

Original article

Assessment of Burnout Syndrome in Undergraduate Students of Anaesthesia Technology

Mirza Jahanzaib¹, Ijaz Ahmed¹, Ameer Hamza¹, Rasab Umar², Inam Ullah^{2*}, Awais Akhtar²

¹ Department of Health Professional Technologies, Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan

² BS Anesthesia Technology Demonstrator, Department of Health Professional Technologies, Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan

* Correspondence: Inam Ullah, inamullah@dhpt.uol.edu.pk; inamkhanswat1276@gmail.com

Received: 7 February 2025 | Accepted: 17 April 2025 | Published: 30 June 2025

How to Cite: Jahanzaib, M. et al. 2025. Assessment of Burnout Syndrome in Undergraduate Students of Anaesthesia Technology: Assessment of Burnout Syndrome in Undergraduate Students. *Journal of Perioperative and Critical Care Sciences*. 2, 1 (Jun. 2025), 1–9.

ABSTRACT

Background: Burnout is an important concern in healthcare education, particularly among students combining intensive academic requirements with clinical training in demanding environments. Evidence specific to undergraduate anesthesia technology students remains limited. **Objective:** To assess the prevalence and severity of burnout and examine relationships among emotional exhaustion, cynicism, and academic efficacy among undergraduate anesthesia technology students. **Methods:** A descriptive cross-sectional study was conducted among 124 third- and fourth-year undergraduate anesthesia technology students at The University of Lahore, Pakistan, from January to March 2025. Burnout was assessed using the Maslach Burnout Inventory–Student Survey. Descriptive statistics were used to summarize participant characteristics and burnout scores, while Pearson correlation analysis evaluated relationships among burnout dimensions. **Results:** The mean overall burnout score was 54.29 ± 4.52 (95% CI: 53.49–55.09). Overall, 48 (38.8%) participants were classified as having low burnout, 38 (30.6%) moderate burnout, and 38 (30.6%) high burnout; consequently, 61.3% were within the combined moderate-to-high categories. Emotional exhaustion was strongly positively correlated with cynicism ($r = 0.74$, $p < 0.001$). Academic efficacy was inversely correlated with emotional exhaustion ($r = -0.60$, $p < 0.001$) and cynicism ($r = -0.61$, $p < 0.001$). **Conclusion:** Moderate-to-high burnout was common among undergraduate anesthesia technology students, with strong interrelationships among emotional exhaustion, cynicism, and academic efficacy. These findings highlight burnout as an important student well-being concern within anesthesia technology education. **Keywords:** Academic efficacy; Anesthesia technology students; Burnout syndrome; Cynicism; Emotional exhaustion; Healthcare education.

EDITORIAL INFORMATION

Author Contributions: Concept: MJ, IA; Design: MJ, IA, AH; Data Collection: MJ, AH, RU; Analysis: IU, AA; Drafting: MJ, IA, RU, IU, AA.

Ethical Approval: Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan.

Informed Consent: Written informed consent was obtained from all participants

Conflict of Interest: The authors declare no conflict of interest; **Funding:** No external funding; **Data Availability:** Available from the corresponding author on reasonable request; **Acknowledgments:** N/A.

INTRODUCTION

Burnout syndrome is an increasingly recognized concern in healthcare education and is generally characterized by emotional exhaustion, cynicism toward academic activities, and diminished academic efficacy. Unlike transient academic stress, burnout reflects a more persistent response to prolonged demands that may progressively affect students' motivation, engagement, and perception of their academic competence. Students enrolled in health-professional programmes may be particularly susceptible because they must manage intensive theoretical coursework alongside clinical training, examinations, competency development, and exposure to demanding healthcare environments. The cumulative effects of these pressures may manifest as persistent fatigue, psychological detachment from academic activities, declining motivation, and reduced confidence in academic performance. Consequently, burnout during healthcare education has implications not only for students' psychological well-being but also for the quality and continuity of their professional development (1–3).

