

The use of emotions in the learning process: a systematic review of strategies in medical education

Regulação das emoções no processo de aprendizagem: uma revisão sistemática de estratégias na educação médica

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ABSTRACT

Introduction: Emotions can influence the learning process; this reinforces the importance of including discussions about their management in medical training and incorporating strategies that consider emotions as a fundamental part of learning. **Objective:** To identify strategies that can be incorporated into medical education to promote better emotion regulation and ensure the development of emotional intelligence among medical students, analyzing their benefits and implications for the learning process. **Methods:** A systematic review was conducted in five databases (SciELO, PubMed, Embase, Scopus, and LILACS), including studies published between 2018 and 2023, in English, Spanish, and Portuguese. Articles that addressed the role of emotions in medical education and the importance of emotional intelligence in learning were included, highlighting the importance of emotion regulation for academic performance and professional development. **Results:** Interventions such as simulations with standardized patients, mindfulness, reflective writing, Balint groups, self-regulated learning, empty-com training, emotional feedback, flipped classroom, and cognitive reassessment showed several benefits, such as increased self-awareness, improved motivation, empathy development, and improved emotional regulation. **Conclusion:** Implementing these strategies contributes to more effective learning, strengthens the doctor-patient relationship, and fosters the development of more resilient, empathetic, and self-confident professionals.

Keywords: Emotions; Medical Education; Learning; Strategies and Systematic Review.

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RESUMO

Introdução: As emoções podem influenciar o processo de aprendizagem, o que reforça a importância de incluir discussões sobre seu manejo na formação médica e incorporar estratégias que considerem as emoções como parte fundamental da aprendizagem. **Objetivo:** Identificar estratégias que possam ser incorporadas à educação médica a fim de promover uma melhor regulação das emoções e garantir o desenvolvimento da inteligência emocional entre os estudantes de medicina, analisando seus benefícios e suas implicações no processo de aprendizagem. **Métodos:** Foi conduzida uma revisão sistemática em cinco bases de dados (SciELO, PubMed, Embase, Scopus e LILACS), contemplando estudos publicados entre 2018 e 2023, nos idiomas inglês, espanhol e português. Foram incluídos artigos que abordaram o papel das emoções na educação médica e a importância da inteligência emocional na aprendizagem, destacando a importância da regulação das emoções para o desempenho acadêmico e a formação profissional. **Resultados:** Intervenções como simulações com pacientes padronizados, “mindfulness”, escrita reflexiva, “Balint groups”, autorregulação da aprendizagem, “empty-com training”, feedback emocional, “flipped classroom” e reavaliação cognitiva mostraram diversos benefícios, como maior autoconhecimento, melhora da motivação, desenvolvimento da empatia e aprimoramento da regulação emocional. **Conclusão:** A implementação dessas estratégias contribui para uma aprendizagem mais eficaz, fortalece a relação médico-paciente e favorece a formação de profissionais mais resilientes, empáticos e autoconfiantes.

Palavras-chave: Emoções; Educação médica; Aprendizagem; Estratégias e revisão sistemática.

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INTRODUCTION

Emotions are mental and bodily responses that can influence social interactions and communication^{1,2}. They have a significant effect on cognitive processes such as understanding, attention, learning, memory, reasoning, and problem-solving²⁻⁴. Therefore, effective emotion management and regulation in medical education are essential for both learning and enhancing the doctor-patient relationship⁵.

Emotions affect cognition through several mechanisms: memory, cognitive resources, cognitive strategies, and motivation³. For example, emotions can impose additional cognitive load, which can, paradoxically, aid in the consolidation of learning by helping students manage complex information more effectively. Emotional skills can be developed and trained throughout medical education, contributing to

the development of more humanistic professionals⁵. This highlights the need for further research on strategies to integrate emotional management into medical education, as implementation challenges remain³. In this sense, it is crucial to understand the concept of Emotional Intelligence (EI), which is the ability to assess and regulate emotions in oneself and others, as it can be an important aspect of learning and clinical practice.

Emotional Intelligence can be related to various aspects of medical practice, including diagnosis, patient relationships, teamwork, communication, and empathy. Furthermore, EI can improve stress management and enhance performance and job satisfaction, suggesting significant benefits from including EI in medical curricula¹.

EI is a skill that can be developed since it is a social competence that can be taught, trained, and improved^{6,7}. Consequently, strategies to develop the

emotional competencies of medical students should be implemented longitudinally and comprehensively throughout medical training. Valuing and developing these emotional skills will lead to professionals with greater empathy, self-confidence, and emotional and intellectual maturity, ultimately improving doctor-patient relationships⁸.

Emotions are crucial for clinical reasoning, self-regulation and academic performance³. However, managing emotions is one of the most challenging aspects of a medical career, and most medical curricula do not address this issue directly⁹. Given that active memory is influenced by information complexity and presentation, as well as new learning schemes, strategies for integrating emotions into medical education are highly relevant and should be more thoroughly explored.

