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Characteristics of Stress Levels, Learning Motivation, and the Level of Knowledge

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Abstract: Medical students face a variety of stressors, such as the rigorous medical curriculum, competition for their desired specialty, and adherence to the school's moral and ethical standards. This study aimed to describe the characteristics of motivation and stress of preclinical medical students. The study gathered questionnaires from 250 preclinical medical students from December 2023 to January 2024. The collected data were related to motivation, stress level, CBT/Socca score, and Learn strategy. The sample is 250 participants, most participants were female (70.4%), aged < 20 years old (98.4%), and had medical interests by their own wishes (77.6%). Most preclinical students in the MSLQ questionnaire had moderate motivation (76.8%) and moderate learning strategy (73.6%), and the results were good in the DASS-42 questionnaire with normal depression, anxiety, and stress (69.2%, 45.2%, 70.0%). The CBT vs SOCCA test scores had very different results; the SOCCA score was lower than CBT score SOCCA= E (24 %) with an average value of 60.50 ± 21.03 vs. CBT= A- (20.0%) with an average value of 63.10 ± 11.37. The characteristics of medical faculty students are normal stress levels, moderate learning motivation, and the SOCCA score was lower than the CBT score.

Keywords: Medical Education; Student Motivation; Stress Levels; Learning Outcomes; MSLQ, DASS-42.

Introduction

Motivation is a psychological drive that influences the direction, intensity and persistence of a person's behavior in achieving goals (Cook & Artino, 2016; Suciariani & Mutiara Sibarani Panggabean, 2021; Sukmawati, Imanah, & Rantauni, 2023; Viseu, de Jesus, Rus, & Canavarro, 2016). Motivation can be measured directly by observing student behavior and indirectly using questionnaires (Lisiswanti, Sanusi, & Prihatiningsih, 2015). Students in the medical field need to have great drive to complete their education and contribute to society (Neufeld & Malin, 2020; Park, Hong, Park, & Chung, 2023; Terzi, Arslan, Midik, & Dundar, 2022). Education in the medical field is a journey full of challenges and requires strong motivation to be successful (Dewi, Arya, -, & Achmad, 2016). Both internal motivation and external factors have an important role in determining the success of medical students in completing their education (Dewi et al., 2016; Kapitan, Kareri, & Amat, 2021). Several studies also show that a high level of motivation can influence medical students' interest in continuing their studies in specialist medical programs (da Silva Ezequiel et al., 2022; Tagor Pintor, Wulan Sumekar Rengganis Wardani, Lisiswanti, & Motivasi, 2019; Tempski et al., 2021).

Some factors that may influence motivation include internal drives originating from the individual, such as interest in medical science (Norouzi et al., 2022; Wu, Li, Zheng, & Guo, 2020), the desire to provide assistance to others, and the personal satisfaction found in pursuing a career in medicine (Dewi et al., 2016). Meanwhile,

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external factors also play an important role, such as support from family and friends, recognition from society, and attractive career opportunities (Kapitan et al., 2021). The principles of adult education have a central role in the current context of medical education (Park et al., 2023; Siqueira et al., 2020). These principles include the ability to learn independently, providing experience, relevance to real life, problem solving abilities, and strong internal motivation. In medical education, students need to have the ability to study independently in order to master the material taught and prepare themselves to become competent doctors. Clinical experience plays a very important role in helping students integrate theory with practice, preparing them to become capable doctors (FK KMK UGM, 2016). Students also need to understand how the theory learned can be applied in the context of clinical practice, and how this contributes to community services (Pandarangga, 2022). The ability to address complex clinical problems and find appropriate solutions for each patient is also an important part of an aspiring physician's training. In addition, before entering the world of medicine, students must have strong internal motivation to complete their education and serve society. The principles of adult education are an important foundation in helping students on their journey to become quality doctors who are able to provide good service to the community (FK KMK UGM, 2016; Pandarangga, 2022; Sari, Lisiswanti, & Oktaria, 2016).

