

# The Physical Activity Level Of Medical Students Does Not Correlate With Their Sleep Quality And Excessive Daytime Sleepiness (EDS)

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**Abstract.** One of the main causes of non-communicable diseases is an unhealthy lifestyle. One of the examples is a lack of physical activity. Physical activity is important for good sleep quality and prevents excessive daytime sleepiness (EDS), which can interfere with productivity. This observational analysis with a cross-sectional study approach aims to determine the relationship between the level of physical activity and sleep quality and excessive daytime sleepiness in medical students at the faculty of medicine, Universitas Brawijaya. 444 respondents were included in this study. The level of physical activity was measured using the short version of the International Physical Activity Questionnaire, sleep quality was measured with the Pittsburg Sleep Quality Index (PSQI), and EDS was measured with the Epworth Sleepiness Scale (ESS). The results showed that 230 (51.8%) respondents had moderate levels of physical activity, 286 students (64.4%) had poor sleep quality, and 291 students (65.5%) did not experience EDS. The results of the Chi-square correlation test showed p-values of 0.508 and 0.470 for the relationship between physical activity, sleep quality, and EDS, respectively. It can be concluded that there is no significant relationship between the level of physical activity and sleep quality, and EDS. Further study with many other factors needs to be done to determine the contributing factors to sleep quality and EDS.

## 1 Introduction

Non-communicable diseases caused 40.5 million global deaths in 2016. This is due to changes in lifestyle, environment and technology that have shifted the pattern of non-communicable diseases as the highest cause of death globally [1]. And lack of physical activity is also a risk factor for non-communicable diseases [2].

Physical activity affects various aspects, both physical and psychological aspects. Physically physical activity affects cardiovascular health, and psychologically good physical activity regulates neurotransmitters and hormones well. Proper regulation of neurotransmitters affects sleep through melatonin or stress through endorphins and cortisol [3].

This study focuses on medical students with a heavy study load and high academic hours that impact their physical activity. Existing research from the University of Sebelas Maret, 15.24% have a low level of physical activity, and from the University of Brawijaya, 60% have a low level of physical activity [4,5]. This becomes a problem in itself because, in the future, medical students are role models for society in healthy living, so it is essential to maintain physical activity to have good quality sleep that avoids EDS.

Considering that there has been no research discussing this before, it is necessary to know the effect level of physical activity on sleep quality and EDS.

## 2 Material and Methods

This research is an analytic observational with a cross-sectional study approach. The subjects in this study were students of the Medical Education Study Program, Faculty of Medicine, Universitas Brawijaya batch 2015 - 2020 (Levels 1 – 5), with exclusion criteria if the respondent did not fill out the questionnaire completely or had a physical disability so that it could hinder the activities carried out.

Data collection was carried out online using Google Forms to meet the needs of calculating a minimum sample size of 370. The instruments used were demographic data questionnaires (name, gender, age, generation), the International Physical Activity Questionnaire-Short Form (IPAQ-SF) questionnaire for physical activity level variable, the Pittsburg' Sleep Quality Index (PSQI) questionnaire for sleep quality, the Epworth Sleepiness Scale (ESS) questionnaire for EDS. The research data were analyzed statistically using the SPSS 26 for the windows program with the Chi-Square correlation test.

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**Table 1. Characteristics of Respondents**

Characteristic	Frequency (n)	Percentage (%)
Gender		
Male	142	32
Female	302	68
Age		
17-19	158	35.6
20-22	275	62.0
≥ 23	11	2.4
Study Program		
Bachelor of Medicine	405	91.2
Clinical Rotation	39	8.8
Medical Education Level		
1st year	97	21.8
2nd year	134	30.2
3rd year	173	39.0
4th year	27	6.1
5th year	13	2.9
Physical Activity Level		
Low	121	27.3
Moderate	230	51.8
High	93	20.9
Stress Level		
Low	128	28.8
Moderate	279	62.9
High	37	8.3
Quality of Life		
Low	30	6.8
Moderate	186	41.9
High	228	51.3
Sleep Quality		
Good	158	35.6
Bad	286	64.4
Excessive Daytime Sleepiness		
Lower normal	80	18
Higher normal	211	47.5
Mild	67	15.1
Moderate	61	13.7
Severe Excessive	25	5.6

### 3 Result and Discussion

There of 444 respondents who matched the criteria for inclusion and exclusion where participants were studied. The description of the results is presented in Table 1.

