

Unravelling the relationship between stress and discipline with academic performance in first-semester medical students: a longitudinal study

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SUMMARY

Medical education is demanding and stressful, leading to psychological distress among students. Discipline is a pivotal trait for excelling in medical school. This study analyzes the relationship between stress, discipline and academic performance in first-semester medical students.

This longitudinal study applied the Perceived Medical School Stress (PMSS) and the Academic Self Discipline (ASD) scales to medical students before their first and second midterm examinations in the Embryology subject. Scores and pass/fail percentages were recorded for analysis. Demographic data were recuperated as well. The tested hypothesis was that discipline correlates positively with academic performance, while negatively with stress.

A notable decrease in stress during the second examination was noted in comparison to the first. Conversely, discipline increased slightly. Stress correlated negatively with discipline only during the first examination, but not during the second, while discipline correlated positively with academic performance during the second examina-

tion but not during the first. Logistic regression analysis identified that students whose place of origin was out of the state, completed high school in three years, and/or had higher grade point average during high school had higher probabilities of passing the second examination.

These results suggest that stress and discipline change as the semester progresses, and that these demographic factors play an important role in academic performance. This study highlights the importance of self-discipline as well as demographic factors for excelling in medical school. Further research, however, in other contexts are warranted to replicate these results.

Key words: Medical education – Embryology – Academic discipline – Stress

INTRODUCTION

To become a licensed physician, one must complete four to six years of medical school, depending on the country. Students are first exposed to the basic sciences (anatomy, physiology, pathology, etc.) for a fundamental understanding of the

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clinical sciences (internal medicine, surgery, obstetrics and gynecology, etc.). While medical education is ultimately gratifying and rewarding, the entire journey is rigorous and demanding.

There has been extensive research on the impact of medical school on psychological aspects of students, such as stress, burnout, depression, and many others. It has been found that medical students are at an increased risk of psychological distress due to the demanding nature of medical school (Arif, 2021; March, 2022; Capdevila, 2021; Rotenstein, 2016; Hankir, 2014). Listed causes include high academic workload, lack of adequate sleep, limited social life, among many others (Capdevila, 2021). In addition, there is a social stigma in which medical students and professionals are perceived as 'invincible', which in turn makes them less likely to seek help when their mental health deteriorates (Hankir, 2014). On the other hand, to a much lesser extent, there has also been research on factors related to academic performance (Ranasinghe, 2017; Al, 2019; Rehman, 2021; Wu, 2020).

Discipline is a trait related to the self-initiated regulation of thoughts, feelings, and actions when long-term goals conflict with seemingly momentary, highly gratifying activities that are not aligned with long-term goals (Duckworth, 2019). Many studies show how self-discipline produces positive results. Among them, it is worth highlighting the importance in academic performance, since it is usually difficult at first to develop study habits that include discipline, but the results are usually reflected impressively, even in all aspects of the student's life, whether academic, physiological and physical (Şimşir, 2020). Consequently, self-discipline must be a fundamental trait for medical students to excel during their preclinical and clinical years.

Given the negative impact of medical school on students' psychological well-being and the importance of discipline in academic performance, this study aimed to examine how stress and discipline impact on academic performance, along with demographic aspects and previous academic history. In addition, how discipline and stress levels change over the course of the semester was also examined. The tested hypotheses were: 1) disci-

pline correlates positively with academic performance, while 2) stress correlates negatively with academic performance.

METHODS

Study design

This is a prospective longitudinal study conducted during the semester of January– June 2024. The study was conducted and reported according to the STROBE guideline.

Setting and participants

An online survey was administered via Microsoft Forms to the first semester generation of medical students from the Faculty of Medicine of the Autonomous University of Nuevo León in Monterrey, Mexico. A professor affiliated to the department attended to each group and invited the students to participate. The only inclusion criterion to be considered was to be over 18 years of age. Participants were excluded if the information they provided was incomplete or if they missed an examination. Participants were also excluded if they failed to respond to any of the surveys.

Ethical considerations

Although the project was initially submitted for review, the ethics committee concurred that the project could be waived given the non-risk nature of the study and inclusion of participants only over the age majority. The study was conducted in accordance with the principles of the Declaration of Helsinki, and received approval from an expert in Bioethics, who was independent from the research team. Electronic informed consent was obtained from the participants before the survey was conducted. The purpose of the study was explained to them, and it was made clear that participation was voluntary and would not affect their midterm grades or their final grade in the course. A de-identified dataset was created by omitting participants' names and using only their student registration number. In addition, professional counseling is offered at the beginning of the semester to all the students in the faculty by the institutional counseling program to help all students address personal issues, discuss optimal

study techniques, and manage stress.

