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Approaches to Teaching Empathy to Medical Students: A Systematic Review

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Abstract

Background:
Empathy is essential for healthcare professionals, enhancing patient-physician relationships, clinical outcomes, and patient adherence while reducing medical errors. It comprises emotional, cognitive, moral, and behavioral components. However, empathy levels among medical students can be influenced by educational and environmental factors. This systematic review aims to identify and analyze educational determinants that shape empathy during medical training.

Methods:
Following PRISMA 2020 guidelines, we conducted a systematic review, searching seven databases (e.g., MEDLINE, APA PsycINFO, Embase, Web of Science, PubMed, CINAHL, and LISSA) for studies published between 2002–2025 in English or French. Inclusion criteria: (1) assessment of empathy using validated scales, (2) focus on preclinical medical students, (3) examination of educational determinants. Exclusion criteria: qualitative studies, non-educational factors, or non-medical student populations. Study quality was assessed using the MERSQI tool.

Results:
Ninety-three studies were included. The *Jefferson Scale of Empathy*(JSE-MS) was the most used tool (61.3%). Five categories emerged: (1) psychosocial skills development, (2) empathy-focused curricula, (3) patient encounters, (4) clinical simulations, and (5) conceptual teaching on communication/empathy. Single-category studies showed significant improvements in empathy, as in 41.7% of studies with psychosocial skills interventions. Combined interventions were often reported to have positive effects (78.0%).

Conclusions:
Results highlight the heterogeneity of educational approaches and their variable impact on empathy. The most effective interventions combined multiple determinants, such as theoretical teaching, clinical simulations, and patient interactions. However, empathy measurement tools (mostly self-report scales) have limitations, including social desirability bias and low sensitivity to change. Observed variations often fall below detectable thresholds, warranting cautious interpretation. A mixed-methods approach may provide more robust assessments. Educators can combine diverse educational interventions in integrative and longitudinal approaches to support empathy development for medical students.

BACKGROUND

Caring for a patient involves a holistic attention to the individual, combining clinical expertise and relational skills to best meet their needs. This approach goes beyond applying protocols and scientific knowledge to include listening, understanding, and supporting each individual, while embodying patience, kindness, and empathy (1). Empathy is therefore an essential skill for healthcare professionals. It allows them to understand the patient's situation, perspective, and emotions, to communicate this understanding by verifying its accuracy, and then to act appropriately (2–4).

The empathy demonstrated by doctors towards their patients allows for more in-depth conversations (5), improves clinical and biological parameters (6), enhances adherence, and contributes to the well-being of both the patient (7, 8) and the healthcare professional, with a reduction in professional suffering (9). It has also been shown that doctors with higher levels of empathy are less prone to medical errors, which directly influences patient safety (6).

In healthcare, clinical empathy consists of four components: emotional (sharing the patient's emotions), cognitive (identifying and understanding the patient's emotions), moral (acting accordingly), and behavioral (communicating this understanding) (10). This multidimensional capacity enables healthcare professionals to adopt their patients' emotional perspectives without experiencing their emotional realities.

Many determinants of empathy exist. Those associated with a decrease include psychological factors (stress, fatigue), an unstable learning environment, loss of ideals, the perception of a need for emotional detachment (11), lack of role models, excessive workload, time pressure (12), or training focused more on biomedical aspects than on psychosocial ones (10, 13). There are also determinants linked to increased empathy, such as simulation exercises between students involving patient scenarios (14, 15) or early patient contact during medical studies (16). Previous reviews have shown that patients-as-teachers can foster empathy (17) and that inadequate teaching or assessment can decrease empathy, whereas formal empathy training can increase it (17).

While some studies have shown that empathy may decrease over the course of medical training (9, 18–20), and others indicate a nonlinear evolution (21), these variations, sometimes divergent and of limited amplitude, necessitate a cautious interpretation of the data: they reflect inherent fluctuations of a complex phenomenon and should not justify an excessively alarmist interpretation.

To objectify empathy and measure its evolution during medical training, research primarily relies on validated self-reported scales. The Jefferson Scale of Empathy – Student version (JSE-MS) is the most widely used (22), as it distinguishes between the cognitive component of empathy (intellectual understanding of the patient's perspective) and its affective dimension (emotional resonance). Other tools not specifically developed for healthcare professions exist, such as the Interpersonal Reactivity Index (IRI) (23), which evaluates four empathetic subdimensions (perspective taking, empathic concern, fantasy, personal distress), or the Toronto Empathy Questionnaire (TEQ) (24), which focuses on the general tendency to perceive and share others' emotions.

Numerous studies show that empathy can be cultivated during the medical curriculum through specific educational interventions (17, 25, 26). These teaching modalities can include clinical situational practice, simulation, virtual patients, reflection on practice, and arts and humanities (27, 28). Thus, it establishes itself as a fully-fledged professional competency that can be taught and cultivated alongside technical or clinical skills.

Furthermore, assessing empathy in medical education can be challenging. The definition of the concept determines the tool used to assess it. As empathy in medical education is complex, the tools used must reflect this aspect (29).

To reflect on actions that could improve future healthcare professionals' empathy, it is necessary to specifically highlight the educational factors that shape it. By educational determinants, we refer to interventions that may alter students' empathy during their medical training. A better understanding of these determinants among educators would enable them to initiate actions to support medical students' empathy.

METHODS

We aim to identify and analyze the educational determinants of medical students' empathy, including formal teaching methods, internship experiences, and complementary activities (e.g., workshops, medical humanities, tutoring).

Study design

We conducted this systematic review in accordance with the 2020 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (30, 31). We submitted the protocol for this systematic review to the PROSPERO international registry on 11/12/24 under reference number CRD42024598454 to ensure transparency in the research process.

Sources and search strategies

The period covered was from January 1, 2002, to October 8, 2025, with a restriction to articles written in English or French. We searched seven databases: MEDLINE, APA PsycINFO, Embase, Web of Science (WOS), PubMed, CINAHL, and LISSA.

We developed search equations in collaboration with a specialized librarian (PM) from the University of Ottawa. They included a combination of standard terms and keywords such as empathy, compassion, medical student, medicine, and undergraduate (Table 1Table 1 - Search Strategies _ Approaches to Teaching Empathy to Medical Students: A Systematic Review and Supplemental file 1)

Inclusion and exclusion criteria

We included articles if they fulfilled the following criteria: (1) the study assessed empathy using a validated scale; (2) it focused on preclinical medical students; (3) it studied the influence of an educational determinant.

We excluded the articles if: (1) the study focused on related concepts such as emotional intelligence or compassion; (2) it used a solely qualitative methodology (no validated scale); (3) it explored empathy without a pedagogical factor; (4) the participants were from other health science disciplines; (5) the study was based on secondary analyses.

Selection process

We used the Covidence® software for duplicate removal, analysis, and data extraction. Three researchers (SL, PS, and MJ) independently and blindly selected titles and abstracts or full texts. In the event of disagreement, two researchers met to reach a consensus; for full texts, the third researcher provided their opinion to reach a consensus.

Data extraction and analysis

We assessed the methodological quality of the included studies using the Medical Education Research Study Quality Instrument (MERSQI) (32). The data extracted were as following : (1) general information about the studies (title, publication journal, country, objectives, period of completion); (2) participant characteristics (number of participants, distribution by gender, age); (3) scales used to assess empathy; (4) details of the educational interventions (description, belonging to a family of determinants); (5) duration of the intervention; (6) its impact on empathy (positive, negative, or indeterminate).

Two researchers randomly and independently extracted a sample of 10 studies. They verified the consistency of the data extracted in consultation meetings. They reached a consensus that the data matched satisfactorily, allowing the extraction to be continued by a single researcher (LS).

