Original Research Article

Journal of Public Health Research

Factors on medical clerkship students' quality of life: A survey study

Journal of Public Health Research
2024, Vol. 13(4), 1–7

DOI: 10.1177/22799036241301705
journals.sagepub.com/home/phj
Sage

Yunisa Astiarani[1], Kevin Kristian[1], Anthony Ekaputra[1] and Nicholas Hardi[2]

Abstract

Introduction: Due to the higher demand for healthcare provision in Indonesia, increasing the number of medical schools in Indonesia was highly encouraged. Meanwhile, medical students were considered a susceptible population to a variety of issues that negatively impact their quality of life (QOL) in comparison to the general community.

Objectives: The study aims to assess the QOL of Indonesian medical students during the clinical clerkship program (years 4–5) of their medical training while also exploring the association between the results and their ongoing rotation.

Methods: The survey was conducted online to 311 students at a private medical school in Jakarta using the Indonesian version of WHOQOL-BREF. Participants' characteristics, sleep duration, physical activity, and smoking history were also assessed to see if there was any association. Results: 82% of 311 registered clerkship students responded to the survey. In terms of overall QOL, being in a major department, 7–9 h of sleep duration, and owning a private vehicle increased the QOL.

Conclusion: This study suggested that medical schools' policies may consider sleep duration, travel time, transportation-related infrastructure, and social-related infrastructure to underpin students' social relationships and, afterward, improve their QOL in intangible ways.

Keywords

Quality of life, clinical clerkship, medical education, Indonesia, medical student

Date received: 10 August 2023; accepted: 1 November 2024

Introduction

As part of Indonesia's health reform, the Indonesian Ministry of Health collaborated with the Ministry of Education, Culture, Research, and Technology have agreed to increase the number of students enrolled in medical schools.[1,2] Historically, the challenge of increasing medical students in Indonesia can be traced back to the recognition of an insufficient doctor-to-patient compared to World Health Organization (WHO) standards. The issue has been a focal point in healthcare policy since at least the early 2000s. Based on a review by the World Health Organization regarding the health system in Indonesia in 2017, the proportion of patient-to-doctor in Indonesia has not been sufficient to meet the WHO recommendation, considering Indonesia's huge number of populations, and the still co-existing health discrepancies.[2–4] Consequently, as a part of the governmental strategies to overcome the shortage, increasing the enrollment quantity of medical schools in Indonesia was highly encouraged.[3,5]

The low doctor-to-patient ratio highlights the imbalance between healthcare demand and the supply of qualified professionals, which has significant implications for healthcare delivery and public health outcomes. Unfortunately, the implementation process of the decision came with

[1]Department of Public Health and Nutrition, School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, Jakarta, Indonesia
[2]Department of Psychiatry, School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, Jakarta, Indonesia

Corresponding author:
Kevin Kristian, School of Medicine and Health Science, Atma Jaya Catholic University of Indonesia, Jl.Pluit Raya, No. 2, RT.21/RW.8, Penjaringan, Pluit, Jakarta 14440, Indonesia.
Email: kevin.kristian@atmajaya.ac.id

several issues, such as a severe lack of logistical services, shortfalls of the essential improvements required in the medical education system, and poor educational facilities. Accordingly, preparedness in the medical education system on behalf of the policy was essential to producing graduates of remarkable quality.[6–8] Theoretical perspectives on educational reform suggest that systemic improvements and resource allocation are critical to achieving the desired outcomes in student quality and healthcare delivery. Key concepts such as medical student quality of life (QOL) and mental health are crucial in understanding the challenges faced by students in this context. Issues regarding mental health have also been an occurring problem among medical students in Indonesia, which later, in addition to the lack of an adequate educational system, further deteriorates their well-being.[9–11] A study conducted in China has revealed that medical students are considered a susceptible population to various issues, including increased pressure to find employment after graduation, subpar living and learning conditions, and other psychological problems that negatively impact their QOL compared to the general community.[12]