Therefore, this article aims to address this gap and explore the importance of emotions in medical education, highlighting their influence on knowledge consolidation, academic performance, and clinical practice. Given the limited available data on the effectiveness and potential benefits of learning methods that incorporate emotional aspects, it is crucial to expand discussions on this topic. In this context, this study seeks to evaluate the influence of such approaches on long-term information retention and the development of more human-centered learning. Additionally, it aims to identify which teaching techniques are amenable to training and assess the feasibility and benefits of their inclusion in medical education.

METHODS

This systematic review was conducted following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement to analyze the relationship between emotion management strategies and medical education. The review aimed to identify relevant studies published in the last five years, focusing on how emotions are integrated into medical education, taking into account the use of teaching strategies and their results on academic performance and professional training of medical students.

SEARCH STRATEGY

The literature search was performed across five major databases: SciELO, PubMed, Embase, Scopus, and LILACS. The search was conducted in November 2023, targeting studies published between 2018 and 2023, in English, Spanish or Portuguese.

These databases were systematically reviewed, using the following strategy: (“emotions” AND “medical education”), with the results limited to title and abstract.

INCLUSION AND EXCLUSION CRITERIA

Studies meeting the following criteria were included: (1) articles published within the last five years (2018-2023); (2) articles written in English, Spanish or Portuguese; and (3) studies directly related to the use and management of emotions within the context of medical education.

Exclusion criteria were: (1) articles addressing emotions in general, not specifically in relation to medical education; (2) duplicates across databases; (3) reflection studies, conference abstracts, and proceedings without peer-reviewed full-text availability; (4) articles in other languages; and (5) articles published outside the defined date range.

Following the database search, all retrieved records were screened for relevance by reviewing titles and abstracts. Duplicates were removed using reference management software. The initial selection process was conducted independently by two reviewers for each study. In cases of disagreement, a third reviewer was consulted to reach a consensus.

Studies that met the inclusion criteria proceeded to full-text evaluation. Following full-text assessment using the PRISMA checklist, a minimum cut-off score of 20 was established for inclusion based on the simple average of the two reviewers' scores. Studies that did not meet this cut-off score were also excluded, resulting in a final inclusion of 26 articles.

QUALITY ASSESSMENT AND DATA EXTRACTION

The selected articles were assessed for quality using a modified PRISMA-based checklist. Four evaluators, working in pairs, independently evaluated the articles based on the following criteria: (1) title relevance; (2) clarity of objectives; (3) eligibility criteria; (4) information sources; (5) risk of bias; (6) methods used to present and synthesize results; (7) included studies; (8) synthesis of results; (9) limitations of evidence; (10) interpretation of the results and important application; (11) funding; and (12) registration.

Each criterion was scored on a scale of 0 to 2, with a maximum possible score of 24. A simple average of the two reviewers' scores was calculated for each study, and a minimum cut-off score of 20 was established for inclusion in the final synthesis. Discrepancies in scoring between evaluators were resolved through discussion, and if necessary, by involving a third evaluator.

REGISTRATION

This systematic review integrates a research in Strategic Planning as a management tool for the discipline of Pediatrics 1 of the Medicine course of the Federal University of Minas Gerais (UFMG), having been approved by the Research Ethics Committee (REC) via Plataforma Brasil, com CAAE:20305319.4.0000.5149, consolidated opinion 3.742.721.

RESULTS

In the initial search, 759 articles were obtained. After selection according to title and abstract and removal of duplicate articles, 64 articles were selected, which were evaluated according to the PRISMA statement (Page, 2021)¹⁰, as shown in Figure 1.

After evaluation with the PRISMA statement, 26 articles were selected and included in the final review. The analysis of kind of study and the inclusion criteria for the 26 selected articles is described in Table 1.

The selected articles allowed a review with a synthesis of the main strategies used for the development of emotional skills in students, considering that the regulation of emotions is an ability susceptible to training and can be developed throughout the medicine undergraduate program.

SIMULATIONS WITH STANDARDIZED PATIENTS

According to Schweller (2018)⁹, medical education must incorporate new teaching methods to promote a safe environment for reflection, an essential aspect of lifelong learning. Among the various techniques available for learning new skills, Schweller highlights simulation with the participation of standardized patients, that has been increasingly used, mainly for the training of specific skills related to physical examination, communication, and evaluation in objective structured clinical examinations (OSCE).

In addition, simulation can provide students with a guided and safe learning environment, especially when it comes to difficult-to-manage clinical conditions or those that take longer for treatment, such as cardiac arrest. However, there is a very high chance of psychological stress and high emotional load¹¹.

Schweller (2018)⁹ developed a simulation activity of a medical consultation with standardized patients. The emotions of the patient, related to the disease and the doctor, were always evidenced during the consultations. The goal was to bring emotions into the debate and allow facilitators to share with students the importance of being aware of emotions and their impact on clinical reasoning and the doctor-patient relationship. With this dynamic, students could understand that emotions are natural and that it is important for the doctor to deal with them in a positive way⁹.