RESULTS

Study characteristics

The search returned 11,281 citations. After removing the duplicates and the exclusions, we included 93 studies (Figure 1).

Most studies were cohort studies (n = 53, 57.0 %), followed by non-randomized experimental studies (n = 22, 23.7 %), randomized controlled trials (n = 15, 16.1 %), and cross-sectional studies (n = 3, 3.2%). The number of participants per study ranged from 10 to 1,007, with a mean of 188 participants (SD = 185) and a median of 144. A total of 49 studies targeted a single grade level (52.7 %), 38 included multiple grade levels (40.9 %), and 6 did not specify participants' grade level (6.5 %). Not all studies reported gender, but among those that did (n = 64), women accounted for 55 % of the study population.

Empathy assessment scales used

The most frequently used tool was the Jefferson Scale of Empathy in its medical student version (JSE-MS/JSE-S) (n = 57, 61.3 %). The IRI was used in its standard form (n = 8, 8.6 %) and in modified versions (n = 5, 5.4 %). The TEQ (n = 3, 3.2 %) and the CARE scale (n = 4, 4.3 %) were also used; in one case, the CARE scale was combined with the MITI to analyze the empathic components of clinical communication. Finally, other instruments were used more marginally (n = 1 each, 1.1 %). In most cases, students assessed their own empathy (92.5 %). The studies characteristics can be found on supplemental file 2.

Educational determinants

The educational determinants identified in this review are numerous and heterogeneous, both in terms of content and implementation duration. After consensus, researchers grouped the determinants into five categories: (1) psychosocial skills development (PSD); (2) empathy-focused curriculum (EFC); (3) patient encounters (PE); (4) clinical situation simulations (CSS); (5) conceptual teaching on communication and empathy (CTCE).

There were 52 studies in which the educational determinant corresponded to a single category (55.9 %) as follows: (1) 22 (23,7%) in PSD; (2) 9 (9.7%) EFC; (3) 9 (9.7 %) in PE; (4) 8 (8,6%) in CSS; (5) 4 (4,3%) in CTCE. Of the studies evaluating interventions focused on “psychosocial skills development,” 10 (41.7 %) reported a significant improvement in empathy. Most studies on empathy-focused curricula reported a positive effect on empathy (n = 8, 88.9%). Most of the interventions based on patient encounters reported indeterminate results (n = 6, 66,7%), when a couple (22,2%) reported a decrease and one (11,1%) an improvement. Among studies on clinical-situation simulations, 6 (75.0%) reported improvements in empathy, and two studies (25.0%) showed no significant effect. Among the four studies on the conceptual teaching of empathy, three (75.0%) reported significant improvement, while one (25.0%) showed indeterminate results.

Of the 93 studies included, 41 (44.1%) combined several categories of educational determinants. The analysis showed that, across all categories, the interventions included mostly “conceptual teaching on communication and empathy” (n = 35, 37.6%) or “development of psychological skills” (n = 34; 36.6%). Some studies showed a positive effect on empathy (n = 32, 78.0%), while others reported indeterminate results (n = 8, 19.5%) or divergent results (n = 1, 2.4%).

The results can be found in Table 2 - Determinants of empathy in empathy teaching for medical students.

DISCUSSION

This systematic review, based on the analysis of 93 studies, aimed to identify and characterize the educational determinants of empathy among medical students. Our results reveal a wide variety of approaches, with each study proposing unique combinations of interventions covering up to five broad categories: psychosocial skills development, empathy-focused curriculum, clinical simulations, patient

encounters, and conceptual teaching on communication and empathy. The studies analyzed presented a distinct educational profile: no determinant is reproduced identically across studies. Almost half of the studies combine several determinants, illustrating the tendency to combine them to enhance their impact. Sixty-two studies showed a positive effect on empathy.

Teaching and learning empathy

The importance of didactic teaching (conceptual teaching on communication and empathy) has already been highlighted in the literature. This type of learning helps build the theoretical knowledge necessary for the practical implementation of empathic competence(33), as confirmed by our results.

Learning by observation (encounters with patients) also supports the development of complex psychosocial skills, particularly interpersonal skills (34).

Regarding learning through repetition (clinical-situation simulations), the decreased tendency could be linked to performance anxiety induced by simulation situations(35). It highlights the value of a differentiated assessment of empathy based on its components.

Interventions involving learning through reflection (psychosocial skills development) are the most represented group in this review. Reflexivity alone seems not sufficient to transform professional practices. Models of experiential learning and reflective practice highlight the need for guided, structured reflection that is closely linked to action(36). In medical training, approaches such as discussion groups, reflective writing, or mindfulness interventions could produce inconsistent effects when implemented in isolation or without sufficient supervision (36). In our review, many reflective learning interventions appeared to be implemented without explicit articulation with practice, or with limited information about the proposed educational framework and supervision. These factors may contribute to the heterogeneity of the results observed. Conversely, integrating these mechanisms into a structured educational framework, combined with support and opportunities for practical reinvestment, appears to determine their effectiveness in developing complex skills such as empathy.

This study is therefore the first to focus on categorizing the educational determinants of medical students' empathy. Given that empathy is a complex skill to develop, its teaching and assessment should reflect it (17, 26, 28, 29). Our review can help educators structure their curriculum by articulating various determinants, enabling them to reflect on this complexity and better support students' development.

Measuring empathy

It also appears essential to have a reliable, standardized measurement tool that produces reproducible results and distinguishes among the components of empathy. Although widely used in scientific literature, instruments designed to measure empathy have several limitations, both conceptual and methodological. Most studies use self-report questionnaires, such as the JSPE or the IRI. However, this type of self-reported assessment is particularly prone to social desirability bias: medical students, in particular, may be tempted to respond in line with expectations associated with their future professional

role rather than expressing their actual subjective experience (37). Comparative studies have also shown differences between disciplines: nursing and midwifery students tended to overestimate their empathy, probably due to a more pronounced social desirability bias in professions focused on the care relationship, while medical students slightly underestimated it, possibly due to a culture that values technical competence more than emotional competence (38). These results could also reflect a metacognitive bias, such as the Dunning-Kruger effect, whereby less empathetic individuals do not fully perceive their limitations, while more empathetic individuals are more self-critical (39). In our study, only six studies used a hetero-assessment scale (40–45).

Furthermore, these scales were not initially designed to measure changes in empathy over time or in response to educational determinants. Their sensitivity to change remains uncertain. The minimal detectable change (MDC) of the JSE-HPS is estimated at 13.5 points, raising the question of the significance of variations below this threshold, which may be due to measurement noise (46). In this review, the observed variations almost never reach this threshold, warranting great caution in interpreting these results as evidence of actual changes in empathy. It has also been shown that different scales do not assess the same components of empathy, making it difficult to compare the studies included in our work. For example, the JSE and the IRI show a weak correlation (47). Consistent with these limitations, several longitudinal studies do not observe a significant effect, even when educational interventions are intensive, which calls into question the real ability of these tools to capture subtle and lasting changes (11).

These findings call for reflection on the relevance of these scales as indicators of pedagogical effectiveness and highlight the need to develop more sensitive assessment methods that combine objective measures, feedback, and mixed approaches integrating behavioral dimensions. Several authors suggest that combining methods (a mixed approach) may be the most fruitful path: using quantitative tools to identify trends, then resorting to qualitative narratives to shed light on the underlying mechanisms. Finally, the literature on empathy also notes that quantitative tools (EQ, IRI, QCAE, etc.) present problems of validity or meaning, despite their apparent reliability, which highlights that even “strict measures” are not certainties—and it is precisely in these margins of uncertainty that the qualitative approach can provide useful interpretative nuance (48, 49). We could also discuss the data analysis model used. Indeed, while aiming to measure a complex concept such as empathy, we can wonder whether the rating scale is homogeneous between different grades. Therefore, an analysis model, such as Rasch (50–52), could be considered to improve the validity of the results for the empathy measure.

