

Empathy and its Correlates: Perceived Stress and Socio Demographic Factors in Medical Students.

Mohi Ud Din¹, Mehreen Babar², Ayesha Nizami¹, Shazia³, Sidra Faryal¹, Ali Raza Khan⁴

1. Department of Community Medicine, Aziz Fatimah Medical & Dental College, Faisalabad, Pakistan.
2. Department of ENT, NUST School of Health Sciences, Islamabad, Pakistan.
3. Department of Pulmonology, Rawal Institute of Medical Sciences, Islamabad, Pakistan.
4. University Hospital, Faisalabad, Pakistan.

Abstract

Background: Empathy, defined as the ability to understand and share the feelings of another, is a cornerstone of effective healthcare delivery. It plays a vital role in strengthening the patient–physician relationship and is consistently associated with improved patient satisfaction, enhanced treatment adherence, and more accurate clinical outcomes.

Objectives: Empathy is the cornerstone of quality healthcare; however, stress has the potential to diminish it. The main objectives of this research were to assess the empathy levels of medical students and to find out if there is a correlation among stress, gender, academic year, age, and the type of residence, and empathy.

Materials and Methods: This cross-sectional study involved 300 medical students who were selected through non-probability quota sampling over a span of seven months. The data were obtained through an online questionnaire that was distributed via social media and analyzed by using SPSS 25. Frequency and percentage have been used to describe categorical data and associations have been checked by chi-square testing. Binary logistic regression has been used to find factors that are independently associated with empathy.

Results: The majority of the participants (61%) were found to possess empathy below the average level, while 67% of them reported to be under moderate stress. In the regression analysis, female gender (aOR=2.13, p=0.004) and less stress (aOR=2.53, p<0.001) appeared to be the most important independent predictors of average/high empathy. The factors of academic year, age, and type of residence were not significantly related to the levels of empathy in the final analysis.

Conclusion: Medical students demonstrated low empathy, which was independently predicted by being male and having higher stress. It is strongly recommended to introduce curricular reforms that incorporate empathy training and stress reduction activities as a measure to facilitate the emergence of healthcare professionals who care.

Keywords: *Empathy, Medical, Stress, Students*

Introduction

Empathy, characterized as the quality that lets one feel the same way as another, is a primary support of healthcare. It is an important factor for the patient-physician relationship and is always linked with increased patient satisfaction, better treatment compliance, and more precise diagnoses, thus, a critical component of the patient-physician relationship.^{1,2} For the physician, the skill to communicate empathetically is also connected with more significant professional satisfaction and personal resilience, thus, serving as the burnout shield.³

Medical education seeks to bring forth compassionate healers, yet, ironically, the very nature of training impedes the development and even maintenance of empathy.⁴ The unending academic load, the culture of high-stakes examinations, and the emotionally charged nature of clinical encounters together form a place where it is hard to keep up the empathetic engagement.⁵ Students, who are under the pressure of the curriculum, may unconsciously adopt detachment as a mechanism of coping, which could cause a decline in their natural empathetic abilities. One of the main factors behind this situation is the chronic stress. Medical student stress is multifactorial, originating from

academic performance pressures, financial concerns, and the unique emotional burdens of witnessing human suffering and death.⁶ This continuous stress can drain an individual's emotional resources. Prolonged stress can exhaust the emotional resources of a person. The mental and emotional processes necessary for empathy will be impaired if emotional resources are used up. Hence, stress can bring about a psychological response that protects the individual, resulting in emotional numbing and a reduced ability for empathic understanding, which in the end, may affect patient care.⁷

Although the stress-empathy relationship is very important, it is not the only factor in the universe. In order to have a complete picture, it is necessary to look at other variables that are also influential. Research findings have been pointing out gender as a major determinant and female medical students often have higher empathy scores than males, which is a trend seen in different cultural settings.⁸ The academic year or level of training is another important factor. The empathy of a first-year student, who is learning basic sciences, may be different from that of a final-year student who is doing clinical internships and has the responsibilities that come with it; this implies that the difficulties and rewards of each stage have a different impact on the development of empathy.⁹ In addition, the socio-demographic characteristics like age and type of living (e.g., living in a university hostel or commuting from family home) may also play a role in a student's psychosocial well-being which would, in turn, affect the student's empathy responses, although the evidence is not as strong in this area.¹⁰