Surveys

The Perceived Medical School Stress (PMSS) scale consists of 13 items evaluating the level of stress caused by medical school, with higher scores indicating a greater amount of stress (Vitalino, 1984; 1989). The Academic Self Discipline (ASD) scale consists of 18 items evaluating the level of self-discipline, with higher scores indicating a greater amount of discipline (Sal, 2022). Anonymity was maintained to reduce social desirability and response bias. In addition, participants were told that their scores would be compared along with their midterm scores, thus encouraging them to respond truthfully.

Survey application and delivery

The PMSS and ASD scales were adapted to Spanish and sent to the students via a Microsoft Forms Survey link. Demographic variables were also collected. Embryology midterms were held on March 12 (1st midterm) and April 23 (2nd midterm) during 2024, both days being Tuesdays. Surveys were administered via the department's online website on March 8 and April 19, both Fridays. Participants were notified during regular Friday class that the survey was open, so that they could complete the surveys on the Friday, Saturday, Sunday, and Monday before each midterm. To avoid recall bias and participants marking the same answers as the previous application, they were told that these scores were independent of the answers given before the first midterm.

Midterm examinations

The midterm examinations assessed the students' understanding of various Embryology topics. The first exam primarily focused on the fundamentals of Embryology, covering subjects such as male and female gametogenesis, fertilization, implantation, the sexual cycle, placental development, and types of congenital malformations. On the other hand, the second exam, tested students' knowledge on the development of specific structures and systems, including the cardiovascular, digestive, respiratory, and musculoskeletal systems, as well as pharyngeal arch derivatives and

facial development.

Each exam consists of 50 multiple-choice questions, with two points awarded for each question answered correctly. To pass, students must answer at least 35 questions correctly, achieving a minimum score of 70.

Variables

Independent quantitative variables such as age and high school GPA were recorded. The Faculty of Medicine of the State of Nuevo Leon is located in the city of Monterrey. Usually, students from other states of Mexico, even other countries, come to the faculty to pursue their studies in medicine, so they were asked if they lived in the state or from outside the state. In addition, high school in institutions assigned to the Autonomous University of Nuevo Leon usually last only 2 years, while others, as well as in the rest of the country, high school usually takes 3 years to complete. Therefore, the participants were also asked about the duration of their high school. In addition to these variables, first semester students often seek extra help by taking additional independent courses outside the faculty, so participants were also asked if they had taken additional courses. These were recorded as independent categorical variables, along with sex. The other independent variables were PMSS and ASD scores, as continuous variables. Dependent variables included midterm scores and the pass/fail status of each midterm, as determined by a minimum score of 70 in each midterm

Statistical analysis

Qualitative variables were evaluated using descriptive statistics, including frequencies, percentages, and Fisher's exact test to examine the data distribution among categories. The distribution of quantitative variables was initially evaluated using the Kolmogorov-Smirnov test. The data were presented as either the mean and standard deviation or the median and interquartile range. Inferential statistics were conducted using either Student's T-test or the U Mann-Whitney test to compare between groups. Spearman's correlation coefficient was calculated to assess the relationship between the PMSS and the ASD scores with the midterm scores. A single logistic regression

analysis was performed to assess the effect of demographic variables on the failure outcome of each midterm, and then multivariate analysis was conducted to adjust for the PMSS and ASD scores. Statistical significance was set at $p < 0.05$.

RESULTS

Sample characteristics

88 students fulfilled the inclusion criteria and were therefore included in the analysis. Of the participants, 68 were female and 20 were male, with a median age of 18 years. Of the participants, 57 were residents of the state of Nuevo Leon, while 31 traveled from another state to pursue a degree in medicine. Forty-one students had completed two years of high school education, while forty-seven had completed three years. The median grade point average was 90. No significant differences were identified between the proportion of students who sought additional courses outside the faculty between the first and second midterm, nor in the proportions of students who passed or failed (Table 1).