The burden of burnout among healthcare students has been demonstrated across different educational systems. A systematic review and meta-analysis by Almutairi et al. reported a substantial global prevalence of burnout among medical students, although estimates varied considerably between studies and geographical settings (1). Such variation suggests that burnout is influenced by multiple

contextual factors, including curriculum structure, academic workload, stage of training, institutional support, assessment practices, and the nature of clinical exposure. Previous research has also demonstrated associations between burnout and academic performance, suggesting that students experiencing greater emotional exhaustion and disengagement may encounter difficulties maintaining effective academic functioning (2). High workload and limited institutional support have similarly been associated with greater burnout among healthcare students (3). These findings emphasize the importance of examining burnout within individual professional programmes rather than assuming that experiences observed among medical students are directly transferable to other healthcare disciplines.

The transition from predominantly classroom-based education to clinical training represents an especially demanding phase of health-professional education. Students must apply theoretical knowledge in real clinical situations while simultaneously developing technical competence, communication skills, professional behavior, and confidence in working with patients and multidisciplinary healthcare teams. Clinical placements may also expose students to unfamiliar environments, critically ill patients, procedural complications, time pressure, irregular schedules, and expectations from clinical supervisors. When these demands coexist with examinations, assignments, attendance requirements, and concerns regarding academic performance, students may experience substantial physical and psychological strain. Repeated exposure to such pressures without adequate opportunities for recovery or appropriate institutional support may contribute to emotional exhaustion and progressive disengagement from academic activities.

Evidence from anesthesia-related professions supports the relevance of these occupational and educational stressors. Research involving anesthesiology trainees and professionals has identified workload, prolonged working hours, demanding workplace interactions, academic pressures, insufficient recovery, and inadequate institutional support as important factors associated with burnout (4–6). Chong et al., in a systematic review of anesthesiology residents, demonstrated that burnout represents a considerable concern during anesthesia training and identified several work- and training-related stressors contributing to its development (4). Burnout and depressive symptoms have also been documented among anesthesiology trainees in the United States (5), while inadequate workplace support has emerged as an important correlate of burnout among practicing anesthesiologists (6). Although undergraduate anesthesia technology students differ substantially from physicians and postgraduate anesthesiology trainees in their responsibilities and level of clinical autonomy, these findings illustrate the psychological demands associated with sustained exposure to anesthesia and perioperative environments.

Burnout among healthcare students has likewise been documented across Middle Eastern and South Asian educational settings. Research among health-profession students has identified substantial levels of emotional exhaustion and cynicism and has demonstrated relationships between burnout and psychological distress (7). Studies involving anesthesia professionals have similarly highlighted the contribution of demanding clinical environments to occupational psychological burden (8). Within Pakistan, available evidence indicates that stress and burnout constitute important concerns among healthcare trainees, with academic workload, examinations, extended study periods, inadequate sleep, and other educational pressures contributing to students' psychological burden (9). Such findings warrant particular attention in professional programmes in which classroom education occurs concurrently with intensive clinical exposure.

The consequences of burnout during undergraduate healthcare education may extend beyond immediate psychological discomfort. Emotional exhaustion may diminish students' capacity to remain actively engaged with academic and clinical learning, whereas cynicism may manifest as detachment from coursework or reduced enthusiasm toward professional training. Despite the expanding literature on burnout in healthcare education, available evidence remains concentrated predominantly on medical students, nursing students, physicians, and postgraduate trainees. Undergraduate anesthesia technology students represent a comparatively understudied population, particularly within South Asian settings. Their educational experience differs from that of medical students because it combines discipline-specific technical training with repeated exposure to perioperative and critical-care environments.

This evidence gap is particularly relevant in Pakistan, where locally derived data are necessary because educational structures, available student-support resources, clinical-training conditions, and sociocultural circumstances may differ from those represented in international studies. Identifying the extent and pattern of burnout among anesthesia technology students may therefore provide an empirical basis for recognizing student well-being as an important component of professional education and for informing appropriately designed academic and psychological support strategies.

