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Burnout and temperament in Tunisian medical students

Epuisement académique et tempérament chez les étudiants en médecine tunisiens

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ABSTRACT

Introduction : *Burnout is increasingly prevalent among medical students. Several factors are associated with burnout risk, but the role of affective temperament remains insufficiently studied. This study aimed to assess the association between affective temperaments and academic burnout among medical students in Tunisia.* ***Patients and methods:*** *This descriptive and analytical cross-sectional study included medical externs from four Tunisian medical schools during the 2023–2024 academic year. Data were collected using an electronic questionnaire. Academic burnout was assessed using the Maslach Burnout Inventory–Student Survey (MBI-SS), and affective temperament was assessed using the TEMPS-A scale.* ***Results:*** *A total of 537 students were included, with a mean age of 22.24 years and a male-to-female ratio of 0.37. The prevalence of burnout was 49.3%. Low academic efficacy, high cynicism, and high emotional exhaustion were observed in 71.3%, 71.1%, and 78.0% of students, respectively. Cyclothymic and hyperthymic temperaments had the highest scores. Cyclothymic and depressive temperaments were associated with burnout (p = 0.001), whereas hyperthymic temperament was associated with a lower likelihood of burnout (p = 0.001). Emotional exhaustion and cynicism were correlated with cyclothymic, depressive, and irritable temperaments.* ***Conclusion:*** *Considering affective temperament may help identify medical students at risk of burnout and support the development of tailored preventive strategies throughout medical training.*
Keywords: *Academic burnout; Affective temperament; Medical students.*

RESUME

Introduction: *Le burn-out est de plus en plus fréquent chez les étudiants en médecine. Plusieurs facteurs sont associés à son risque, mais le rôle du tempérament affectif reste insuffisamment étudié. Cette étude visait à évaluer l'association entre les tempéraments affectifs et le burn-out académique chez les étudiants en médecine en Tunisie.* ***Patients et méthode:*** *Il s'agissait d'une étude transversale descriptive et analytique menée auprès d'étudiants externes de quatre facultés de médecine tunisiennes au cours de l'année universitaire 2023–2024. Les données ont été recueillies à l'aide d'un questionnaire électronique. Le burn-out académique a été évalué par le Maslach Burnout Inventory–Student Survey (MBI-SS) et le tempérament affectif par l'échelle TEMPS-A.* ***Résultats :*** *Au total, 537 étudiants ont été inclus, avec un âge moyen de 22,24 ans et un sex-ratio homme/femme de 0,37. La prévalence du burn-out était de 49,3 %. Une faible efficacité académique, un cynisme élevé et un épuisement émotionnel élevé étaient observés chez respectivement 71,3 %, 71,1 % et 78,0 % des étudiants. Les tempéraments cyclothymique et hyperthymique présentaient les scores les plus élevés. Les tempéraments cyclothymique et dépressif étaient*

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associés au burn-out (p = 0,001), tandis que le tempérament hyperthymique était associé à une moindre probabilité de burn-out (p = 0,001). L'épuisement émotionnel et le cynisme étaient corrélés aux tempéraments cyclothymiques, dépressif et irritable. L'efficacité académique était corrélée au tempérament hyperthymique et inversement corrélée aux tempéraments cyclothymique et dépressif. ***Conclusion :*** *La prise en compte du tempérament affectif pourrait contribuer à mieux identifier les étudiants à risque de burn-out et à adapter les stratégies de prévention au cours de leur formation médicale.* ***Mots-clés :*** *Burn-out académique ; Tempérament affectif ; Étudiant en médecine.*

1. Introduction

Burnout (BO) is defined as a state of mental and physical exhaustion resulting from prolonged stress and overwork [1]. Often described as the "modern affliction of the century," its prevalence has been steadily increasing. Although originally studied in occupational contexts, research has shown that BO can also affect students, particularly those in demanding academic environments. Reported prevalence rates among students vary widely, ranging from 30% to 88% depending on the population and methodology used [2–4]. Di Vincenzo et al. recently highlighted the growing concern of burnout among medical students, describing it as an emerging epidemic [5]. Medical students appear particularly vulnerable to BO due to the demanding and high-stakes nature of their training. The rapid evolution of medical knowledge, high academic expectations, long study hours, and low tolerance for errors create a stressful environment that predisposes students to psychological distress, including burnout [6].

