Soedjianto SG et al., JPKI, 2025;14(4):200-207
doi: 10.22146/jpki.105046

ORIGINAL RESEARCH

The Hidden Struggle: How the Learning Environment Influences Impostor Phenomenon in Medical Students

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Submitted: 27 February 2025; Final Revision: 27 December 2025; Accepted: 29 December 2025

ABSTRACT

Background: High achievers frequently suffer from the impostor phenomenon, which is typified by emotions of intellectual fraudulence and self-doubt when success is attributed to external factors, such as luck or timing, rather than actual abilities. The competitive learning environment in medicine typically demands high academic standards, which makes medical students vulnerable to this phenomenon.
Aims: This study aimed to investigate the correlation between pre-clinical medical students' experiences of the impostor phenomenon and their perceptions of the learning environment.
Methods: This cross-sectional study was conducted among second- and third-year pre-clinical students from the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia. Total sampling was applied to students achieving grades above the cutoff. The Clance Impostor Phenomenon Scale (CIPS) and Dundee Ready Educational Environment Measure (DREEM) were used to collect data. We obtained data from 255 preclinical medical students.
Results: On average, students thought their learning environment was quite good, with an average score of 131.42 out of 200, and they frequently experienced the impostor phenomenon, which had a prevalence of 67.1%. This study also discovered that there was a significant moderate negative correlation between perception of the learning environment and the occurrence of the impostor phenomenon ($r = -0.410$, $p < .001$), as shown by the higher CIPS scores of students who felt that their learning environment was poor.
Conclusion: This study emphasized that a supportive learning environment plays an important role in lowering impostor feelings among medical students. Strengthening aspects such as mentorship, constructive feedback, and peer support may help reduce psychological burden and improve students' academic experience.

Keywords: Learning environment, impostor phenomenon, medical student, DREEM, CIPS

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PRACTICE POINTS

- A supportive learning environment significantly reduces the impostor phenomenon among medical students.
- A competitive and high-expectation learning environment contributes to students' feelings of inadequacy.
- Addressing the impostor phenomenon in medical students is essential to help minimize impostor tendencies and support more positive learning experiences and professional development during training.

INTRODUCTION

The impostor phenomenon, or impostor syndrome, is a behavior in which a person denies their abilities, intelligence, and success, and also attributes their accomplishments to external factors such as good fortune, empathy, or appearance. High achievers, those with high expectations, and those without support typically encounter the impostor phenomenon.[1] Medical students are also included in the high-achieving group because of the intense academic pressure they endure and the long educational process they must complete.[2] Medical students tend to experience stress, depression, and burnout, which are closely related to the impostor phenomenon.[3] Villwock et al. (2016) stated that the prevalence of impostor phenomenon in medical students globally is 22.5% to 46.6%. The impostor phenomenon is a significant issue faced by medical students worldwide, including in Indonesia. A cross-sectional study conducted at the Faculty of Medicine, Pembangunan Nasional Veteran University of Jakarta in 2024 reported that the prevalence of second, third-, and fourth-year medical students with high impostor scores reached 57.6%.[4]

The learning environment, or all elements affecting learning in an institution, is frequently linked to the impostor phenomenon. The three elements that make up the learning environment are physical attributes, psychology, which fosters trust and helps students, and sociocultural, or interactions with teachers, coworkers, and peers. Students feel safe, motivated, excited, and inspired by their surroundings and experience improvements in their skills and knowledge if the learning environment can attain the best possible outcomes in these three areas.[5] However, the impostor phenomenon can still occur in a good learning environment because of the high expectations and standards that students hold themselves to.[6] While individual traits such as personality and self-esteem contribute to impostor experiences, the learning environment is a modifiable institutional factor that can be improved through educational strategies. Investigating its relationship with the impostor phenomenon is essential to inform potential interventions at the medical school level. Since limited evidence is available in the Indonesian context, examining this association may provide institution-specific insights and contribute to existing literature in medical education. Given these considerations, the researchers studied the correlation between medical students' learning environments and the impostor phenomenon.

METHODS

Participants and Context

This study used a cross-sectional approach to examine the correlation between preclinical medical students' experiences of the impostor phenomenon and their perceptions of the learning environment. The participants were second- and third-year students from the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, who had completed their first module of the odd semester in the 2024/2025 academic

year. The modules completed by participants included foundational medical sciences for second-year students and organ-system pathology for third-year students, representing the typical pre-clinical curriculum at our institution. First-year students were not included because they were still in the introductory phase of medical education, where academic demands are relatively low and exposure to evaluative pressure remains limited. To pass a module, the minimum requirement is a grade of C (equivalent to a 2.0 out of 4.0 GPA), and we invited all second- and third-year students who met this requirement. We only included students who achieved a minimum grade of B (≥3.0 of 4.0 GPA) because high-achieving students are considered more vulnerable to the impostor phenomenon, as reported in previous studies. This sampling approach also ensured alignment with the study objective by focusing on students who were academically successful yet potentially at higher risk of experiencing impostor feelings. Additionally, students who repeated the module were excluded from the participant list. A total of 255 students met this criterion and were included in the study.