After the simulation, a “debriefing” was done and an anonymous questionnaire was completed in which all participants evaluated the dynamics, answered how they felt during the activity and how it impacted on their personal and professional life. During debriefing, 96% of students felt comfortable even when discussing patient-related emotions. In the opinion of more than 95% of students, the activity had a positive impact on their ability to listen to patients and, for more than 91%, this impact also extended to the ability to listen to others in general. When asked about the effect of the activity on their interactions with colleagues in the simulation group, about 75% of the students reported a positive impact. Sometimes, during debriefing, students report that, throughout the week, they were faced with real situations in which they could apply their ability to listen to patients or to listen to others and that this brought them personal satisfaction. When asked about the practical applicability of the activity, 100% of the students reported that they would apply what they learned in their professional life and more than 93% reported that they would also apply it in their personal life⁹.

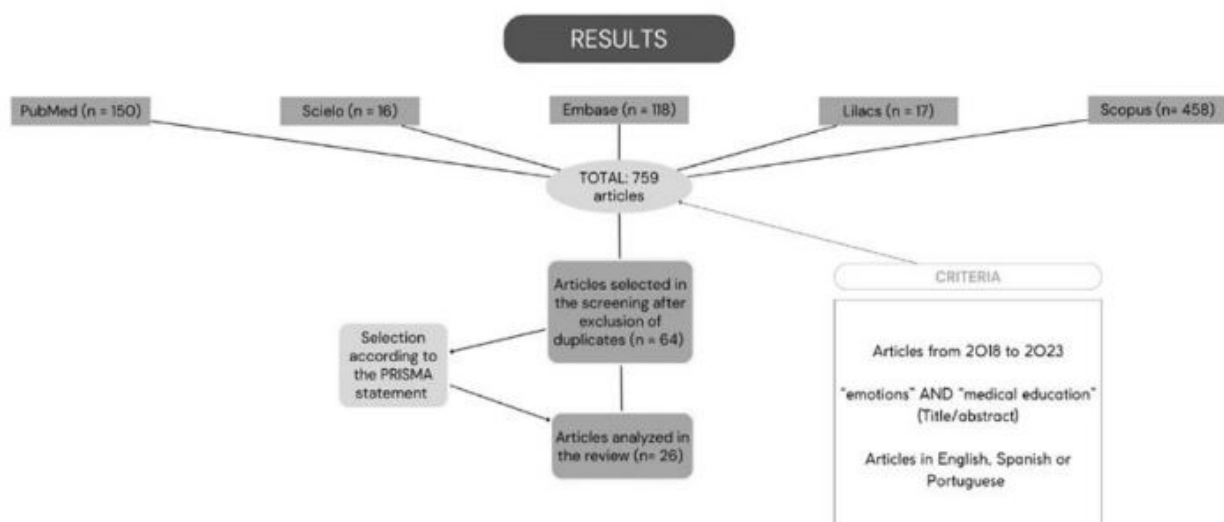


Figure 1. Flowchart of the search and selection of studies based on the PRISMA (2021)¹⁰.

Source: Elaborated by authors (2024).

Table 1. Overview of the 26 selected articles.

Author/Year	Country	Study Type	Sample	Inclusion Criteria	Prisma Score
LI et al., 2023	China	Cross-sectional	Medical students, n=878	Relationship between self-regulated learning (SRL) and learning strategies	23.5
KREMER et al., 2023	Brazil	Experimental research	Residents, n=99	Effect of negative emotions on residents' learning	24
GARCIA et al., 2023	USA	Literature review	Six platforms plus Google Scholar	Impact of humor on Medical interns	21.5
ARDENGHI et al., 2023	Italy	Experimental research	Medical students, n=398	To what extent emotional dysregulation predicted empathy in medical students	24
DONISI et al., 2022	Italy	Experimental research	Medical students, n=264	Evaluation of student empathy and emotional intelligence before and after "Emoty-Com training"	20.5
AJJAWI et al., 2022	Australia	Literature review	32 articles from: Academic Medicine, Medical Education, or Adv. in Health Sciences Ed.	What is the role of emotion during feedback and what "work" do they perform?	21.5
WARMINGTON et al., 2022	New Zealand	Dialogic narrative analysis	Medical students, n=5	Explore reflective essays of Medical students	21.5
BEHRENS et al., 2021	Chile	Experimental research	Medical students, n=56	Understand the emotional experiences of students in complex simulations and their impact on learning	21
LI et al., 2021	Canada	Experimental research	Medical students, n=23	Relationship of emotional variability in specific phases of self-regulated learning with student performance	22.5
BABA et al., 2021	Lebanon	Cross-sectional study	Residents, n=45	Negative emotions as a key factor for reducing medical errors and optimizing quality of care	21.5
DESHPANDE et al., 2020	USA	Cross-sectional study	Medical students, n=34	Flipped classroom is associated with mixed academic performance results in Medical education	23.5
HARLEY et al., 2019	Canada	Experimental research	Medical students, n=37	Evaluation of students' habitual use of emotional regulation strategies	21.5
NAISMITH et al., 2019	Canada	Experimental research	Medical students, n=28	Relationships between personal factors of orientations, emotions, and attention to feedback	23
VASEFI et al., 2018	Iran	Experimental research	Medical students, n=435	Emotional intelligence of medical students	23.5

