

ORIGINAL ARTICLE

Factors Associated with Burnout among Medical Students: Roles of Grit, Resilience, and the Educational Environment.Supitcha Thamissarakul¹, Winita Wajatieng², Wasana Hongkan¹¹*Chonburi Medical Education Center, Chonburi, Thailand*²*Nakornping Medical Education Center, Chiang Mai, Thailand*

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Abstract

Background: The rigorous nature of medical education often contributes to various mental health concerns, including burnout syndrome. Students who possessed strong grit and resilience attributes, coupled with a supportive educational environment, were less likely to experience burnout. This study investigates the association of grit, resilience, and the educational environment with burnout syndrome among clinical medical students.

Methods: A cross-sectional study was conducted involving 103 (97.17%) fourth-to sixth-year medical students in a Chonburi Hospital, Thailand in the academic year 2024. Participants completed self-administered questionnaires including: demographic information (sex, level, GPAX, rotation and intention to study medicine), Maslach Burnout Inventory, 8-item Short Grit Scale, Davidson Resilience Scale 10 and Dundee Ready Education Environment Measure (DREEM). Data were analyzed using linear regression analysis, and binary logistic regression with statistical significance $p < 0.05$.

Results: The prevalence of burnout was 53.4%. High resilience and grit were 48.5% and 20.4% of students, respectively. Significant negative correlations were found between burnout dimensions (EE, DP) and grit ($p = 0.049$), resilience ($p = 0.032$), and several DREEM subscales consisted of academic self-perception ($p < 0.001$) and social self-perception ($p = 0.004$). Multivariable logistic regression revealed that low perception of atmosphere (OR = 12.84, $p = 0.018$) and low social self-perception (OR = 9.44, $p = 0.006$) were significantly associated with burnout. The model yielded an AUC of 0.77.

Conclusions: Grit, resilience, self-confidence, and strong peer support were key protective factors against burnout. Academic and social self-perceptions were strong predictors of burnout risk.

Keywords: burnout, grit, resilience, educational environment, medical Student

Background

Medical education is a demanding, challenging, and stressful process that medical students must endure. The nature of medical training exposes students to multiple forms of stress, which may contribute to mental health problems such as burnout syndrome¹⁻³. A previous study conducted among clinical medical students at Chonburi Medical Education Center (CMEC)⁴ revealed that fourth-year students, male students, and those with GPAX < 3.0 tended to experience higher levels of emotional exhaustion and depersonalization, highlighting the need to monitor and support at-risk groups.

On the other hand, individual psychological resources play an important role in shaping how students perceive and cope with stressful environments. Students who possess strong psychological resources are better able to handle heavy academic workloads, adapt to constant pressure, and overcome challenges effectively². Two such psychological⁵⁻¹⁰, grit and resilience, have received increasing attention. These two constructs are interrelated constructs that function as key protective factors against burnout. Grit supports sustained effort and goal commitment despite prolonged academic demands⁵⁻⁷, whereas resilience facilitates adaptive coping and psychological recovery when encountering stressors and setbacks⁸⁻¹⁰. Together, they may reduce emotional exhaustion and depersonalization while supporting personal accomplishment.

Another crucial factor is the educational environment¹¹⁻¹⁵, which includes the curriculum, teachers, peer relationships, and overall learning atmosphere. It is hypothesized that students with higher levels of grit and resilience, together with a positive educational environment, are less likely to experience burnout. However, studies exploring the association among burnout, grit, resilience, and the educational environment among clinical medical students remain limited. This study aimed to investigate the relationships between burnout, grit, resilience, and the educational environment among medical students.

Materials and Methods

Study design and population

A cross-sectional design was conducted at the Chonburi medical education center, Thailand, during June and August 2024. Participation included 103^{4th-6th} - year medical students. Ethical clearance was obtained from the Chonburi Hospital Research Ethics Committee (No. 31/67/S/q).

Data collection

Data were collected using a structured self-administered online questionnaire, which comprised five sections: demographic information, burnout, resilience, grit, and perception of the educational environment. All instruments used were previously validated and widely applied in medical education research.

Research instruments

1. Demographic and Academic Characteristics

Information was collected on sex, year of study, grade point average (GPAX), and type of clinical rotation. Clinical rotations were categorized into major departments (Internal Medicine, Surgery, Obstetrics and Gynecology, and Pediatrics) and minor departments (Psychiatry, Orthopedics, Ophthalmology, and Community Medicine).