Therefore, this study aimed to assess the prevalence and severity of burnout and examine the relationships among emotional exhaustion, cynicism, and academic efficacy among undergraduate anesthesia technology students at The University of Lahore. Based on the conceptual relationship among the MBI-SS dimensions, it was anticipated that greater emotional exhaustion would be associated with greater cynicism, whereas academic efficacy would be inversely associated with both emotional exhaustion and cynicism.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted among undergraduate anaesthesia technology students in the Department of Health Professional Technologies, Faculty of Allied Health Sciences, The University of Lahore, Lahore, Pakistan, from July 2024 to October 2024. The study population comprised students in the third and fourth academic years (5th–8th semesters) who were undergoing clinical training as part of the BS Anesthesia Technology programme. A total of 124 students participated in the study and were recruited using a purposive sampling technique.

Students aged 20–27 years, of either gender, enrolled in the 5th–8th semesters and actively participating in clinical rotations were eligible for inclusion. Students who were absent or on leave during data collection, declined or withdrew consent, or returned questionnaires with incomplete responses for the burnout assessment were excluded. Participation was voluntary, and written informed consent was obtained before questionnaire administration. Burnout was assessed using the Maslach Burnout Inventory–Student Survey (MBI-SS), which evaluates three related dimensions of academic burnout: emotional exhaustion, cynicism, and academic efficacy. Emotional exhaustion reflects feelings of being emotionally depleted by academic demands, cynicism represents psychological detachment or a negative attitude toward study, and academic efficacy reflects perceived competence and accomplishment in academic activities. The instrument comprised 15 items in the version used in this study, with items 1–5 contributing to the emotional exhaustion domain, items 6–10 to cynicism, and items 11–15 to academic efficacy. Higher emotional exhaustion and cynicism scores, together with lower academic efficacy, were interpreted as indicating a greater burnout profile.

In addition to the MBI-SS domains, the study dataset contained an overall burnout score. For descriptive categorisation, participants were classified into low, moderate, and high burnout groups according to the tertile-based approach used in the original study analysis, with the 33rd and 66th percentile positions defining the category boundaries. Because academic efficacy is directionally inverse to emotional exhaustion and cynicism within the burnout construct, the three MBI-SS dimensions were additionally examined separately and their interrelationships were treated as the principal inferential assessment. This domain-based approach allowed the pattern of burnout to be evaluated without relying solely on interpretation of the overall score. Demographic and training-related information included age group, gender, academic year, marital status, and weekly clinical-training exposure. Completed questionnaires were reviewed for completeness before data entry. Participant information was handled confidentially, and the analytical dataset was anonymised before statistical analysis.

Data were analysed using IBM SPSS Statistics version 20.0, as specified in the original study analysis. Categorical variables were summarised as frequencies and percentages, whereas continuous burnout measures were described using means, standard deviations, medians, and ranges where available. The mean overall burnout score was additionally expressed with a 95% confidence interval. Burnout categories were presented as frequencies and percentages. Pearson correlation analysis was used to evaluate the relationships among emotional exhaustion, cynicism, and academic efficacy. Correlation coefficients were interpreted according to their absolute magnitude as very weak (0.00–0.19), weak (0.20–0.39), moderate (0.40–0.59), strong (0.60–0.79), and very strong (0.80–1.00). Statistical tests were two-tailed, and $p < 0.05$ was considered statistically significant.

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and the requirements of the Ethical Review Committee of the Faculty of Allied Health Sciences, The University of Lahore (Ref. No.: DRC/DHPT001/07/24). Written informed consent was obtained from all participants before enrolment. Participation was voluntary, confidentiality and anonymity were maintained throughout the study, and participants could withdraw without penalty at any stage of data collection.