Strengths and limitations

Excluding studies from other health disciplines strengthened the homogeneity of the study population and the relevance of comparisons; however, it resulted in the exclusion of a significant number of relevant publications on empathy development, thereby limiting the data available for our review. Nevertheless, we included enough publications to provide data for discussion. In addition, studies involving interns or healthcare professionals were excluded from our analysis. This methodological

choice was made to focus on initial medical training. The inclusion of these populations would have enabled us to explore additional educational determinants, thereby enriching our understanding of the mechanisms underlying empathy development.

We aimed to identify the educational determinants studied and their positive or negative effects on the development of empathy among medical students. However, this work was not intended to assess the strength of these effects or the methodological robustness of the studies included. Indeed, most publications did not allow for the extraction of comparable, quantified data, making it impossible to perform any statistical analysis or to weight by effect size.

Furthermore, the multiplicity of educational determinants within a single intervention—combining, for example, clinical simulations, theoretical teaching, and experiential learning—made interpreting the results more complex. This heterogeneity of approaches obscures the interpretation of the effects specific to each type of intervention and limits the accuracy of the conclusions that can be drawn. Another limiting factor is the often-incomplete description of the curricula and the educational interventions presented. The teaching methods, duration, specific content, and implementation conditions were frequently lacking in detail, making it difficult to interpret the results accurately.

Regarding the analysis of the methodological quality of the studies, assessed using the Medical Education Research Study Quality Instrument (MERSQI) (53), the scores obtained appear broadly consistent, suggesting comparable methodological approaches across the included studies. However, while MERSQI is widely used in medical education, its weighting system has limitations in the context of this review. The last dimension of the MERSQI, which relates to the level of outcomes measured, proved poorly suited to the included studies, whose interventions mainly targeted interpersonal and attitudinal skills. On the other hand, the other dimensions of the tool, particularly study design, analysis methods, and the validity of measurement instruments, proved to be generally relevant in the context of this work. In this context, MERSQI was used as a tool for overall methodological assessment; the results must be interpreted with caution and placed in the specific context of educational interventions aimed at developing empathy. Future methodological efforts, particularly expanding the sample size and strengthening monitoring procedures, are necessary to increase the reliability and scope of results in medical education.

In the absence of delayed measurements in the medium- and long-term (a single study reported a decrease in empathy one year after the intervention), it remains difficult to distinguish between a simple effect of temporal proximity and a genuine, lasting change in empathic skills. Therefore, to better assess the stability of empathy gains and their real impact on clinical practice, it would be essential to include follow-up assessments several months or even a year later to verify that the initial improvements do not fade over time.

CONCLUSION

This review identifies the various approaches medical educators can combine to help foster students' empathy, although the effects observed remain heterogeneous. Teaching empathy cannot be considered a one-off or isolated intervention; it must be part of a longitudinal, integrative educational approach that combines several determinants and is supported by reflective guidance and appropriate feedback. Future studies, based on more consistent methodologies, adequate complex assessment tools, and long-term evaluations, will be necessary to better identify the conditions conducive to the sustainable development of empathy during medical training.

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

JM contributed to the conception of the study, the extraction of data, the discussion on the analysis of the data, and was a major contributor in writing the present manuscript.

SP contributed to the conception of the study, the extraction of data and the discussion on the analysis of the data. SP reviewed the manuscript.

LS was a major contributor on the extraction, analysis and discussion of the data. LS contributed in writing the manuscript.

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References

1. Kelley JM, Kraft-Todd G, Schapira L, Kossowsky J, Riess H. The Influence of the Patient-Clinician Relationship on Healthcare Outcomes: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Timmer A, editor. PLoS ONE. 2014 Apr 9;9(4):e94207. doi:10.1371/journal.pone.0094207
2. Mercer SW, Reynolds WJ. Empathy and quality of care. Br J Gen Pract. 2002 Oct;52 Suppl(Suppl):S9-12. PubMed PMID: 12389763; PubMed Central PMCID: PMC1316134.
3. Reynolds WJ, Scott B. Empathy: a crucial component of the helping relationship. Psychiatric Ment Health Nurs. 1999 Oct 4;6(5):363–70. doi:10.1046/j.1365-2850.1999.00228.x
4. Hojat M. A Definition and Key Features of Empathy in Patient Care. In: Empathy in Health Professions Education and Patient Care [Internet]. Cham: Springer International Publishing; 2016 [cited 2026 Mar 6]. p. 71–81. Available from: http://link.springer.com/10.1007/978-3-319-27625-0_6 doi:10.1007/978-3-319-27625-0_6
5. Suchman AL, Markakis K, Beckman HB, Frankel R. A model of empathic communication in the medical interview. JAMA. 1997 Feb 26;277(8):678–82. PubMed PMID: 9039890.
6. Hojat M, Louis DZ, Markham FW, Wender R, Rabinowitz C, Gonnella JS. Physicians' Empathy and Clinical Outcomes for Diabetic Patients: Academic Medicine. 2011 Mar;86(3):359–64. doi:10.1097/ACM.0b013e3182086fe1
7. Howick J, Moscrop A, Mebius A, Fanshawe TR, Lewith G, Bishop FL, et al. Effects of empathic and positive communication in healthcare consultations: a systematic review and meta-analysis. J R Soc Med. 2018 Jul;111(7):240–52. doi:10.1177/0141076818769477
8. Derksen F, Bensing J, Lagro-Janssen A. Effectiveness of empathy in general practice: a systematic review. Br J Gen Pract. 2013 Jan;63(606):e76–84. doi:10.3399/bjgp13X660814
9. Neumann M, Edelhäuser F, Tauschel D, Fischer MR, Wirtz M, Woopen C, et al. Empathy Decline and Its Reasons: A Systematic Review of Studies With Medical Students and Residents: Academic Medicine. 2011 Aug;86(8):996–1009. doi:10.1097/ACM.0b013e318221e615
10. Jeffrey D. A meta-ethnography of interview-based qualitative research studies on medical students' views and experiences of empathy. Medical Teacher. 2016 Dec 1;38(12):1214–20. doi:10.1080/0142159X.2016.1210110
11. Batt-Rawden SA, Chisolm MS, Anton B, Flickinger TE. Teaching Empathy to Medical Students: An Updated, Systematic Review. Academic Medicine. 2013 Aug;88(8):1171–7. doi:10.1097/ACM.0b013e318299f3e3
12. Hojat M, Vergare MJ, Maxwell K, Brainard G, Herrine SK, Isenberg GA, et al. The Devil is in the Third Year: A Longitudinal Study of Erosion of Empathy in Medical School: Academic Medicine. 2009