2. Burnout

Burnout was measured using the Maslach Burnout Inventory (MBI), originally developed by Maslach and Jackson and translated into Thai by Summawart S. The MBI assesses three dimensions: emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA). According to the scoring criteria proposed by Maslach and Jackson, students were classified as having burnout if $EE \geq 27$ or $DP \geq 13$. Previous studies among medical students have demonstrated good internal consistency, with Cronbach's alpha coefficients of 0.87 for EE, 0.86 for DP, and 0.77 for PA.

3. Resilience

Resilience was assessed using the Davidson Resilience Scale – 10 items (DRS-10)^{16,17}, which measures an individual's ability to adapt to stress and recover from chal-

lenges. A total score ranging from 0 to 40. A score of ≥ 25.5 ¹⁸ indicated good resilience, as previously reported in validation studies conducted among Thai university students (Cronbach's alpha = 0.82)

4. Grit

Grit was measured using the 8-Item Short Grit Scale developed by Duckworth and Quinn¹⁹. Total scores were categorized into three levels: high grit (>75th percentile), average grit, and low grit. Higher scores indicated greater perseverance and long-term passion for goals, with a Cronbach's alpha = 0.83

5. Educational Environment

The Dundee Ready Education Environment Measure (DREEM)²⁰⁻²² was used to evaluate students' perceptions of their learning environment. It comprises 50 items categorized into five domains: Students' Perceptions of Learning (SPL), Students' Perceptions of Teachers (SPT), Students' Academic Self-Perception (SAP), Students' Perception of Atmosphere (SPA), and Students' Social Self-Perception (SSP). Each item is scored on a 5-point Likert scale, where 0–1 indicates a negative perception, 2 is neutral, and 3–4 reflects a positive perception. The Thai adaptation of the DREEM instrument has demonstrated high internal consistency, with Cronbach's alpha exceeding 0.91.

Statistical analysis

All data were analyzed using IBM SPSS Statistics version 26 (IBM Corp., Armonk, NY, USA). Pearson's correlation analysis was performed to examine the association among burnout components, grit, resilience, and DREEM subscales. Multivariable linear regression was applied to identify independent predictors of EE and DP, adjusting for sex, academic year, GPAX, and clinical rotation. In addition, binary logistic regression was conducted to determine factors associated with burnout status. Statistical significance was set at $p < 0.05$.

Results

Baseline Characteristics

A total of 103 clinical medical students participated in the study, representing a 97.2% response rate. Most participants were female

(59.2%), and the distribution across academic years was similar (32.0% fourth-year, 34.0% fifth-year, and 34.0% sixth-year students). The majority were assigned to major clinical rotations (68.0%) and reported a personal intention to study medicine (86.4%). The median GPAX was 3.2 (IQR 2.97–3.45), and 70.9% had $GPAX \geq 3.00$. The mean resilience score was 25.09 ± 5.01 .

As illustrated in Figure 1A, burnout syndrome was observed in 53.4% of clinical medical students, indicating that more than half of the participants experienced either high emotional exhaustion or depersonalization. Figures 1B–D that most students reported average grit levels and generally positive perceptions of the educational environment across overall DREEM categories and subscales.