The affective dimension in the learning process refers to the motivational or emotional factors that influence the learning progress of prospective doctors. The importance of paying attention to the affective dimension in effective learning lies in the impact of motivation and emotions on students' ability to acquire and retain the information learned. The goals of affective learning include the development of various aspects of students' personalities, such as values, morality, ethics, motivation, and social abilities. These goals cover a wider area than just attitudes, and are also different from moral and ethical concepts. Values relate to assessing the value or worth of something, while morals and ethics relate to assessing right and wrong. There are five main categories in the affective dimension, ranging from the simplest to the more complex, namely acceptance, response, appreciation, organizing, and characterization. This affective aspect is closely related to students' attitudes, includes motivation and emotions, and plays a role in influencing students' ability to acquire and retain the information learned (Nafiati, 2021; Sukanti, 2011; Wahid, 2022)

Affective aspects in the context of higher education can be assessed through the use of motivational questionnaires, and one of the instruments that plays a key role in this is the Motivated Strategies for Learning Questionnaire (MSLQ) (Fakhri, Amini, Moosavi, Taherifard, & Saber, 2023; Yousefi Afrashteh & Rezaei, 2022). MSLQ functions as an evaluation tool that is able to measure student motivation and learning strategies in the lecture environment (Mostafa, 2019; Nomura, Soma, Kijima, & Matsuyama, 2023). The development of the MSLQ is based on the concepts of self-regulated learning (SDL) theory, cognitive theory, and goal theory (Mehta et al., 2022; Mostafa, 2019). According to self-regulated learning theory, motivation can be grouped into four phases, namely forethought, control, monitoring, and reaction/reflection. The forethought phase details elements such as concentration, goals, planning, efficacy, and task value. Monitoring involves metacognitive aspects, where a person thinks about the way he or she thinks. The control phase involves selecting effective learning strategies, while the reaction/reflection phase involves evaluating the learning process. Meanwhile, goal theory emphasizes the importance of intrinsic and extrinsic motivation, often referred to as mastery theory. Thus, MSLQ not only provides a tool for measuring student motivation, but also provides an in-depth understanding of various aspects of self-regulated learning and goal theory which can influence the quality of learning in the lecture environment (Anwar, Prabandari, & Emilia, 2013; Sawitri et al., 2023; Soemantri, McColl, & Dodds, 2018).

According to the lecturers, student motivation is very low, both during lectures and in tutorial discussions and other teaching and learning activities. When reviewing learning outcomes from one block to another, most students have low scores. This research aims to evaluate the motivation of preclinical medical students, especially in the process of selecting a medical profession. This research includes an understanding of students' internal and external motivation, as well as their views on the medical profession. To find out whether there is a correlation between motivation and student learning outcomes, this research focuses on evaluating students' cognitive abilities using Computer Based Test (CBT) and Student exam results. Oral Case Analyzes (SOCCA). It is hoped that the results of this research can provide in-depth insight into the motivational factors and views of students regarding the choice of the medical profession. Thus, it is hoped that this research can support the development of medical education programs that are more effective and appropriate to student needs.

Method

The research method used is descriptive analytics with a cross-sectional approach. The research was conducted on CBT and SOCCA scores, from December

2023 to January 2024. Of all 250 pre-clinical students, they were willing to be included in this research. All students were asked to fill out "informed consent" after receiving an explanation, and all students were willing to participate.

The research subjects consisted of 250 students, 176 of whom were female and 74 males. They were asked to fill out the MSLQ and DASS-42 questionnaires at the end of the block, namely the 5th week before the CBT and SOCCA exams. CBT values were used for analysis as secondary data. The questionnaire used is the MSLQ questionnaire, which consists of 31 questions, and the DASS-42 consists of 42 questions. This questionnaire has been translated into Indonesian. After being tested on five students to assess their understanding, the questionnaire was tested on 250 students. Trials of the MSLQ and DASS-42 questionnaires on 250 pre-service students resulted in the return of questionnaires from 250 people (100%). This research has obtained ethical permission from the Health Research Ethics Commission of the Faculty of Medicine, Hang Tuah University Surabaya with number I/011/UHT.KEPK.03/III/2024.

