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ORIGINAL PAPER

Empathy (non)erosion: a cross-sectional study of empathy levels and trait emotional intelligence in Slovak medical students

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Abstract

Aim: Empathy is a vital component of medical and nursing practice. However, research on empathy erosion among healthcare students has produced mixed findings, potentially due to measurement-related limitations. This study is the first to examine empathy erosion among Slovak medical students within the framework of trait emotional intelligence (TEI). *Design:* Quantitative, correlational-comparative, cross-sectional study. *Methods:* Data were collected from 545 medical students across all six years of study (57% women; M_{age} = 22.3, SD_{age} = 2.1) via an online questionnaire assessing empathy (Empathy Quotient; EQ) and trait emotional intelligence (TEIQue–SF). ANOVA was used to compare empathy and TEI across study years, followed by correlational and linear regression analyses to explore the relationships between empathy and TEI. *Results:* No significant differences in empathy or TEI were observed across study years. Female students scored higher in empathy. TEI and its factors were significant predictors of EQ, explaining 14% and 36% of the variance in empathy scores, respectively. *Conclusion:* The findings indicate that empathy, TEI, and its factors do not vary significantly across the demanding years of medical training. These results highlight the importance of careful selection of measurement tools when assessing psychological constructs.

Keywords: empathy erosion, Empathy Quotient, medical students, trait emotional intelligence (TEI).

Introduction

Empathy is a fundamental element of effective healthcare, strongly influencing patients' adherence to medical advice and overall health outcomes. An empathic approach by healthcare professionals is closely linked to patients' subjective well-being and health status (Del Canale et al., 2012; Hojat et al., 2009). In nursing, insufficient empathy can undermine nurse – patient relationships, reduce the quality of care, and lower patient satisfaction (Brunero et al., 2010; Yu & Kirk, 2008). Empathy also serves as a protective factor against burnout, a significant occupational hazard for health professionals (De Hert, 2020; West et al., 2018; Wilkinson et al., 2017).

Despite its importance, several studies have raised concerns about a decline in empathy – often termed "empathy erosion" – among healthcare students during their training (e.g., Chen et al., 2007; Hojat et al., 2009; Newton et al., 2008; Ward et al., 2012). This issue is particularly pressing given the global shortage of healthcare workers and the demanding nature of their roles (World Health Organization [WHO], n.d.). Understanding the dynamics of empathy and related constructs such as emotional intelligence is therefore essential.

To address this gap, the present study is the first to examine empathy erosion and trait emotional intelligence among Slovak medical students, with particular attention to measurement considerations and gender differences.

Empathy erosion

Although empathy is widely recognized as essential in healthcare, multiple studies have documented troubling declines among future health professionals during their training (Chen et al., 2007; Newton et al., 2008; Ward et al., 2012). In a longitudinal study, Hojat et al. (2009) observed a marked reduction

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in empathy among medical students, particularly during the third year of study. Similarly, Ward et al. (2012) reported empathy decline in nursing students, noting that those with more intensive patient contact exhibited greater erosion than peers with limited clinical exposure. According to Hojat et al. (2009), such declines may be linked to practical training that involves frequent patient interactions, as well as to a combination of contributing factors: cognitive overload from rigorous academic demands, physiological strain from sleep deprivation and stress, environmental pressures such as high-stress clinical settings and negative role modelling by senior staff, and, in some cases, harassment.

Although many studies have examined changes in empathy among future health professionals during their training, evidence for empathy erosion remains inconclusive. A meta-analysis of 30 studies from 20 countries found that nearly half reported a decline in medical students' empathy, while more than half produced ambiguous findings, including insignificant changes or even increases in empathy (Andersen et al., 2020). Research on nursing students is less extensive, yet similarly mixed, with some studies reporting declines (e.g., Ward et al., 2012) and others finding stability or growth (e.g., Díaz-Narváez et al., 2020; Ferri et al., 2017). Such variability may be influenced by differences in curricula, educational environments, and cultural contexts (Andersen et al., 2020; Bertram et al., 2016). Nevertheless, empathy, when considered as a trait, is generally thought to be relatively stable over time and even capable of increasing (Gaspar & Esteves, 2022; Grühn et al., 2008). This perspective aligns with the view that measurement tools play a critical role and may, in fact, underlie apparent instances of empathy erosion (Yu & Kirk, 2008).