QOL in medical students is a multidimensional concept encompassing physical, psychological, and social aspects. Pursuing a medical degree has been widely perceived as difficult, including by medical students. Studying medicine requires a longer duration of time, which is also pushed by pressures, which can lead to serious consequences.[9,13,14] Rahmi et al. have reported negative implications that have occurred among medical students concerning the disruption of their mental health.[13] In general, medical students should face several adaptations, mainly in their role as qualified medical personnel, with both direct and indirect expectations and responsibilities, as well as a variety of stressors, namely examinations and long hours of study.[9,15] The theoretical perspective here emphasizes the role of stress and adaptation in academic and professional development, suggesting that high stress can negatively impact both mental health and educational outcomes. In a cross-sectional study by Chakladar et al., many students in the United States reported problems related to their physical and mental health, school and social dysfunctionality, as well as career prospects that were higher during the pandemic than ever before.[16]

The history of research on medical student well-being has highlighted a consistent trend of elevated stress and mental health issues, especially during clinical training. Transitioning from undergraduate students to the apprenticeship phase through the clinical rotations in hospital-based education has been burdensome for sophomore medical students.[9] Related to that matter, several studies about the clinical clerkship students reported a higher level of stress than the undergraduates.[13,15,17] The alteration in educational settings has become the main struggle for students. Pressures from their newly added responsibilities, long work hours and schedules, poor relationships with supervisors, staff, and colleagues, and difficult clinical events and patients have also been common among the students.[13,15,18] Further deterioration of their well-being has also been linked specifically to their poor physical and mental conditions.[18,19]

Addressing well-being, including QOL issues among medical students, is essential to produce a qualified medical doctor. The importance of a robust medical curriculum is underscored by the need to integrate social accountability, as highlighted by Shrivastava et al., emphasizing that such integration enhances medical education and ensures the relevance of healthcare delivery to societal needs.[20] In addition to the COVID-19 pandemic, medical students' well-being has declined, especially for those in clinical settings.[11,21] Regarding that matter, factors that affect medical students in clerkship programs must be fully understood. As duties and tasks differ among each clinical rotation, it may be one of the factors that should be considered. Unfortunately, studies about QOL among Indonesian medical students are scarce. Although similar studies have previously been done during the pandemic, those studies have not been conducted among medical students in their final years with higher academic pressures and expectations of clinical rotations, who have been reported to be more susceptible to stress.[12,22,23] Therefore, the study aimed to assess the QoL of Indonesian medical students in Jakarta during their clinical clerkship program (years 4–5) of their medical training using the Indonesian version of WHOQOL-BREF. The study also aimed to explore the association between QOL outcomes and their ongoing rotations and to identify the predictors of QOL and their relationship with sociodemographic characteristics, including age, gender, and socioeconomic status.[24,25]

Methods

Participants and data collection procedures

This study was a survey-based observational study. The survey was conducted in January 2023 among medical students in clinical clerkships at a private medical school in Jakarta. In Indonesian medical schools, medical education is divided into two phases: (i) the medical education phase, in which students take courses like other majors. The courses take place on campus for 3.5 years; (ii) the second phase is the clinical rotation or clerkship phase (usually lasts four semesters), in which students have to complete clerkships in major departments (Internal Medicine, Surgery, Pediatrics, Gynecology, and Public Health) and minor departments (Dermatology, Ophthalmology, Otolaryngology, Radiology, Anesthesiology, Neurology, Forensic Medicine, Psychiatry, and Dentistry). At this medical school, the clerkship lasts 9 weeks in the major department and 4 weeks in the minor department. Despite the general similarities between the curricula of medical

schools in Indonesia, there are minor differences in courses and credit to be given.

Eligibility criteria

The inclusion criteria included all active clinical rotation students (311 students) who could take the survey online. Student participation was voluntary, and the survey was anonymous. Students with chronic conditions and major psychological problems that affect their QOL were excluded from the study. Students were informed that the research results would be available to medical education decision-makers. To ensure the anonymity, confidentiality, and privacy of the subjects, the study implemented several safeguards throughout the data collection and handling process. Participants were informed about the study's purpose, procedures, and their right to withdraw at any time, and they provided free and informed consent through an online consent form before participation. Access to the data was restricted to the principal investigator and a small team of authorized research staff, all of whom signed confidentiality agreements. Data analysis was conducted using de-identified datasets to ensure confidentiality further, meaning that no information could be traced back to individual participants. The study protocol included a data destruction plan, where all collected data will be permanently deleted 1 year after the publication of the study findings, following ethical guidelines, and institutional policies. The institutional ethics committee of the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, has approved this study.