LIM et al., 2023	Singapore	Systematic review	199 articles from: PubMed, Embase, PsychINFO, CINAHL, etc.	Use of reflective writing for emotion management by Medical students	20.5
TOUFAN et al., 2023	Iran	Literature review	34 articles from: PubMed, ERIC, Google Scholar, and Science Direct	Emotions in Medical education	20
COURY et al., 2020	Brazil	Cross-sectional study	Medical students, n=209	Emotional intelligence levels in medical students from different years of the course	21.5
NAVARRO et al., 2022	Chile	Cross-sectional study	Nursing, Speech Therapy, Kinesiology, Med, Nutrition, etc. students, n=364	Assess emotional intelligence levels at the beginning and end of the academic year	23
SILVA et al., 2021	Brazil	Cross-sectional study	Medical students, n=193	Emotional intelligence and empathy in Medicine	22
KALUF et al., 2019	Brazil	Cross-sectional study	Medical students, n=120	Emotional conditions of medical students	21
AL HUSEINI et al., 2019	Oman	Cross-sectional study	Residents of OMSB (Oman Medical Specialty Board), n=320	Evaluation of emotional intelligence in Medical residents	22
LUNA et al., 2020	Mexico	Cross-sectional study	Medical students, n=161	Empathy levels at different moments of the medical course	22
GAJREE et al., 2020	UK	Experimental research	4 th and 5 th -year Medical students, n=16	Use of "Balint groups" as a strategy for managing emotions in the doctor-patient relationship	20
KELLY et al., 2019	Canada	Cross-sectional study	Physicians working at a Canadian medical school, n=15	Relationship between physical touch and empathy in Medical practice	22.5
VERWEIJ et al., 2018	Netherlands	Experimental research	Residents of Radboud University Medical Center, n=148	Benefits of mindfulness and its importance for emotional control and professional development	21
SCHWELLER et al., 2017	Brazil	Experimental research	4 th and 6 th -year Medical students, n=551	Simulation of medical consultations with standardized patients and emotions of Medical students	20.5

Source: Elaborated by authors (2024).

A central point in performing simulations is the use of standardized patients or dummies. On this matter, Toufan (2023)³ argues that simulation with real people can generate more effective learning. In theory, conducting consultations and procedures with real people could compromise learning, since it generates greater embarrassment and greater anxiety. However, the same study described a paradox in which embarrassment becomes beneficial for learning, since a person who experiences a more intense emotional reaction has better retention of learning.

As outlined by Schweller (2018)⁹, the doctor-patient relationship is a complex interaction and requires various skills on the part of the doctor. To address this theme, didactic interventions must go beyond communication skills, and activities such as simulation of medical consultations with standardized patients can be a way to deal with the feelings of students and patients.

“MINDFULNESS”

As posited by Verweij (2018)¹², an intervention that can contribute to the professional development of health professionals is the reduction of stress based on the practice of “mindfulness”, since studies on the neuropsychological effects and mechanisms of “mindfulness” suggest that it can improve attention, working memory, self-awareness, and self-regulation.

Verweij (2018)¹² conducted a qualitative study with residents, based on face-to-face interviews, after eight weekly sessions, and the practice of “mindfulness” based on the program developed by Jon Kabat-Zinn.

With the practice of “mindfulness”, residents reported (1) an increase in awareness during the working day, in terms of thoughts, emotions, body sensations and behavior; (2) a greater self-reflection; and (3) changes in attitude and behaviors at work¹².

Moreover, residents indicated that they were aware of bodily sensations, emotions and thoughts associated with stress. They also reported that they were better able to see their behavioral tendencies when confronted with stress and difficulties. They realized their self-criticism, perfectionism, high standards and tendency were always engaged¹².

Many residents indicated that they had learned to adopt a less critical stance, which helped them accept unpleasant and difficult experiences better. They were able to recognize, allow and de-identify themselves with unpleasant thoughts, feelings, or bodily sensations. It is interesting to note that, on the one hand, “mindfulness” helped them to accept their limitations and, on the other, increased their confidence in their abilities as doctors¹².

The residents also indicated that they were better able to reflect on their own clinical practice and behavior during the day, without judging, and to examine whether a particular behavior was useful or not. They indicated that when stressed, they were now able to stop for a moment and reflect on the situation¹².

Finally, they reported being more resilient and better at defining priorities and limits. Residents realized that they had the possibility to choose how to deal with stress factors. In addition, they were better able to recognize their own limits, uncertainties, errors, and to act accordingly. They improved self-regulation of cognitive, emotional, and sometimes even unpleasant physical reactions, which resulted in a greater sense of appropriation of their life and work¹².

Verweij (2018)¹² argues that “mindfulness” can assist in the development of skills and qualities essential to medical practice, such as self-regulation; a conscious and reflective approach to practice; resilience to a sustainable practice; and responsibility for oneself, including personal care, in order to serve others.

In this sense, it is promising to use “mindfulness” as a tool for better control of emotions in medical education.

REFLECTIVE WRITING

As Lim (2023)¹³ points out reflective practice allows doctors to review their actions and recognize how their thoughts, feelings and emotions affect decision-making, clinical reasoning, and professionalism.