Measurement issues

In their meta-analysis, Andersen et al. (2020) reported that 23 of the 30 included studies employed the self-report Jefferson Scale of Physician Empathy (JSPE). This instrument was also used by Ward et al. (2012), who observed a significant decline in empathy among nursing students. As its name suggests, the JSPE was originally developed to assess empathy in medical students and practicing physicians. It contains 20 items grouped into three factors: perspective taking, compassionate care, and ability to stand in patients' shoes (Hojat et al., 2009, p. 1184). However, confirmatory factor analysis by Tavakol et al. (2011) indicated that the third factor would be more accurately described as emotional detachment, based on its item content. Notably, the factor with the greatest loading (10 items) does not measure empathy per se but rather compassionate care – a construct related to, yet distinct from, empathy.

First, compassion – literally meaning "to suffer together" – is primarily concerned with experiencing and responding to suffering (Strauss et al., 2016), whereas empathy involves perceiving and understanding a broader range of emotions (Cuff et al., 2014; Sinclair et al., 2016). Second, compassion is closely linked to motivation and the active desire to alleviate or ease suffering and pain (Strauss et al., 2016). However, research indicates that behavioral responses such as compassionate care are distinct from empathy itself (Cuff et al., 2014; Sinclair et al., 2016). Furthermore, neuroscientific evidence supports the distinction between empathy and compassion, demonstrating that each engages different neurobiological mechanisms (Chierchia & Singer, 2017). Consequently, compassion should not be conflated with empathy, though it can be regarded as an extension or complement of empathy.

Moreover, another key factor potentially contributing to the decline in empathy scores measured by the JSPE is compassion fatigue, a phenomenon directly related to compassion but distinct from empathy. Compassion fatigue refers to the depletion of emotional, physical, and cognitive resources and is closely linked to burnout (Cocker & Joss, 2016; Ledoux, 2015). Thus, when Hojat et al. (2009) attribute empathy erosion to factors such as sleep deprivation, frequent patient contact, and cognitive overload, we propose that these factors primarily reflect the depletion of compassion rather than empathy itself. A similar explanation may apply to nursing students in Ward et al.'s (2012) study, in which those with greater patient exposure exhibited a more pronounced decline in empathy scores. Motivated by the need to distinguish between these related but distinct constructs, we chose to use the Empathy Quotient (EQ) – a free, one-dimensional, validated instrument that captures both cognitive and affective components of empathy (Baron-Cohen & Wheelwright, 2004).

Emotional intelligence and empathy

Recognizing the complexities of empathy and its measurement, we also examined the role of emotional intelligence (EI) in this study. EI is defined as the capacity to recognize, understand, regulate, and manage emotions in oneself and others (Petrides, 2011), and it has been shown to be a significant predictor of academic achievement, job performance, quality of patient

care, and resilience against burnout (Chew et al., 2013; Görgens-Ekermans & Brand, 2012; Karimi et al., 2021; O'Boyle et al., 2011). Higher levels of EI can also offer protection in stressful environments (Mikolajczak et al., 2006). We focused on trait emotional intelligence (TEI), conceptualized as a relatively stable constellation of emotional self-perceptions (Petrides, 2011), comprising four primary factors: Emotionality, Sociability, Self-control, and Well-being.

Given that empathy is often considered a core component of TEI, we hypothesized a positive correlation between these constructs. However, empirical findings in healthcare settings are mixed regarding the strength of this relationship. For instance, Bertram et al. (2016) reported strong positive correlations, whereas Abe et al. (2018) found weaker associations, possibly reflecting cultural variations in empathy and emotional intelligence. These inconsistencies further suggest that the choice of measurement instruments may influence the observed strength of the relationship between empathy and EI.

