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Moral competence and medical education in contemporary times: a Brazilian study

Marcio Rodrigues de Castro [1], *Alexandre de Araújo Pereira* [1], *Patrícia Unger Raphael Bataglia* [2]

1. Universidade José do Rosário Vellano, Belo Horizonte/MG, Brasil. **2.** Universidade Estadual Paulista, Marília/SP, Brasil.

Abstract

To evaluate the moral competence of medical students, this article compares different moments of medical training, identifying sociodemographic and academic aspects related to this competence, then discussing the evaluation tool. This is a quantitative, cross-sectional and observational study, with application of the extended version of Lind's Moral Competence Test and a socio-demographic and academic questionnaire. Low mean scores were identified in the periods evaluated—the first period's mean was higher than the others—and behavior that deviates from the "physician's dilemma" in relation to the others, regardless of the period. Low moral competency scores were detected in all periods evaluated, with decline or stagnation over the course and "segmentation phenomenon" of the test. No relevant correlation of sociodemographic and academic variables was identified. Finally, this study found scores for the initial periods lower than those described in the literature, suggesting a generational trend.

Keywords: Education, medical. Ethics, medical. Moral development. Morals. Ethical analysis.

Resumo

Competência moral e formação médica na contemporaneidade: estudo brasileiro

A fim de avaliar a competência moral de estudantes de medicina, este artigo compara diferentes momentos do curso, identificando aspectos sociodemográficos e acadêmicos relacionados a essa competência e discutindo a ferramenta de avaliação. Trata-se de estudo quantitativo observacional transversal, com aplicação da versão estendida do Teste de Competência Moral, de Lind, e questionário sociodemográfico-acadêmico. Identificaram-se escores médios baixos nos períodos avaliados – com média do primeiro período superior aos demais – e comportamento destoante do "dilema do médico" em relação aos demais, independentemente do período. Detectaram-se escores de competência moral baixos em todos os períodos avaliados, com declínio ou estagnação no decorrer do curso e "fenômeno de segmentação" do teste, e não se identificou correlação relevante das variáveis sociodemográficas e acadêmicas. Por fim constatou-se que escores dos períodos iniciais inferiores aos descritos na literatura prévia podem sugerir tendência geracional.

Palavras-chave: Educação médica. Ética médica. Desenvolvimento moral. Princípios morais. Análise ética.

Resumen

Competencia moral y educación médica en la contemporaneidad: un estudio brasileño

Este artículo evalúa la competencia moral de estudiantes de medicina desde comparaciones de diferentes momentos del curso, identificando los aspectos sociodemográficos y académicos y discutiendo el instrumento de evaluación. Este estudio es cuantitativo observacional, transversal, que aplicó la versión extendida de la Prueba de Competencia Moral, de Lind, y el cuestionario sociodemográfico y académico. Se identificaron las puntuaciones medias bajas en los períodos evaluados –un promedio del primer período superior a los demás– y los comportamientos que diferían del "dilema del médico" con relación a los demás, independientemente del período. Resultaron bajas las puntuaciones de la competencia moral en todos los períodos evaluados, con descenso o estancamiento durante el curso y un "fenómeno de segmentación" de la prueba, además, no hubo correlación significativa entre las variables sociodemográficas y académicas. Las puntuaciones de los períodos iniciales fueron más bajas a las descritas en la literatura, lo que supone una tendencia generacional.

Palabras clave: Educación médica. Ética médica. Desarrollo moral. Principios morales. Análisis ético.

The authors declare no conflict of interest.

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Research

Despite the historical importance of the study of ethics in medicine, the field does not seem to have followed the technical-scientific development in medical undergraduate courses in the last century. Since the publication of the 1910 *Flexner report* [1], medical schools have emphasized the scientific and care aspects, often to the detriment of ethical education, keeping it isolated and in the background, part of the "hidden curriculum" [2].

Recently, medical ethics has been discussed in the context of restructuring undergraduate curricula, contemplating new proposals for academic approaches and medical training aligned with ethical, reflective, and humanistic principles [3]. From a contemporary and humanist perspective [4,5], *the ethics of care can represent the synthesis of moral values applied to medical practice, contemplating the moral virtues*, (...) [and] *for this, skills such as empathy and the development of a high level of moral reasoning may be essential* [6].