RESULTS

A total of 124 undergraduate anesthesia technology students were included in the analysis. The largest age group was 24–26 years, comprising 69 (55.6%) participants, while 27 (21.8%) were aged 21–23 years and 28 (22.6%) were aged ≥ 27 years. The sample was relatively balanced by gender, with 65 (52.4%) male and 59 (47.6%) female participants. Most students were in their fourth academic year (83, 66.9%), whereas 41 (33.1%) were in their third year. The majority were single (100, 80.6%), as shown in Table 1.

Table 1. Table 1. Demographic and Academic Characteristics of Participants

Characteristic	Category	n	%
Age group, years	21–23	27	21.8
	24–26	69	55.6
	≥ 27	28	22.6
Gender	Male	65	52.4
	Female	59	47.6
Academic year	Third year	41	33.1
	Fourth year	83	66.9
Marital status	Single	100	80.6
	Married	24	19.4

Data are presented as n (%). Percentages are based on N = 124.

Clinical-training exposure was also examined. Of the 124 participants, 59 (47.6%) reported 6 hours of clinical training per week, whereas 65 (52.4%) were in the >7-hours category (Table 2). Thus, slightly more than half of the participants were represented in the higher reported clinical-training category. The previously stated value of 76.6% was not supported by the tabulated data and was therefore not retained.

Table 2. Weekly Clinical Training Exposure of Participants

Clinical training per week	n	%
6 hours	59	47.6
>7 hours	65	52.4
Total	124	100.0

Categories are presented according to the available study data.

The overall burnout score had a mean of 54.29 ± 4.52 and a median of 54.00, with observed scores ranging from 43.00 to 64.00. Based on the reported sample size and variability, the calculated 95% confidence interval (CI) for the mean was 53.49–55.09 (Table 3). The relatively close mean and median indicate that the central estimates of the overall score were similar within the study sample.

Table 3. Descriptive Statistics for Overall Burnout Score

Outcome	n	Mean $\pm$ SD	Median	95% CI for Minimum mean	Maximum
Overall burnout score	124	54.29 4.52	$\pm$ 54.00	53.49– 55.09	43.00 64.00

CI, confidence interval; SD, standard deviation. The 95% CI was calculated from the reported n, mean, and SD.

When the overall burnout scores were classified according to the tertile-based categorization used in the study, 48 participants (38.8%) were classified in the low-burnout category, while 38 (30.6%) were classified as having moderate burnout and another 38 (30.6%) as having high burnout (Table 4). Accordingly, 76 of the 124 participants were classified in the combined moderate-to-high burnout

categories, representing 61.3% of the sample based on the underlying frequencies. High burnout alone was present in 30.6% of participants.

Table 4. Distribution of Burnout Categories Among Participants

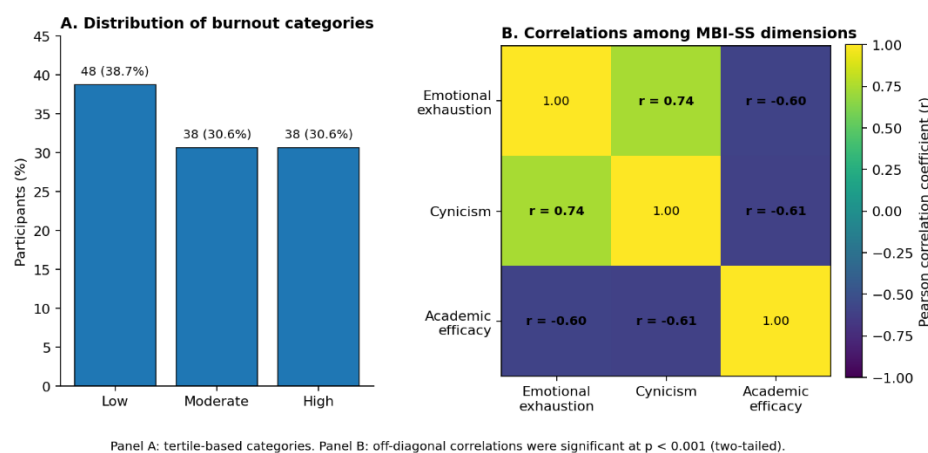
Burnout category	n	%
Low	48	38.8
Moderate	38	30.6
High	38	30.6
Total	124	100.0

Burnout categories were based on the tertile-based classification applied in the original study analysis

Figure 1 presents the distribution of burnout categories among anesthesia technology students and the correlations between the three dimensions of the Maslach Burnout Inventory–Student Survey (MBI-SS), providing an overview of burnout prevalence and inter-dimensional relationships.