Sep;84(9):1182–91. doi:10.1097/ACM.0b013e3181b17e55

13. Ayub A, Khan RA. Measuring empathy of medical students studying different curricula; a causal comparative study. J Pak Med Assoc. 2017 Aug;67(8):1238–41. PubMed PMID: 28839311.
14. McNally G, Haque E, Sharp S, Thampy H. Teaching empathy to medical students. The Clinical Teacher. 2023 Feb;20(1):e13557. doi:10.1111/tct.13557
15. Kim KJ. Project-based learning approach to increase medical student empathy. Medical Education Online. 2020 Jan 1;25(1):1742965. doi:10.1080/10872981.2020.1742965
16. Ye X, Guo H, Xu Z, Xiao H. Empathy variation of undergraduate medical students after early clinical contact: a cross-sectional study in China. BMJ Open. 2020 Jul;10(7):e035690. doi:10.1136/bmjopen-2019-035690
17. Howick J, Dudko M, Feng SN, Ahmed AA, Alluri N, Nockels K, et al. Why might medical student empathy change throughout medical school? a systematic review and thematic synthesis of qualitative studies. BMC Med Educ. 2023 Apr 24;23(1):270. doi:10.1186/s12909-023-04165-9
18. Samarasekera DD, Lee SS, Yeo SP, Ponnamperuma G. Development of student empathy during medical education: changes and the influence of context and training. Korean J Med Educ. 2022 Mar 1;34(1):17–26. doi:10.3946/kjme.2022.216
19. Andersen FA, Johansen ASB, Søndergaard J, Andersen CM, Assing Hvidt E. Revisiting the trajectory of medical students' empathy, and impact of gender, specialty preferences and nationality: a systematic review. BMC Med Educ. 2020 Dec;20(1):52. doi:10.1186/s12909-020-1964-5
20. Bellini LM, Shea JA. Mood Change and Empathy Decline Persist during Three Years of Internal Medicine Training: Academic Medicine. 2005 Feb;80(2):164–7. doi:10.1097/00001888-200502000-00013
21. Papageorgiou A, Miles S, Fromage M. Does medical students' empathy change during their 5-year MBBS degree? Educ Health (Abingdon). 2018;31(3):142–7. doi:10.4103/efh.EfH_279_17 PubMed PMID: 31134944.
22. Hojat M, DeSantis J, Shannon SC, Mortensen LH, Speicher MR, Bragan L, et al. The Jefferson Scale of Empathy: a nationwide study of measurement properties, underlying components, latent variable structure, and national norms in medical students. Adv in Health Sci Educ. 2018 Dec;23(5):899–920. doi:10.1007/s10459-018-9839-9
23. Davis MH. A Multidimensional Approach to Individual Differences in Empathy. Catalog of Selected Documents in Psychology. 1980;10:85.
24. Spreng* RN, McKinnon* MC, Mar RA, Levine B. The Toronto Empathy Questionnaire: Scale Development and Initial Validation of a Factor-Analytic Solution to Multiple Empathy Measures. Journal of Personality Assessment. 2009 Jan;91(1):62–71. doi:10.1080/00223890802484381
25. Hojat M, Axelrod D, Spandorfer J, Mangione S. Enhancing and sustaining empathy in medical students. Medical Teacher. 2013 Dec;35(12):996–1001. doi:10.3109/0142159X.2013.802300
26. Ngo HL, Sokolovic N, Jenkins JM. Teaching cognitive and affective empathy in medicine: a systematic review and meta-analysis of randomized controlled trials. Medical Education Online.

2025 Dec 31;30(1):2501263. doi:10.1080/10872981.2025.2501263 PubMed PMID: 40329527.

27. Kelm Z, Womer J, Walter JK, Feudtner C. Interventions to cultivate physician empathy: a systematic review. BMC Med Educ. 2014 Dec;14(1):219. doi:10.1186/1472-6920-14-219
28. Zhou YC, Tan SR, Tan CGH, Ng MSP, Lim KH, Tan LHE, et al. A systematic scoping review of approaches to teaching and assessing empathy in medicine. BMC Med Educ. 2021 May 22;21(1):292. doi:10.1186/s12909-021-02697-6
29. Fragkos KC, Crampton PES. The Effectiveness of Teaching Clinical Empathy to Medical Students: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Academic Medicine. 2020 Jun;95(6):947–57. doi:10.1097/ACM.0000000000003058
30. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ. 2021 Mar 29;n71. doi:10.1136/bmj.n71
31. Page MJ, Moher D, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. BMJ. 2021 Mar 29;n160. doi:10.1136/bmj.n160
32. Cook DA, Reed DA. Appraising the Quality of Medical Education Research Methods: The Medical Education Research Study Quality Instrument and the Newcastle–Ottawa Scale-Education. Academic Medicine. 2015 Aug;90(8):1067–76. doi:10.1097/ACM.0000000000000786
33. Ngo H, Sokolovic N, Coleman A, Jenkins JM. Teaching empathy to mental health practitioners and trainees: Pairwise and network meta-analyses. Journal of Consulting and Clinical Psychology. 2022 Nov;90(11):851–60. doi:10.1037/ccp0000773
34. Hill CE, Lent RW. A narrative and meta-analytic review of helping skills training: Time to revive a dormant area of inquiry. Psychotherapy: Theory, Research, Practice, Training. 2006;43(2):154–72. doi:10.1037/0033-3204.43.2.154
35. Ngo HL, Sokolovic N, Jenkins JM. Teaching cognitive and affective empathy in medicine: a systematic review and meta-analysis of randomized controlled trials. Medical Education Online. 2025 Dec 31;30(1):2501263. doi:10.1080/10872981.2025.2501263
36. Mann K, Gordon J, MacLeod A. Reflection and reflective practice in health professions education: a systematic review. Adv in Health Sci Educ. 2009 Oct;14(4):595–621. doi:10.1007/s10459-007-9090-2
37. Hojat M. Empathy in patient care: antecedents, development, measurement, and outcomes. New York: Springer; 2007.
38. Weber LM, Bauer L, Führer A. Hierarchy hurts: a comparative cross-sectional analysis of empathy and its determinants in medical, midwifery, and nursing students. BMC Med Educ. 2025 Jul 18;25(1):1076. doi:10.1186/s12909-025-07683-w
39. Kruger J, Dunning D. Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. Journal of Personality and Social Psychology. 1999;77(6):1121–34. doi:10.1037/0022-3514.77.6.1121

40. Chéret A, Durier C, Noël N, Bourdic K, Legrand C, D'Andréa C, et al. Motivational interviewing training for medical students: A pilot pre-post feasibility study. Patient Education and Counseling. 2018 Nov;101(11):1934–41. doi:10.1016/j.pec.2018.06.011
41. Buffel du Vaure C, Lemogne C, Bunge L, Catu-Pinault A, Hoertel N, Ghasarossian C, et al. Promoting empathy among medical students: A two-site randomized controlled study. J Psychosom Res. 2017 Dec;103:102–7. doi:10.1016/j.jpsychores.2017.10.008 PubMed PMID: 29167035.
42. Del Barrio LG, Rodríguez-Díez C, Gea A, Arbea L, Pereira J, Díez N. Impact of a longitudinal course on medical professionalism on the empathy of medical students. Patient Education and Counseling. 2024 Feb;119:108042. doi:10.1016/j.pec.2023.108042
43. Foster A, Chaudhary N, Kim T, Waller JL, Wong J, Borish M, et al. Using Virtual Patients to Teach Empathy: A Randomized Controlled Study to Enhance Medical Students' Empathic Communication. Sim Healthcare. 2016 Jun;11(3):181–9. doi:10.1097/SIH.0000000000000142
44. LoSasso AA, Lamberton CE, Sammon M, Berg KT, Caruso JW, Cass J, et al. Enhancing Student Empathetic Engagement, History-Taking, and Communication Skills During Electronic Medical Record Use in Patient Care. Academic Medicine. 2017 Jul;92(7):1022–7. doi:10.1097/ACM.0000000000001476
45. Daeppen JB, Fortini C, Bertholet N, Bonvin R, Berney A, Michaud PA, et al. Training medical students to conduct motivational interviewing: A randomized controlled trial. Patient Education and Counseling. 2012 Jun;87(3):313–8. doi:10.1016/j.pec.2011.12.005
46. Frontera WR, DeGroote W, Ghaffar A, and for the Health Policy & Systems Research for Rehabilitation Group. Importance of Health Policy and Systems Research for Strengthening Rehabilitation in Health Systems. Rehabilitation (Stuttg). 2023 Oct;62(05):265–7. doi:10.1055/a-2154-9546
47. Quince T, Thiemann P, Benson J, Hyde S. Undergraduate medical students' empathy: current perspectives. AMEP. 2016 Aug;Volume 7:443–55. doi:10.2147/AMEP.S76800
48. Lima FFD, Osório FDL. Empathy: Assessment Instruments and Psychometric Quality – A Systematic Literature Review With a Meta-Analysis of the Past Ten Years. Front Psychol. 2021 Nov 24;12:781346. doi:10.3389/fpsyg.2021.781346
49. Hong H, Han A. A systematic review on empathy measurement tools for care professionals. Educational Gerontology. 2020 Feb 1;46(2):72–83. doi:10.1080/03601277.2020.1712058
50. Penta M, Arnould C, Decruynaere C. Développer et interpréter une échelle de mesure: applications du modèle de Rasch. Sprimont: Mardaga; 2005. (Pratiques psychologiques).
51. Rasch G. Probabilistic models for some intelligence and attainment tests. Expanded ed. Chicago: University of Chicago Press; 1980. 199 p.
52. Boone WJ, Staver JR, Yale MS. Rasch analysis in the human sciences. Dordrecht: Springer; 2014.
53. Cook DA, Reed DA. Appraising the Quality of Medical Education Research Methods: The Medical Education Research Study Quality Instrument and the Newcastle–Ottawa Scale-Education. Academic Medicine. 2015 Aug;90(8):1067–76. doi:10.1097/ACM.0000000000000786