This research aims at a thorough exploration of medical students' empathy levels, as well as the factors of stress and socio-demographics that are related to them. The connection between empathy and stress has been looked at worldwide but remains an understudied area specific-

Corresponding Author

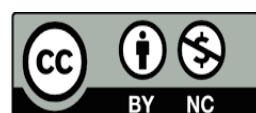
Mohi Ud Din
Community Medicine Dept, Aziz Fatimah Medical & Dental College,
Faisalabad
Email: dr.md89@outlook.com

Received: June 28, 2025

Revised: June 6, 2026

Accepted: June 10, 2026

DOI: <https://doi.org/10.52442/jrcd.v7i02.146>



This is an Open Access article distributed under the terms of the Creative Commons Attribution-Non Commercial 2.0 Generic License

ly in the cultural and educational contexts of Pakistan. In addition, it is crucial to set a local baseline for the purpose of designing institution-specific curricular interventions. Thus, this research intends to contribute data from a Pakistani medical school to the literature revealing the prevalence of empathy and its correlates and thus providing insights that are pertinent to this population. It was proposed that the medical students' empathy levels would be closely related to their perceived stress and gender, even when controlling for other socio-demographic and academic factors. Hence, the present study was designed according to the following specific objectives: 1) To find out how many medical students have below-average empathy, 2) To examine the stress levels in the same group of students, and 3) To look at the relationship between empathy and stress, gender, academic year, age, and type of residence.

Material and Methods

It was a cross-sectional study design that was used since it is the most suitable and effective method for determining the prevalence of empathy levels and for analyzing the relationship between the variables at one point of time. The online questionnaire was distributed to each class of MBBS through social media platforms. A non-probability quota sampling method was applied. The precise quotas were established to incorporate the same number of subjects from every one of the five MBBS classes (60 students per year) and, within each class, an equal gender distribution (30 males and 30 females per year), thus yielding a total sample of 300.

The design was deliberately selected for two main reasons: first, it provided proportional representation from all academic levels, which made it possible to carry out a strong cross-sectional analysis of how empathy and stress could differ across the medical curriculum. Second and most importantly, it ensured a balanced sample of both genders that was large enough for testing one of the study's main aims, which was to find out if there were any gender-based differences in empathy and stress, to an extent that the results would be reliable. Random sampling would have been the best choice; however, it was logistically impractical for a voluntary, survey-based study.

The quota system offered a planned and practical alternative to creating a sample that was well-balanced according to the primary variables of interest to our analysis. Based on a framework from earlier research on the prevalence of empathy among medical students and related factors, a sample size of 300 was taken using an OpenEpi calculator; and a validated and structured questionnaire was employed.¹¹ The study lasted for 1 year i.e. July 2023 to July 2024.

Ethical approval was taken with ref. no. IEC/237-23. An equal number of participants were taken from each class with an equal percentage of males and females. Those who completed the questionnaire first were included and the remaining were not considered. Students who provided consent and completed the questionnaire met the inclusion criteria; non-medical students and those who did not give consent were excluded. The empathy questionnaire i.e. 'The Toronto Empathy Questionnaire' has 16 questions with scores distribution as per the Likert scale from never = 0 to always = 4 with a range of total scores after summing up is 0 to 64. Item responses are scored according to the scale for positively worded items, while negatively worded items are reverse scored.

A score of less than 45 was taken as a cut-off limit to label medical students as having below-average empathy levels.

To assess levels of personal stress, a perceived stress scale (PSS-10) was used which has 10 questions and scores range from 0 to 40 with higher scores indicating higher perceived stress. Data was then imported to Excel sheet and subsequently to SPSS 25 on which statistical analysis was conducted.