Among some of the main modalities of reflection, Lim (2023)¹³ highlights the electronic portfolios, reflective writing journals, oral narration (interviews, group discussions) and video diaries, more authentic answers that can be later reviewed, discussed, and reflected in sessions. There is also a distinction between group activities and individual activities, highlighting face-to-face meetings for feedback and discussion. Peer discussions proved to be important for recognizing strengths, while self-reflection was paramount for recognizing personal weaknesses.

Reflective writing (RE) is certainly the most common form of reflective practice in medical education, already occupying a key role in competency-based medical practice and professional development¹³.

RE can be structured in different ways. The main format is according to the Kolb Learning Cycle, which describes learning from a 4-stage-cycle: (1) concrete experience; (2) reflective observation; (3) abstract conceptualization; and (4) active experimentation. Other theories and models for implementing reflective writing include Kim’s critical-reflective inquiry; Boud’s Reflection model; Grifths and Tann’s 5-Level Reflection model; Mamede and Schmidt’s 5-Factor Reflective Practice Model; among others.

Lim (2023)¹³ divides the benefits of RE into 2 categories: professional and personal. From a professional perspective, RE improves learning, facilitates continuing medical training, inculcates moral, ethical, professional, and social standards and expectations, improves patient care, and nurtures the formation of professional identity. From a personal perspective, RE increases self-awareness and personal development, facilitates understanding of individual strengths and weaknesses and learning

needs, promotes a culture of self-monitoring and self-improvement, developing critical perspectives of oneself and fostering resilience and the ability to better deal with situations. Finally, it highlights that RE also guides changes in thinking and perspectives and focuses on a more holistic appreciation of decision-making.

RE can influence the sensitivity, judgment, will, balance and responsiveness of physicians¹³. Therefore, the potential of using RE as a strategy for managing emotions in medical education is noticeable, since it contributes to the development of emotional intelligence by students, making learning much more effective.

“BALINT GROUPS”

Michael Balint was a Hungarian psychotherapist who introduced the “Balint groups” into medical practice in London. They aim to provide a support forum for participants to reflect on their experiences of being with patients and the emotions involved in these experiences¹⁴.

As outlined by Gajree (2020)¹⁴, Balint groups comprise case presentations and discussions centered on the emotional aspect of interactions with patients.

Teaching medical students about the role of emotions in disease and in relationships with patients can be challenging¹⁴. In this sense, the “Balint groups” are an excellent alternative, allowing the approach of the theme in the students’ daily lives.

The study conducted by Gajree (2020)¹⁴ aimed to determine whether the “Balint groups” helped students better understand the role of emotions in the doctor-patient relationship.

Each session followed the traditional format of the “Balint groups”, with students and leaders seated in chairs arranged in a circle. The leaders ask a volunteer student to describe a meeting with a patient who continued to occupy their mind. The group then had the opportunity to ask the student-presenter to clarify aspects of the meeting before the student who made the presentation left the discussion. At this point, the group discusses the case, with the leaders guiding all participants to focus on the relationship between the student and the patient, as well as the emotions experienced by both parties. At the end of the session, the student returns to the circle and participates in the discussion again.

After a 5-week cycle, all participating students filled out a feedback form. Students were asked to respond to four statements on a Likert scale to determine whether the “Balint groups” helped them better understand the role of emotions in the doctor-patient relationship.

Most students strongly agreed or agreed that the “Balint groups” helped them explore their feelings towards patients (86%), see the situation from the patient’s perspective (56%), understand the feelings doctors may have when they see patients (94%) and to realize that the group was a useful space to reflect on the doctor-patient relationship (94%). To assess the

value of the educational opportunity that the groups provided them, they were asked to respond to two other statements. Most students (69%) strongly agreed or agreed that participation in a Balint group was an important part of their training as a doctor. The vast majority (94%) agreed that the “Balint groups” provide an aspect of training that is not currently addressed at other points in the medical students’ curriculum¹⁴.

Gajree (2020)¹⁴ highlights two of the main benefits of the “Balint groups”: a space to discuss encounters with emotionally charged patients and the opportunity to discover that other students go through similar experiences.

The “Balint groups” can be an innovative means of educating students about the role of emotions in the doctor-patient relationship¹⁴, being therefore a promising strategy for the management of emotions in medical education.

SELF-REGULATION LEARNING

Zhu (2023)¹⁵ defines self-regulation learning (SRL) as a process comprising metacognition, motivation and dynamic behavior in learning. It consists of 4 major elements: planning, learning, self-assessment, and monitoring, and actively empowers students to take greater control over their learning. By using this strategy, students adapt different approaches to learning, necessitating continuous adjustments in their cognition, actions, and emotions. From this perspective, SRL positively correlates with other teaching strategies and academic success¹⁵.

SRL is a skill that can be taught and learned; it is not acquired naturally. It encompasses cognitive strategies, such as summarizing, elaborating, and organizing; metacognitive strategies, including monitoring, planning, and execution; emotional strategies, like motivation, interest, and learning attitude; and resource management, involving time, learning environment, and seeking help. Thus the SRL consists of 3 stages: (1) anticipation: in which the student analyzes and establishes goals; (2) performance: in which the student uses several skills while carrying out the task; and (3) self-reflection: in which students judge and unravel the strategies used and their behavior, delving deeper into how this affected their learning¹⁵.