Procedure

The researcher distributed the Dundee Ready Educational Environment Measure (DREEM) and the Clance Impostor Phenomenon Scale (CIPS) questionnaires to all second- and third-year preclinical students after the final examinations of each module had been completed. The researcher excluded students who repeated the module and those who scored below a B based on the inclusion criteria. Ethical approval for this study was obtained from the Research Ethics Committee of the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia (approval code 11/06/KEP-FKIKUAJ/2024). Following this, the researchers proceeded with data analysis.

Data Collection

Students' perception of their learning environment was measured with the validated Indonesian version of the Dundee Ready Educational Environment Measure (DREEM). This 5-point Likert scale questionnaire consists of 55 items ranging from "strongly disagree" to "strongly agree" with a total score of 200. Developed in 1997, DREEM covers five domains: perception of learning, perception of teachers, perception of atmosphere, social self-perception, and academic self-perception. In 2017, Leman translated DREEM into Indonesian and tested its reliability, achieving a Cronbach's alpha of 0.883.[7] The Indonesian version of the Clance Impostor Phenomenon Scale (CIPS) was used to find out the occurrence of the impostor phenomenon amongst participants. CIPS is an assessment tool developed by Clance in 1985, and in 2019, Nurhikma modified CIPS into a 21-item instrument, translated it into Indonesian, and validated its reliability (Cronbach's alpha of 0.828). This is a 5 - point Likert scale questionnaire with scores ranging from "never" to "always" with a total score of 105. Based on the total score, participants can be categorized into four categories: low (≤40), moderate (41-60), frequent (61-80), and intense (>80) impostor phenomenon. Lower scores reflect minimal impostor characteristics, while higher scores indicate increasing levels of impostor feelings, with scores above 60 suggesting clinically relevant impostor experiences requiring further attention.[8]

Data Analysis

The DREEM and CIPS data were analysed using SPSS 29. Descriptive analysis was then performed to calculate the mean and standard deviation, and the study showed that the average DREEM score was 131.42±22.50 and the average CIPS score was 65.61±15.54. From the normality test, it was found that the data distribution was not normal ($p < .001$); hence, the Spearman correlation test was used to investigate the correlation between DREEM and CIPS scores.

RESULTS AND DISCUSSION

A total of 255 students consisted of 114 second-year students (44.7%) and 141 third-year students (55.3%). Detailed participants' demographic characteristics are shown in Table 1.

Tabel 1. Participants Demographic Characteristics

Academic Year	Gender				Total
	Male		Female		
	n	%	n	%	
2nd year	45	31.9	96	68.1	141
3rd year	32	28.1	82	71.9	114
Total	**77**	**30.2**	**178**	**69.8**	**255**

Most respondents from both academic years had a good perception of their learning environment. None of the participants perceived their learning environment as poor. The DREEM questionnaire's reliability indicates excellent internal consistency in response, as shown by a Cronbach's alpha of 0.951.

Tabel 2. Participants' Perception of the Learning Environment (DREEM)

Learning Environment Perception*	Academic Year			
	2nd year		3rd year	
	n	%	n	%
Poor	0	0%	0	0%
Problematic	3	2.1%	16	14%
Quite good	118	83.7%	75	65.8%
Good	20	14.2%	23	20.2%
Total	**141**	**100%**	**114**	**100%**

Note. *Presented scores indicate the average scores from all participants

From the five domains measured by the DREEM questionnaire, participants' perception of learning showed the highest average score, followed by participants' perception of teachers. On the other hand, the social self-perception domain showed the lowest average score compared to the other four domains (see Table 3).

Participants' perception of the learning environment varied across domains, with most responses falling into the quite good and good categories for both academic years. The highest values were observed in the perception of atmosphere and perception of teachers domains, indicating generally positive teaching quality and learning climate. Meanwhile, the social self-perception domain showed the lowest classification distribution for both year levels, reflecting comparatively weaker confidence and social support (see Table 4).

Contrary to participants' perception of their learning environment, which leaned towards quite good and good, this study found that around 67.1% participants (171 students, consisting of 99 second- and 72 third-year students) reported experiencing impostor phenomenon based on the CIPS questionnaire result (Cronbach's alpha = 0.941). We further calculated the prevalence rate of impostor phenomenon in the second- and third-year students by looking at the proportion of students who reported experiencing frequent and intense impostor phenomenon (CIPS score higher than 60). Based on the result, we found that the prevalence of impostor phenomenon in the second-year students was 70.2% (99 students), while the prevalence in the third-year students was 63.2% (72 students). Detailed results were provided in Table 5.