Frequency and percentages were determined for categorical variables. Chi-square was used for comparing categorical data. Pearson correlation was used to find out the relationship between empathy and stress. As a result of the binary logistic regression, factors that are independently related to low empathy levels were identified. The dependent variable was empathy status ('below-average' against 'average/high' categories) while the independent variables included gender, academic year (MBBS class), age group, current residence, permanent residence, and the total perceived stress score. A significance threshold of $p < 0.05$ was used.

Results

Total number of participants included in the study were 300. Among them, 150 (50%) were males and 150 (50%) were females. An equal number of participants were included from each MBBS class i.e. 60 (20%). Most participants were below 21 years of age i.e. 167 (55.7%), also 221 (73.7%) were day scholars while the majority of the participants i.e. 222 (74%) were having urban residences. Most of the participants were having below average empathy levels as shown in Figure 1.

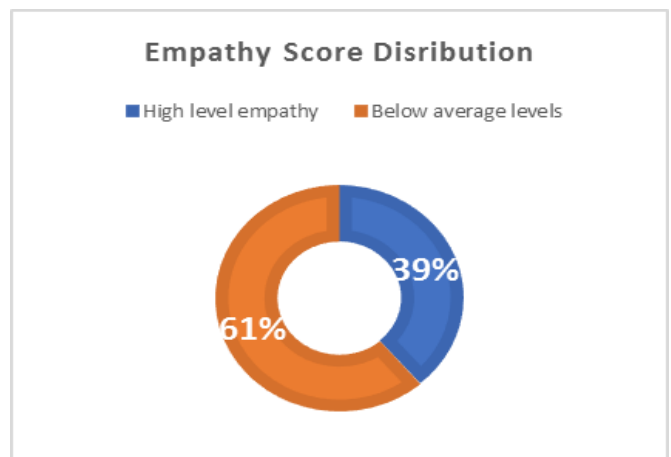


Figure 1: Distribution of empathy levels (n = 300)

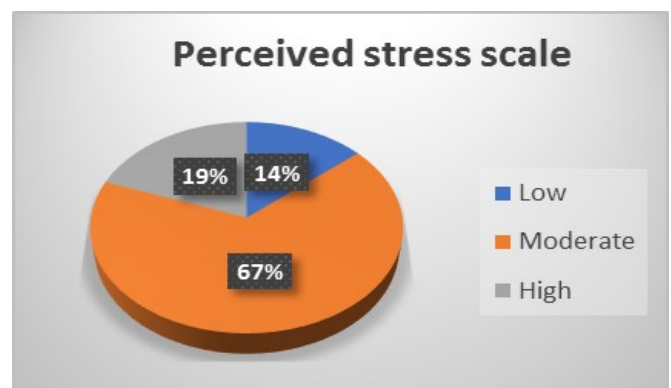


Fig 2: Levels of perceived stress among participants

Association of socio-demographic properties of participants with empathy and stress was evaluated. Gender showed significant association both with empathy and stress. Below average empathy levels were seen more commonly among 2nd year MBBS students and in males. Stress perceived by majority of participants was of moderate level, more in 3rd

year MBBS students while females perceived higher levels of stress as shown in table 1. Correlation test was employed to see linkage between empathy and stress which showed correlation coefficient of 0.25 with p value i.e. 0.00, depicting a strong linear correlation between empathy and stress among study participants. In order to identify independent predictors of empathy levels, a binary logistic regression analysis was carried out, which is displayed in Table 2. The model revealed two important factors: gender and perceived stress. Females had almost twice the chance of being in the average/high empathy category when compared to males (aOR = 2.13, 95% CI [1.28, 3.56]). On the other hand, stress was found to be a strong factor contributing to lower empathic responses in students with the highest positive correlation between empathy and stress was observed, however, regression analysis which took potential confounders into consideration found only female gender and lower perceived stress levels as the independent predictors of average or high empathy that were statistically significant.