In the medical field, self-regulated learning holds great significance for both doctors and academics due to the extensive knowledge required for clinical practice. Because health professionals must demonstrate high competence and possess comprehensive knowledge across various domains, this approach enhances students’ control over their motivations and self-regulation. Similar to other forms of learning, emotions can influence or impact self-regulated learning.

Researchers discovered that different emotions play a significant role in the process of learning self-regulation,

influencing the quality of knowledge retention¹⁶. In the first step of the process, emotions of anticipation prevail, such as stress, hope or fear; furthermore, students experience the sensation of expecting a challenge or threat. In the second step, students tend to experience a mix of emotions that depends on the student's own judgment of their performance, along with a high level of anxiety. Finally, in the third step, students can experience positive or negative emotions, depending on the outcome of their activity.

In that same study, students were encouraged to solve clinical cases while a facial expression reader gauged their emotions. Results indicated that high emotional variability in the first two phases was a negative predictor of the correct resolution of the case; however, in the reflection phase, a high frequency of emotions was associated with a higher probability of reaching the correct solution¹⁶. That is, emotional variability led to a decrease in the effectiveness of cognitive skills and motivation, both important for clinical practice. Therefore, it is essential to remain emotionally stable to ensure quality care and diagnostic resolution. On the other hand, in the reflective phase, emotions can aid students in understanding their problem-solving approaches and improving their diagnostic processes.

In the context of education, it is crucial to impart the skills of emotional regulation to students, both during the learning process and in clinical practice, enabling them to navigate challenging situations. Achieving this requires enhancing the motivation for learning among medical students, by providing ample opportunities, challenging learning tasks, and exposure to clinical environments to help them recognize their future responsibilities. Moreover, teaching-learning strategies such as planning, monitoring, and regulating learning behaviors are essential, along with refining the ability to manage time, seek help, and engage in self-reflection. Cultivating self-confidence in educators and resilience in students, alongside timely evaluation and feedback, are integral components¹⁵. Furthermore, instructors can encourage students to think differently in complex situations, regulate family demands, and try to understand and change their adaptive responses¹⁶.

Therefore, as self-regulation learning is essential for continued professional development and can be altered by emotions, integrating those strategies into the medical curriculum would greatly benefit students by improving their knowledge retention and enhancing their emotional control.

COGNITIVE REAPPRAISAL

In a recent publication, Kremer (2023)¹⁷ posited that cognitive reappraisal is a "form of cognitive change which involves modifying one's appraisal of a situation to alter its emotional impact". This strategy aims to mitigate the

adverse effects of negative situations on students without directly altering their emotions, effectively serving as a form of emotional regulation; in other words, it works as a form of emotional control. For example, a student may see a test failure as an opportunity for improvement and better performance in future assessments¹⁷.

Positive emotions are associated with global processing, which enhances students' cognitive flexibility and understanding of different situations. Conversely, emotionally challenging situations can trigger negative predispositions, leading students to avoid them, and ultimately reducing their interest and motivation in learning materials. However, Kremer (2023)¹⁷ didn't find a correlation between cognitive reappraisal and the reduction of the impacts of negative emotions that arise from some clinical situations in residents, requiring further studies on the case.

EMOTIONAL FEEDBACK AND REFLEXIVITY

Feedback is a form of information exchange between student and educator, which is based on critically evaluating the student's performance. However, it is recognized that this process is made up of many emotions that are relevant to the idea that people have of themselves and their education¹⁸. Studies indicate that negative emotions experienced during feedback can have a long-lasting impact, posing a threat to the process and requiring proactive management. In essence, feedback is a highly emotive experience for students, with positive feedback leading to positive emotions and negative feedback resulting in negative emotions¹⁹.

One approach to improve the feedback process for students, similar to the strategy mentioned previously, is emotional reflexivity, defined by Ajjawi (2021)¹⁸ as "a process of drawing on emotions to, potentially, chart a unique path, thus making our way emotionally and relationally through the world". This strategy aims to help students alter their interpretations and responses to their own emotions and those of their teachers, enabling them to learn and achieve their educational goals.

Furthermore, motivation and attention are important for feedback, so that memory is created and consolidated, strengthening learning. A study showed that when the goal set by the student was performance, their attention to feedback was reduced, as well as when the emotion experienced by the student at the time of feedback was relief – for having managed to do well on the task. However, when the emotion experienced at the time of feedback was shame (negative), attention to the feedback increased¹⁹.

This leads us to think that, in the case of feedback, in which attention is essential, less satisfactory performances lead students to increase their level of attention and, consequently, learn more from the feedback. Therefore, it may be beneficial for educators to address and adjust

student's beliefs about value and perceptions of self-efficacy before creating a learning environment.

It's crucial to ensure that negative emotions triggered by feedback don't take precedence over attention and, consequently, learning. Enforcing emotional regulation techniques, like the one mentioned earlier, is vital for the effective use of this learning strategy. However, it might also be beneficial to prioritize key information or adjust the sequence of presented material to align with specific instructional objectives. Furthermore, outlining explicit learning goals and relevant progress markers enables students to use feedback more effectively to enhance their performance.