Surveys' and midterms' scores

A notable decrease of 3.7 points was observed between the mean scores of the PMSS scale prior to the second midterm examination compared to the first. Although not statistically significant, the ASD score exhibited an increase of 0.93 points before the second midterm compared to the first. No statistically significant differences were observed in the proportion of students who passed or failed in both midterm examinations (Table 1).

Relationship between PMSS, ASD and midterms' scores

Rho's correlation coefficient was calculated for the PMSS and ASD scores in relation to the respective first and second midterm scores. It was observed that during the first midterm examination, there was a negative correlation between PMSS and ASD; however, this was not the case during the second examination. In contrast, ASD exhibited a positive correlation with the second midterm score, but not with the first (Figs. 1A and 1C).

Influence of demographic variables on academic outcomes

A logistic regression analysis was conducted to assess the correlation between sex, place of origin, high school duration, high school GPA, and additional courses with the academic outcome of failing the examination. The odds ratios (OR) were calculated for the failing outcome. During the first midterm, none of the variables were significant for failing the exam. However, when the variables were analyzed during the second midterm, significant results were observed for the variables of place of origin (local was the comparator), high school duration (a two-year duration was the comparator), and high school GPA (ORs: 0.09, 0.25, 0.82, respectively). When adjusting for stress and discipline, these variables remain significant as seen in Table 2.

DISCUSSION

Medical education is inherently challenging, particularly given the demanding nature of the curriculum. The scientific literature has extensively documented the prevalence and correlates of psychological circumstances such as stress, anxiety, burnout, and depression. These studies have employed self-administered questionnaires to assess the prevalence and correlates of these psychological attributes. Nevertheless, to the best of our knowledge, no studies have sought to evaluate the relationship between stress, self-discipline, and demographic variables in relation to academic performance in medical students. Moreover, no studies were identified that evaluated discipline using the ASD scale. Furthermore, there is a lack of longitudinal studies that assess the changes in these variables over time.

The objective of this study was to assess the relationship between stress levels experienced by medical students with self-discipline and its impact on academic performance, as measured by the scores and outcomes of two midterm examinations. A decline, though not significant, was observed in the median scores of the second midterm compared to those of the first. Although the difficulty of the questions remains consistent between midterms, the topics tested on the second

Table 1. Participants' Characteristics, Questionnaires' Scores, and Midterms' Scores

Variables	Frequency (%) or Mean±(sd) or Median (IQR)	p
Sex		
Female	68 (77.3)	
Male	20 (22.7)	
Age	18 (1)	
Origin		
Local	57 (64.8)	
Foreign	31 (35.2)	
High School Duration		
2 Years	41 (46.6)	
3 Years	47 (53.4)	
High School GPA	90 (8)	
1Mt		
Additional Courses		
No	55 (62.5)	
Yes	33 (37.5)	
PMSS Score	31.40±10.20	
ASD Score	60.11±10.30	
1Mt Score	55.00±17.14	
Pass	21 (23.9)	
Fail	67 (76.1)	
2Mt		
Additional Courses		
No	49 (55.7)	
Yes	39 (44.3)	0.076
PMSS Score	27.70±7.70	0.012
ASD Score	61.04±9.17	0.550
2Mt Score	45 (31)	0.066
Pass	18 (79.5)	
Fail	70 (20.5)	0.999

This table depicts demographic data of participants, as well as their questionnaires' and first and second midterm scores. No significant differences were observed in the proportions of passed/failed students between the first and second examinations nor in the proportions of students who took additional courses (Fisher's exact test), nor between the discipline scores among examinations (Paired Student's t test). However, stress scores increased significantly during the second examination compared to the first (Paired Student's t test). sd: standard deviation, IQR: interquartile range, GPA: grade point average, 1Mt/2Mt: first and second midterms, PMSS: perceived medical school stress, ASD: academic self discipline.

examination are covered at greater detail, which students may have underestimated. However, assessing the students' perception of the complexity of these examinations was beyond the scope of this study.

A notable decline in stress levels was observed among students following the administration of

the initial midterm examination. It was hypothesized that students' stress levels would increase in line due to increased academic demands of the course as the semester progressed, as well as the changes in tested topics between exams. However, the results indicate otherwise. On the other hand, there was a slight, though not statistically significant, increase in self-discipline scores.