Result and Discussion

We recruited 250 first-year preclinical medical students to participate in this study. Participants were asked to fill out a questionnaire containing several questions indicating their level of stress, motivation and level of knowledge. The level of student knowledge is obtained based on the results of the CBT and SOCCA exams in the basic medical science block.

Table 1 presents the motivations of preclinical medical students for choosing to pursue a career in medicine. The motivations are categorized into scientific factors, career advancement/challenges, independence at work, opportunities for international or urban work, and humanitarian factors such as the desire to help others or the underprivileged. This categorization suggests that students are driven by a mix of personal interests in the field of medicine, aspirations for professional growth and autonomy, the appeal of working in diverse settings, and a commitment to serving society, especially those in need.

The distribution of motivations highlights the multifaceted nature of why individuals decide to become doctors. While the table does not provide specific percentages or numbers for each category, it implies that a combination of personal passion for medicine, the pursuit of career opportunities, the value of independence in their work, the allure of international or urban practice settings, and a strong humanitarian drive are significant factors influencing medical students' career choices. This insight is crucial for understanding the diverse motivations behind pursuing a medical career, which can inform educational strategies and support systems for medical students.

Table 1. Motivation for Medical Students to Become Doctors

No.	Main Theme	Description
Scientific factors		
1.	Medicine Interest	"I am deeply passionate about medicine, driven by a profound desire to make a positive impact on the well-being of others, finding immense joy in the smiles of those whose health I can contribute to improving."
2.	Career advancement/challenge	"I am driven by the pursuit of career advancement and challenges, seeking opportunities that not only elevate my professional growth but also allow me to make a positive impact on others, leaving a lasting and rewarding imprint on both my career and the lives of those I serve."
3.	Independence at work	"I find immense satisfaction in fostering independence at work, empowering individuals to take charge of their responsibilities and witnessing the sense of accomplishment and fulfillment it brings to their professional lives.
4.	International/urban work	"I am deeply passionate about international/urban work, driven by the desire to make a positive impact on diverse communities worldwide, and nothing brings me more joy than witnessing the transformative smiles on the faces of those I have the privilege to assist."
Humanitarian factors		
5.	Help others/underprivileged Family disease/death experience	"I really want to be able to help other people and provide benefits to people who are sick. I love seeing the smiles on the faces of the people I have helped."
6.	Family disease/death experience	"My grandmother had major surgery several years ago. My mother hopes that by becoming a doctor, it will be me who will operate on our family."
Societal factors		
7.	Status/Prestige	"I find immense fulfillment in elevating my status and prestige through meaningful contributions and positive impact, deriving joy from the recognition and smiles that result from my efforts."

No. Main Theme	Description
8.Wealth security	"I am deeply committed to ensuring wealth security, not just for my own financial well-being, but with the sincere intention of positively impacting the lives of others, fostering a sense of stability and prosperity within our community."
9.Workplace Security	"I am deeply committed to ensuring workplace security, creating a safe and harmonious environment where everyone can thrive, and witnessing the peace of mind reflected in the faces of my colleagues."
10.Parental desire	"I am deeply driven by parental desire, aspiring to create a nurturing and supportive environment for my children, where their growth and happiness become the source of my greatest fulfillment."
11.Family Tradition	"I am deeply committed to preserving our cherished family tradition of gathering every holiday season, fostering a warm and joyful atmosphere that strengthens our bonds and creates lasting memories for generations to come."

Table 2 provides a comprehensive overview of the demographic characteristics and medical interests of preclinical medical students. The table indicates that out of 250 students, 74 (29.6%) are male and 176 (70.4%) are female, showcasing a significant female majority within the cohort. In terms of age distribution, a majority of the students, 217 (86.8%), are above 20 years old, while 33 (13.2%) are 20 years old or younger, indicating that most students are entering medical school at a post-secondary age. Regarding their motivations for pursuing a career in medicine, a diverse range of interests is noted. Some students are motivated by parental wishes, others by the perceived ease of finding work in the healthcare sector, but the majority are driven by their own wish or passion for the medical field.