However, the risk of developing BO is not equally distributed across individuals. While academic and environmental stressors play a major role, individual-level factors also significantly influence susceptibility to burnout [7]. Among these factors, personality traits have been extensively studied, but affective temperament—the innate and relatively stable way a person typically feels and reacts emotionally, partly inherited rather than learned—remains underexplored in this context.

Temperament refers to enduring emotional and behavioral predispositions that influence how individuals perceive and respond to their environment. Affective temperaments have been categorized into five subtypes: depressive, cyclothymic, hyperthymic, irritable, and anxious. Each temperament is associated with different patterns of emotional reactivity and risk for mood disorders. While previous studies have explored the relationship between temperament and psychiatric outcomes, few have examined its role in academic burnout, particularly in medical students. This study therefore had two primary objectives: (1) to assess the prevalence and characteristics of burnout among medical students in Tunisia, and (2) to investigate its potential association with affective temperament.

2. Patients and method

Study Design

This was a cross-sectional, descriptive, and analytical study conducted between April and May 2024, during the 2023–2024 academic year. Data collection was performed outside examination periods to assess burnout in relation to the usual academic workload rather than acute, examination-related stress.

Study Population and Recruitment

The study included undergraduate medical students enrolled during the 2023–2024 academic year at the medical schools of Tunisia. Only students in the first five years of the medical curriculum were eligible. These students were selected because, at this stage of training, their clinical exposure is limited to observational placements and they do not yet have the clinical workload and responsibilities associated with the final years of medical education. This approach allowed us to assess burnout in a population with a relatively comparable level of academic exposure while limiting the potential confounding effects of clinical responsibilities and direct contact with patients experiencing illness and suffering.

Participants were recruited through Facebook groups and pages dedicated to Tunisian medical students. Participation was voluntary, anonymous, and confidential. Data were collected using a self-administered electronic questionnaire developed on Google Forms, which required approximately 15 minutes to complete.

The survey was deliberately conducted outside examination periods. This timing was chosen to minimize the influence of temporary situational factors, such as intensive revision, sleep deprivation, and performance-related anxiety, which could increase emotional exhaustion independently of the usual academic workload. It also facilitated student participation by avoiding a period of particularly high academic demands.

Students were eligible if they were undergraduate medical students enrolled in one of the first five years of the medical curriculum, were aged 18 years or older, and

agreed to participate and complete all items of the Maslach Burnout Inventory–Student Survey (MBI-SS).

Study Instruments

Burnout Assessment

Academic burnout was assessed using the Maslach Burnout Inventory–Student Survey (MBI-SS), a validated adaptation of the MBI-General Survey for academic populations [8]. The MBI-SS consists of 15 items distributed across three dimensions: emotional exhaustion (EE), comprising five items; cynicism (CY), comprising four items; and academic efficacy (AE), comprising six items. Representative items include "I feel emotionally drained by my studies" for EE, "I doubt the significance of my studies" for CY, and "I can effectively solve the problems that arise in my studies" for AE.

Each item is rated on a seven-point Likert scale ranging from 0 ("never") to 6 ("always"). Higher EE and CY scores and lower AE scores indicate greater burnout. For each dimension, scores were categorized as low, moderate, or high according to the following thresholds: EE, low <10, moderate 10–14, and high >14; CY, low <2, moderate 2–6, and high >6; and AE, low <23, moderate 23–27, and high >27. Burnout was defined as the simultaneous presence of high EE and CY scores and a low AE score.

Affective Temperament Assessment

Affective temperament was assessed using the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego–Autoquestionnaire (TEMPS-A). The short French version, consisting of 39 items, was used to facilitate participation. It assesses five affective temperament dimensions: anxious (3 items), cyclothymic (12 items), depressive (8 items), hyperthymic (8 items), and irritable (8 items).

Participants responded "yes" to statements describing their usual emotional and behavioral characteristics. For each temperament dimension, the score was calculated as the total number of affirmative responses, with higher scores indicating a greater expression of the corresponding temperament [9].

Sample Size Calculation

The sample size was calculated to estimate the prevalence of academic burnout with an acceptable level of precision using the standard formula for estimating a single proportion:

$$N = Z^2 \times p \times (1 - p) / i^2$$

where Z was set at 1.96, corresponding to a 95% confidence level; p was the expected prevalence of burnout, estimated at 38.2% based on previous studies; and i was the desired margin of error. The precision was set at 20% of the expected prevalence, corresponding to i = 0.076.