A research done by Jarurin Pitanupong et al showed similar results like our study where majority (61%) of participants showed below average empathy levels.¹² A study done by Katti Sathaporn et al also showed similar to our study that more than half of study participants had below average empathy levels and more males had below average empa-

thy levels as compared to females.¹³ Similarly, research done by Valerie Carrard et al also showed that females reported higher empathy as compared to males¹⁴ which is similar to our study. In addition, our logistic regression verified that female gender was a significant and independent predictor of higher empathy (aOR = 2.13), thus strengthening this established trend.

A study done by Reyhane Hizomi Arani et al showed no significant association between empathy and gender but with levels of MBBS class which is in contrast to our results.¹⁵ The variation in results might be explained by cultural differences in gender socialization or the use of different types of measuring instruments for empathy. A study done by Hyoung Seok Shin et al showed significant association between gender and empathy which is similar to our study.¹⁶ A research done by Palinee Detsomboonrat et al showed no significant association between years of study and empathy which is similar to our study but our study showed significant gender association with empathy which this study did not.¹⁷ The regression analysis pointed out that there were differences in empathy according to the academic years, however, this association disappeared in the multivariate model. This meant that the differences observed between the age groups were probably due to other factors such as the distribution of stress or gender rather than the year of study being a direct cause. A study done by Muhammad Nazir et al showed that empathy scores increased significantly with each senior class students¹⁸ which is in contrast to our study where although highest score was seen in 4th MBBS class but scores remained static or increased insignificantly from junior to senior students. One of the explanations for this difference might be curricular clinical exposure timing; either the structure and quality of the clinical rotations can support or hinder developing empathy. A study done by Naseem et al showed similar results like our study in which females showed higher empathy levels than males and also fourth year MBBS students had higher empathy levels than other classes.¹⁹ A study done by Adam Dinoff et al showed that lowest empathy scores were demonstrated by fourth year MBBS students which is in contrast to results of our study.²⁰ Such opposing results point out that the empathy route is not the same all over and is probably molded by a complicated mix of institutional culture, particular curricular stressors (e.g., high-stakes exams in a given year), and the kind of early clinical experiences.

The original weak positive correlation ($r=0.25$) was clarified by the regression analysis which showed that high stress was indeed a very strong independent predictor of

Table 1: Participants socio-demographics association with empathy and stress

	Empathy			Stress perceived			
Current MBBS	Below average	High levels	p value	Low	Moderate	High	P value
1 st year	39	21	0.06	5	43	12	0.08
2 nd year	41	19		9	39	12	
3 rd	40	20		8	46	6	
4 th	27	33		5	42	13	
5 th year	37	23		14	31	15	
Age group							
< 21 years	106	61	0.39	27	106	34	0.27
> 21	78	55		14	95	24	
Current residence							
Day	129	92	0.08	29	151	41	0.72
Hos- telite	55	24		12	50	17	
Gender							
Male	107	43	0.00	27	100	23	0.03
Female	77	73		14	101	35	
Permanent residence							
Rural	53	25	0.16	11	53	14	0.93
Urban	131	91		30	148	44	

Material and Methods

This cross-sectional analytical study was conducted at the Department of Prosthetics, Fatima Memorial Hospital, Lahore, from July 2024 to January 2025 and ethical approval was obtained from Fatima Memorial Hospital under ethical number **FMH-21/07/2025-IRB-1689**. A total of 200 patients who underwent CBCT scans were included in the

study. The sample size was calculated using the formula for comparing two proportions using the 2×2 chi-square test, assuming a ratio of 1:1 between the two groups, assuming a

Table 2: Binary Logistic Regression Analysis of Factors Associated with Average/High Empathy Levels (n=300)