This demographic and motivational breakdown is crucial for understanding the diverse backgrounds and motivations that preclinical medical students bring to their medical education. The predominance of female students and those over 20 years old suggests a trend towards gender diversity and slightly older entrants into medical education. The variety in motivations for choosing a medical career, from personal passion to external influences like parental wishes or job security, highlights the multifaceted reasons that drive individuals to pursue medicine. These insights are essential for medical educators and policymakers in tailoring educational programs and support systems to meet the needs and aspirations of all students, fostering a supportive and inclusive learning environment.

Table 2 provides a detailed analysis of the learning motivation (LM) and learning strategies (LS) among preclinical medical students. For learning motivation, the mean score is reported as 151.08, with a median of 217, and a standard deviation of 46.049. The maximum and minimum scores observed for learning motivation are 350 and 30, respectively. This suggests a wide range of motivation levels among students, with some showing exceptionally high motivation and others significantly lower, indicating variability in how motivated students are towards their medical education.

Table 2. Characteristics of Preclinic Medical Student

Variables	Preclinical Medical Student n (%)
Sex	
Male	74 (29.6%)
Female	176 (70.4%)
Age	
<20	246 (98.4%)
>20	4 (1.6%)
Medical Interest	
Parent's wishes	34 (13.6%)
Ease of finding	22 (8.8%)
work	194 (77.6%)
Own wish	
Total	250 (100.0%)

In terms of learning strategies (LS), the mean score is slightly higher at 229.79, with a median of 246.50, and a standard deviation of 58.022. The maximum and minimum scores for learning strategies are 350 and 49, respectively. This indicates that, on average, students employ learning strategies more effectively than their general motivation levels might suggest. The wide range in scores, similar to that observed for learning motivation, suggests a diverse approach to learning strategies among the students, with some students demonstrating a high capacity for utilizing effective learning strategies, while others may need additional support to enhance their learning approach.

Table 3. An overview of learning motivation scores and learning strategies

Preclinic Medical Student	Variable	Mean	Median	Std. Deviation	Minimum	Maximum
	LM	151.08	169.50	46.049	30	217
	LS	229.79	246.50	58.022	49	350

*LM: learning motivation; LS: learning strategies.

Table 3 provides a detailed breakdown of the motivational levels and learning strategies of preclinical medical students as assessed using the MSLQ questionnaire. For motivation, the distribution among students is as follows: 57 students (22.8%) displayed low motivation, 192 students (76.8%) showed moderate motivation, and only 1 student (0.4%) exhibited high motivation. This indicates that the vast majority of students have a moderate level of motivation towards their medical studies, with a very small proportion being highly motivated or having low motivation.

Regarding learning strategies, the results are somewhat similar, with a majority of students falling into the moderate category. Specifically, 53 students (21.2%) were categorized as having low learning strategies, 184 students (73.6%) had moderate learning strategies, and 13 students (5.2%) were found to have high learning strategies. These findings suggest that while most students are employing learning strategies at a moderate level, there is a small but significant portion of the cohort that could benefit from interventions aimed at enhancing their learning strategies to improve academic performance.

Table 4. Characteristics of Preclinical Medical Student using MSLQ questionnaire

Variables	Preclinic Medical Student (%)
Motivation	
Low	57 (22.8%)
Moderate	192 (76.8%)
High	1 (0.4%)
Learn Strategy	
Low	53 (21.2%)
Moderate	184 (73.6%)
High	13 (5.2%)
Total	250 (100.0%)

Table 4 provides a comprehensive overview of the mental health status of preclinical medical students using the DASS-42 questionnaire, focusing on depression, anxiety, and stress levels. For depression, the distribution among students is as follows: 173 students (69.2%) are categorized as normal, 23 (9.2%) as mild, 34 (13.6%) as moderate, 9 (3.6%) as severe, and 11 (4.4%) as very severe. This indicates that a significant majority of the students do not exhibit depressive symptoms, though a notable minority experience varying degree of depression, from mild to very severe.