Gender differences in empathy and trait emotional intelligence

Gender differences in empathy are consistently documented across cultures, with women generally scoring higher than men – a pattern that holds true among future health professionals as well (Abe et al., 2018; Bertram et al., 2016; Ferri et al., 2017; Hojat et al., 2009; Ward et al., 2012). This disparity may be attributed to women's greater propensity to perceive, understand, and respond to others' emotions (Christov-Moore et al., 2014). Similarly, women tend to score higher on facets of trait emotional intelligence related to emotionality, including emotion perception, expression, and empathy (Petrides & Furnham, 2006). However, significant gender differences in overall trait emotional intelligence (TEI) are less consistently observed (Petrides, 2009).

Aim

Given the limitations of empathy alone in capturing the full spectrum of emotional capabilities, the present study aims to examine empathy erosion and trait emotional intelligence (TEI), including its constituent factors, among future health professionals – specifically, Slovak medical students – across six study years. Based on previous research, we anticipated a positive correlation between TEI and empathy (e.g., Bertram et al., 2016). Additionally, we explored the role of gender and its influence on the relationship between TEI factors and empathy. Consistent with prior findings, we hypothesized that women would score higher than men on both empathy and the Emotionality factor of TEI (Christov-Moore et al., 2014; Petrides & Furnham, 2006).

Methods

Design

This study employed a quantitative, correlational-comparative, and cross-sectional design.

Sample

We aimed to recruit a gender-balanced sample of 50 female and 50 male medical students from each study year, targeting a total of 600 participants. Data were collected online from two medical faculties between December 2019 and June 2020. We received 723 responses, of which 178 were excluded due to incorrect answers on control questions or incomplete surveys. The final sample consisted of 545 valid responses (57% female; M_{age} = 22.3 years, SD_{age} = 2.1).

Data collection

Data were collected via an online survey hosted on the Qualtrics platform. The survey was distributed through official faculty email lists and social media channels. After providing informed consent, participants completed socio-demographic questions followed by the Trait Emotional Intelligence Questionnaire – Short Form (TEIQue-SF) and the Empathy Quotient (EQ) scales. Two control items were included to ensure participant attention and comprehension. The study adhered to the Journal Article Reporting Standards for Quantitative Research (JARS-Quant) as outlined by the APA – American Psychological Association (APA, 2020).

Measures

The Empathy Quotient (EQ) scale (Baron-Cohen & Wheelwright, 2004) is a validated, unidimensional measure of empathy. It comprises 40 items rated on a four-point Likert scale ranging from "strongly disagree" to "strongly agree." Total scores are calculated using the scoring key provided by the authors, with higher scores indicating greater empathy. The Slovak version of the EQ demonstrated very good internal consistency in our sample, with a McDonald's omega of $\omega = 0.82$.

Trait Emotional Intelligence Questionnaire (TEIQue-SF)

The TEIQue-SF (Petrides, 2009) is a validated, four-factor scale measuring trait emotional

intelligence, with a Slovak version available (Kaliská et al., 2015). It consists of 30 items divided into four factors: Well-being (6 items, ω = 0.83), Emotionality (8 items, ω = 0.74), Sociability (6 items, ω = 0.68), and Self-control (6 items, ω = 0.71). Participants respond on a seven-point Likert scale ranging from "completely disagree" to "completely agree." The global TEI score is calculated as the average of all item responses, with higher scores indicating higher trait emotional intelligence. The Slovak version demonstrated excellent overall internal consistency, with McDonald's omega of ω = 0.87.

Data analysis

We used ANOVA tests to examine empathy erosion and trait emotional intelligence (TEI) across study years, considering gender differences. To explore the relationship between empathy (measured by EQ) and TEI, we conducted Pearson correlation analyses and linear regression models with empathy as the outcome variable. Four regression models were specified: the first set assessed the total TEI score, while the second set examined the four TEI factors individually – Well-being, Emotionality, Self-control, and Sociability. Each set included models both unadjusted and adjusted for gender and age. Statistical analyses were performed using R (R Core Team, 2021), utilizing built-in functions for ANOVA and linear regression. Figures were created with the ggplot2 package (Wickham, 2016).