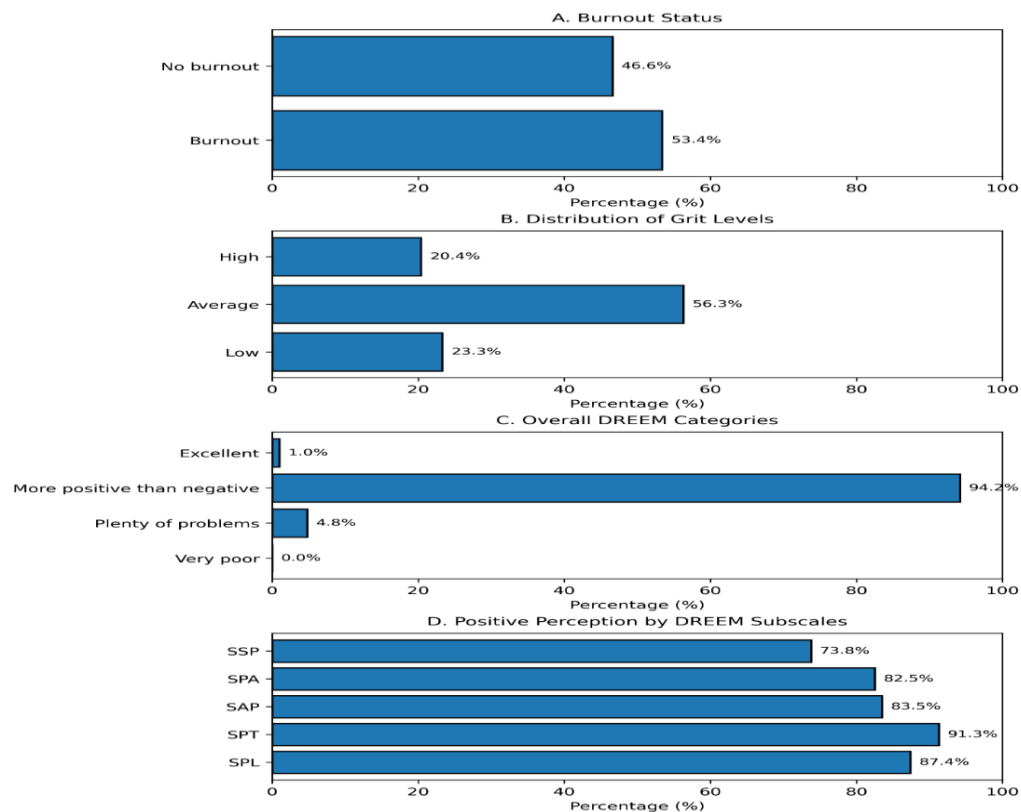


Figure 1. (A) prevalence of burnout syndrome, (B) distribution of grit levels, (C) overall perception of the educational environment based on DREEM categories, and (D) proportion of students reporting positive perceptions across DREEM subscales. Values are presented as percentages. Spl, Students' Perception of Learning; Spt, Students' Perception of Teachers; Sap, Students' Academic Self-Perception; Spa, Students' Perception of Atmosphere; Ssp, Students' Social Self-Perception; DREEM, Dundee Ready Education Environment Measure

Regression analysis revealed that positive SAP significantly reduced all three burnout components: EE ($\beta = -0.905$, 95% CI -1.327 to -0.483 , $p < 0.001$), DP ($\beta = -0.491$, 95% CI -0.849 to -0.133 , $p = 0.008$), and Low PA ($\beta = -0.675$, 95% CI -1.226 to -0.124 , $p = 0.017$). Lower scores in SSP were also associated with higher EE and DP. In addition, higher total DREEM, grit, and resilience scores were linked to lower burnout across all dimensions, showing that both psychological strength and a supportive educational environment protect against burnout. (Table 1)

Table 1 The multivariable linear regression analysis examining predictors of the three burnout components

	EE			DP			PA		
	beta	95% CI	p	beta	95% CI	p	beta	95% CI	p
Spl	-0.29	-0.67, 0.09	0.14	-0.30	-0.60, 0.00	0.05	-0.24	-0.71, 0.23	0.31
Spt	-0.10	-0.58, 0.38	0.68	-0.33	-0.78, 0.05	0.09	-0.39	-0.97, 0.20	0.19
Sap	-0.91	-1.33, -0.48	<0.001	-0.49	-0.85, -0.13	0.01	-0.68	-1.23, -0.12	0.02
Spa	-0.06	-0.43, 0.30	0.74	0.06	-0.23, 0.36	0.67	-0.28	-0.73, 0.16	0.21
Ssp	-0.64	-1.08, -0.20	0.00*	-0.40	-0.76, -0.05	0.03	-0.34	-0.90, 0.22	0.23
DREEM	-0.13	-0.24, -0.02	0.02*	-0.09	-0.18, 0.00	0.04	-0.13	-0.27, 0.01	0.06
Grit	-0.31	-0.62, 0.00	0.05*	-0.16	-0.41, 0.09	0.21	-0.45	-0.83, -0.07	0.02
Resilience	-0.27	-0.52, -0.02	0.03*	-0.23	-0.43, -0.03	0.02	-0.33	-0.63, -0.02	0.04

EE, Emotional Exhaustion; DP, Depersonalization; PA, Personal Accomplishment; Spl, Students' Perception of Learning; Spt, Students' Perception of Teachers; Sap, Students' Academic Self-Perception; Spa, Students' Perception of Atmosphere; Ssp, Students' Social Self-Perception; DREEM, Dundee Ready Education Environment Measure; CI, confidence interval.

Students in minor wards were less likely to experience burnout compared with those in major wards (adjusted OR = 0.40, 95% CI 0.15–1.04, $p = 0.061$). Low scores in SPA and SSP were significantly related to burnout (SPA: adjusted OR = 12.84, 95% CI 1.54–106.91, $p =$

0.018; SSP: adjusted OR = 9.44, 95% CI 1.92–46.46, $p = 0.006$) (**Table 2**). The multivariate model predicting burnout had good accuracy, with an area under the ROC curve (AUC) of 0.77.