Measures

The outcome variable in this study is the QOL assessed by the World Health Organization QOL Brief Version (WHOQOL-BREF).[25] The questions in the questionnaire are statements about the QOL, health, and well-being. In this study, the Indonesian version of the WHOQOL-BREF was used, which consists of 26 questions about perceptions of health and well-being in the past 2 weeks. Questions were answered on a Likert scale of 1–5, with one representing "disagree" or "strongly disagree" and five representing "strongly agree." WHOQOL-BREF includes four domains, each with specific aspects: (1) Physical health, (2) Psychology, (3) Social relationships, and (4) Environment. In addition, two separate questions were explicitly related to a person's overall perception of health and QOL.[25] The overall score would be assessed as numerical variables and categorized based on data distribution.

The degree of internal consistency of Indonesian WHOQOL-BREF was measured by Cronbach's α-coefficient, which resulted in 0.928 for the questionnaire as a whole, 0.775 for the physical health domain, 0.832 for the mental health domain, 0.710 for the social relations domain, and 0.827 for the environmental domain. Since Cronbach's α-coefficient of >0.7 is considered a desirable reliability estimate, these results indicate good internal consistency for the domains tested.

Participant characteristics, including sex, age, the current status of clinical rotation (department and cycle sequence), living situation (with parents, in a dormitory, in a rented flat, or "other"), origin (capital or outside the capital), physical activity, and sleep duration were collected using a checklist. Physical activity was assessed by asking how often the respondent engaged in daily 30 min of moderate physical activity (e.g. running, walking, swimming, bicycling, or other activities that increase heart rate to some degree); the response was categorized as yes or no. Sleep duration was categorized as less than 7 h, 7–9 h, and more than 9 h.[22,23]

Data analysis

Data analysis was carried out using STATA version 15. For statistical analysis, before the data was summarized and analyzed, the internal consistency and reliability of the Indonesian questionnaire were tested using Cronbach's α coefficient. Descriptive data was presented in terms of frequency distributions, proportions, measures of central tendency, and measures of variability (standard deviation (SD); range). The test for the normality of the data was performed using the Kolmogorov-Smirnov test. Student's t-test, chi-square test, and one-way analysis of variance (ANOVA) were used for bivariate analysis, depending on the tests' assumptions. The significance level was set at 5%, and the study employed 95% confidence intervals.

Results

Of the 311 registered clerkship students, 255 responded to the online survey (82%). Of the 255 students, 243 (95.3%) were still active in clinical rotations during the survey period and the last 2 weeks. Twelve students (4.7%) had completed their clerkship during the survey period; therefore, these 12 students were excluded from the analysis of quality-of-life scores to avoid bias.

The characteristics of the clerkship students included in this study are shown in Table 1. The mean age of the students was 23.60 ± 1.00 years, with the youngest student being 21 years old and the oldest 28 years old. Female students outnumbered male students (65.1%). Most students were from the capital and its surroundings (63.5%), lived alone in boarding houses or apartments (60.8%), and mostly walked to the hospital (47.2%). In the last 2 weeks, 55.7% of the students were in the major departments, 39.6% were in the minor departments, and 4.7% had completed the clinical rotation. Since most students are in major departments, 55.3% are on night duty. About 86.7% of students do less than three times a week of physical activity, and 70.6% have fewer than 7 h of sleep.

Table 1. Clerkship student's characteristics.

Characteristics	n	%	Mean ± SD*	Min-Max
Age (Years)	255	100	23.60 ± 1.00	21–28
Gender				
Male	89	34.90		
Female	166	65.10		
Origin				
Capital	162	63.50		
Outside capital	93	36.50		
Living arrangements				
With family	97	38.00		
Live alone	155	60.80		
Sharing	3	1.20		
Transportation				
Personal vehicle	91	35.70		
Public transportation	44	17.30		
Walk	120	47.10		
Departments				
Major	101	39.60		
Minor	142	55.68		
Finish	12	4.70		
Night duty				
Yes	141	55.30		
No	114	44.70		
Moderate physical activity				
Less than 3 times/week	221	86.70		
≥3 times/week	34	13.30		
Sleep duration				
<7 h	180	70.60		
7–9 h	72	28.20		
>9 h	3	1.20		

*SD = Standard Deviation.