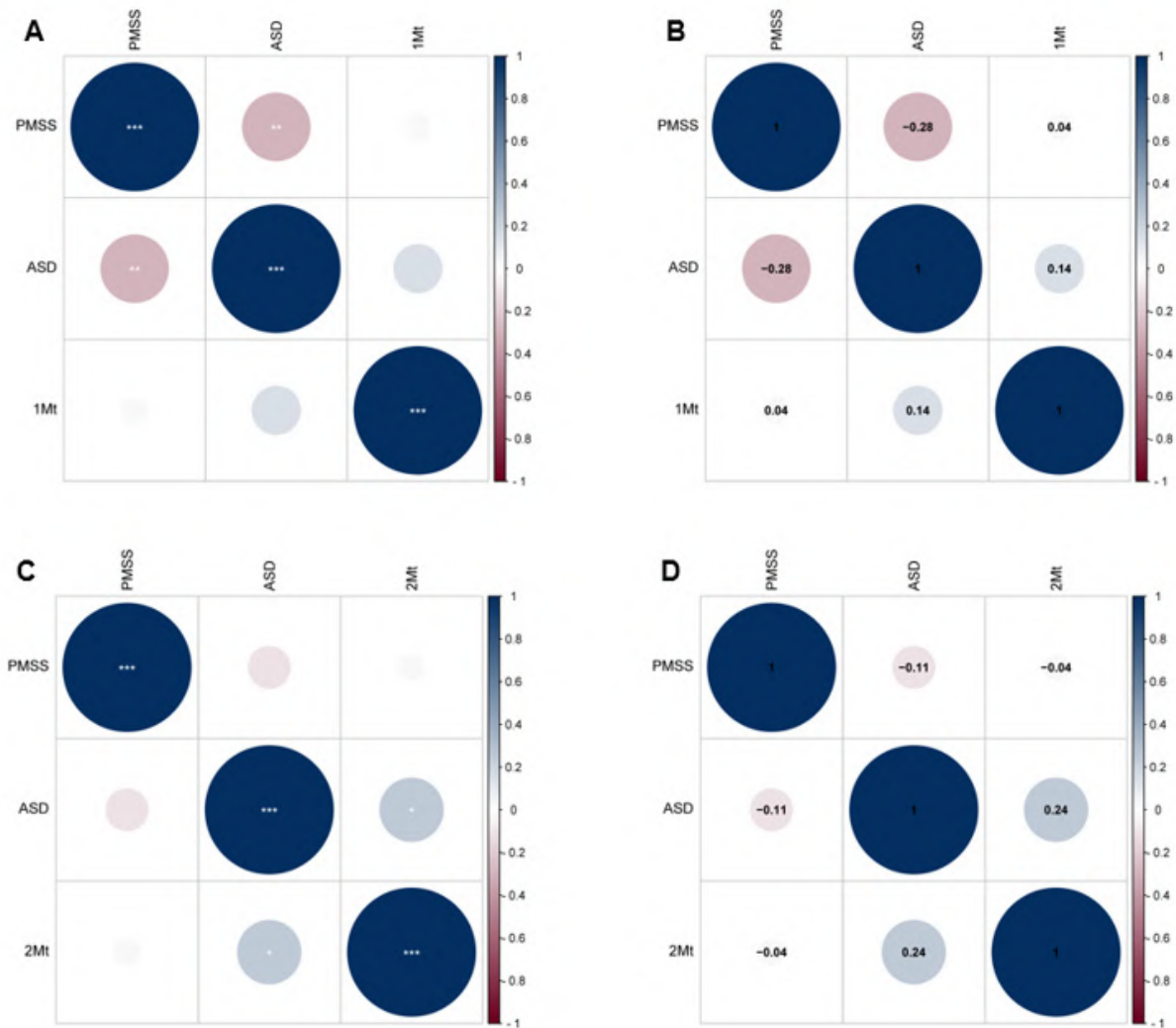


Fig. 1.- Correlations between PMSS, ASD and Midterm Scores. The panels in the left indicate the significance of the correlations in the first (A) and second (C) examinations, while panels in the right exhibit the strength of the correlations in the first (B) and second (D) examinations. Significance is indicated by asterisks, where not shown: $p > 0.05$, *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$. The direction of the correlation is indicated by color where blue is positive and red is negative. An inverse significant correlation was noted in the first examination between stress and discipline, while a positive correlation was observed in the second examination between discipline and the midterm score.