54. Abrams M.P., Salzman J., Espina Rey A., Daly K. Impact of Providing Peer Support on Medical Students' Empathy, Self-Efficacy, and Mental Health Stigma. International Journal of Environmental Research and Public Health. 2022;19(9):5135. doi:10.3390/ijerph19095135
55. Airagnes G, Consoli SM, De Morlhon O, Galliot AM, Lemogne C, Jaury P. Appropriate training based on Balint groups can improve the empathic abilities of medical students: a preliminary study. Journal of Psychosomatic Research. 2014;76(5):426–9. doi:10.1016/j.jpsychores.2014.03.005
56. Buffel du Vaure C, Lemogne C, Bunge L, Catu-Pinault A, Hoertel N, Ghasarossian C, et al. Promoting empathy among medical students: A two-site randomized controlled study. Journal of Psychosomatic Research. 2017;103:102–7. doi:10.1016/j.jpsychores.2017.10.008
57. Chen AK, Kumar A, Haramati A. The effect of Mind Body Medicine course on medical student empathy: a pilot study. Medical Education Online. 2016;21:31196. doi:10.3402/meo.v21.31196
58. Danilewitz M, Koszycki D, Maclean H, Sanchez-Campos M, Gonsalves C, Archibald D, et al. Feasibility and effectiveness of an online mindfulness meditation program for medical students. Canadian Medical Education Journal. 2018;9(4):e15–25.
59. Demiroren M., Saka M.C., Senol Y., Senturk V., Baysal O., Oztuna D. The impact of reflective practices on medical students' attitudes towards mental illness. Anadolu Psikiyatri Dergisi. 2016;17(6):466–75. doi:10.5455/apd.214188
60. Duke P, Grosseman S, Novack DH, Rosenzweig S. Preserving third year medical students' empathy and enhancing self-reflection using small group 'virtual hangout' technology. Medical Teacher. 2015;37(6):566–71. doi:10.3109/0142159X.2014.956057
61. Epinat-Duclos J, Foncelle A, Quesque F, Chabanat E, Duguet A, Van der Henst JB, et al. Does nonviolent communication education improve empathy in French medical students? International Journal of Medical Education. 2021;12:205–18. doi:10.5116/ijme.615e.c507
62. Iaconisi J, Hasselblatt F, Mayer B, Schoen M, Böckers TM, Böckers A. Effects of an Educational Film About Body Donors on Students' Empathy and Anxiety Levels in Gross Anatomy. Anatomical Sciences Education. 2019;12(4):386–98. doi:10.1002/ase.1880
63. Imperato A, Strano-Paul L. Impact of Reflection on Empathy and Emotional Intelligence in Third-Year Medical Students. Academic Psychiatry: The Journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry. 2021;45(3):350–3. doi:10.1007/s40596-020-01371-1
64. Kanagasabai P, Ormandy J, Filoche S, Henry C, Te Whaiti S, Willink R, et al. Can storytelling of women's lived experience enhance empathy in medical students? A pilot intervention study. Medical Teacher. 2024;46(2):219–24. doi:10.1080/0142159X.2023.2243023
65. Kruse SW, Getch SE, Kumar A, Roffler M. Required Art-Based Curriculum Improves Essential Qualities in Medical Students: A Three-Year Study With In-Person and Remote Art Observation Experiences. Cureus. 2025;17(4):e82022. doi:10.7759/cureus.82022
66. Lemogne C, Buffel du Vaure C, Hoertel N, Catu-Pinault A, Limosin F, Ghasarossian C, et al. Balint groups and narrative medicine compared to a control condition in promoting students' empathy.

BMC medical education. 2020;20(1):412. doi:10.1186/s12909-020-02316-w

67. McManus S, Killeen D, Hartnett Y, Fitzgerald G, Murphy KC. Establishing and evaluating a Balint group for fourth-year medical students at an Irish University. Irish Journal of Psychological Medicine. 2020;37(2):99–105. doi:10.1017/ipm.2019.28
68. Meirovich A, Ber R, Moore M, Rotschild A. Student-centered tutoring as a model for patient-centeredness and empathy. Advances in Medical Education and Practice. 2016;7:423–8. doi:10.2147/AMEP.S107115
69. Pierce C, Appel J, Rice T. Narratives of Mental Illness and Well-being: A 6-Week Course Aiming to Improve Medical Student Empathy and Resilience Through the Creative Arts. Acad Psychiatry. 2025;49(2):142–6. doi:10.1007/s40596-024-02088-1
70. Potash JS, Chen JY, Lam CLK, Chau VTW. Art-making in a family medicine clerkship: how does it affect medical student empathy? BMC medical education. 2014;14:247. doi:10.1186/s12909-014-0247-4
71. Scullion R., Icke K., Tissen-Diabate T., Adam D., Ortiz M., Witt C.M., et al. Self-care strategies for medical students: an uncontrolled mixed-methods evaluation of a mind-body-medicine group course. BMC medical education. 2023;23(1):816. Located at: 642648356. doi:10.1186/s12909-023-04745-9
72. Shapiro J, Morrison E, Boker J. Teaching empathy to first year medical students: evaluation of an elective literature and medicine course. Education for Health (Abingdon, England). 2004;17(1):73–84. doi:10.1080/13576280310001656196
73. Singh SP, Modi CM, Patel CP, Pathak AG. Low-fidelity simulation to enhance understanding of infection control among undergraduate medical students. The National Medical Journal of India. 2017;30(4):215–8. doi:10.4103/0970-258X.218677
74. van Dijk I, Lucassen PLBJ, Akkermans RP, van Engelen BGM, van Weel C, Speckens AEM. Effects of Mindfulness-Based Stress Reduction on the Mental Health of Clinical Clerkship Students: A Cluster-Randomized Controlled Trial. Academic Medicine: Journal of the Association of American Medical Colleges. 2017;92(7):1012–21. doi:10.1097/ACM.0000000000001546
75. Archer E, Turner R. Changes in the empathy levels of a group of undergraduate medical students: A longitudinal study. SOUTH AFRICAN JOURNAL OF BIOETHICS AND LAW. 2023;16(2):46–9. Located at: WOS:001110469500001. doi:10.7196/SAJBL.2023.v16i2.1015
76. Chen CH, Wang SJ, Yeh WY, Wu CL, Wang YA, Chen CF, et al. Evaluating Teaching Effectiveness of Medical Humanities in an Integrated Clerkship Program by a Novel Prospective Propensity Score Matching Framework. International Journal of Environmental Research and Public Health. 2022;19(3):1882. doi:10.3390/ijerph19031882
77. Jacoby JL, Smith AB, DeWaay DJ, Barraco RD, Greenberg MR, Kane BG, et al. Developing Emotional Intelligence Through a Longitudinal Leadership Curriculum in UME: Combating the Decline in Medical Student Empathy. Medical Science Educator. 2021;31(1):29–35. doi:10.1007/s40670-020-01120-x