The QOL score was assessed by dividing it according to the clinical rotation department in which they worked. This consideration was made because there were significant differences between the activities in the major and minor departments, including night duty, scientific assignments, and exam intensity. The results of the comparative test of the QOL scores in each domain (physical health, mental health, social relationships, and environment) are shown in Table 2. The comparative test results showed that the average scores of overall QOL, social relationships, and environment domains were significantly higher for students in major departments than their counterparts.

The multiple linear regression analysis was performed on the overall QOL and each domain. The independent factors included in the analysis were assessed by bivariate analysis on each factor using either an independent t-test or one-way ANOVA. The factors included in the analysis if they had a value of $p < 0.25$ and had no multicollinearity. The result of multiple linear regression is presented in Table 3.

The analysis results show that in the overall QOL, being in a major department increases the QOL score by 15.2 units ($p < 0.05$), sleep duration of 7–9 h increases by 14.55 -unit score ($p < 0.05$), and owning a private vehicle increases the score per unit 19.64 ($p < 0.05$). In the physical and psychological health domains, sleep duration of 7–9 h increased by 6.53 unit scores ($p < 0.05$) and 4.42 unit scores ($p < 0.05$), respectively. In the social relationship domain, owning a private vehicle increases the unit score of 6.52 ($p < 0.05$). In contrast, being in a major department in the environment domain increases the unit score of 6.21 ($p < 0.05$).

Discussion

To date, different regions have investigated various predictors of medical students' QOL. Other predictors may have later impacted QOL, even though many published studies have documented how mental health becomes the most significant predictor. However, only a few studies have looked specifically at other predictors in Indonesia.[26,27]

To find predictors that can serve as a foundation for the ongoing development of the medical school, this study explored the relationship between those predictors and highlighted the association of sociodemographic characteristics with the QOL of Indonesian medical students in a novel way. This study explored some predictors, including age, gender, origin, living arrangements, transportation, departments, night duty, physical activity, and sleep duration. Based on the sociodemographic traits, we found a discreet predominance of females, reflecting the growing presence of women in medicine.[27,28] Numerous studies regarding QOL have highlighted the prominent participation of females in their studies. However, we have not found any difference in QOL between genders from the multiple logistic regression model. This is similar to a study in Jakarta that found gender does not impact QOL in medical students.

This study found that most students were from the capital and its surroundings, lived alone in boarding houses or apartments, and mostly walked to the hospital. It provides valuable information about the living environment of our medical students who migrate from rural areas to achieve education in urban settings. Nevertheless, the QOL between students outside and inside the capital is quite the same. It is similar to a study in Brazil that shows no significant impact on QOL between students who live outside and inside the city where the university is located.

From the multiple linear regression model, a factor that is affecting medical students' QoL, especially in overall and environmental domains, is the type of department they are enrolling in. Being in a major department increases the overall QOL and environment domain score by 15.2 units

Table 2. Comparative results of QOL and its domains according to the clinical rotation department.

QOL and domains	Clinical rotation department		Mean differences	p**
	Major	Minor		
	Mean ± SD*	Mean ± SD*		
Overall QOL	252.98 ± 47.25	241.77 ± 49.51	−11.21	0.038
Domains				
Physical health	64.27 ± 14.25	64.02 ± 12.61	−0.24	0.445
Psychological	58.42 ± 16.06	55.87 ± 15.80	−2.55	0.110
Social relationship	60.93 ± 13.84	57.88 ± 14.21	−3.05	0.047
Environment	69.34 ± 12.67	63.99 ± 15.57	−5.35	0.002

QOL = Quality of Life; SD = Standard Deviation; **$p < 0.05$ = Significant Level.

Table 3. Multiple linear regression analysis on factors affecting QOL.