Predictor Variable	Adjusted Odds Ratio (aOR)	95% Confidence Interval	p-value
Academic Year (Ref: 5th Year)			0.175
First Year	0.83	0.37 - 1.87	0.658
Second Year	0.75	0.34 - 1.68	0.482
Third Year	0.76	0.34 - 1.69	0.497
Fourth Year	1.81	0.82 - 3.98	0.143
Age Group (Ref: >21 years)	1.11	0.63 - 1.93	0.726
Current Residence (Ref: Hostelite)	0.59	0.33 - 1.07	0.081
Gender (Ref: Female)	0.47	0.28 - 0.78	0.004
Perceived Stress Score	2.53	1.58 - 4.06	<0.001

criteria. Intermental foramina measurements were obtained by identifying the mental foramina bilaterally and measuring the mean distance between them. Additionally, the vertical position of the foramina relative to the alveolar crest was identified in medical students and identify factors affecting it including stress. Mostly participants in our study i.e. 61% had below average empathy levels while majority of them i.e. 67% perceived moderate stress. A significant association was observed between gender with empathy and stress. Initially, a slight positive correlation between empathy and stress was observed, however, regression analysis which took potential confounders into consideration found only female gender and lower perceived stress levels as the independent predictors of average or high empathy that were statistically significant.

A research done by Jarurin Pitanupong et al showed similar results like our study where majority (61%) of participants showed below average empathy levels.¹² A study done by Katti Sathaporn et al also showed similar to our study that more than half of study participants had below average empathy levels and more males had below average empathy levels as compared to females.¹³ Similarly, research done by Valerie Carrard et al also showed that females reported higher empathy as compared to males¹⁴ which is similar to our study. In addition, our logistic regression verified that female gender was a significant and independent predictor of higher empathy (aOR = 2.13), thus strengthening this established trend.

A study done by Reyhane Hizomi Arani et al showed no significant association between empathy and gender but with levels of MBBS class which is in contrast to our results.¹⁵ The variation in results might be explained by cultural differences in gender socialization or the use of different types of measuring instruments for empathy. A study done by Hyoung Seok Shin et al showed significant association between gender and empathy which is similar to our study.¹⁶ A research done by Palinee Detsomboonrat et al showed no significant association between years of study and empathy which is similar to our study but our study showed significant gender association with empathy which

this study did not.¹⁷ The regression analysis pointed out that there were differences in empathy according to the academic years, however, this association disappeared in the multivariate model. This meant that the differences observed between the age groups were probably due to other factors such as the distribution of stress or gender rather than the year of study being a direct cause. A study done by Muhammad Nazir et al showed that empathy scores increased significantly with each senior class students¹⁸ which is in contrast to our study where although highest score was seen in 4th MBBS class but scores remained static or increased insignificantly from junior to senior students. One of the explanations for this difference might be curricular clinical exposure timing; either the structure and quality of the clinical rotations can support or hinder developing empathy. A study done by Naseem et al showed similar results like our study in which females showed higher empathy levels than males and also fourth year MBBS students had higher empathy levels than other classes.¹⁹ A study done by Adam Dinoff et al showed that lowest empathy scores were demonstrated by fourth year MBBS students which is in contrast to results of our study.²⁰ Such opposing results point out that the empathy route is not the same all over and is probably molded by a complicated mix of institutional culture, particular curricular stressors (e.g., high-stakes exams in a given year), and the kind of early clinical experiences.

The original weak positive correlation ($r=0.25$) was clarified by the regression analysis which showed that high stress was indeed a very strong independent predictor of low empathy (aOR for average/high empathy = 2.53). This means that the positive correlation might be a case of spurious effect which could have been confused with other variables such as gender. The regression model enables one to see the true nature of this relationship: stress at a higher level is strongly associated with being less likely to show empathy. This is in line with the 'conservation of resources' theory,²¹ whereby chronic stress can deplete the emotional reservoir and thus more or less induce emotional numbness or disengagement as a form of defense.²²

This research has some drawbacks that need to be taken into account while interpreting the results. The first limitation is the employed cross-sectional design which is able to establish correlations but not to determine the direction of the relationship between empathy, stress, and the other examined variables. The second limitation is the non-probability quota sampling method used, which, although necessary to make sure that there is a proper representation of gender and students from different years, limits the applicability of our results to the institution where the research was conducted. In addition, the sampling method, being "first-come, first-served," might have led to the selection of more motivated or available students, thus causing bias in the sample. To overcome these limitations, researchers in the future might consider using longitudinal studies and multi-institutional random sampling which would result in the better detection of causality and increased applicability.