The minimum required sample size was estimated at 157 participants. To account for an anticipated 20% non-response rate, the target sample size was increased to 189 participants.

Statistical Analysis

Statistical analyses were performed using SPSS Statistics version 23. Qualitative variables were summarized using frequencies and percentages, whereas quantitative variables were described using means and standard deviations or medians, as appropriate according to the distribution of the data.

Associations between qualitative variables were assessed using the chi-square test or Fisher's exact test, as appropriate. For comparisons of quantitative variables, the Student's *t*-test or Mann–Whitney *U* test was used according to the distribution of the data. Correlations between quantitative variables were assessed using Pearson's or Spearman's correlation coefficient, as appropriate.

Binary logistic regression and linear regression models were used to investigate factors associated with burnout and its individual dimensions. A two-sided *p*-value <0.05 was considered statistically significant.

Table 1. Distribution according to the sub-dimensions of burnout

	EE (%)	CY (%)	AE (%)
Low	60 (11.2)	19 (3.5)	383 (71.3)
Moderate	58 (10.8)	136 (25.3)	83 (15.5)
High	419 (78.0)	382 (71.1)	71 (13.2)
Average score	**20.39 ± 7.299**	**10.92 ± 6.355**	**18.11 ± 7.562**

EE: emotional exhaustion; CY: cynicism; AE: academic efficacy.

Table 2. Sample distribution by temperament (n = 537)

Temperament	Score	Minimum–Maximum
Cyclothymic	7.14 ± 2.615	0–11
Depressive	3.41 ± 2.422	0–8
Hyperthymic	4.29 ± 1.984	0–8
Anxious	1.97 ± 1.068	0–3
Irritable	1*	0–8

Values are expressed as mean ± standard deviation for normally distributed scores, except for the irritable temperament (non-normal distribution), reported as median. Scores correspond to the number of affirmative responses on each TEMPS-A subscale.

Table 3. Association between burnout and temperament

Temperament	Burnout	Mean	SD	p
Cyclothymic	Yes	7.60	2.394	< 0.001
	No	6.69	2.745	
Depressive	Yes	4.05	2.405	< 0.001
	No	2.79	2.278	
Hyperthymic	Yes	4.01	1.990	= 0.001
	No	4.56	1.943	
Irritable*	–	–	–	0.58
Anxious	Yes	2.02	1.030	0.379
	No	1.93	1.105	

*SD: standard deviation. *Non-parametric test.*

3. Results

During the data collection period, from April to May 2024, a total of 537 students completed the questionnaire and met the inclusion criteria. All participants were included in the analysis, exceeding the calculated minimum sample size and thereby improving the precision of the estimates.

The mean age of the participants was 22.24 years (range, 18–30 years). Women represented 73.6% of the sample, and 97.2% of participants were single. The majority of students (85.8%) reported a middle socioeconomic status. Regarding health status, 49.2% of participants considered themselves to be in good health. None reported substance use.

The prevalence of academic burnout was 49.3%. Regarding the three dimensions of the MBI-SS, 71.3% of students had low academic efficacy, 71.1% had high cynicism, and 78.0% had high emotional exhaustion (Table 1).

The highest affective temperament scores were observed for the cyclothymic and hyperthymic temperaments (Table 2). Students with cyclothymic or depressive temperaments were significantly more likely to experience burnout ($p = 0.001$), whereas students with hyperthymic temperament were significantly less likely to experience burnout ($p = 0.001$) (Table 3).

The correlations between affective temperament scores and the three dimensions of burnout are presented in Table 4. Emotional exhaustion was positively correlated with cyclothymic ($r = 0.328$; $p < 0.001$), depressive ($r = 0.278$; $p < 0.001$), irritable ($r = 0.194$; $p < 0.001$), and anxious ($r = 0.093$; $p = 0.031$) temperaments. The strongest correlations were observed for cyclothymic and depressive temperaments. Cynicism was positively correlated with cyclothymic ($r = 0.281$; $p < 0.001$), depressive ($r = 0.327$; $p < 0.001$), and irritable ($r = 0.124$; $p = 0.004$) temperaments. Academic efficacy was positively correlated with hyperthymic temperament ($r = 0.216$; $p < 0.001$) and negatively correlated with cyclothymic ($r = −0.119$; $p = 0.006$) and depressive ($r = −0.292$; $p < 0.001$) temperaments.