Variables		QOL domains			
	Overall QOL	Physical health	Psychological	Social relationships	Environment
	Std Coeff.	Std Coeff.	Std Coeff.	Std Coeff.	Std Coeff.
Department					
Minor	Ref.	Ref.	Ref.	Ref.	Ref.
Major	15.20*	2.54	4.19	2.26	6.21*
Night duty					
No	Ref.	Ref.	Ref.	Ref.	Ref.
Yes	−7.15	−2.99	−2.31	0.69	−2.52
Sleep duration					
<7 h	Ref.	Ref.	Ref.	Ref.	Ref.
7–9 h	14.55*	6.53*	4.42*	0.34	3.21
>9 h	2.44	1.01	−2.44	−0.78	1.12
Living arrangement					
Live alone/Sharing	Ref.	Ref.	Ref.	Ref.	Ref.
Family	−0.27	−0.25	1.63	−1.90	0.24
Origin					
Capital	Ref.	Ref.	Ref.	Ref.	Ref.
Outside capital	−7.97	−3.54	0.12	−2.55	−1.99
Transportation					
Public transportation	Ref.	Ref.	Ref.	Ref.	Ref.
Walk	4.65	2.33	−3.78	−0.25	2.22
Personal vehicle	19.64*	3.75	5.32	6.52*	4.03
Physical activity					
<3 times/week	Ref.	Ref.	Ref.	Ref.	Ref.
≥3 times/week	7.47	2.79	2.71	2.63	−0.65
Gender					
Male	Ref.	Ref.	Ref.	Ref.	Ref.
Female	0.74	−1.36	0.46	1.66	−0.02
Age	1.27	1.29	0.8	−0.33	0.02

*$p < 0.05$, QOL = Quality of Life; Std Coeff = Standardized Coefficient; Ref = Reference.

and 6.21 units ($p < 0.05$), respectively. Several studies have examined the impact of major and minor clinical rotations on determining QOL. They have captured that medical students in minor clinical rotations typically have a higher QOL due to having less volume of tasks assigned and night shifts. Our study, however, indicated minor clinical rotations were detrimental compared to the major ones. A few things are considered. Minor clinical rotations have

shorter weeks and earlier examination schedules, so medical students have less time to adjust to a new rotation in which they are enrolled. This acute adaptation of challenging coursework and grueling scheduling requirements could lead to substantial lifestyle changes that can be psychologically daunting for students and negatively affect their QOL. This finding is similar to studies by Bergmann et al. and Hill et al. that explained the inability of students to participate in recreational and leisure activities due to tight schedules, which subsequently lead to disruptions in personal lives. Moreover, as there are more students in the cohort during a major clinical rotation, the workload can be distributed equally among the peers, giving them more leisure and free time.[29,30]

Our study has also highlighted the impact of sleeping duration on nearly all domains in QoL (Table 3). Some studies have highlighted the fact that students, particularly the major ones, had insufficient sleep hours during the clinical rotation. Sleeping disturbance has been shown to disrupt alertness and performance, especially for those who work a night shift or even a more sequential night shift. Also, according to studies conducted by Perotta et al. and Pagnin et al., emotional exhaustion and poor sleep quality are linked to a decline in physical health, which affects one's ability to focus and stay motivated while meeting academic demands.[31,32] In medical education circumstances, however, medical students have long working hours as there is no break between the night and day shifts due to a short clinical rotation period. It intensifies their stress and pressure. Therefore, because medical students need to maintain good physical and mental health to handle academic challenges, medical schools must consider student health and well-being when developing strategies to improve their educational programs.

This study confirms previous research that has linked transportation to physical, mental, social, and economic well-being. Our study shows that transportation by personal vehicle increased overall QOL. This result is consistent with a study by Jahangeer et al. that found the contribution of overcrowding, long travel, and air and noise pollution from public transportation all to transportation-related stress, which hurts QOL. Intriguingly, in the social relationship domain, owning a private vehicle increases the unit score by 6.52 ($p < 0.05$). Jahangeer et al. and Lee et al. claim that personal transportation within populated places with overcrowded public transit offers independent mobility and gives medical students more free time for leisure activities and friend-hanging. This is significant, as clinical rotation lectures are prone to rescheduling; using public transport would be time-consuming due to the heavy traffic in the capital metropolitan area. Therefore, this study suggests that medical schools' policies may consider travel time and transportation-related and social-related infrastructure to underpin students' social relationship lives and improve their QOL in intangible ways.[33,34]

Limitations

This study has limitations. Although it could be the only study exploring QOL in final-year medical students in Indonesia, the nature of cross-sectional studies cannot assess temporal effects between dependent and independent variables. Also, a single-center sample merely gives the profile from one university. Thus, generalization is limited. Finally, we include data from major and minor clinical rotations with uneven night shifts, schedules, and workloads.