Tabel 3. Participants' Perception of the Learning Environment per Domain (DREEM)

Learning Environment Perception*	Domain				
	Perception of Learning	Perception of Teachers	Social self-perceptions	Perception of Atmosphere	Academic self-perceptions
Poor	0	0	0	0	0
Problematic	19.58	19.74	11.37	17.11	13.53
Quite good	33.58	27.67	17.78	29.53	20.67
Good	42.98	33.72	22.65	37.26	26.81

Note. *Presented scores indicate the average scores from all participants

Tabel 4. Participants' Perception of the Learning Environment per Domain (DREEM) based on academic year

Learning Environment Perception*	Domain									
	Perception of Learning		Perception of Teachers		Social self-perceptions		Perception of Atmosphere		Academic self-perceptions	
	2nd year	3rd year	2nd year	3rd year	2nd year	3rd year	2nd year	3rd year	2nd year	3rd year
Poor	0	0	0	0	0	0	0	0	0	0
Problematic	16.00	20.25	23.00	19.13	16.67	10.38	25.00	15.63	16.33	13.00
Quite good	33.72	33.36	27.93	27.25	17.60	18.05	29.75	29.17	20.72	20.59
Good	43.05	42.91	34.60	32.96	22.75	22.57	39.20	35.57	27.70	26.04

Note. *Presented scores indicate the average scores from all participants

Tabel 5. Occurrence of the Impostor Phenomenon based on Academic Year

Learning Environment Perception*	Academic Year			
	2nd year		3rd year	
	n	%	n	%
Low (<40)	8	5.7%	5	4.4%
Moderate (41-60)	34	24.1%	37	32.5%
Frequent (61-80)	80	56.7%	52	45.6%
Intense (>80)	19	13.5%	20	17.5%
Total	**141**	**100%**	**114**	**100%**

To see how the learning environment might impact participants' experience of impostor phenomenon, we cross-tabulated participants' DREEM and CIPS results (see Table 6). The cross-tabulation pattern indicated that participants with higher CIPS scores were more frequently found in lower DREEM interpretation categories, suggesting a potential inverse association between perceived learning environment quality and impostor feelings. To further determine the correlation between participants' perceptions of their learning environment and the occurrence of impostor phenomenon, we conducted a Spearman correlation test. We found a significant moderate negative correlation between the two variables ($r = -.410$, $p < .001$), indicating that as students' perception of their learning environment improves, their impostor experiences tend to decrease. None of the participants scored in the poor category of DREEM; therefore, no data were presented for this group, which may reflect that the overall educational environment in this institution is generally favorable, despite the presence of substantial impostor phenomenon levels.

Tabel 6. Cross-Tabulated result of Participants' DREEM and CIPS scores

DREEM Interpretation	Average of the CIPS score
Poor	0
Problematic	81.95
Quite good	66.40
Good	54.81

In addition, when the DREEM interpretation was compared by academic year, a similar pattern emerged. Second-year students categorized under a problematic learning environment demonstrated the highest mean CIPS score, while those in the good category showed the lowest. Third-year students demonstrated the same trend, although with slightly lower average CIPS scores within each category. This consistency across year levels reinforces the observation that a more positive perception of the learning environment corresponds with lower impostor phenomenon scores (see Table 7).

Tabel 7. Cross-tabulated Results of Participants' DREEM and CIPS Scores based on Academic Year

DREEM Interpretation	Average of the CIPS score 2nd year	Average of the CIPS score 3rd year
Poor	0	0
Problematic	85.50	63.00
Quite good	63.88	68.01
Good	54.13	55.60

The learning environment at the School of Medicine and Health Sciences of Atma Jaya Catholic University of Indonesia is perceived to be quite good by the majority of second and third-year preclinical

students, with an average total DREEM score of 131.42 out of 200. According to the data, second-year preclinical students had a more positive perception of the learning environment than third-year students. This might be attributed to the fact that third-year students often face increased challenging experiences as they transition from focusing predominantly on theoretical knowledge to engaging in more clinical training.[9] Concurrently, the curriculum at the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, is divided into three phases: the first phase (year 1) covers the basics of medical science, the second phase (year 2) covers the principles of diseases, and the third phase (year 3) covers the organ system pathologies.