78. McGeehan J, English R, Shenberger K, Tracy G, Smego R. A community continuity programme: volunteer faculty mentors and continuity learning. The Clinical Teacher. 2013;10(1):15–20. doi:10.1111/j.1743-498X.2012.00602.x
79. San-Martín M, Delgado-Bolton R, Vivanco L. Role of a Semiotics-Based Curriculum in Empathy Enhancement: A Longitudinal Study in Three Dominican Medical Schools. Frontiers in Psychology. 2017;8:2018. doi:10.3389/fpsyg.2017.02018
80. Santiago LM, Rosendo I, Coutinho ML, Maurício KS, Neto I, Simões JA. Comparing empathy in medical students of two Portuguese medicine schools. BMC medical education. 2020;20(1):153. doi:10.1186/s12909-020-02034-3
81. Zgheib NK, Dimassi Z, Arawi T, Badr KF, Sabra R. Effect of Targeted Curricular Reform on the Learning Environment, Student Empathy, and Hidden Curriculum in a Medical School: A 7-Year Longitudinal Study. Journal of Medical Education and Curricular Development. 2020;7:2382120520953106. doi:10.1177/2382120520953106
82. Banerjee S, Jones C, Wright J, Grosvenor W, Hebditch M, Hughes L, et al. A comparative study of the effect of the Time for Dementia programme on medical students. International Journal of Geriatric Psychiatry. 2021;36(7):1011–9. doi:10.1002/gps.5532
83. Collins PB, Dinzeo T, Sepede JC, Bertagnolli JF, White C. Empathy and the Medical Student House Call: The Effect of Clinical Settings on Empathy in Third Year Medical Students. Journal of medical education and curricular development. 2023;10(101690298):23821205231175804. doi:10.1177/23821205231175804
84. Fowler LA, Ellis S. The Effect of 12 Hour Shifts, Time of Day, and Sleepiness on Emotional Empathy and Burnout in Medical Students. Clocks & Sleep. 2019;1(4):501–9. doi:10.3390/clockssleep1040038
85. Givron H, Desseilles M. Decline of Empathy after the First Internship: Towards a More Functional Empathy? Sante Mentale Au Quebec. 2020;45(1):183–200.
86. Hojat M, DeSantis J, Ney DB, DeCleene-Do H. Empathy of Medical Students and Compassionate Care for Dying Patients: An Assessment of 'No One Dies Alone' Program. Journal of Patient Experience. 2020;7(6):1164–8. doi:10.1177/2374373520962605
87. Modi A, Fascelli M, Daitch Z, Hojat M. Evaluating the Relationship Between Participation in Student-Run Free Clinics and Changes in Empathy in Medical Students. Journal of Primary Care & Community Health. 2017;8(3):122–6. doi:10.1177/2150131916685199
88. Candido MA, Venturini V, Polly M, Torsani MB, Sizilio A, Sakô JM, et al. The educational impact of medical students' participation in a short-term health expedition: The Iguape one health experience. Clinics (Sao Paulo). 2025;80:100601. doi:10.1016/j.clinsp.2025.100601
89. Dodsworth A, Alberti H, Hirsh DA, Paes P, Illing J. Longitudinal Integrated Clerkships, empathy and patient centredness: A prospective cohort study. Med Teach. 2025 Aug;47(8):1344–51. doi:10.1080/0142159X.2024.2430362 PubMed PMID: 39652468.

90. Winter R, Jamanda L, Alice D, Cameron D, Mark H, Howick J. Patients Enhance Empathy and Learning in Biomedical Science Teaching at Medical School: The Design, Implementation and Evaluation of a Curriculum Wide Initiative [Internet [Internet]. Rochester, NY: Social Science Research Network; 2025. Available from: https://papers.ssrn.com/abstract=5243260
91. Bagacean C, Cousin I, Ubertini AH, El Yacoubi El Idrissi M, Bordron A, Mercadie L, et al. Simulated patient and role play methodologies for communication skills and empathy training of undergraduate medical students. BMC medical education. 2020;20(1):491. doi:10.1186/s12909-020-02401-0
92. Balez R., Berthou C., Carpentier F.-G. Announcing a lymphoma: Teaching empathy for French medical students. Psycho-Oncologie. 2014;8(1):29–36. doi:10.1007/s11839-014-0450-x
93. Bunn W, Terpstra J, Bellini B Bertakis, DasGupta, DiLalla, Diseker, Evans, Fine, Folstein, Henry Tillman, Hojat, Hojat, Hojat, Hojat, Jarski, Kim, Kramer, Lancaster, Martineau, Mercer, Roter, Sanson Fisher, Shapiro, Shapiro, Stepien, Stewart, Suchman, Wilkes, Winefield, Zachariae. Cultivating empathy for the mentally ill using simulated auditory hallucinations. Academic Psychiatry. 2009;33(6):457–60. doi:10.1176/appi.ap.33.6.457
94. Chen A, Hanna JJ, Manohar A, Tobia A. Teaching Empathy: the Implementation of a Video Game into a Psychiatry Clerkship Curriculum. Academic Psychiatry: The Journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry. 2018;42(3):362–5. doi:10.1007/s40596-017-0862-6
95. DelPrete A, Giordano C, Castiglioni A, Hernandez C. Medical Students' Attitudes Toward Non-Adherent Patients Before and After a Simulated Patient-Role Activity and Small-Group Discussion: Revisited. Cureus. 2016;8(4):e576. doi:10.7759/cureus.576
96. Zare-Bidaki M., Ehteshampour A., Reisaliakbarighomi M., Mazinani R., Khodaie Ardakani M.R., Mirabzadeh A., et al. Evaluating the Effects of Experiencing Virtual Reality Simulation of Psychosis on Mental Illness Stigma, Empathy, and Knowledge in Medical Students. Frontiers in Psychiatry. 2022;13((Zare-Bidaki, Ehteshampour, Samani) Social Determinants of Health Research Center, Faculty of Paramedical Sciences, Birjand University of Medical Sciences, Birjand, Iran, Islamic Republic of(Reisaliakbarighomi, Mirabzadeh, Mousavi) Psychiatry Department,):880331. Located at: 2017471676. doi:10.3389/fpsyt.2022.880331
97. Kohn JN, Troyer EA, Wilson KL, Reddy R, Vieten C, Viirre E, et al. Virtual reality communication training in pain medicine: effects on medical students' racial bias, empathy, and interview performance with virtual patients. Pain Med. 2025;26(2):120–3. doi:10.1093/pm/pnae100
98. D'souza PC, Rasquinha SL, D'souza TL, Jain A, Kulkarni V, Pai K. Effect of a single-session communication skills training on empathy in medical students. Bayne B Chen, Hardy, Hausberg, Hojat, Hojat, Hojat, Kelm, Khademalhosseini, Mishra, Pohontsch, Schweller, Sears, Shashikumar, Son, Srivastava, Taveira Gomes, Williams, editor. Academic Psychiatry. 2020;Journal of Psychiatric Education44(3):289–94. doi:10.1007/s40596-019-01158-z