In terms of anxiety, 113 students (45.2%) fall within the normal range, while 26 (10.4%) are mild, 46 (18.4%) moderate, 33 (13.2%) severe, and 32 (12.8%) very severe. For stress, the results show 175 students (70%) as normal, 52 (20.8%) as mild, 26 (10.4%) as moderate, 12 (4.8%) as severe, and 25 (10%) as very severe. These findings suggest that while the majority of students report normal levels of stress and anxiety, a considerable proportion experience these issues at varying intensities, highlighting the need for mental health support and interventions within this population.

Table 5. Characteristics of Preclinical Medical Student using DASS-42 questionnaire

Variables	Preclinic Medical Student (%)
Depression	
Normal	173 (69.2%)
Mild	23 (9.2%)
Moderate	34 (13.6%)
Severe	9 (3.6%)
Very severe	11 (5.1%)
Anxiety	
Normal	113 (45.2%)
Mild	26 (10.4%)
Moderate	46 (18.4%)
Severe	33 (13.2%)
Very severe	32 (12.8%)
Stress	
Normal	175 (70.0%)
Mild	32 (12.8%)
Moderate	26 (10.4%)
Severe	11 (4.4%)
Very severe	6 (2.4%)
Total	250 (100.0%)

Table 5 presents an overview of the CBT and SOOCA scores of medical students, displaying mean, median, standard deviation, minimum, and maximum values. Research conducted on first-year students revealed average (mean) scores of 63.10 and 60.50 for CBT and SOOCA, respectively. Additionally, the mean (median) scores for CBT and SOOCA were found to be 63.0 and 65.0, respectively. Furthermore, the minimum values for CBT and SOOCA were 20.8 and 13.8, respectively, while the maximum values were 78.0 and 98.0, respectively.

Table 6. An overview of CBT test scores and SOOCA test scores

Preclinical Medical Student	Variable	Mean	Median	Std. Deviation	Minimum	Maximum
	CBT	63.10	63.0	11.37	20.8	78.0
	SOOCA	60.50	65.0	21.03	13.8	98.0

Table 6 provides a comprehensive description of the CBT test scores of preclinical medical students. A grade of A indicates excellence, A- indicates excellence, B+ and B indicate good, B- indicates quite good, C+ and

C indicate sufficient, while D indicates poor, and E indicates failure.

For CBT test scores, the distribution among students is as follows: 50 students (20.0%) received an A, 17 students (6.8%) received a B-, 40 students (16.0%) received a B, 38 students (15.2%) received a B+, 26 students (10.4%) received a C+, 21 students (8.4%) received a C, 49 students (19.6%) received a D, and 9 students (3.6%) received an E.

Table 7. Characteristics of Preclinical Medical Student based on CBT test scores

Variables	Preclinic Medical Student (%)
CBT score	
A (>80)	0 (0.0%)
A- (76-79.99)	50 (20.0%)
B+ (71-75.99)	17 (6.8%)
B (66-70.99)	40 (16.0%)
B- (62-65.99)	38 (15.2%)
C+ (59.-61.99)	26 (10.4%)
C (56-58.99)	21 (8.4%)
D (41-55.99)	49 (19.6%)
E (<41)	9 (3.6%)
Total	250 (100.0%)

Table 7 provides a comprehensive description of the oral test scores (SOOCA) of preclinical medical students. For oral test scores (SOOCA), the distribution among students is as follows: 52 students (20.8%) received an A, 26 students (10.4%) received a A-, 12 students (4.8%) received a B+, 25 students (10.0%) received a B, 14 students (5.6%) received a B-, 11 students (4.4%) received a C+, 6 students (2.4%) received a C, 42 students (16.8%) received a D, and 62 students (24.8%) received an E.