Conclusions

The results of this study indicate that WHOQOL-BREF can be used to assess the quality of life of Indonesian medical students. This study also shows the influence of department type, sleep duration, and private transportation on the quality of life of clerkship medical students. These results can fill this gap and add recommendations to existing regulations and policies to improve the quality of life of final-year medical students to make them outstanding scholars.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported by the author's self funding.

Ethical approval and informed consent

This study was approved by Atma Jaya Catholic University Ethical Committee. All participants agreed to be included in the study before the interview began. We have obtained written informed consent but the written consent itself was held by the authors. Students were informed that the research results would be available to medical education decision-makers.

ORCID iDs

Kevin Kristian https://orcid.org/0000-0002-0197-227X
Anthony Ekaputra https://orcid.org/0000-0003-1408-8608

References

1. Ali Majid R. *Indonesia kurang dokter, mendikbud & menkes sepakat tambah kuota kuliah kedokteran. Kompas TV*, https://www.kompas.tv/article/308373/indonesia-kurang-dokter-mendikbud-menkes-sepakat-tambah-kuota-kuliah-kedokteran (2022, accessed 17 February 2023).
2. Kementerian Pendidikan dan Kebudayaan. *Upaya pemerintah akselerasi peningkatan kapasitas dan kualitas fakultas kedokteran*, https://www.kemdikbud.go.id/main/blog/2022/07/upaya-pemerintah-akselerasi-peningkatan-kapasitas-dan-kualitas-fakultas-kedokteran (2022, accessed 17 February 2023).