Results

Descriptive statistics and correlations

Descriptive statistics (see Table 1) showed that female students consistently scored higher on the Empathy Quotient (EQ) across all study years, with the highest empathy levels observed in the fifth and sixth years. In contrast, male students generally scored slightly higher than females on global trait emotional intelligence (TEI) in most study years.

Table 1 Descriptive statistics of variables – Empathy Quotient and trait emotional intelligence (N = 545)

			Empathy Quotient			TEI global		
Study year	**Gender**	**n**	**min–max**	**M (SD)**	**Mdn**	**min–max**	**M (SD)**	**Mdn**
1st year	all	100	14–64	39 (9.5)	38	3.3–6.4	5 (0.6)	5
	women	53	14–64	41.2 (10.2)	40.5	3.3–6.0	4.9 (0.7)	5
	men	47	16–52	36.6 (8.1)	36	3.7–6.4	5 (0.6)	5.1
2nd year	all	106	17–59	36.9 (9.3)	36	2.7–6.1	4.8 (0.6)	4.9
	women	54	18–59	39.4 (8.5)	39	3.1–6.1	4.8 (0.7)	4.8
	men	52	17–56	34.6 (9.6)	33	2.7–6.1	4.9 (0.7)	4.9
3rd year	all	88	14–63	38.9 (9.2)	39	3.0–6.8	4.8 (0.7)	4.8
	women	51	14–63	39.4 (10)	40	3.0–6.3	4.7 (0.8)	4.8
	men	37	24–61	38.4 (8)	39	3.7–6.8	5 (0.7)	4.8
4th year	all	99	16–57	38.7 (8.6)	38	3.4–6.3	4.9 (0.7)	5.1
	women	53	22–57	41.3 (8.4)	43	3.4–6.2	4.9 (0.6)	5
	men	46	16–52	35.5 (7.9)	36	3.7–6.3	5 (0.7)	5.1
5th year	all	83	9–65	39.4 (10)	38	3.7–6.3	5 (0.5)	5.1
	women	52	20–65	40.7 (9.2)	39	3.7–6.3	5 (0.6)	5.1
	men	31	9–58	37.2 (11)	38	4.5–5.9	5 (0.4)	5.1
6th year	all	82	12–66	39.6 (9.6)	39.5	2.9–6.8	4.8 (0.7)	4.8
	women	53	21–62	40.7 (9.1)	40	2.9–6.1	4.7 (0.8)	4.7
	men	29	12–66	37.6 (10.3)	39	4.1–6.8	5 (0.5)	5

TEI – trait emotional intelligence

With the exception of Self-control, significant positive correlations were observed between the Empathy Quotient (EQ), global trait emotional intelligence (TEI), and its factors Well-being, Emotionality, and Sociability (see Table 2). The Emotionality factor showed a moderate positive correlation with EQ ($p < 0.001$), as did global TEI ($p < 0.001$). The associations between EQ and the Well-being and Sociability factors were positive but weak ($p < 0.001$).

Table 2 Spearman's correlations of EQ, TEI, and its factors (N = 545)

	EQ score	TEI global	Well-being	Emotionality	Self-control
EQ score	—				
TEI global	0.36 ***	—			
Well-being	0.19 ***	0.76 ***	—		
Emotionality	0.59 ***	0.63 ***	0.35 ***	—	
Self-control	0.03	0.71 ***	0.50 ***	0.15 ***	—
Sociability	0.17 ***	0.70 ***	0.41 ***	0.29 ***	0.50 ***

*EQ – Empathy Quotient; TEI – trait emotional intelligence; *** p < 0.001*

Differences in empathy across study years regarding gender

ANOVA results showed that the interaction between study year and gender was not significant [$F(5,533) = 0.73$, $p = 0.58$, $\eta^2 = 0.007$], indicating that the effect of study year on empathy did not differ significantly between male and female students. Therefore, we examined the main effects and found no significant differences in empathy scores across study years [$F(5,533) = 0.72$, $p = 0.61$, $\eta^2 = 0.006$]. However, there was a significant main effect of gender, with female students scoring higher in empathy than male students [$F(1,533) = 22.36$, $p < 0.001$, $\eta^2 = 0.04$; see Figure 1].