Conclusion The present study revealed a significant occurrence of low empathy among medical students, wherein male gender and high stress were the principal independent indicators. An immediate change of view on medical education is required to proactively protect student well-being. It is strongly suggested that the core curriculum be supplemented with stress-mitigation programs as well as empathy training that is longitudinal and personalized. To avoid the extinction of this vital clinical skill, such initiatives are a must. Subsequent longitudinal stud-

ies should be conducted to follow empathy development over time and assess the effectiveness of these interventions.

CONFLICT OF INTEREST: None

FUNDING SOURCES: None

Refereces

1. Roling G, Lutz G, Edelhäuser F, Hofmann M, Valk-Draad MP, Wack C, et al. Empathy, well-being and stressful experiences in the clinical learning environment. *Patient Educ Couns.* 2020;103(11):2320-7. <https://doi.org/10.1016/j.pec.2020.04.025>
2. Wolfshohl JA, Bradley K, Bell C, Bell S, Hodges C, Knowles H, et al. Association between empathy and burnout among emergency medicine physicians. *J. Clin. Med. Res.* 2019;11(7):532. doi: 10.14740/jocmr3878
3. Shapiro J, Youm J, Kheriaty A, Pham T, Chen Y, Clayma R. The human kindness curriculum: an innovative preclinical initiative to highlight kindness and empathy in medicine. *J. Health Educ.* 2019;32(2):53-61. DOI: 10.4103/efh.EfH_133_18
4. Krishnasamy C, Ong SY, Loo ME, Thistlethwaite J. How does medical education affect empathy and compassion in medical students? A meta-ethnography: BEME Guide No. 57. *Med. Teach.* 2019;41(11):1220-31. <https://doi.org/10.1080/0142159X.2019.1630731>
5. Yang C, Zhu Y-L, Xia B-Y, Li Y-W, Zhang J. The effect of structured empathy education on empathy competency of undergraduate nursing interns: A quasi-experimental study. *Nurse Educ. Today.* 2020;85:104296. <https://doi.org/10.1016/j.nedt.2019.104296>
6. Seeberger A, Lönn A, Hult H, Weurlander M, Wernerson A. Can empathy be preserved in medical education? *Int J Med Educ.* 2020;11:83. doi: 10.5116/ijme.5e83.31cf
7. Bas-Sarmiento P, Fernández-Gutiérrez M, Baena-Baños M, Correro-Bermejo A, Soler-Martins PS, de la Torre-Moyano S. Empathy training in health sciences: A systematic review. *J. Nurs. Educ. Pract.* 2020;44:102739. <https://doi.org/10.1016/j.nepr.2020.102739>
8. Yazdi NA, Arabshahi KS, Bigdeli S, Ghaffarifar S. Challenges in promoting clinical empathy skills in medical students: A content analysis study. *Med. J. Islam. Repub. Iran* 2019;33:104. doi: 10.34171/mjiri.33.104
9. Schwartz BD, Horst A, Fisher JA, Michels N, Van Winkle LJ. Fostering empathy, implicit bias mitigation, and compassionate behavior in a medical humanities course. *Int. J. Environ. Res.* 2020;17(7):2169. <https://doi.org/10.3390/ijerph17072169>
10. Findyartini A, Felaza E, Setyorini D, Mustika R. Relationship between empathy and motivation in undergraduate medical students. *GMS J Med Educ.* 2020;37(4). doi: 10.3205/zma001336
11. Biswas B, Haldar A, Dasgupta A, Mallick N, Karmakar A. An epidemiological study on empathy and its correlates: A cross-sectional assessment among medical students of a government medical college of India. *Indian J. Psychol. Med.* 2018;40(4):364-9. https://doi.org/10.4103/IJPSYM.IJPSYM_109_18
12. Pitanupong J, Sathaporn K, Ittasakul P, Karawekpanyawong N. Relationship of mental health and burnout with empathy among medical students in Thailand: A multicenter cross-sectional study. *PLoS One.* 2023;18(1):e0279564. <https://doi.org/10.1371/journal.pone.0279564>
13. Sathaporn K, Pitanupong J. Factors associated with the improvement of the empathy levels among clinical-year medical students in Southern Thailand: a university-based cross-sectional study. *BMC Psychol.* 2022;10(1):128. <https://doi.org/10.1186/s40359-022-00842-4>
14. Carrard V, Bourquin C, Berney S, Schlegel K, Gaume J, Bart P-A, et al. The relationship between medical students' empathy, mental health, and burnout: A cross-sectional study. *Med. Teach.* 2022;44(12):1392-9. <https://doi.org/10.1080/0142159X.2022.2098708>
15. Hizomi Arani R, Naji Z, Moradi A, Shariat SV, Mirzamohamadi S, Salamati P. Comparison of empathy with patients between first-year and last-year medical students of Tehran University of Medical Sciences. *BMC Med. Educ.* 2021;21:1-7. <https://doi.org/10.1186/s12909-021-02897-0>
16. Shin HS, Park H, Lee Y-M. The relationship between medical students' empathy and burnout levels by gender and study years. *Patient Educ Couns.* 2022;105(2):432-9. <https://doi.org/10.1016/j.pec.2021.05.036>
17. Detsomboonrat P, Theppanich S, Banyen S, Hongviphat S, Khamnil Y, Lapauthaya K, et al. Empathy level towards patients among thai dental students: a cross-sectional study. *BMC Oral Health.* 2023;23(1):184. <https://doi.org/10.1186/s12903-023-02891-6>