3. Mahendradhata Y, Trisnantoro L, Listyadewi S, et al. The Republic of Indonesia health system review. *Heal Syst Transit* 2017; 7(1): 121–122.
4. World Health Organization's Global Health Workforce Statistics. Physicians (per 1,000 people) - Indonesia, https://data.worldbank.org/indicator/SH.MED.PHYS.ZS?locations=ID (2019, accessed 17 February 2023).
5. Handini D. *Mendikbudristek dan menkes menandatangani SKB peningkatan kuota program kedokteran dan dokter spesialis melalui sistem kesehatan akademik. Direktorat Jenderal Pendidikan Tinggi, Riset, dan Teknologi*, https://dikti.kemdikbud.go.id/kabar-dikti/kabar/mendikbudristek-dan-menkes-menandatangani-skb-peningkatan-kuota-program-kedokteran-dan-dokter-spesialis-melalui-sistem-kesehatan-akademik/ (2022, accessed 17 February 2023).
6. Putri L. *Dokter menumpuk di Jawa dan kota: akar masalahnya pada sistem rekrutmen dan pendidikan kedokteran. The Conversation*, http://theconversation.com/dokter-menumpuk-di-jawa-dan-kota-akar-masalahnya-pada-sistem-rekrutmen-dan-pendidikan-kedokteran-122391 (2019, accessed 17 February 2023).
7. Mustika R, Nishigori H, Ronokusumo S, et al. The odyssey of medical education in Indonesia. *The Asia Pacific Scholar* 2019; 4(1): 4–8.
8. Anjani E, Sari M and Apriliana E. Hubungan antara lingkungan belajar dengan pendekatan belajar mahasiswa tahun pertama fakultas kedokteran Universitas Lampung. *Medical Profession Journal of Lampung* 2020; 10(2): 351–358.
9. Ramadianto AS, Kusumadewi I, Agiananda F, et al. Symptoms of depression and anxiety in Indonesian medical students: association with coping strategy and resilience. *BMC Psychiatry* 2022; 22(1): 92.
10. Ursula F, Sunjaya A and Chris A. Anxiety and sleep quality among medical students in Indonesia during the COVID–19 pandemic. In: The 1st Tarumanagara international conference on medicine and health, Indonesia, 5–6 August 2021, pp.78–82. Atlantis Press.
11. Turana Y, Primatanti PA, Sukarya WS, et al. Impact on medical education and the medical student's attitude, practice, mental health, after one year of the COVID-19 pandemic in Indonesia. *Front Educ* 2022; 7: 843998.
12. Zhang Y, Qu B, Lun S, et al. Quality of life of medical students in China: a study using the WHOQOL-BREF. *PLoS One* 2012; 7(11): e49714.
13. Rahmi A, Karimah A and Rehatta NM. Cause of stress and coping mechanism among medical students year 2013 – 2015 in Universitas Airlangga. *Jurnal Kedokteran Syiah Kuala* 2019; 19(2): 55–59.
14. Abdulghani HM, Irshad M, Al Zunitan MA, et al. Prevalence of stress in junior doctors during their internship training: a cross-sectional study of three Saudi medical colleges' hospitals. *Neuropsychiatr Dis Treat* 2014; 10: 1879–1886.
15. Neufeld A and Malin G. How medical students cope with stress: a cross-sectional look at strategies and their sociodemographic antecedents. *BMC Med Educ* 2021; 21(1): 299.
16. Chakladar J, Diomino A, Li WT, et al. Medical student's perception of the COVID-19 pandemic effect on their education and well-being: a cross-sectional survey in the United States. *BMC Med Educ* 2022; 22(1): 149.
17. Bexelius T, Lachmann H, Järnbert-Pettersson H, et al. Stress among medical students during clinical courses: a longitudinal study using contextual activity sampling system. *Int J Med Educ* 2019; 10: 68–74.
18. Byrnes C, Ganapathy VA, Lam M, et al. Medical student perceptions of curricular influences on their wellbeing: a qualitative study. *BMC Med Educ* 2020; 20(1): 288.
19. Klein HJ and McCarthy SM. Student wellness trends and interventions in medical education: a narrative review. *Humanit Soc Sci Commun* 2022; 9(1): 1–8.
20. Shrivastava SR, Shrivastava PS, Mendhe HG, et al. Integrating social accountability into the medical curriculum: the need, implementation, and impact measurement. *Asian J Soc Health Behav* 2024; 7(1): 51–53.
21. Habsari A and Rumawas M. Gambaran kualitas hidup pada mahasiswa fakultas kedokteran Universitas Tarumanagara Jakarta. *Jurnal Muara Medika dan Psikologi Klinis* 2021; 1(2): 105–114.
22. Hirshkowitz M, Whiton K, Albert SM, et al. National sleep foundation's updated sleep duration recommendations: final report. *Sleep Health* 2015; 1(4): 233–243.
23. King AC, Whitt-Glover MC, Marquez DX, et al.; 2018 PHYSICAL ACTIVITY GUIDELINES ADVISORY COMMITTEE. Physical activity promotion: highlights from the 2018 physical activity guidelines advisory committee systematic review. *Med Sci Sports Exerc* 2019; 51(6): 1340–1353.
24. World Health Organization. WHOQOL: measuring quality of life, https://www.who.int/tools/whoqol (2012, accessed 17 February 2023).
25. The WHOQOL Group. Development of the world health organization WHOQOL-BREF quality of life assessment. The WHOQOL Group. *Psychol Med* 1998; 28(3): 551–558.
26. Miguel AQC, Tempski P, Kobayasi R, et al. Predictive factors of quality of life among medical students: results from a multicentric study. *BMC Psychol* 2021; 9(1): 36.
27. Solis AC and Lotufo-Neto F. Predictors of quality of life in Brazilian medical students: a systematic review and meta-analysis. *Braz J Psychiatry* 2019; 41(6): 556–567.
28. Kobayasi R, Tempski PZ, Arantes-Costa FM, et al. Gender differences in the perception of quality of life during internal medicine training: a qualitative and quantitative analysis. *BMC Med Educ* 2018; 18(1): 281.
29. Bergmann C, Muth T and Loerbroks A. Medical students' perceptions of stress due to academic studies and its interrelationships with other domains of life: a qualitative study. *Med Educ Online* 2019; 24(1): 1603526.
30. Hill MR, Goicochea S and Merlo LJ. In their own words: stressors facing medical students in the millennial generation. *Med Educ Online* 2018; 23(1): 1530558.
31. Perotta B, Arantes-Costa FM, Enns SC, et al. Sleepiness, sleep deprivation, quality of life, mental symptoms and perception of academic environment in medical students. *BMC Med Educ* 2021; 21(1): 111.
32. Pagnin D and de Queiroz V. Influence of burnout and sleep difficulties on the quality of life among medical students. *Springerplus* 2015; 4(1): 676.
33. Jahangeer SMA, Hasnain N, Tariq MT, et al. Frequency and association of stress levels with modes of commuting among medical students of a developing country. *Malays J Med Sci* 2021; 28(4): 113–122.
34. Lee RJ and Sener IN. Transportation planning and quality of life: where do they intersect? *Transp Policy* 2016; 48: 146–155.