Design and setting

Prospective analysis of data collected at Harran University, Music Department, Urfa, Turkey. Local ethics committee of the Erzurum Regional Training and Research Hospital approved this study with an approval number of 2018/ 11-78.

Study participants

In accordance with the declaration of Helsinki, a total of 132 volunteer students [M/F, 70/62; Mean age (\pm SD), 23.5 \pm 3.2 years] participated in the study. Academic performances of students with good and poor sleep quality was compared as well as comparing sleep qualities of students with good and bad academic performance (over 1 year).

Materials

Sleep quality was assessed with Pittsburgh Sleep Quality Index (PSQI); those having a PSQI score of 5 or higher were regarded as having poor subjective sleep quality while those with a score of less than 5 were regarded as good. PSQI is a questionnaire that evaluates sleep quality with questions asked in 7 main topics: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disorders, use of sleeping medicine and daytime functions. Its validity and reliability have been internationally accepted. Academic performance was assessed with the help of the academic transcripts of the students. On a score system of 5, mean grade point average (GPA) (Mean \pm SS) was 2.3 \pm 0.5; a GPA of above this mean was defined as good academic performance and one below this mean was defined as academic jeopardy.

Statistical analysis

Academic performances of students with good and poor sleep quality was compared as well as comparing sleep qualities of students with good and bad academic performance by utilizing Sample t test and Yates Chi-square.

RESULTS

Of the 132 volunteers, 44 had (33.3%) good sleep quality, 88 had (66.6%) poor sleep quality. Students with good sleep quality (n=44) performed better academically ($p=0.007$). 90.3% of students (n=31) who had low academic performance (GPA: 2.2 \pm 0.5) had poor sleep quality, of the students with good academic performance (GPA: 2.4 \pm 0.4) (n=101) 59.4% had poor sleep quality ($p=0.003$) (Table 1; Table 2).

When a comparison was made based on poor sleep quality, there was a statistically significant difference between academic performances ($p<0.005$). 90.3% of the students who had

Table 1: Comparison of Grade Point Averages based on Sleep Quality.

| | Poor sleep quality | | P* |
|---------------------|----------------------------|----------------------------|------|
| | Absent (n=44) | Present (n=88) | |
| Grade Point Average | 2.4 ± 0.4 2.4 (1.7-3.4) | 2.2 ± 0.5 2.2 (1.0-3.6) | .007 |

Independent Samples t Test
Grade point averages differed significantly depending on sleep quality ($p < 0.05$). Students with good sleep quality were seen to have better academic performance.

Table 2: Comparison of Academic Performance Based on Poor Sleep Quality.

| | | Academic Performance Status | | P* |
|--------------------|---------|-----------------------------|--------------------|------|
| | | Success (n=31) | Failure (n=101) | |
| Poor Sleep Quality | Present | 3 (9.7%) | 41 (40.6%) | .003 |
| | Absent | 28 (90.3%) | 60 (59.4%) | |

* Yates Chi-square

academic failure had poor sleep quality, among those who were academically successful, 59.4% had poor sleep quality (Figure 1).

Academic failure due to poor sleep quality was 6.38 times higher than academic failure associated with good sleep quality (Odds Ratio=6.378, 95%CI= 1.818-22.376).

DISCUSSION

In this study, by comparing subjective sleep scores and GPAs of MIUP students, who use prominently perceptual and motor skills compared to other university students, we aimed at understanding the effects of sleep quality on academic performance; seeing high academic performance in students who receive music education made us think that these students either respect or make the effort to respect sleep hygiene rules.

Sleep hygiene (behavioral factors) is important for academic success and mental development. Indeed, higher GPAs have been shown to be associated with earlier getting up times (18-19). Gray and Watson interpreted this relationship in light of additional evidence that higher GPAs were related to personality variables such as conscientiousness, stating that "early risers tend to be more disciplined, achievement-oriented individuals than evening types." Experimental studies indicate that partial or total sleep deprivation is associated with decrements in cognitive functioning (20-21). Outside the laboratory, evidence has accrued that individuals who report naturally occurring sleep deficits and who are involved in demanding activities, such as long-distance drivers and shift workers, suffer adverse effects. Young people are at risk due to the ill effects of sleep deprivation. Total sleep time decreases across the adolescent years, largely due to increasingly later bedtimes (22-25). Morning fatigue is commonly reported among young adults (26) and 15% of college students experience poor sleep quality (27). All these experimental groups remind us of the behavioral factors of sleep activity, namely the rules of sleep hygiene. Learning and memory (most needed for academic performance) functions of the brain and sleep activity is closely related (28). Inadequate sleep or sleep deprivation causes problems like attention deficits and memory problems in individuals during daytime. In our study we

made a comparison between GPAs and sleep activity. Students with good sleep quality were found to have higher GPA scores and the difference was statistically significant ($p < 0.05$). The high academic success scores of music education students with high sleep quality have shown that these students comply with or try to comply with sleep hygiene rules. It was found in academically failure students with good sleep quality, but the fact that rate of academically failure students with poor sleep quality was higher than these students (Odds Ratio=6.378, 95% CI= 1.818-22.376) once again emphasized the importance of sleep quality.

Limitations and Future Directions

Our correlational design permits no inferences of a causal nature concerning the association between sleep quality and academic performance. Another limitation is that students were aware that the study concerned relations between sleep quality, sleep propensity, and academic performance. Their expectations concerning such relations may have affected our findings. We further recommend that research employing standardized measures of sleep such as Pittsburgh Sleep Quality Index include a measure of socially desirable responding, such as the Paulhus Deception Scales (29). In our future studies, we want to use polysomnography and multiple sleep latency tests (1), including sleep EEG, and reveal more electrophysiological findings.

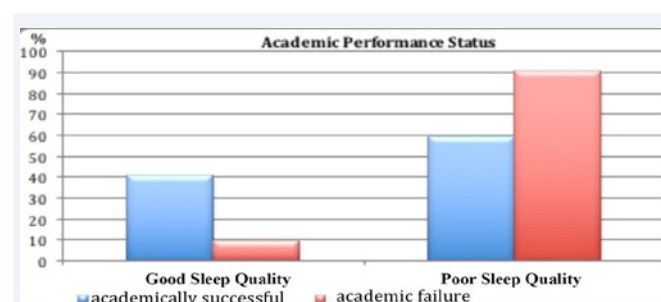


Figure 1 Comparison of GPA with poor sleep quality (GPA: Grade Point Average).

CONCLUSION

Attention should be paid to sleep hygiene, which plays an important role in determining the quality of sleep in high schools and universities where academic performance is high, such as music education where perceptual and motor skills are developed.

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