Both observations could be attributed to a sense of confidence provided by the previous experience of taking the first examination, which in turn would lower their stress levels and increase their self-discipline towards the subject.

In a cohort of first-year German medical students, Heinen reported higher levels of stress, anxiety, and depression compared to the general population (Heinen, 2017). Additionally, he revealed an association between optimism, self-efficacy, and resilient coping, but not with academic performance. However, his study was not longitudinal in design.

Two correlation analyses were performed with

the PMSS and ASD scores, according to the results of the examination in question. A significant negative correlation was observed between stress and discipline prior to the initial midterm examination, but not prior to the second. Conversely, a slight but significant positive correlation was identified between discipline and the score of the second midterm examination, but not in the first. This suggests a shift in the students' attitude towards stress, discipline, and academic outcomes before and after the first examination. The underlying causes of this shift in student perceptions remain to be elucidated.

Kötter (2017) examined the impact of stress

Table 2. Single and Multiple Logistic Regression Analysis

Variables	Single Analysis		Multiple Analysis		
	1Mt	OR (95%CI)	p	OR (95%CI)	p
Sex (Male)		1.33 (0.39 - 4.54)	0.645	-	-
Origin (Foreign)		1.48 (0.51 - 4.33)	0.466	-	-
High School Duration (2 years)		0.69 (0.30 - 2.20)	0.694	-	-
High School GPA		0.94 (0.87 - 1.01)	0.136	-	-
Additional Courses (Yes)		0.57 (0.21 - 1.55)	0.275	-	-
2Mt	OR (95%CI)	p	OR (95%CI)	p	
Sex (Male)		0.50 (0.16 - 1.56)	0.234	-	-
Origin (Foreign)		0.09 (0.02 - 0.31)	<0.001	0.08 (0.02 - 0.31)	<0.001
High School Duration (2 years)		0.25 (0.07 - 0.85)	0.026	0.21 (0.05 - 0.80)	0.023
High School GPA		0.82 (0.72 - 0.93)	0.003	0.81 (0.70 - 0.93)	0.004
Additional Courses (Yes)		0.75 (0.26 - 2.11)	0.587	-	-

The effect of demographic data was analyzed on the failing outcome of the first and second midterm examinations. During the first examination, none of the variables were associated significantly. On the counterpart, origin, high school duration, and high school GPA associated negatively with the failing outcome of the second examination. The comparator is in parentheses. 1Mt/2Mt: first and second midterms, OR: odds ratio, 95%CI: 95% confidence intervals, GPA: grade point average.

levels on medical students during their freshman and sophomore years, with a 12-month interval between measurements. Their findings indicated that the PMSS score, age and gender were significant predictors of academic performance. In contrast, the cohort of students under consideration demonstrated an increase in PMSS scores, which differs from the results observed in our study. This difference in results may be attributed to the temporal discrepancy between the two measurement periods. Our second round of applications was conducted only one month after the initial measurement, whereas Kötter's study measurements were taken at a 2-year interval. Moreover, their examination was a standardized nationwide exam that German students are required to pass to continue their medical education. As the examinations evaluated were midterm exams for the Embryology course, it is not possible to make a direct comparison with the German cohort in terms of stress levels. This may explain the discrepancies observed in the change between the PMSS scores.

Furthermore, previous studies have demonstrated a notable correlation between stress and suboptimal academic performance (Lam, 1999; Sohail, 2013; Linn, 1984). It is noteworthy that Sohail (2013) observed a more pronounced correlation between the number of stressors and aca-

demical performance than with the level of stress itself. Linn (1984) conducted further research into the nature of stress, and demonstrated that students who perceived their stress as beneficial did not exhibit a negative correlation with academic performance. It is noteworthy that our study revealed a negative correlation between stress and discipline, but not with academic performance.

Moreover, the influence of demographic variables on the academic outcome of failing the examination was examined through the application of single and multiple logistic regression analysis. The findings indicated that pursuing three years of secondary education, being a foreign student, and a higher secondary school grade point average (GPA) were associated with a reduced likelihood of failing the second midterm examination, but not the first. These findings lend further support to the hypothesis that medical students initially lack the requisite skills to excel in medical school examinations but develop these abilities as they progress through the semester. However, students who possess the aforementioned characteristics demonstrate better chances to pass the subsequent examination.