Table 4. Figure 1. Burnout burden and inter-dimensional relationships among undergraduate anesthesia technology students

Burnout burden and inter-dimensional relationships among anesthesia technology students (N = 124)



Analysis of the individual burnout dimensions demonstrated clear inter-dimensional relationships. Emotional exhaustion was strongly and positively correlated with cynicism ($r = 0.74$, $p < 0.001$), indicating that higher emotional exhaustion scores were associated with higher cynicism scores. Based on the coefficient of determination, these dimensions shared approximately 54.8% variance ($r^2 = 0.548$).

Academic efficacy showed strong inverse correlations with both emotional exhaustion and cynicism. Emotional exhaustion was negatively correlated with academic efficacy ($r = -0.60$, $p < 0.001$), corresponding to approximately 36.0% shared variance. Similarly, cynicism was negatively correlated with academic efficacy ($r = -0.61$, $p < 0.001$), corresponding to approximately 37.2% shared variance. The complete correlation matrix is presented in Table 5.

Table 5. Correlations Among Burnout Dimensions

Burnout dimension	Emotional exhaustion	Cynicism	Academic efficacy
Emotional exhaustion	1.00	0.74***	-0.60***
Cynicism	0.74***	1.00	-0.61***
Academic efficacy	-0.60***	-0.61***	1.00

**Values are Pearson correlation coefficients (r). ** $p < 0.001$, two-tailed.*

Overall, the results demonstrate that 61.3% of the participants were classified within the combined moderate-to-high burnout categories. Among the relationships examined, the strongest association was observed between emotional exhaustion and cynicism ($r = 0.74$), while academic efficacy was inversely associated with both emotional exhaustion ($r = -0.60$) and cynicism ($r = -0.61$). These findings establish a consistent pattern of association among the three measured dimensions of burnout within the study population.

Table 2. Weekly Clinical Training Exposure of Participants

Clinical training per week	n	%
6 hours	59	47.6
>7 hours	65	52.4
Total	124	100.0

Categories are presented according to the available study data.

The overall burnout score had a mean of 54.29 ± 4.52 and a median of 54.00, with observed scores ranging from 43.00 to 64.00. Based on the reported sample size and variability, the calculated 95% confidence interval (CI) for the mean was 53.49–55.09 (Table 3). The relatively close mean and median indicate that the central estimates of the overall score were similar within the study sample.

Table 3. Descriptive Statistics for Overall Burnout Score

Outcome	n	Mean $\pm$ SD	Median	95% CI for Minimum mean	Maximum
Overall burnout score	124	54.29 $\pm$ 4.52	54.00	53.49–55.09	43.00–64.00

CI, confidence interval; SD, standard deviation. The 95% CI was calculated from the reported n, mean, and SD.

When the overall burnout scores were classified according to the tertile-based categorization used in the study, 48 participants (38.8%) were classified in the low-burnout category, while 38 (30.6%) were classified as having moderate burnout and another 38 (30.6%) as having high burnout (Table 4). Accordingly, 76 of the 124 participants were classified in the combined moderate-to-high burnout

DISCUSSION

This study identified a substantial burden of burnout among undergraduate anesthesia technology students, with 61.3% of participants classified within the combined moderate-to-high burnout categories and 30.6% within the high-burnout category. The most notable finding was the strong interrelationship among the three measured burnout dimensions. Emotional exhaustion was strongly and positively associated with cynicism, whereas academic efficacy was inversely associated with both emotional exhaustion and cynicism. Together, these findings suggest that burnout in anesthesia technology students is not limited to a single aspect of academic distress but is characterized by interconnected patterns of exhaustion, disengagement, and perceived academic competence.