Respondents were dominated by the female sex, 302 people (68%). The majority of respondents came from third-year students (39%), with the most extensive age distribution being 20-22 years (62%). Most of the students had moderate levels of physical activity (51.8%), poor sleep quality (64.4%), and did not have EDS (65.5%).

The questionnaire results found that students dominated the respondents with moderate levels of physical activity with poor sleep quality (34.7%) and moderate levels of physical activity without EDS (34%). The Chi-Square test was used to determine the relationship between the level of physical activity with the dependent variables, namely, sleep quality and EDS. From the analysis results, P-value > 0.05 was obtained for all variables, so there was no significant relationship between physical activity levels with sleep quality and EDS of Medical Students of Brawijaya University.

The research respondents generally represent the student population of Brawijaya University's Medical

students, which are mainly female, with the majority of respondents aged between 20-22 years, similar to Paramita (2010), who stated that the average undergraduate student in Indonesia is in the age range of 18 to 24 years [6].

#### 3.1 Physical Activity Levels

At the level of physical activity, most respondents engage in moderate levels of physical activity. These results are also supported by research conducted on the University of Indonesia's third-year medical students, which showed that most respondents had moderate physical activity levels [7]. However, it is different from research on medical students at Udayana University, where 40 majorities of activity levels [8]. However, even so, it is expected that medical students have a high level of physical activity by the WHO's recommendations; namely 3000-4000 MET per week [9]. This can happen because each individual's level of physical activity can be positively influenced by culture, influence, and family support and support from friends or sports partners, or negatively influenced by medical students who make academic matters a top priority [10].

**Table 2.** Relationship between Physical Activity Levels with Sleep Quality

Sleep Quality	Physical Activity Levels			P-value
	Low	Moderate	High	
Good	46 (10.4%)	76 (17.1%)	36 (8.1%)	0.508
Bad	75 (16.9%)	154 (34.7%)	57 (12.8%)	

**Table 3.** Relationship between Physical Activity Levels with Excessive Daytime Sleepiness

Excessive Daytime Sleepiness	Physical Activity Levels			P-value
	Low	Moderate	High	
Yes	38 (8.6%)	79 (17.8%)	36 (8.1%)	0.470
No	83 (18.7%)	151 (34.0%)	57 (12.8%)	

### 3.2 Sleep Quality

The quality of sleep majority of respondents has poor sleep quality. In line with research on Andalas University, medical students 56% had poor sleep quality. This can happen because students lack adapting, both managing and efficient use of time, especially in processing problems. After all, it can be separate distress that can trigger poor sleep quality [11].

The analysis results found that physical activity did not have a significant effect or relationship with sleep quality. This is different from Baso's research which says that there is a relationship between physical activity and one's sleep quality and is supported by Fakihan's research (2016) [12]. However, research explains that factors can affect sleep quality, especially age and health conditions [13].

This research is supported by research on medical students at the University of North Sumatra, which states that physical activity does not significantly affect sleep quality [14]. Differences in research results from several other studies can be caused by differences in population both in terms of number and situation, and characteristics, especially in medical students. This is supported by research by Haryati (2020), which states that physical activity does not significantly affect sleep quality. However, in Haryati's research, it was found that the factors that have a major influence on sleep quality in medical students are emotional stress (p-value = 0.021) and sleep patterns (p-value = 0.019) [15]. It was also explained that health, environmental, and emotional factors are also several elements that can have an impact on a person's sleep quality [16].