Ethics has been addressed in medical education under different aspects, such as professionalism [5] or as medical humanities or virtues [4]—altruism, integrity, empathy, advocate, respect for privacy, and dignity, for example. Or, still, according to Eckles and collaborators, *honesty, accountability, compassion, service, industry, interprofessional respect, public health, and self-policing* (...) [2]. Castro, Pereira and Bataglia, *respect, compassion, and honesty, characteristics fundamental to any morality and that all professional medical caregivers are expected to embrace* [2], *bring them closer to the so-called ethics of care* [6]. The authors also emphasize the broad diversity and heterogeneity of curricula and concepts or values evaluated which prevented conclusions regarding the quality of the programs [2].

One challenge observed in discussions about ethical training in medical education lies in the modalities of evaluation. As highlighted by Bataglia, Morais, and Lepre [7], studies on morality applied to moral development emphasize cognitive-evolutionary theories, especially those derived from Piaget's and Kohlberg's propositions about judgment and the development of moral reasoning.

Both theories, related to the cognitive development of morality, presuppose the notion of justice and social and environmental interaction and can be considered essential and predictors of moral conduct, whose analyzes lend themselves to evaluating moral and, indirectly, ethical values. In this regard, morality assessment tools stand out, given their potential to combine ethical and moral concepts with teaching-learning theories, allowing the evaluation of moral development, an important gap in ethical education [6].

Recent studies carried out in several countries showed stagnation or moral decline during medical education [8], suggesting that the traditional teaching model may inhibit students from developing moral competence.

Several authors propose evaluations of moral judgment based on Piaget's and Kohlberg's cognitive-evolutionary theories, cited by Bataglia, Morais and Lepre [7], especially the Moral Competence Test (MCT), developed by Lind [9]. This instrument, which measures the degree of consistency with which the individual analyzes arguments and counter-arguments to a character's decision, has been widely used to evaluate moral competence in medical students. Moral competence emerges therefore as an aspect of ethics that can be evaluated, and as the best predictor of the moral act (or action) [7].

Thus, we suggest that undergraduate medical education train professionals poorly qualified to face the ethical challenges of contemporary society [10] and that ethical education has not followed the scientific-technological development of medicine, leaving gaps in the understanding of these educational processes and the new challenges of contemporaneity.

Given this scenario, this study analyzes the decline in moral competence during undergraduate medical training, correlating this phenomenon with socioeconomic conditions or academic and extracurricular experiences and discusses the MCT test applicability in contemporary times.

Method

Study design and population

This is a quantitative, cross-sectional and observational study was carried out in 2018 at a private higher education institution located in Southeast Brazil, whose curriculum adopts the problem-based learning (PBL) methodology.

Research

By criterion of convenience, the sample included 139 students from the first period (freshmen), fifth period, and sixth (final) year. Freshmen were approached in the inaugural class, before any contact with academic activities, while the others were invited during regular academic activities. Individuals under 18 years of age were excluded.

Students in the 11th and 12th periods were approached indiscriminately, as they participate simultaneously in internship activities. After signing the informed consent form (ICF), the participants filled two self-answered questionnaires:

1. Moral Competence Test extended version (MCTxt), validated in Brazil by Bataglia[11]. This version comprises three dilemmas: the two original ones (worker and doctor) and a third one (judge);
2. Self-authored questionnaire with sociodemographic, academic, and extracurricular data.

Statistical analysis strategies

- Comparison of students from the three periods regarding each of the MCTxt C scores (global, grouped two by two, and segmented by dilemma) by one-way analysis of variance (ANOVA);
- Evaluation of the influence of the variables "student's course period" and "dilemmas" on the MCTxt C scores by analysis of variance (ANOVA), based on a model of repeated measures;
- Evaluation of the correlation of the students' sociodemographic and academic variables with the MCTxt C scores (global or segmented) by multiple linear regressions.

Results

Population studied

A total of 139 students were included, 58 from the first period, 36 from the fifth period and 45 from the sixth year (11th/12th periods), representing, respectively, 44%, 63% and 36.5% of the students regularly enrolled in each course period.

The sample studied consisted of mostly female (64.7%), white (77.5%), and single (95.7%) students, from high-income families (41.5% have a family income above 10 minimum wages), high schooling (71.6% of those financially responsible for the family have a college degree or graduation course), and who do not live with family members (63.3%). Age followed the course period, with the median ranging from 19 years in the first period to 25 years in the last year. On average, 15.8% receive some form of scholarship (or equivalent), ranging from 3.4% in the first period to 26.7% in the last year.