The proportion of students with moderate-to-high burnout observed in the present study is broadly consistent with evidence indicating a substantial burden of burnout across healthcare education. Almutairi et al. reported a pooled burnout prevalence of approximately 37% among medical students in their systematic review and meta-analysis, although considerable heterogeneity was observed across included studies (1,10). Differences between that pooled estimate and the present findings should be interpreted cautiously because burnout estimates vary according to study population, educational context, measurement instrument, and classification criteria. Al-Jehani et al. similarly documented a considerable burden of burnout among medical students and identified educational stressors as important correlates (3,11). Among health-profession students in Qatar, Sulaiman et al. also demonstrated substantial burnout and an important relationship between burnout and psychological distress (7,12). Collectively, these studies support the broader observation that sustained academic and clinical demands may represent an important challenge to student well-being across healthcare disciplines.

The training environment of anesthesia technology students may provide an important context for understanding the observed burden. Unlike programmes based predominantly on classroom learning, anesthesia technology education requires students to combine theoretical coursework with technical competency development and clinical exposure to perioperative environments. Operating rooms and related high-acuity clinical settings demand sustained attention, adherence to safety procedures, adaptation to multidisciplinary teamwork, and exposure to patients undergoing complex procedures

(5,13). These demands occur alongside examinations, assignments, attendance requirements, and other academic responsibilities. Although the present cross-sectional study was not designed to determine the causes of burnout, evidence from anesthesia-related training suggests that workload, demanding clinical environments, prolonged working schedules, and inadequate support may contribute to psychological strain (4,6,14).

The strongest association identified in the present study was between emotional exhaustion and cynicism ($r = 0.74$). This relationship is conceptually important because emotional exhaustion reflects depletion of psychological and emotional resources, whereas cynicism represents increasing psychological distance from academic work. Their strong positive association suggests that students reporting greater exhaustion also tended to report greater disengagement from their studies. Similar patterns have been recognized in burnout research involving healthcare trainees, in whom sustained educational and workplace demands may coexist with exhaustion and reduced engagement (4,5,15). However, because the current study measured these variables simultaneously, the direction of this relationship cannot be established. Emotional exhaustion may contribute to disengagement, cynicism may exacerbate perceived exhaustion, or both may arise from common academic and clinical stressors.

Academic efficacy demonstrated strong inverse relationships with emotional exhaustion ($r = -0.60$) and cynicism ($r = -0.61$). Students reporting greater perceived academic efficacy therefore tended to have lower exhaustion and cynicism scores. These findings are consistent with the multidimensional conceptualization of academic burnout, in which exhaustion and disengagement coexist with reduced perceptions of competence and accomplishment. Previous research has also demonstrated associations between burnout and academic performance or educational functioning among healthcare students (2,16). Nevertheless, academic efficacy should not be interpreted as a proven protective factor on the basis of the present analysis. The cross-sectional correlations establish association rather than temporal or causal relationships, and longitudinal studies would be required to determine whether stronger academic efficacy reduces subsequent burnout or whether increasing burnout progressively undermines students' perceptions of academic competence.

The clinical-training profile of the participants provides additional context. Slightly more than half of the students were in the higher reported clinical-training category, and approximately two-thirds were fourth-year students. Greater exposure to clinical environments may coincide with increasing educational responsibility as students' progress through professional training. Previous research among anesthesiology trainees has identified workload and training demands as important burnout-related stressors (4,5,17), while research among practicing anesthesiologists has highlighted the relevance of workplace support to professional well-being (6). However, the present dataset did not provide subgroup analyses linking clinical-training hours or academic year directly with burnout outcomes. Consequently, these participant characteristics should be regarded as descriptive contextual factors rather than demonstrated predictors of burnout.