No relation was found between age or sex and the failure of any examination. In contrast, external professors frequently offer compensated sup-

plementary courses to reinforce their knowledge and pass the subject. Nevertheless, no significant relations were identified with the failing outcome.

Stewart demonstrated that academic performance during the pre-med years not only correlated with performance during medical school, but also predicted the levels of stress experienced during medical school (Lam, 1999). Despite the differences in medical education between Mexico and other countries, our findings indicate that a higher GPA in high school is associated with a reduced likelihood of failing in medical school. This is despite the fact that, in Mexico, students can enter medical school directly after graduating from high school, without the need to obtain an undergraduate degree.

Since our state offers the possibility of graduating from high school within two years, we conducted an analysis to determine whether there is a relation between the duration of high school and the incidence of failing to meet the standards set forth in the midterm examinations. It is noteworthy that our findings indicate a correlation between enrolling in three years of high school and a reduced likelihood of failing the examination. It is postulated that an additional year of high school allows students to develop greater emotional maturity, which in turn affects academic performance. The relation between these variables has been previously established in research studies (MacCann, 2020; Alvi, 2023; Altwijri, 2021) and it would be of great interest to our state local education committees to compare the difference in emotional maturity level between two-year and three-year high school students, as this phenomenon is usual to our local context.

It is not uncommon for students from outside a particular state to relocate to another state or even a different country to pursue their studies. At our institution, although the precise figure is unknown, there is a notable prevalence of foreign students hailing from diverse states within Mexico, and to a lesser extent, from other countries. Thus, we sought to determine whether there was a relation between hailing from a different state and the likelihood of failing the examination. Our findings indicated that foreign status was associated with a reduced likelihood of failing the sec-

ond midterm examination. A comparable study was conducted at our institution by Garza-Garcia (2024), who examined the resilience scores of anatomy regularization students that had previously failed the anatomy course. The findings indicated that foreign students exhibited higher resilience scores than their local counterparts, along with a greater likelihood of course approval. Although resilience was not measured in this study, it is an important factor that contributes to favorable academic outcomes. It is postulated that foreign students are motivated to excel in out-of-state institutions by the aspiration to achieve success outside of their hometowns.

It is important to note that our study is not without limitations. One of the most significant limitations is the potential influence of psychological comorbidities, such as depression, anxiety, burn-out, or even attention deficit disorder, on academic success. Other demographic variables, such as interest in pursuing a medical degree prior to admission to medical school or admission to a different career path than medicine, and subsequent cessation of studies to pursue a career in medicine, may also have an impact on academic performance. Another limitation of the study was the inclusion of only students older than 18 years of age, given that a significant proportion of first-semester medical students are minors, because high school can be completed in two years.

Conclusion

This study offers insights into the complex interrelationship between stress, discipline, demographic characteristics, and academic performance in first-semester medical students. The present study examined the fluctuations in stress and discipline across two distinct periods within a single semester. Additionally, it identified specific demographic attributes that are linked to enhanced academic performance. It is important to note that our results are influenced by the characteristics of our local context and culture, therefore similar studies in different contexts are warranted to obtain more ascertained conclusions.