EMOTY-COM TRAINING

In the context of contemporary medicine, it is essential that the doctor is technically competent, but also has highly developed communication skills and emotional intelligence. These qualities are essential for effectively gathering patient information and demonstrating empathy. They have been linked to heightened patient satisfaction and improved treatment adherence. As a result, medical universities must incorporate training on communication skills and emotional regulation into their curriculum.

Thus, emoty-com training²⁰ was used as a teaching strategy in emotions to improve student's communicative and emotional management skills towards patients. This strategy is based on four moments: (1) first classroom meeting, focusing on developing communication skills, including how to establish rapport with the patient, conduct interviews, and use active listening to gather information through open and technical questions; (2) second classroom meeting, which aimed to improve student's emotional capacity, allowing them to identify patient's emotions, respond appropriately, and handle effectively with emotionally challenging situations; (3) meeting with the real outpatient; (4) third meeting in the classroom, in which students quickly role-play the medical appointment and discuss the difficulties.

This strategy for teaching clinical practice and emotional management proved to be very effective as it reduced student's anxiety in dealing with their own emotions when in front of a patient. This is crucial in clinical practice, as challenges in managing their own emotions can divert the focus of students or professionals away from the patient, potentially leaving the patient without the needed emotional support and hindering the doctor-patient relationship.

Moreover, the emoty-com training has contributed to a greater understanding among male students of the necessity for doctors to engage with patients on an emotional level in a particular manner²⁰.

This could be a strategy to be implemented and taught at medical universities to improve students' emotional management, especially during clinical practice.

FLIPPED CLASSROOM

The flipped classroom²¹ is a learning method that reduces class time and increases preparation time for class. The objective is to raise the efficiency of learning by making it more active and faster, without reducing quality. It works in two moments: at home and in the classroom. At home, or in another study scenario, the student watches videos or reads up on an established topic. In the classroom, the case is discussed in three ways: through (1) a pre-test, which is an exercise carried out before identifying concepts that were not clear; followed by (2) a micro-lecture, which would be a quick class based on the pre-test questions; and, finally, (3) a discussion based on clinical cases to increase the efficiency of obtaining knowledge.

When compared to the traditional teaching model, the flipped classroom led to a rise in student preparation time, resulting in more productive classroom sessions. However, it did not impact post-class study time, maintaining its reputation as a fast-paced learning method. Additionally, students in the flipped classroom group reported experiencing more enjoyment and less boredom than their counterparts in the traditional classroom model, contributing to increased motivation²¹.

As motivation and learning are directly related, it is to be expected that obtaining knowledge was also more effective. This was shown by the positive relationship between the flipped classroom and flexible learning strategies, self-regulation learning, and academic performance²¹. The encouraging outcomes can be attributed to the positive impact of the flipped classroom on student motivation and effort. The approach empowered students to take greater control of their learning process, incorporating clinical cases in discussions to enhance their interest in the subject. By reducing boredom, an emotion with a negative effect on learning – the result of extensive classes and lectures in which knowledge is obtained passively – the flipped classroom fostered a more stimulating environment for students, leading to improved academic performance.

Finally, it was found that the flipped classroom stimulated interpersonal relationships between students during quizzes and increased the effectiveness of knowledge exchanges with educators¹⁹ especially during discussions on clinical cases. These findings underscore the positive impact of the flipped classroom in creating a more collaborative and conducive learning environment. Figure 2 summarizes the main strategies found during the research.

DISCUSSION

A wide variety of strategies for managing emotions in medical education were found: simulations with standardized patients, mindfulness, reflective writing, Balint groups, self-regulation learning, empty-com training, feedback



Figure 2. Summary of the main strategies used to manage emotions in medical education.

Source: Elaborated by authors (2024).

and emotional reflexivity, flipped classroom and cognitive reappraisal.

Beginning with “simulation with standardized patients”, discussed by Schweller (2018)⁹, it is possible to analyze that there is an emphasis on the importance of emotions by exposing students to emotionally challenging situations. The controlled environment allows students to cope better with emotions during appointments, which contributes to the development of essential skills for medical practice.

The practice of “mindfulness”¹² is also a promising strategy for managing emotions in medical education. This technique promotes increased awareness, encourages self-reflection, and makes students more resilient, contributing significantly to the improvement of emotional intelligence and exerting a great impact on the skills needed for the practice of medicine, which justifies its inclusion in students’ daily lives.

Likewise, the “reflective writing” proposed by Lim (2023)¹³, promotes self-reflection and encourages self-knowledge, allowing for a better understanding of emotions by students and health professionals. With this same point of view, the “Balint groups”¹⁴ enable a more effective approach to emotions and how they influence the patient-physician relationship.

In addition, the “self-regulation of learning”^{15,16} highlights the importance of students developing skills to more effectively control their emotions to favor the retention of knowledge during the learning process. However, it is essential to explore the best practices to implement these

strategies further, as well as to evaluate their long-term impact on clinical practice.