The findings have implications for anesthesia technology education. Burnout during undergraduate training warrants attention because emotional exhaustion and academic disengagement may interfere with students' learning experiences and overall well-being. Educational institutions may benefit from integrating student-support approaches into demanding clinical programmes, including accessible psychological support, academic counselling, mentorship, opportunities to discuss stressful clinical experiences, and periodic evaluation of academic and clinical workload (18). Importantly, interventions should not place responsibility solely on individual students. Because burnout can reflect interactions between personal, academic, and training-environment factors, institutional approaches should also consider curriculum organization, scheduling, supervision, communication, and the availability of supportive learning environments.

This study contributes discipline-specific evidence from an undergraduate anesthesia technology population, a group that has received substantially less research attention than medical students, physicians, and postgraduate anesthesiology trainees (19). The inclusion of students actively engaged in clinical training and the assessment of relationships among the three burnout dimensions provide additional insight beyond reporting a single overall burnout estimate. The internally coherent pattern of correlations higher emotional exhaustion accompanying higher cynicism and both being associated with

lower academic efficacy also supports the importance of examining burnout as a multidimensional construct (20).

Several limitations should be considered when interpreting the findings. First, the cross-sectional design prevents determination of temporal or causal relationships among burnout dimensions or between burnout and potential academic or clinical stressors. Second, participants were recruited from a single institution using purposive sampling, which limits generalizability to anesthesia technology students at other universities or healthcare education programmes. Third, burnout was assessed using a self-administered instrument and may therefore have been influenced by response or social-desirability bias. Fourth, the available analysis did not examine potentially important predictors or confounding factors such as gender, academic year, marital status, clinical-training exposure, sleep, examination burden, or psychological distress. Finally, the low, moderate, and high burnout categories were derived from the tertile-based classification applied in the study rather than from diagnostic thresholds; therefore, these categories should be interpreted as relative levels within the study population rather than as a clinical diagnosis of burnout.

CONCLUSION

Burnout was common among undergraduate anesthesia technology students, with 61.3% of participants classified within the combined moderate-to-high burnout categories and 30.6% within the high-burnout category. Emotional exhaustion was strongly and positively associated with cynicism ($r = 0.74$), while academic efficacy was inversely associated with emotional exhaustion ($r = -0.60$) and cynicism ($r = -0.61$). These findings demonstrate a closely interrelated pattern of exhaustion, academic disengagement, and perceived academic efficacy within this student population. Given the cross-sectional design and tertile-based classification of burnout, the findings should be interpreted as evidence of the burden and pattern of burnout within the study population rather than as evidence of causal relationships or clinically diagnosed burnout.

REFERENCES

1. Almutairi H, Alsubaiei A, Abduljawad S, Alshatti A, Fekih-Romdhane F, Husni M, et al. Prevalence of burnout in medical students: a systematic review and meta-analysis. *Int J Soc Psychiatry*. 2022;68(6):1157–1170.
2. Aljadani AH, Alsolami A, Almeahmadi S, Alhuwaydi A, Fathuldeen A. Epidemiology of burnout and its association with academic performance among medical students at Hail University, Saudi Arabia. *Sultan Qaboos Univ Med J*. 2021;21(2):e231–e238.
3. Al-Jehani YM, Althwanay AM, Buainain HM, Abuhaimed AK, Almulhim AM, Abusrir FA, et al. Burnout prevalence and associated stressors in medical students of traditional and problem-based learning curricula in a Saudi University. *Saudi J Med Med Sci*. 2020;8(2):125–132.
4. Chong MYF, Lin SHX, Lim WY, Ong J, Kam PCA, Ong SGK. Burnout in anaesthesiology residents: a systematic review of its prevalence and stressors. *Eur J Anaesthesiol*. 2022;39(4):368–377.
5. Bui D, Winegarner A, Kendall MC, Almeida M, Apruzzese P, De Oliveira G. Burnout and depression among anesthesiology trainees in the United States. *J Clin Anesth*. 2023;84:110990.
6. Afonso AM, Cadwell JB, Staffa SJ, Sinskey JL, Vinson AE. US attending anesthesiologist burnout in the post-pandemic era. *Anesthesiology*. 2024;140(1):38–51.
7. Sulaiman R, Ismail S, Shraim M, El Hajj MS, Kane T, El-Awaisi A. Experiences of burnout, anxiety, and empathy among health profession students in Qatar University during the COVID-19 pandemic: a cross-sectional study. *BMC Psychol*. 2023;11(1):111.
8. Alghamdi WA, Maamoun A, Khalaf HMA, Nezar K, Khalifah HSA, Abdulaziz K, et al. Current mental health status and burnout level among anesthesiologists in Riyadh, Saudi Arabia. *Med Sci*. 2022;26(126):1–12.
9. Shadid A, Shafiq M, Khalid M. Stress, burnout and associated risk factors among medical students in Pakistan. *J Pak Med Assoc*. 2020;70(7):1186–1191.
10. Shahbaz S, Zakar R, Fischer F. Anesthesia health system capacities in public hospitals of Punjab, Pakistan. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*. 2021 Nov 14;58:00469580211059740.