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REFERENCES

- AL-KHANI AM, SARHANDI MI, ZAGHLOUL MS, EWID M, SAQUIB N (2019) A cross-sectional survey on sleep quality, mental health, and academic performance among medical students in Saudi Arabia. *BMC Res Notes*, 12(1): 665-673.
- ALTWIJRI S, ALOTAIBI A, ALSAEED M, ALSALIM A, ALATIQ A, AL-SARHEED S, AGHA S, OMAIR A (2021) Emotional intelligence and its association with academic success and performance in medical students. *Saudi J Med Med Sci*, 9(1): 31-37.
- ALVI T, NADAKUDITIRL, ALOTAIBITH, AISHAA, AHMAD MS, AHMAD S (2023) Emotional intelligence and academic performance among medical students-a correlational study. *Eur Rev Med Pharmacol Sci*, 27(4):230-1237.
- ARIF NMNA, ROSLAN NS, ISMAIL SB, NAYAK RD, JAMIAN MR, MOHAMAD ALI ROSHIDI AS, EDWARD TC, KAMAL MA, AMIN I, SHUKRI SHAARI MM, BASRI MFS (2021) Prevalence and associated factors of psychological distress and burnout among medical students: findings from two campuses. *Int J Environ Res Public Health*, 18(16): 8446-8456.
- CAPDEVILA-GAUDENS P, GARCÍA-ABAJO JM, FLORES-FUNES D, GARCÍA-BARBERO M, GARCÍA-ESTAÑ J (2021) Depression, anxiety, burnout and empathy among Spanish medical students. *PLoS One*, 16(12): e0260359.
- DE LA GARZA-GARCIA LA, DE LA FUENTE-VILLARREAL D, MUÑOZ-LEIJA MA, JEZZINI-MARTINEZ S, QUIROGA-GARZA A, JACOBO-BACA G, SALINAS-ALVAREZ Y, MARTINEZ-GARZA JH, ELIZONDO-OMAÑA RE, GUZMAN-LOPEZ S (2024) Medical school students' resilience and its relationship with demographic and non-demographic variables. *Medicina Universitaria*, 26(1): 1-10.
- DUCKWORTH AL, TAXER JL, ESKREIS-WINKLER L, GALLA BM, GROSS JJ (2019) Self-control and academic achievement. *Annu Rev Psychol*, 70(1): 373-399.
- HANKIR AK, NORTHALL A, ZAMAN R (2014) Stigma and mental health challenges in medical students. *BMJ Case Reports*, 2014: 205226.
- HEINEN I, BULLINGER M, KOKALEVENT R-D (2017) Perceived stress in first year medical students-associations with personal resources and emotional distress. *BMC Med Educ*, 17: 1-14.
- KÖTTER T, WAGNER J, BRÜHEIM L, VOLTMER E (2017) Perceived medical school stress of undergraduate medical students predicts academic performance: an observational study. *BMC Med Educ*, 17: 1-6.
- LAM B, WONG E, WONG T (1999) A prospective analysis of stress and academic performance in the first two years of medical school. *Med Educ*, 33(4): 243-250.
- LINN BS, ZEPPA R (1984) Stress in junior medical students: relationship to personality and performance. *Acad Med*, 59(1): 7-12.
- MACCANN C, JIANG Y, BROWN LER, DOUBLE KS, BUCICH M, MINBASHIAN A (2020) Emotional intelligence predicts academic performance: A meta-analysis. *Psychol Bull*, 146(2): 150-186.
- MARCH-AMENGUAL J-M, CAMBRA BADI I, CASAS-BAROY J-C, ALTARRIBA C, COMELLA COMPANY A, PUJOL-FARRIOLS R, BAÑOS JE, GALBANY-ESTRAGUÉS P, COMELLA CAYUELA A (2022) Psychological distress, burnout, and academic performance in first year college students. *Int J Environ Res Public Health*, 19(6): 3356-3365.
- RANASINGHE P, WATHURAPATHA WS, MATHANGASINGHE Y, PONNAMPERUMA G (2017) Emotional intelligence, perceived stress and academic performance of Sri Lankan medical undergraduates. *BMC Med Educ*, 17: 1-7.
- REHMAN R, TARIQS (2021) Emotional intelligence and academic performance of students. *J Pak Med Assoc*, 71(12): 2777-2781.
- ROTENSTEIN LS, RAMOS MA, TORRE M, SEGAL JB, PELUSO MJ, GUILLE C, SEN S, MATA DA (2016) Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: a systematic review and meta-analysis. *Jama*, 316(21): 2214-2236.
- SAL F (2022) Development of an academic self-discipline questionnaire for university students. *Pedagog Perspect*, 1(2): 76-88.
- ŞİMŞİR Z, DİLMAÇ B (2020) Self-discipline in the life of university students: A qualitative research. *Res Educ Psychol*, 4(2): 153-171.
- SOHAIL N (2013) Stress and academic performance among medical students. *J Coll Physicians Surg Pak*, 23(1): 67-71.
- VITALIANO PP, MAIURO RD, MITCHELL E, RUSSO J (1989) Perceived stress in medical school: resistors, persistors, adaptors and maladaptors. *Soc Sci Med*, 28(12): 1321-1329.
- VITALIANO PP, RUSSO J, CARR JE, HEERWAGEN JH (1984) Medical school pressures and their relationship to anxiety. *J Nerv Ment Dis*, 172(12): 730-736.
- WU H, LIS, ZHENG J, GUO J (2020) Medical students' motivation and academic performance: the mediating roles of self-efficacy and learning engagement. *Med Educ Online*, 25(1): 1742964-1742971.