A binary logistic regression analysis was performed to further assess the association between burnout and the three temperaments previously identified as significantly associated with burnout, namely cyclothymic, depressive, and hyperthymic temperaments (Table 5). All three temperaments remained significantly associated with academic burnout in the multivariable analysis.

Table 4. Correlation between burnout dimensions and temperament

Temperament	EE r	EE p	CY r	CY p	AE r	AE p
Cyclothymic	0.328	<0.001	0.281	<0.001	−0.119	0.006
Depressive	0.278	<0.001	0.327	<0.001	−0.292	<0.001
Irritable	0.194	<0.001	0.124	0.004	−0.012	0.774
Hyperthymic	−0.041	NS	−0.077	NS	0.216	<0.001
Anxious	0.093	0.031	0.080	NS	−0.047	NS

EE: emotional exhaustion; CY: cynicism; AE: academic efficacy; r: correlation coefficient; NS: not significant.

Table 5. Binary logistic regression of burnout on temperament

Temperament	β	p
Cyclothymic	0.077	0.045
Depressive	0.183	<0.001
Hyperthymic	−0.135	0.004

β: regression coefficient.

Linear regression analyses showed that cyclothymic and depressive temperaments jointly explained 13.3% of the variance in emotional exhaustion ($p < 0.001$) and 13.6% of the variance in cynicism ($p < 0.001$). Depressive and hyperthymic temperaments jointly explained 12.1% of the variance in academic efficacy ($p < 0.001$).

4. Discussion

This study found that nearly half of the participating medical students in Tunisia experienced academic burnout, with high levels of emotional exhaustion and cynicism and a majority reporting low academic efficacy. These findings highlight the substantial psychological burden associated with medical education and are consistent with previous international reports [5]. The prevalence of burnout observed in our study (49.3%) underscores the importance of addressing mental health in medical education, particularly in low- and middle-income countries, where access to student support services may be more limited.

A key contribution of this study is the exploration of affective temperament in relation to academic burnout. Cyclothymic and depressive temperaments were positively associated with burnout, whereas hyperthymic temperament was associated with a lower likelihood of burnout.

These associations remained statistically significant in the binary logistic regression model including the three temperaments identified in the preliminary analyses. However, because the model was not adjusted for other potential confounding factors, these findings should be interpreted as associations rather than evidence of independent predictive effects.

Previous studies have examined the relationship between temperament and burnout using different conceptual frameworks. In South Korean medical students, Lee et al. used Cloninger's Temperament and Character Inventory to assess temperament traits and their relationship with burnout at the end of the academic semester [10]. Harm avoidance and novelty seeking were identified as vulnerability factors, whereas self-directedness and cooperativeness appeared to have protective effects against burnout [10,11]. Although these dimensions differ from those assessed by the TEMPS-A, these findings support the broader hypothesis that stable individual characteristics may influence vulnerability to burnout.

Evidence from other professional populations also supports an association between affective temperament and burnout. In a study of nurses and civil servants in Poland, Jaracz et al. used the TEMPS-A to assess affective temperament and the MBI-GS to evaluate burnout [12]. Nurses had higher levels of anxious temperament and greater work-related burnout than civil servants. Among nurses, cyclothymic and anxious temperaments were positively correlated with stress and burnout symptoms, whereas no significant association between affective

temperament and burnout was observed among civil servants. Regression analyses in both groups showed significant effects of stress and cyclothymic temperament on burnout [12]. These findings suggest that cyclothymic temperament may increase vulnerability to occupational stress and burnout in professions characterized by sustained emotional and interpersonal demands.

Cyclothymic and depressive temperaments may contribute to burnout through several mechanisms. Cyclothymic temperament is characterized by mood lability and heightened emotional sensitivity, which may increase vulnerability to chronic academic stress. Depressive temperament, meanwhile, is associated with pessimism, negative cognitive styles, and a tendency to experience failure more negatively [13]. In the context of medical education, these characteristics may contribute to greater emotional exhaustion and reduced perceptions of academic competence.

Similar findings have been reported among healthcare professionals. In a self-assessment study of 706 Japanese nurses, work-related stress, temperament, and depressive symptoms were assessed using the Brief Job Stress Questionnaire and the TEMPS-A [14]. Overtime work and depressive and cyclothymic temperaments were significantly associated with depressive symptoms. Correlation analyses further suggested that depressive and cyclothymic temperaments influenced depressive symptoms both directly and indirectly through occupational stress [14]. In contrast, irritable and anxious temperaments and quantitative workload were not significantly associated with depressive symptoms. These findings are consistent with the associations observed in our study and suggest that cyclothymic and depressive temperaments may interact with stressful environments to increase psychological vulnerability.