Moreover, “the cognitive reappraisal”¹⁷ emphasizes the complexity of emotional management, although it has not shown a direct correlation with the reduction of negative emotions in certain clinical contexts, which implies added studies are needed to understand its real applicability.

Additionally, the practice of “feedback and emotional reflexivity”^{18,19} are essential to a positive exchange between students and educators, being highly efficient in knowledge consolidation. In this same perspective, the “emoty-com training”²⁰ reveals that training communications skills reduces the students’ anxiety in dealing with their emotions and promotes a better response in learning and in emotional support. Thus, it generates a more efficient doctor-patient relationship.

Finally, the flipped classroom²¹ demonstrated effectiveness by increasing students’ motivation and providing a more productive moment with their educators, thus being positive in the learning process.

Thus, it is clear that strategies for helping students manage their emotions and learn effectively can be addressed in undergraduate programs. However, despite this, most universities have yet to incorporate this issue into their curricula⁹. Some theories about the insistence on teaching based on methodologies that do not promote effective learning and that also fail to address students’ emotions

can be raised: (1) the popular belief that doctors should avoid patient involvement, becoming a “distant” and “cold” figure; (2) traditional teaching methods, which remain active in most universities; (3) emotional distance between professor and student, which hinders the establishment of a learning bond; among other issues.

It can be inferred that learning and the ways of dealing with emotions are influenced by a culture that tends to distance students from their affective selves. In this context, it is essential to understand that culture is different in each society and serves as the “baseline” from which individuals experience, interpret, and act²². That is, an individual learns to understand and react to emotions according to their culture. Thus, if the culture of medical schools is characterized by difficulties in regulating and managing emotions, students will base themselves on, learn from, and act according to these maxims, encountering challenges in establishing emotionally effective relationships with their patients and with learning.

This is reflected, as Moreto and Blasco²³ stated, in the “erosion of medical student empathy,” where students at the beginning of the course are more empathetic and enthusiastic than students in the final stages of their degree. This is a result of doctors who, since they are not being taught how to manage their own emotions and those of their patients during their academic training, develop impersonal strategies to practice their profession.

Therefore, it would be important for medical schools to utilize a combination of these strategies and provide a comprehensive approach to integrating emotions into medical education, enabling students to gain a deeper understanding of their emotions, develop effective emotional management skills, and use their emotions more constructively.

Furthermore, it is essential to also consider the cultural differences that permeate the application of these strategies. Considering that, as previously stated, culture is the baseline from which we interpret the world, each society and individual understands and acts differently in response to certain emotions. In this context, since the strategies and studies were mostly developed internationally, ways must be found to adapt them to Brazilian society and culture. Therefore, in addition to including a combination of these strategies in undergraduate programs, Brazilian universities should also study and find ways to make them effective for their students, so they do not just become a tedious form of learning.

LIMITATIONS AND RECOMMENDATIONS

The study has some limitations. One of the article’s significant limitations is its inability to cover all available literature that could assist in developing other learning strategies, despite extensive research in major databases. Notable limitations also include the fact that some articles mentioned techniques for using emotions for learning, but outside the context of medical education. Others addressed medical education, albeit without a direct association with emotions. It is also essential to highlight the cultural limitations of the study. Since most of the

strategies found come from international studies, it is necessary to establish cultural approaches to implement such programs in Brazilian universities.

Therefore, further studies are needed to determine the impact of emotions on the learning process, especially studies focused on medical students and the practical application of emotion management strategies, particularly in the Brazilian context.

From this perspective, since it is known that emotional intelligence can significantly contribute to the development of skilled healthcare professionals who are aware of the complexities of medical practice, it is necessary to implement courses that practice skills related to emotional intelligence in undergraduate programs.

CONCLUSION

It is established that emotions exert a direct influence on human cognitive processes, including comprehension, attention, memory and problem-solving, in addition to their well-documented role in modulating behavior. With this in mind, to explore the importance of emotions in medical education and highlight their influence on the learning process and in clinical practice, this systematic review explains different strategies that can be implemented to promote a more efficient approach to manage emotions during the medical program.

Therefore, since emotional intelligence is a skill susceptible to training, implementing strategies for its development is fundamental. The valuation of feelings in this context not only contributes to enhanced academic performance but also to the formation of more empathetic, self-confident, and emotionally mature professionals, which ultimately leads to a positive doctor-patient relationship.

Nevertheless, further research is required in this area to gain a deeper understanding of the effectiveness of these strategies in medical training and their long-term outcomes. This will equip the next generation of physicians with the knowledge and skills to navigate the emotional and cognitive challenges of clinical practice.

AUTHOR’S CONTRIBUTIONS:

We describe contributions to the papers using the taxonomy (CRediT) provided above: Conceptualization, Investigation, Methodology, *Visualization & Writing—review & editing*: CG do Amaral; BV da SS Costa; JVS Lima; IL Silva; JAO Novaes. *Project administration, Supervision & Writing—original draft*: CG do Amaral; BV da SS Costa; JVS Lima. *Validation & Software*: JVS Lima. *Resources & Funding acquisition*: CG do Amaral. *Data curation & Formal Analysis*: CG do Amaral.

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