Table 2 Factors associated with burnout by binary logistic regression

variable	Crude OR	95% CI	p	Adjusted OR	95 % CI	p
- Male	0.91	0.41, 2.01	0.82			
- 4 th year student	-	-	1.00			
- 5 th year student	0.47	0.18,1.26	0.13			
- 6 th year student	0.42	0.16,1.13	0.09			
- GPAX < 3.00	0.46	0.19,1.12	0.09			
- Minor Department	0.30	0.12,0.71	0.01	0.40	0.15,1.04	0.06
- low SPL	-	-	-			
- low SPT	6.85	0.81, 57.88	0.08			
- low SAP	-	-	-			
- low SPA	19.28	2.45, 151.96	0.005*	12.84	1.54,106.91	0.02*
- low SSP	11.19	2.44, 51.35	0.002*	9.44	1.92, 46.46	0.01*
- low DREEM	-	-	-			
- Resilience	0.56	0.26, 1.22	0.15			
- Low Grit	1.78	0.74, 4.25	0.20			

GPAX, cumulative grade point average; Spl, Students' Perception of Learning; Spt, Students' Perception of Teachers; Sap, Students' Academic Self-Perception; Spa, Students' Perception of Atmosphere; Ssp, Students' Social Self-Perception; DREEM, Dundee Ready Education Environment Measure; CI, confidence interval

Discussion

Burnout prevalence observed in this study was comparable to previously reported data from the same institution⁵. International evidence likewise indicates that approximately half of medical trainees experience burnout symptoms¹. In clinical-phase students, burnout is likely driven by cumulative academic demands, prolonged clinical duties, emotional

strain from patient care, and the stress associated with transitioning into clinical responsibilities^{4,13,15}.

The mean DREEM score (125.2 ± 12.6) reflected an overall positive perception of the learning environment. Notably, a more favorable educational climate was significantly associated with lower burnout levels, particularly in the domains of

Students' Academic Self-Perception (SAP), Students' Perception of Atmosphere (SPA), and Students' Social Self-Perception (SSP). These findings are consistent with prior research demonstrating that supportive, learner-centered environments contribute to improved psychological well-being and reduced emotional distress^{11,20,22}. Additionally, students rotating in minor wards exhibited lower burnout tendencies compared with those in major clinical rotations. This difference may be explained by variations in workload, emotional intensity, and levels of supervisory support. Evidence from both Thai and international contexts suggests that smaller, community-based training environments often promote closer mentoring relationships and more supportive student-teacher interactions²¹.

Higher levels of grit and resilience were associated with lower emotional exhaustion, depersonalization, and reduced personal accomplishment. This aligns with evidence indicating that grit and resilience function as protective factors against burnout^{5,6,8}. Resilience scores in this cohort (mean = 25.09 ± 5.01) were comparable to findings among Thai university students assessed using the Connor-Davidson Resilience Scale (CD-RISC)¹⁷. Students scored highest in beliefs reflecting adaptive coping, such as perceiving stress as strengthening and demonstrating the ability to recover from setbacks. However, sustaining concentration

under stress remained challenging, consistent with longitudinal evidence showing that emotional recovery does not always translate into sustained academic focus⁹.

Collectively, these findings underscore the importance of integrating psychological skill development into the medical curriculum. Structured mentoring systems, reflective practice, and resilience training may strengthen coping capacity and mitigate burnout risk². Interventions promoting self-awareness and peer support are also critical for fostering sustainable professional identity formation^{23,24}. Importantly, strategies should address not only individual coping skills but also systemic educational factors including feedback culture, workload management, and learning climate to achieve sustained improvements in student well-being.

Limitations

This study was conducted in a single center and used self-reported measures, which may introduce reporting bias. However, the high response rate and consistency with prior national and international findings enhance the reliability of the results. Future research should employ multicenter longitudinal designs to explore causal relationships and evaluate the effectiveness of interventions promoting grit and resilience.

Conclusions

Grit, resilience, and positive self-perception, both academic and social, serve

as key protective factors against burnout among clinical medical students. Students who demonstrate perseverance, emotional adaptability, and strong peer connections experience lower levels of emotional exhaustion and depersonalization, along with higher personal accomplishment. Conversely, negative perceptions of the learning atmosphere and social environment significantly increase burnout risk. Interventions that strengthen resilience and peer support, while improving the educational climate through mentorship and supportive feedback, may effectively reduce burnout and enhance student well-being during clinical training.

Conflict of Interest

All authors declare no competing interests

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