Our findings are also broadly consistent with previous studies among physicians and nurses [15,16]. Other research has shown that lower self-directedness and cooperativeness and higher harm avoidance are associated with personality disorders, other mental health conditions, and increased burnout [17,18]. Taken together, these findings support the view that individual psychological characteristics may contribute to differences in vulnerability to burnout, although their effects should be considered alongside environmental and organizational factors.

Contextual factors remain important determinants of burnout. A recent study of 462 medical students in Burkina Faso, which did not assess temperament, identified mainly organizational and lifestyle-related factors, including long working hours, lack of physical activity, and insufficient parental support [19]. The prevalence of burnout in that study was lower than that observed in our sample (21.2% versus 49.3%). However, direct comparison is difficult because the populations and assessment conditions differed. The Burkina Faso study included students in advanced clinical years who were exposed to night shifts, whereas our study focused on students without a clinical workload, and different burnout thresholds were used [19]. Notably, examinations were identified as the main source of stress in the Burkina Faso study [19]. This finding raises the possibility that our decision to collect data outside examination periods may have produced a relatively conservative estimate of burnout.

The association between cyclothymic temperament and burnout may also be related to certain behavioral and emotional characteristics described in individuals with this temperament, including obsessive-compulsive traits, difficulties with anger regulation, impulsivity, and reduced use of humor [20]. Perfectionistic or excessive self-demand may encourage overwork and make it difficult for students to disengage from their studies, thereby contributing to emotional exhaustion. Difficulties with emotional regulation may also affect relationships with peers and supervisors and reduce the ability to mobilize social support. Similarly, limited use of humor may reduce the capacity to reframe stressful situations. These mechanisms are plausible but remain hypothetical in the absence of direct assessment in our study.

Depressive temperament may also contribute to burnout through its association with pessimism and negative appraisal of stressful events [21]. Kikuchi et al. reported that higher levels of depressive and cyclothymic temperaments were associated with a more negative evaluation of work-related events, making these events more stressful and potentially increasing the risk of burnout [14]. This mechanism may be particularly relevant in medical education, where repeated academic challenges and perceived failures can reinforce negative self-appraisals.

In contrast, hyperthymic temperament appeared to be associated with a lower likelihood of burnout in our study. This temperament is generally characterized by optimism, energy, sociability, and greater resilience in the face of stress. Such characteristics may facilitate adaptation to demanding academic environments and help students maintain engagement despite recurrent stressors. However, the apparent protective association should be interpreted cautiously because our cross-sectional design does not allow a causal or protective effect to be established.

The analysis of the individual burnout dimensions provides additional insight into these associations. Emotional exhaustion was positively correlated with cyclothymic, depressive, irritable, and anxious temperaments, with the strongest correlations observed for cyclothymic and depressive temperaments. Cynicism was positively correlated with cyclothymic, depressive, and irritable temperaments, whereas academic efficacy

was positively correlated with hyperthymic temperament and negatively correlated with cyclothymic and depressive temperaments. These findings are consistent with previous research. Jaracz et al. reported that higher hyperthymic temperament scores were associated with better performance on tasks [21]. Similarly, Lee et al. found that academic inefficacy was associated with lower self-directedness and higher burnout, which were in turn related to greater harm avoidance [10]. They also reported that cynicism was characterized by lower novelty seeking and lower cooperativeness [10].

Despite the significant associations observed, the effect sizes were modest, suggesting that temperament represents only one component of the multifactorial process leading to academic burnout. Preventive strategies should therefore not focus exclusively on individual characteristics. A comprehensive approach could combine greater flexibility in academic programs, including better distribution of assessments and avoidance of excessive workload peaks, with reduced daily academic demands, confidential access to psychological support, and well-being programs incorporating mindfulness or meditation [22]. Physical activity and peer or group-based support may also be beneficial, as these factors have been associated with lower burnout among medical students in Burkina Faso [19]. In this context, temperament may be considered as one element that could contribute to the early identification of students who may benefit from additional support, rather than as a basis for individualized interventions.