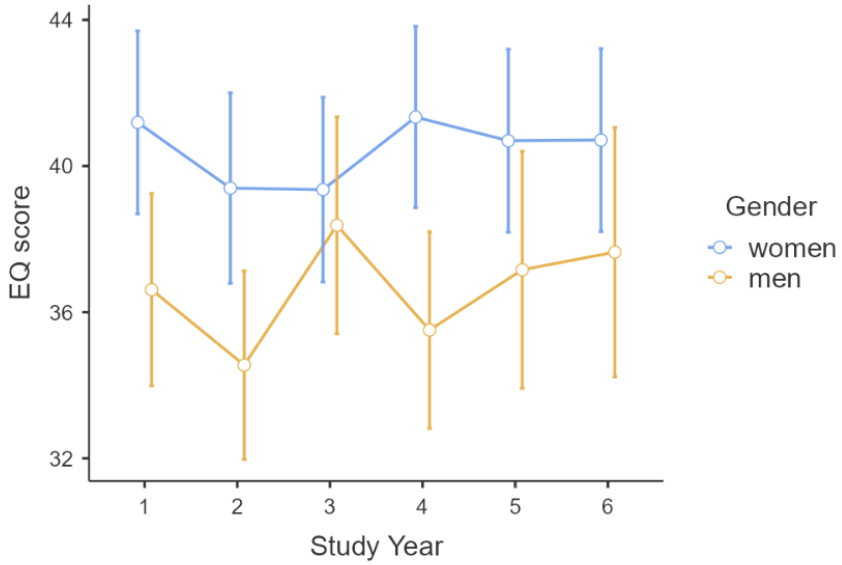
Differences in TEI across study years regarding gender

To gain a more comprehensive understanding, we conducted additional ANOVA tests on global TEI and its factors. For global TEI, the interaction between study year and gender was not significant [$F(5,533) = 0.49$, $p = 0.79$, $\eta^2 = 0.004$; see Figure 2]. Similar to empathy, no significant differences in TEI scores were found across study years in the main effects analysis [$F(5,533) = 0.64$, $p = 0.19$, $\eta^2 = 0.014$]. However, there was a significant main effect of gender, with male students scoring higher in global TEI than female students [$F(1,533) = 5.86$, $p = 0.016$, $\eta^2 = 0.011$].

Confounding of TEI and its factors

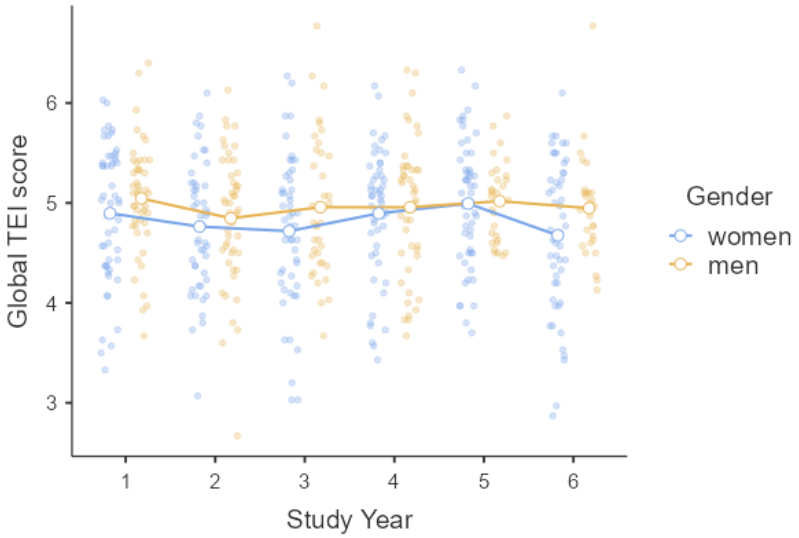
Linear regression revealed a significant positive relationship between EQ and global TEI ($p < 0.001$). This relationship remained significant after adjusting for age and gender ($p < 0.001$). The unadjusted model explained 14% of the variance in EQ, which increased to 21% when adjusted, reflecting gender differences (see Table 3).