### 3.3 Excessive Daytime Sleepiness

In this study, the majority of respondents did not have excessive daytime sleepiness. The findings of this study are consistent with previous research conducted by Shen (2019), which said that only 24.6% of all respondents had EDS [17]. This is explained in Bambangafira's research (2017), which explains a significant increase in awareness of the importance of sleep and time efficiency by comparing junior and advanced students [16].

The analysis found that physical activity did not have a significant effect or relationship with excessive daytime sleepiness. This is different from the research by McClain (2014), which state that there's an interface between physical activity and EDS [18]. The research may differ from the results obtained by researchers due to differences in the number of respondents, situations or characteristics, especially customs and habits between Asians and Europeans.

This study is supported by research from Butner in 2013, which said that exercise and physical activity had no relationship to EDS [19]. Theorell-Haglow research also says that fatigue is more associated with EDS, while physical activity and exercise are not directly related to EDS [20]. He is supported by research by Shimamoto (2021), who suspects a negative effect of increasing physical activity on mental health and EDS in college students. This is because related physical activities such as part-time work and competitive sports are considered stressors that harm mental health and EDS [21]. This is also supported by research by Seravine (2019), which states that the main factors that can affect the results of EDS are body mass index (BMI), sleep duration and depression [22]. This proves that the physical activity's level of someone is not the only factor that significantly influences EDS. Other factors that can influence include neurological disorders, circadian rhythms, sleep deprivation, psychiatric disorders, drugs, and metabolic disorders [23].

## 4 Conclusion

Medical students of the Faculty of Medicine, Brawijaya University, have moderate physical activity levels, poor sleep quality and do not experience EDS. No significant relationship was found between the level of physical activity, sleep quality, and EDS. There are allegations of other factors affecting the dependent variable, which have not been studied in this research.

### Authors' Contributions

YK carried out the concept of the studies, led the studies, and drafted the manuscript. SU and DA were in charge of data collection, analysis, and manuscript writing. RR was

in charge of coordination and design, as well as helping draft the manuscript. All authors read and approved the final manuscript.

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## Ethical Clearance Statement

All subjects participated voluntarily and received a small compensation. The participant provides their written agreement and consent to participate in the research. The ethics committee of Universitas Brawijaya's School of Medicine gave their approval to the study.