This study has several limitations. First, data were collected outside examination periods. Because emotional exhaustion may increase substantially during examinations, the observed prevalence of burnout may underestimate the level experienced by students across the entire academic year. This consideration is particularly relevant to emotional exhaustion and its associations with affective temperament. Conversely, collecting data outside examination periods allowed us to assess burnout in relation to the usual academic workload rather than acute and transient examination-related stress. Repeated assessments before, during, and after examination periods would therefore be useful to characterize temporal variations in burnout and determine whether associations with temperament remain stable under different levels of academic stress.

Second, the use of a self-administered online questionnaire disseminated through Facebook groups and pages may have introduced selection bias. Participation was restricted to students with internet access and sufficient engagement with these platforms. Students who were particularly interested in the topic or more affected by burnout may also have been more likely to participate. Consequently, the sample may not be fully representative of Tunisian medical students, limiting the generalizability of the findings. In addition, self-reported measures may be affected by recall and social desirability biases.

Third, the cross-sectional design does not allow causal inferences or determine the temporal direction of the observed associations. The significant associations between cyclothymic and depressive temperaments and burnout, as well as the lower likelihood of burnout associated with hyperthymic temperament, should therefore be interpreted as correlations rather than evidence of causality. Longitudinal studies are needed to determine whether affective temperament contributes to the subsequent development of burnout and to clarify the magnitude and stability of these associations over time.

Fourth, the regression analyses had important limitations. The logistic regression model included only the three temperaments that were significantly associated with burnout in the preliminary analyses and was not adjusted for potential confounders such as age, sex, or year of study. In addition, although the temperament variables explained approximately 12–14% of the variance in the burnout dimensions, adjusted R^2 values and 95% confidence intervals for the regression coefficients were not reported. The odds ratios were also close to 1 (Table 5), suggesting that the magnitude of the associations may be limited. These findings should therefore be interpreted cautiously and indicate that a substantial proportion of the variability in burnout is likely explained by factors that were not assessed in this study.

Finally, although the TEMPS-A is designed to assess relatively stable affective temperament traits, scores on some dimensions, particularly cyclothymic and depressive temperaments, may be influenced by the participant's current emotional state. We did not perform a concurrent assessment of depressive or anxiety symptoms using validated instruments such as the PHQ-9 or HADS, nor did we systematically assess psychiatric history. Self-perceived general health and substance use were recorded, but these variables cannot substitute for a standardized assessment of current mood. We therefore cannot exclude the possibility that some of the associations observed, particularly those involving cyclothymic and depressive temperaments, were partly influenced by transient affective symptoms rather than stable temperament characteristics. This possibility is particularly relevant because these two temperaments showed the strongest correlations with emotional exhaustion and cynicism. Future studies should therefore include a validated assessment of current mood and psychiatric history and account for these factors in multivariable analyses.

5. Conclusion

In this sample of 537 Tunisian medical students, depressive and cyclothymic temperaments were

significantly associated with burnout, although the effects were modest and temperament explained only a small share of the variance in burnout scores (12-14%). Temperament therefore appears to be one contributing factor among many, alongside academic, environmental, and individual factors that were not assessed here. These findings should be interpreted cautiously given the cross-sectional design and the absence of control for current mood. They suggest that healthcare professionals may consider temperament, particularly depressive and cyclothymic types, as one element among others when supporting medical students in managing factors that contribute to burnout risk. Monitoring students throughout their academic journey could help identify those struggling with the increasing stress of medical studies, and support initiatives could take into account both the academic program and individual characteristics, including temperament. However, our data do not justify individualized interventions based on temperament alone. Longitudinal studies are needed to confirm these associations and to determine whether such monitoring and support could meaningfully reduce burnout risk.

Declarations

Declaration of competing interest : None

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Author Contributions: Rim Sellami and Achraf Trabelsi conceived and designed the study. Achraf Trabelsi was responsible for data acquisition and patient recruitment. Rim Sellami and Ines Feki performed the statistical analysis and interpreted the data. Rim Sellami and Achraf Trabelsi drafted the initial manuscript. Jawaher Masmoudi critically revised the manuscript for important intellectual content. All authors read and approved the final version to be published.

Ethics declarations

The study protocol was approved by the Research Ethics Committee, Faculty of Medicine, University of Sfax, Tunisia and was performed in accordance with ethical standards of declaration of Helsinki. Confidentiality and anonymity were strictly maintained throughout the research process.

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