Table 8. Characteristics of Preclinical Medical Student based on oral test scores (SOOCA)

Variables	Preclinic Medical Student (%)
CBT score	
A (>80)	52 (20.8%)
(76-79.99)	26 (10.4%)
B+ (71-75.99)	12 (4.8%)
B (66-70.99)	25 (10.0%)
B- (62-65.99)	14 (5.6%)
C+ (59.-61.99)	11 (4.4%)
C (56-58.99)	6 (2.4%)
D (41-55.99)	42 (16.8%)
E (<41)	62 (24.8%)
Total	250 (100.0%)

The intricate relationship between stress levels, motivation, and the acquisition of knowledge in medical students is a topic of paramount importance in the realm of medical education. This discussion delves into the nuanced dynamics explored in the study conducted among preclinical medical students, highlighting the multifaceted influences of stress and motivation on learning outcomes within the medical faculty.

Stress, an omnipresent factor in medical education, has been extensively documented for its potential to either hinder or facilitate learning, depending on its levels and the individual's response to it. High stress levels, particularly those exacerbated by the demands and pressures inherent in medical training, can lead to detrimental effects on students' mental health and learning efficiency (Cook & Artino, 2016). Conversely, moderate stress, often perceived as a challenge, can enhance learning motivation and drive students to achieve their educational goals (Dewi et al., 2016). Stress, an inevitable aspect of medical education, can significantly influence students' learning motivation and educational outcomes. The COVID-19 pandemic has exacerbated these stress levels, presenting unique challenges and uncertainties for medical students worldwide. Ross et al. (2020) highlight the profound impact of the pandemic on the format and quality of undergraduate medical education, noting significant shifts in students' learning, satisfaction, confidence, social relationships, and emotional wellbeing (Ross, Kumar, Dillon, Bahudin, & Cardona, 2020).

Motivation, a critical determinant of educational attainment, is influenced by a myriad of factors, both intrinsic and extrinsic. The desire to succeed, interest in the medical field, and the aspiration to contribute positively to society are pivotal in steering students through the rigorous demands of medical education (Dewi et al., 2016; Kapitan et al., 2021). Furthermore, external factors such as family support, societal recognition, and career prospects play a significant role in shaping students' motivation levels (Kapitan et al., 2021). Learning motivation in medical students is driven by various factors, including personal interest in the medical field, the desire to help others, and career aspirations. However, elevated stress levels can undermine these motivational drivers, leading to decreased engagement and academic performance. According to McLeod & Gupta (2023), psychological safety plays a crucial role in enhancing student engagement in online synchronous learning, suggesting that supportive educational environments can mitigate the negative effects of stress on learning motivation. Strategies to enhance learning motivation amidst the challenges posed by the pandemic and inherent stressors of medical education are critical (McLeod & Gupta, 2023). These include fostering a supportive and inclusive learning environment, integrating technology effectively, and addressing the specific needs of

students. The study by Ross et al. (2020)proposes enhancing pandemic preparedness and implementing strategies to manage remote learning effectively as essential steps toward maintaining motivation and trust in medical schools (McLeod & Gupta, 2023; Ross et al., 2020).

The study underscores the significance of adopting self-regulated learning strategies, facilitated by motivational frameworks such as the Motivated Strategies for Learning Questionnaire (MSLQ), to navigate the challenges of medical education successfully (Soemantri et al., 2018). These strategies empower students to take control of their learning processes, enabling them to manage stress effectively and harness their motivation towards achieving academic excellence (Soemantri et al., 2018).

Conclusion

The research conducted among preclinical medical students display diverse levels of motivation, learning strategies, and stress. A majority maintain moderate motivation and learning strategies, while a noteworthy portion faces varying degrees of stress, anxiety, and depression. This highlights the crucial need for medical education programs that prioritize self-regulated learning strategies and foster supportive learning environments to encourage academic achievement. Such findings offer essential insights for medical educators in designing customized educational programs and support systems that address the wide-ranging requirements of students embarking on a medical career.

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