## References

1. World Health Organization, *Non-communicable diseases: Risk factors*, (2020)
2. World Health Organization, *Obesity and overweight*, (2020)
3. R.E. Stevens, D.L. Loudon, D.A. Yow, W.W. Bowden, J.H. Humphrey, *Stress in College Athletics: Causes, Consequences, Coping*, (Routledge 2013)
4. H.S. Utomo, S. Handayani, N. Wiyono, *Hubungan Aktivitas Fisik dengan Kapasitas Memori Kerja pada Mahasiswa Program Studi Kedokteran Universitas Sebelas Maret*, Nexus Kedokt Komunitas, **5**(2), 1–11 (2016)
5. Y.K. Riskawati, E.D. Prabowo, & H. Al Rasyid, *Physical Activity Level of The Second, Third, and Fourth Years Students at Study Program of Medicine*, 26–32 (2016).
6. G.V. Paramita, *Studi Kasus Perbedaan Karakteristik Mahasiswa di Universitas 'X'-Indonesia dengan Universitas 'Y'-Australia*, Humaniora **1**(2), 629 (2010)
7. S. Candrawati, Kedokteran J, Kedokteran F, Kesehatan I-I, Soedirman UJ, *Hubungan Tingkat Aktivitas Fisik Dengan Indeks Massa Tubuh (Imt) Dan Lingkar Pinggang Mahasiswa*, Soedirman J Nursing, **6**(2), 112–8 (2011)
8. N.K. Febriyanti, I.N. Adiputra, I.W.G. Sutadarma, *Hubungan indeks massa tubuh dan aktivitas fisik pada mahasiswa fakultas kedokteran Universitas Udayana*, J. Med Udayana, 1–14 (2015)
9. World Health Organization, *Global Recommendations of Physical Activity for Health*, (2010)
10. A. Wattanapisit, K. Funthongcharoen, U. Saengow, S. Vijitpongjinda, *Physical Activity Among Medical Students in Southern Thailand: A mixed methods study*, BMJ Open, **6**(9), (2016)
11. H. Nilifda, N. Nadjmir, H. Hardisman, *Hubungan Kualitas Tidur dengan Prestasi Akademik Mahasiswa Program Studi Pendidikan Dokter Angkatan 2010 FK Universitas Andalas*, J. Kesehatan Andalas, **5**(1),243–9 (2016)
12. M.C. Baso, F.L.F.G. Langi, S.A.S. Sekeon, *Hubungan Antara Aktivitas Fisik Dengan Kualitas Tidur Pada Remaja Di Sma Negeri 9 Manado*, Kesmas, **7**(5):5–10 (2019)
13. A. Fakihan, *Hubungan Aktivitas Fisik Dengan Kualitas Tidur Pada Lanjut Usia* Publikasi (2016).
14. S.S.N. Bulan, *Hubungan Aktivitas Fisik Selama Pandemi COVID-19 dengan Kualitas Tidur Mahasiswa Fakultas Kedokteran Universitas Sumatera Utara*, (2021)
15. H. Haryati, S. Patma Yunaningsi, RAFJ. *Faktor Yang Mempengaruhi Kualitas Tidur Mahasiswa Fakultas Kedokteran Universitas Halu Oleo*. **26**(11):272–82 (2020).
16. A. Abuelo, J. Hernández, J.L. Benedito, C. Castillo, *The importance of the oxidative status of dairy cattle in the periparturient period: Revisiting antioxidant supplementation*, Journal of Animal Physiology and Animal Nutrition, **99**(6): 1003–1016 (2015) <https://doi.org/10.1111/jpn.12273>
17. Y. Shen, F. Meng, S.N. Tan, Y. Zhang, E.C. Anderiescu, R.E. Abeysekera, *et al.*, *Excessive daytime sleepiness in medical students of Hunan province: Prevalence, correlates, and its relationship with suicidal behaviors*, J. Affect Disord. **255**(May):90–5 (2019)
18. J.J. McClain, D.S. Lewin, A.D. Laposky, L. Kahle, D. Berrigan, *Associations between physical activity, sedentary time, sleep duration and daytime sleepiness in US adults*, Prev. Med. (Baltim), **66**:68–73 (2014)
19. K.L. Butner, T.A. Hargens, A.S. Kaleth, L.E. Miller, D. Zedalis, W.G. Herbert, *Association of obstructive sleep apnea severity with exercise capacity and health-related quality of life*, N. Am. J. Med. Sci. **5**(6):362–6 (2013)
20. J. Theorell-Haglöw, E. Lindberg, C. Janson, *What are the important risk factors for daytime sleepiness and fatigue in women? Sleep*, **29**(6):751–7 (2006)
21. H. Shimamoto, M. Suwa, K. Mizuno, *Relationships between depression, daily physical activity, physical fitness, and daytime sleepiness among japanese university students*, Int. J. Environ Res. Public Health, **18**(15), (2021)
22. C. Seravine, N.A. Prastowo, *Faktor-Faktor Yang Memengaruhi Excessive Daytime Sleepiness Pada Mahasiswa Fakultas Kedokteran Dan Ilmu Kesehatan Universitas Katolik Indonesia Atma Jaya*, **18**(2), 58–66 (2019)
23. J.M. Shneerson, *Sleep Medicine: A Guide to Sleep and its Disorders*, Journal of Chemical Information and Modeling, **2** p332, (2009).