11. Shahbaz S, Zakar R, Howard N. Anaesthesia provision challenges in public hospitals of Pakistan's Punjab province: a qualitative study of expert perspectives. *BMJ open*. 2023 Dec 1;13(12):e075108.
12. Bilal A, Muneer B, Ullah MS, Shahbaz S, Ali R, Noman M. Postoperative Complications of Anaesthesia following Appendectomy: Complications of Anaesthesia following Appendectomy. *The Healer Journal of Physiotherapy and Rehabilitation Sciences*. 2024 Sep 30;4(5):15-21.
13. Fayyaz M, Shahbaz S. A Narrative Review on Management of Cyanosis in Neonates: Management of Cyanosis in Neonates. *Pakistan Journal of Health Sciences*. 2023 Nov 30:14-9.
14. Khan A, Ullah I, Khawaja AZ, Bary A, Ullah TR, Shahbaz S, Ali N. Frequency and Risk Factors Associated with Postoperative Sore Throat (POST) in Adults Undergoing General Anesthesia during ENT and Eye Surgery: A Cross-Sectional Study: POST in Adults Undergoing General Anesthesia During ENT and Eye Surgery. *Pakistan Journal of Health Sciences*. 2025 May 31:110-6.
15. Ullah I, Bibi T, Shahbaz S, Tabassum H, Chaudhary WA. Efficacy of Femoral Nerve Block Compared to Adductor Canal Block for Post Operative Pain Management After Total Knee Arthroplasty: Femoral Nerve vs Adductor Canal Block After Total Knee Arthroplasty. *The Healer Journal of Physiotherapy and Rehabilitation Sciences*. 2024;4(6):22-9.
16. Fayyaz M, Muneer B, Iqbal A, Bilal MA, Tabassum H, Shahbaz S. Mechanical Causes of Osteoarthritis in Adults, its Diagnosis and Treatment: Osteoarthritis in Adults. *THE THERAPIST (Journal of Therapies & Rehabilitation Sciences)*. 2023 Dec 31:02-7.
17. Shahbaz S, Howard N. Anaesthesia delivery systems in low and lower-middle-income Asian countries: a scoping review of capacity and effectiveness. *PLOS global public health*. 2024 Mar 18;4(3):e0001953.
18. Afonso AM, Cadwell JB, Staffa SJ, Zurakowski D, Vinson AE. Burnout rate and risk factors among anesthesiologists in the United States. *Anesthesiology*. 2021 May 1;134(5):683.
19. Mikalauskas A, Benetis R, Širvinskis E, Andrejaitienė J, Kinduris Š, Macas A, Padaiga Ž. Burnout among anesthetists and intensive care physicians. *Open Medicine*. 2018 Apr 5;13(1):105-12.
20. Castanelli DJ, Wickramaarachchi SA, Wallis S. Burnout and the learning environment of anaesthetic trainees. *Anaesthesia and Intensive Care*. 2017 Nov;45(6):744-51.