Competition in the learning environment is a factor that causes students to experience the impostor phenomenon.[10] Medical schools are known for their heavy workload and competitive learning, with a culture of high expectations from the lecturers. This makes medical students a part of a high-achieving group that is susceptible to experiencing the impostor phenomenon.[11] In this study, the prevalence of the impostor phenomenon in second and third-year pre-clinical students of the School of Medicine and Health Sciences, Atma Jaya Catholic University of Indonesia, was relatively high, affecting 67.1% of participants. Interestingly, second-year students showed higher impostor prevalence compared to third-year students, even though their perception of the learning environment was more positive. This apparent contradiction may be explained by the significant academic transition faced in the second year, which increases cognitive load and self-doubt despite favorable perceptions. Furthermore, Franchi and Russell-Sewell stated that the higher the semester, the more resilience will increase, indicating that third-year students may have been learning how to cope with the stresses.[12] Another explanation may relate to the learning environment domain results in this study, where social self-perception scored the lowest among all DREEM domains. Limited peer support, a hierarchical academic culture, and performance-based assessment systems may contribute to feelings of inadequacy during early training stages, despite students reporting an overall positive environment. In addition, younger students in earlier phases of study have been reported to experience greater vulnerability to impostor feelings, as they are still adapting to academic expectations and often struggle with self-esteem and academic resilience.[6,8] Taken together, these findings suggest that positive perceptions of the learning environment alone may not immediately prevent impostor experiences, particularly if internal psychological readiness and supportive social structures are still developing.

The negative correlation between the perception of the learning environment and the occurrence of the impostor phenomenon indicates that a poor learning environment increases the occurrence of the impostor phenomenon and vice versa. Poor learning environments are usually characterized by competitive, achievement-oriented, and high-expectations learning environments, making students feel dissatisfied with their achievements.[13] In this study, it is stated that the lowest perception of DREEM is the social self -perception of society. This may be related to the hierarchical culture commonly observed in Indonesian medical schools, where early-year students may have limited access to supportive interactions with peers or faculty. Additionally, strict academic expectations and performance standards within the institution may further reduce students' sense of belonging or adequacy, especially during academic transitions. This highlights the importance of developing mentoring systems and supportive peer-learning initiatives tailored to the cultural and regulatory context of Indonesian medical education.[13,14] Social support, however, is one of the key factors in creating a good learning environment due to its positive impacts on students. The peer discussion and the use of senior medical students as mentors contributed to social support.[14] Feedback given to junior medical students has proven more valuable and acceptable due to the same journey they are on. In addition, students can evaluate their weaknesses and strengths to feel more motivated in learning and achieving good academic performance.[15] Furthermore, a good learning environment encourages students to be more confident and effective in solving problems.[16]

This study utilized validated measurement tools (DREEM and CIPS) with high internal consistency, ensuring reliable assessment of both the learning environment and the impostor phenomenon. This study also provides valuable insights into the correlation between these variables in a medical education setting, contributing to the existing literature on student well-being. However, this study may be affected by recall bias due to the flexible questionnaire completion time, as delayed responses could influence accuracy. Additionally, response bias may arise from the online data collection method, which limits direct researcher supervision and prevents participants from seeking clarification while completing the questionnaires. Finally, differences in sample size between year levels may also have influenced the mean values, as a larger number of second-year respondents could make the distribution of DREEM categories less balanced, thereby affecting average CIPS scores. Unequal group size is known to reduce statistical stability, especially when comparing subgroups, meaning interpretation of year-to-year differences should be approached with caution.

CONCLUSION

The impostor phenomenon is a significant problem for medical students, and there is a moderately strong negative correlation between how the learning environment is perceived and the incidence of the impostor phenomenon. Although a competitive learning environment, high expectations, and an achievement-oriented culture all contribute to feelings of inadequacy and impostorism, social support is essential in lowering the impostor phenomenon by helping students overcome the difficulties of medical school. In conclusion, creating a more encouraging and less competitive learning environment could mitigate the impostor phenomenon, reduce psychological burdens, and promote students' academic development.

RECOMMENDATION

Future research is recommended to further investigate the relationship between perceptions of the learning environment and the occurrence of the impostor phenomenon. Longitudinal studies conducted over a semester or academic year can provide valuable insights into temporal patterns and their potential impact on students. A comparative analysis by expanding the research scope to include several medical faculties from various universities can provide a more comprehensive understanding of how various educational environments impact the phenomenon. Furthermore, employing a mixed-methods approach that integrates quantitative and qualitative data is strongly encouraged to provide a comprehensive understanding of the interplay between learning environment perceptions and subjective experiences associated with the impostor phenomenon.

ACKNOWLEDGEMENT

The author would like to thank all the students who participated in this study.

COMPETING INTEREST

The authors declare that there are no competing interests related to the study.

AUTHORS' CONTRIBUTION

Susanna Gabriella Soedjianto – participated in data collection, data analysis, review, the writing of the paper, and the formatting for publication.

dr. Daniel Ardian Soeselo Sp.B., M.Si.,Med. – participated in the data analysis, review and direction of the paper.

dr. Gisella Anastasia, MHPE. – Review of the paper.

dr. V. Dwi Jani Juliawati, M.Pd., Sp.KKLP – Review of the paper.

dr. Natalia Puspadewi, MD, MMedEd, PhD – Review of the paper.

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