99. Graham J, Benson LM, Swanson J, Potyk D, Daratha K, Roberts K. Medical Humanities Coursework Is Associated with Greater Measured Empathy in Medical Students. The American Journal of Medicine. 2016;129(12):1334–7. doi:10.1016/j.amjmed.2016.08.005
100. Yuen J.K., See C., Cheung J.T.K., Lum C.M., Lee J.S., Wong W.T. Can teaching serious illness communication skills foster multidimensional empathy? A mixed-methods study. BMC medical education. 2023;23(1):20. Located at: 640018601. doi:10.1186/s12909-023-04010-z
101. Granero Lucchetti AL, Ezequiel O da S, Oliveira IN de, Moreira-Almeida A, Lucchetti G. Using traditional or flipped classrooms to teach 'Geriatrics and Gerontology'? Investigating the impact of active learning on medical students' competences. Medical Teacher. 2018;40(12):1248–56. doi:10.1080/0142159X.2018.1426837
102. Avlogiari E, Karagiannaki S, Panteris E, Konsta A, Diakogiannis I. Improvement of Medical Students' Empathy Levels After an Intensive Experiential Training on Empathy Skills. PSYCHIATRY AND CLINICAL PSYCHOPHARMACOLOGY. 2021;31(4):392–400. doi:10.5152/pcp.2021.21089
103. Bond AR, Mason HF, Lemaster CM, Shaw SE, Mullin CS, Holick EA, et al. Embodied health: the effects of a mind-body course for medical students. Medical Education Online. 2013;18:1–8. doi:10.3402/meo.v18i0.20699
104. Brown MEL, MacLellan A, Laughey W, Omer U, Himmi G, LeBon T, et al. Can stoic training develop medical student empathy and resilience? A mixed-methods study. BMC medical education. 2022;22(1):340. doi:10.1186/s12909-022-03391-x
105. Cecchetti M, Last J, Lynch J, Linehan C. Evaluating the longitudinal impact of a disability education intervention on medical students' attitudes towards persons with a disability. Disability and Health Journal. 2021;14(3):101092. doi:10.1016/j.dhjo.2021.101092
106. Chauvel H., Santini C., Layat Burn C., Jilet L., Abdoul H., Billon G., et al. Changes in the empathy of fourth-year French medical students following a mandatory module on doctor-patient relationships. Annales Medico-Psychologiques. 2023;181(10):871–9. Located at: 2024498316. doi:10.1016/j.amp.2023.04.005
107. de Oliveira R, Montagna E, Zaia V, Torres BB, Barbosa CP. The Development of Cognitive and Affective Skills Through a Sexual and Reproductive Health Medical Education Unit. Sexual Medicine. 2019;7(3):326–36. doi:10.1016/j.esxm.2019.06.008
108. Duggirala N.C., Jagadeesh Settem V.V., Koilada P., Jaya Chandra T. Impact of Anti-stigma Educational Intervention about Mental Illness among Medical Students: A Quasi-experimental Study. Journal of Clinical and Diagnostic Research. 2023;17(5):6–9. Located at: 2029741394. doi:10.7860/JCDR/2023/63356.17898
109. Dyrbye LN, Shanafelt TD, Werner L, Sood A, Satele D, Wolanskyj AP. The Impact of a Required Longitudinal Stress Management and Resilience Training Course for First-Year Medical Students. Journal of General Internal Medicine. 2017;32(12):1309–14. doi:10.1007/s11606-017-4171-2
110. Fukuyasu Y, Kataoka HU, Honda M, Iwase T, Ogawa H, Sato M, et al. The effect of Humanitude care methodology on improving empathy: a six-year longitudinal study of medical students in Japan.

BMC medical education. 2021;21(1):316. doi:10.1186/s12909-021-02773-x

111. G C KB, Arjyal A, Douglas AH, Subedi M, Gongal R. A quantitative evaluation of empathy using JSE-S Tool, before and after a Medical Humanities Module, amongst first-year medical students in Nepal. BMC medical education. 2022;22(1):159. doi:10.1186/s12909-022-03188-y
112. Harlak H, Gemalmaz A, Gurel FS, Dereboy C, Ertekin K. Communication skills training: effects on attitudes toward communication skills and empathic tendency. Education for Health (Abingdon, England). 2008;21(2):62.
113. Hilton A, Jerjes W. 'Walking a Day in My Shoes': A Clinical Shadowing Program to Enhance Medical Students' Understanding of Chronic Disease Management Beyond Clinical Settings. Clin Pract. 2025;15(5). doi:10.3390/clinpract15050094
114. Kagawa Y., Ishikawa H., Son D., Okuhara T., Okada H., Ueno H., et al. Using patient storytelling to improve medical students' empathy in Japan: a pre-post study. BMC medical education. 2023;23(1):67. Located at: 640142428. doi:10.1186/s12909-023-04054-1
115. Kataoka H, Iwase T, Ogawa H, Mahmood S, Sato M, DeSantis J, et al. Can communication skills training improve empathy? A six-year longitudinal study of medical students in Japan. Medical Teacher. 2019;41(2):195–200. doi:10.1080/0142159X.2018.1460657
116. Kim K, Kim SH, Yoon H, Shin HS, Lee YM. Assessing the effects of an empathy education program using psychometric instruments and brain fMRI. Advances in Health Sciences Education: Theory and Practice. 2020;25(2):283–95. doi:10.1007/s10459-019-09918-0
117. Lim BT, Moriarty H, Huthwaite M. 'Being-in-role': A teaching innovation to enhance empathic communication skills in medical students. Medical Teacher. 2011;33(12):e663-669. doi:10.3109/0142159X.2011.611193
118. Lynch J, Last J, Dodd P, Stancila D, Linehan C. 'Understanding Disability': Evaluating a contact-based approach to enhancing attitudes and disability literacy of medical students. Disability and Health Journal. 2019;12(1):65–71. doi:10.1016/j.dhjo.2018.07.007
119. MacLean H, Braschi E, Archibald D, Sanchez-Campos M, Jebanesan D, Koszycki D, et al. A pilot study of a longitudinal mindfulness curriculum in undergraduate medical education. Canadian Medical Education Journal. 2020;11(4):e5–18. doi:10.36834/cmej.56726
120. Ozan S, Ergonul E, Miman O, Kizildag S, Zeybek G, Yazici-Guvercin AC, et al. Can distance communication skills training increase the empathy levels in medical students? An application during the pandemic period. Journal of Basic & Clinical Health Sciences. 2022;6(3):775–83. doi:10.30621/jbachs.1082337
121. Potts LC, Bakolis I, Deb T, Lempp H, Vince T, Benbow Y, et al. Anti-stigma training and positive changes in mental illness stigma outcomes in medical students in ten countries: a mediation analysis on pathways via empathy development and anxiety reduction. Social Psychiatry and Psychiatric Epidemiology. 2022. doi:10.1007/s00127-022-02284-0
122. Praharaj SK, Salagre S, Sharma PSVN. Stigma, Empathy, and Attitude (SEA) educational module for medical students to improve the knowledge and attitude towards persons with mental illness. Asian