When examining the TEI factors, Emotionality ($\beta = 0.59$, $p < 0.001$) and Sociability ($\beta = 0.95$, $p = 0.039$) showed significant positive associations with EQ. Self-control was negatively correlated with EQ ($\beta = -0.11$, $p = 0.009$); however, this relationship became nonsignificant after adjusting for age and gender ($\beta = -0.08$, $p = 0.066$). The unadjusted model explained 36% of the variance in empathy, increasing slightly to 37% after adjustment (see Table 3).



Note: EQ score – Empathy Quotient score.

Figure 1 Differences in empathy levels with study year and gender as fixed factors (N = 545)



Note: TEI score – trait emotional intelligence score.

Figure 2 Differences in global TEI with study year and gender as fixed factors (N = 545)

Table 3 Unadjusted and adjusted models of TEI and its factors as predictors of EQ (N = 545)

	b	CI 2.5%	CI 97.5%	β	p
TEI: Unadjusted Model R_2 = 0.14					
intercept	12.61	7.11	18.11		< 0.001
emotional intelligence	5.35	4.23	6.46	0.37	< 0.001
Age and Gender Adjusted Model R_2 = 0.21					
intercept	8.07	-1.11	17.24		0.09
emotional intelligence	5.70	4.62	6.78	0.40	< 0.001
gender (male)	-4.73	-6.16	-3.30	-0.25	< 0.001
age	0.22	-0.12	0.55	0.05	0.21
Factors of TEI: Unadjusted Model R_2 = 0.37					
intercept	7.42	2.67	12.18	-	0.002
wellbeing	0.13	-0.66	0.92	0.01	0.752
emotionality	6.21	5.46	6.96	0.59	< 0.001
self-control	-1.14	-1.99	-0.28	-0.11	0.009
sociability	0.95	0.05	1.85	0.09	0.039
Age and Gender Adjusted Model R_2 = 0.38					
intercept	3.20	-4.87	11.28	-	0.44
wellbeing	0.08	-0.70	0.86	0.01	0.83
emotionality	5.96	5.20	6.71	0.57	< 0.001
self-control	-0.81	-1.68	0.06	-0.08	0.07
sociability	1.04	0.15	1.94	0.10	0.02
gender (male)	-2.39	-3.70	-1.07	-0.13	< 0.001
age	0.21	-0.08	0.51	0.05	0.15

TEI – trait emotional intelligence; b – unstandardized regression coefficient; CI – Confidence Interval; β – standardized regression coefficient

Discussion

Given the ambiguous findings on empathy erosion among future health professionals across different cultural contexts (e.g., Andersen et al., 2020; Díaz-Narváez et al., 2020; Ferri et al., 2017; Ward et al., 2012), the primary aim of our study was to examine changes in empathy in Slovak medical students for the first time. While several studies have reported declines in empathy linked to increased patient contact or cognitive overload (Hojat et al., 2009), we found no significant decrease in our sample. Similarly, global TEI and its factors did not

show significant declines across study years. We therefore suggest that discrepancies in empathy findings may largely result from differences in the psychometric tools used. Studies reporting substantial empathy declines primarily employed the JSPE (Andersen et al., 2020; Ward et al., 2012), which appears to emphasize compassion rather than empathy. Unlike empathy, compassion can diminish due to compassion fatigue stemming from intensive patient contact and other demanding conditions faced by medical students.