18. Nazir M, Alhareky M, Alqahtani A, Alsulaimi L, Alotaibi R, Yousef N, et al. Measuring empathy among dental students and interns: a cross-sectional study from dammam, saudi Arabia. *Int. J. Dent.* 2021;2021. <https://doi.org/10.1155/2021/5584423>
19. Naseem M, Tahir B, Salman A, Qadir S, Farhan R, Ali S, et al. Empathy levels among undergraduate medical students in Karachi, Pakistan: a cross-sectional study. *Ann. med. surg.* 2023;85(8):3858-62. DOI: 10.1097/MS9.0000000000001042
20. Dinoff A, Lynch S, Hameed AS, Koestler J, Ferrando SJ, Klepacz L. When Did the Empathy Die? Examining the Correlation Between Length of Medical Training and Level of Empathy. *Med. Sci. Educ.* 2023;33(2):489-97. <https://doi.org/10.1007/s40670-023-01768-1>
- Labrague LJ. Pandemic fatigue and clinical nurses' mental health, sleep quality and job contentment during the covid
21. pandemic: The mediating role of resilience. *J Nurs Manag.* 2021;29(7):1992-2001. doi:10.1111/jonm.13383.
22. Carrard V, Bourquin C, Berney S, Schlegel K, Gaume J, Bart PA, et al. The relationship between medical students' empathy, mental health, and burnout: A cross-sectional study. *Med Teach.* 2022;44(12):1392-9. doi:10.1080/0142159X.2022.2098708.

How to cite this article?

Mohi UD, Babar M, Nizami A, Shazia, Faryal S, Khan AR. Empathy and its Correlates: Perceived Stress and Socio-Demographic Factors in Medical Students. *J Rehman Coll Dent.* 2026;7(2): 77-82

Author Contributions

1. **Mohi Ud Din:** Supervision, analysis and/or interpretation, writing, critical review.
2. **Mehreen Babar:** Design, data collection and/or processing, critical review.
3. **Ayesha Nizami:** Conception, data collection and/or processing, critical review.
4. **Shazia:** Design, data collection and/or processing, critical review.
5. **Sidra Faryal:** Conception, data collection and/or processing, critical review.
6. **Ali Raza Khan:** Literature review, critical review.