Journal of Psychiatry. 2021;65:102834. doi:10.1016/j.ajp.2021.102834

123. Rosenthal S, Howard B, Schlussel YR, Herrigel D, Smolarz BG, Gable B, et al. Humanism at heart: preserving empathy in third-year medical students. Academic Medicine: Journal of the Association of American Medical Colleges. 2011;86(3):350–8. doi:10.1097/ACM.0b013e318209897f
124. Sarkis DJ, Lucchetti G, Mattos Martins M do C, de Souza Ferreira B, de Oliveira Soares AH, da Silva Ezequiel O, et al. Effectiveness of different strategies to teach empathy among medical students: A randomized controlled study. Patient Educ Couns. 2025 Jan;130:108468. doi:10.1016/j.pec.2024.108468 PubMed PMID: 39405589.
125. Schweller M, Costa FO, Antônio MÂRGM, Amaral EM, de Carvalho-Filho MA. The impact of simulated medical consultations on the empathy levels of students at one medical school. Academic Medicine: Journal of the Association of American Medical Colleges. 2014;89(4):632–7. doi:10.1097/ACM.0000000000000175
126. Schweller M, Ribeiro DL, Celeri EV, de Carvalho-Filho MA. Nurturing virtues of the medical profession: does it enhance medical students' empathy? International Journal of Medical Education. 2017;8:262–7. doi:10.5116/ijme.5951.6044
127. Sevrain-Goideau M, Gohier B, Bellanger W, Annweiler C, Campone M, Coutant R. Forum theater staging of difficult encounters with patients to increase empathy in students: evaluation of efficacy at The University of Angers Medical School. BMC medical education. 2020;20(1):58. doi:10.1186/s12909-020-1965-4
128. 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. Education for Health (Abingdon, England). 2019;32(2):53–61. doi:10.4103/efh.EfH_133_18
129. Srivastava AK, Tiwari K, Vyas S, Semwal J, Kandpal SD. Teaching clinical empathy to undergraduate medical students of Dehradun: A quasi-experimental study. Indian Journal of Community Health. 2017;29(3):258–63.
130. Tanriverdi EC, Tastan K. The Effect of Education with Simulated Patient on the Empathy Attitudes of Medical Students: An Intervention Study. Konuralp Medical Journal / Konuralp Tip Dergisi. 2022;14(1):42–8. doi:10.18521/ktd.990762
131. Thng J, Tan F, Aw M, Hu S. Combination of Teddy Bear Hospital and Virtual Reality Training increases empathy of medical students. ASIA PACIFIC SCHOLAR. 2022;7(3):33–41. Located at: WOS:001109779000010. doi:10.29060/TAPS.2022-7-3/OA2739
132. Tisdale CE, Black AC, Jain S, Lowther E, Madeline L, Troup C, et al. The Impact of Meeting Patients with Neurological Disorders on Medical Student Empathy. Medical Science Educator. 2020;30(4):1561–8. doi:10.1007/s40670-020-01102-z
133. Vilar Queirós R, Santos V, Madeira N. Decrease in Stigma Towards Mental Illness in Portuguese Medical Students After a Psychiatry Course. Acta Medica Portuguesa. 2021;34(7–8):498–506. doi:10.20344/amp.13859

134. Williams B, Sadasivan S, Kadirvelu A, Olaussen A. Empathy levels among first year Malaysian medical students: an observational study. Advances in Medical Education and Practice. 2014;5:149–56. doi:10.2147/AMEP.S58094

135. Wündrich M, Schwartz C, Feige B, Lemper D, Nissen C, Voderholzer U. Empathy training in medical students - a randomized controlled trial. Medical Teacher. 2017;39(10):1096–8. doi:10.1080/0142159X.2017.1355451

136. Ye X, Guo H, Xu Z, Xiao H. Empathy variation of undergraduate medical students after early clinical contact: a cross-sectional study in China. BMJ open. 2020;10(7):e035690. doi:10.1136/bmjopen-2019-035690

137. Yuan J., Zeng X., Cheng Y., Lan H., Cao K., Xiao S. Narrative medicine in clinical internship teaching practice. Medical education online. 2023;28(1):2258000. Located at: 642311291. doi:10.1080/10872981.2023.2258000

138. Yun JY, Kim KH, Joo GJ, Kim BN, Roh MS, Shin MS. Changing characteristics of the empathic communication network after empathy-enhancement program for medical students. Scientific Reports. 2018;8(1):15092. doi:10.1038/s41598-018-33501-z

Tables

Tables 1 and 2 are available in the Supplementary Files section.

Figures

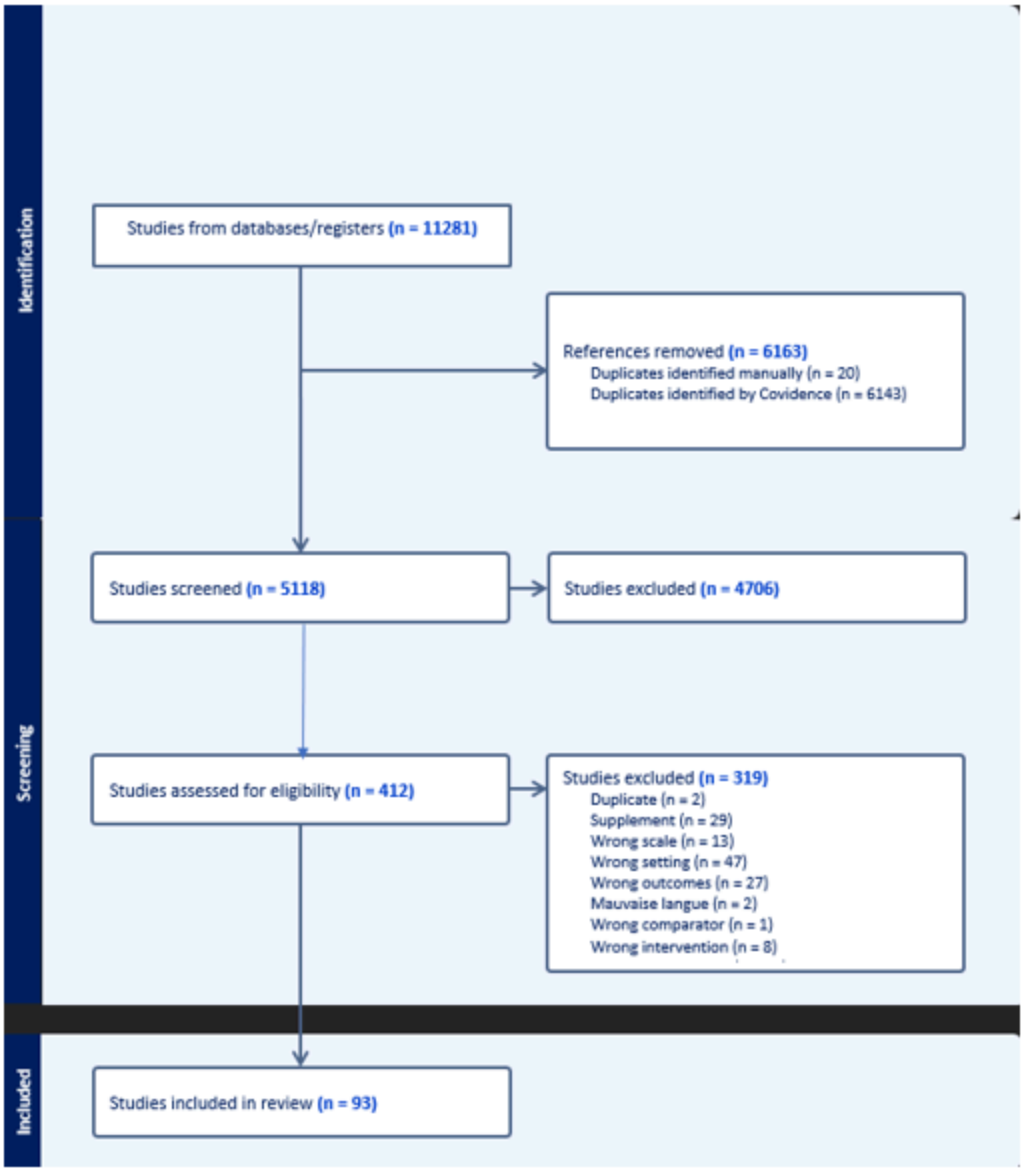


Figure 1

PRISMA FLOW Diagram

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Supplementalfile1searchqueries.docx
- Supplementalfile2studiescharacteristics.docx
- Tables.docx