Geographic and sociocultural factors may also influence empathy erosion among future health professionals. Ponnamperuma et al. (2019) observed that studies from the U.S. consistently report empathy erosion, while non-U.S. studies often show stable or even increasing empathy levels. This geographic pattern appears in both cross-sectional and longitudinal research, shifting attention toward educational context and curriculum design. For instance, a recent U.S. longitudinal study by Herber-Valdez et al. (2024) examined a curriculum introducing patient interactions early in medical training, rather than the typical third or fourth year. Contrary to the common expectation of empathy decline in the U.S., this study found no significant decrease in empathy, suggesting that early patient engagement may help preserve empathy levels. In Slovakia, where patient contact begins later in the curriculum, we similarly found no evidence of empathy erosion. These inconsistencies may reflect cultural differences and variations in measurement tools, underscoring the need for further research to clarify these factors.

Moreover, our study examined empathy levels in medical students in relation to trait emotional intelligence (TEI) and gender. TEI accounted for 14% of the variance in empathy as measured by the Empathy Quotient, while its factors explained 36%. This effect was primarily driven by the Emotionality factor – which encompasses empathy, emotion perception, emotion expression, and relationships (Petrides, 2009) – and demonstrated a strong positive correlation with empathy. Consistent with previous research, female students exhibited higher empathy (e.g., Abe et al., 2018; Bertram et al., 2016; Hojat et al., 2009) and scored significantly higher on Emotionality. In contrast, male students scored higher on Self-control, Sociability, and global TEI, although the latter finding may be specific to our sample.

As demonstrated by our study and others, a major limitation in psychological research lies in measuring abstract constructs that suffer from unclear conceptualization and definition. While psychometric tools aim to capture the complex interpersonal and emotional demands of healthcare, ambiguity in these measures and limited access to validated instruments can lead to inaccurate conclusions about empathy erosion among future health professionals. Advances in neuroimaging techniques may offer more precise definitions of such psychological constructs in the future. Additionally, the cross-sectional design limits the robustness of our findings. We also faced challenges due to limited cooperation from health professionals, likely related to their heavy workloads. Nevertheless, strengthening interdisciplinary collaboration could improve research quality through longitudinal and methodologically rigorous studies on psychological constructs in professional training. Finally, data collection occurred during the initial phase of the COVID-19 pandemic, when some participants volunteered in healthcare settings, potentially influencing their personalities and perceptions of their future careers.

Our findings have important implications for future research on psychological constructs in healthcare. Given that different empathy scales can yield significantly varying results, educators and researchers should carefully select measures that truly reflect the complex interpersonal and emotional nature of healthcare practice. We see valuable opportunities for longitudinal replications of this study, as well as for expanding the research to other healthcare disciplines and related constructs such as emotion regulation. Exploring additional constructs may deepen our understanding of changes in empathy and the broader spectrum of emotional intelligence. Encouragingly, both trait emotional intelligence and empathy can be enhanced through targeted training programs (Juniarta et al., 2023; Mattingly & Kraiger, 2019) and academic coaching (Aguilar-Ferrándiz et al., 2024). Tailored interventions have the potential to strengthen future doctor-patient relationships and reduce burnout risk among healthcare professionals (West et al., 2018; Wilkinson et al., 2017).

Conclusion

Empathy is a fundamental element of effective healthcare and patient satisfaction. In clinical settings, empathetic communication enhances therapeutic outcomes and builds trust between patients and providers. Consequently, accurately and contextually assessing empathy in the education

of future healthcare professionals is crucial. While some studies report a decline in empathy during medical training, we argue that such results largely depend on the measurement tools used, as not all instruments capture the construct accurately. Our study contributes to this ongoing debate by demonstrating that empathy levels among future physicians remain relatively stable throughout their education. The minor, non-significant decreases observed may reflect natural adaptation to the demanding nature of medical training rather than genuine empathy erosion. Overall, these findings suggest that students are able to preserve empathy despite the pressures of their academic environment.

Ethical aspects and conflict of interest

Ethical review and approval were not required for the study on human participants in accordance with the local legislation and institutional requirements. All participants were informed about the terms, conditions, and procedures of the study in the Informed Consent at the beginning of the survey. The authors state that there is no conflict of interest.

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Author contributions

Conception and design (MG, LK), data collection (MG, LK), data analysis and interpretation (MG, NOA), manuscript draft (MG, NOA), critical revision of the manuscript (MG, NOA), final approval of the manuscript (MG).

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