We observed an overall low adherence to extracurricular activities, and less than 10% of participants reported attending a course in humanities or social sciences or regular practice of sports, religious or political activities. Participation in artistic and/or philanthropic activities was reported by 45.8% and 29.4%, respectively; extension activities and undergraduate research, as expected, increased during the course, reaching, in the last year, 48.1%, 33.3% and 25.9%, respectively. The preference for clinical specialty ranged from 46.2% in the first period to 63.6% in the last.

Score evaluation: comparison between course periods

Scores were analyzed globally, considering MCTxt with three dilemmas (worker, doctor, and judge), MCT original version with two dilemmas (worker and doctor), grouped two by two and segmented by dilemma (Table 1). The evaluated students showed low scores in all analyzes, with mean MCTxt C total score of 13.1 and mean C score of the original MCT of 17.4. The mean values of the C segmented score with two dilemmas were 20.7 for worker/judge and 13.5 for doctor/judge, and the C segmented scores per dilemma were 38.2 for worker, 21.5 for doctor, and 33.3 for judge.

Table 1. Comparative analysis between course periods regarding the MCTxt C total scores and segmented scores

		Descriptive measures			
Dilemmas/period	n	Minimum	Maximum	Mean	Standard deviation
Total	–	–	–	–	–
1st period	58.	2.3	45.1	15.7	10.5
5th period	36	1.6	34.7	11.8	7.8
11th/12th periods	45	0.1	33.0	11.0	7.2
All	–	–	–	13.1 –	–
Conclusion:			***p**=0.019 – 1st period>(5th period=6th year)*		
Worker/judge	–	–	–	–	–
1st period	58	1.3	62.2	24.3	15.5
5th period	36	0.5	44.2	19.8	10.7
11th/12th periods	45	0.6	55.1	16.8	11.0
All	–	–	–	20.7	–
Conclusion:			***p**=0.021 – 1st period>6th year*		
Doctor/judge	–	–	–	–	–
1st period	58	1.6	49.4	16.0	11.6
5th period	36	1.3	44.4	11.6	9.8
11th/12th periods	45	0.4	36.0	11.7	8.7
All	–	–	–	13.5	–
Conclusion:			***p**=0.068 – 1st period=5th period=6th year*		
Worker/doctor	–	–	–	–	–
1st period	58	2.0	52.8	19.4	12.8
5th period	36	3.7	41.6	16.5	9.8
11th/12th periods	45	0.4	37.6	15.6	9.9
All	–	–	–	17.4	–
Conclusion:			***p**=0.198 – 1st period=5th period=6th year*		
Worker	–	–	–	–	–
1st period	58	2.1	81.2	39.4	22.6
5th period	36	1.3	82.6	40.3	20.8
11th/12th periods	45	1.4	83.0	35.0	19.9
All	–	–	–	38.2	–
Conclusion:			***p**=0.463 – 1st period=5th period=6th year*		
Doctor	–	–	–	–	–
1st period	58	0.7	88.0	22.9	17.7
5th period	36	2.5	57.1	20.5	15.5
11th/12th periods	45	0.0	76.3	20.6	17.1
All	–	–	–	21.5	–
Conclusion:			***p**=0.715 – 1st period=5th period=6th year*		
Judge	–	–	–	–	–
1st period	58	0.0	90.8	38.7	23.3
5th period	36	0.5	74.5	30.0	21.0
11th/12th periods	45	2.2	64.6	28.3	17.3
All	–	–	–	33.3	–
Conclusion:			***p**=0.028 – 1st period>6th year*		

Database: 139 students (1st period: 58 students; 5th period: 36 students; and 11th/12th periods: 45 students).

p: *probability of significance of the one-way analysis of variance* with 1 factor

**Probability of significance of the one-way analysis of variance, based on Welch's robust test for equality of means, due to non-homogeneity of variances*

Research

In the analyzes by course period, low average MCTxt C total scores (below 20) were detected in all course stages (first, fifth and 11th/12th periods), respectively, 15.7, 11.8, and 11.0, with individual scores ranging from 0.1 to 45.1. Using one-way ANOVA, we observed a statistically significant drop between the 1st period and the others, showing a decline in moral competence between the 1st and 5th periods: *p*=0.019; 1st period>(5th period=6th year).

The segmented sub-analyzes, with two dilemmas (worker and judge), and segmented by dilemma (using the judge's dilemma), identified a decline between the 1st and the remaining periods, since, in the first case, the average scores ranged from 24.3 to 16.8, and in the second, from 38.7 to 28.3. Both showed a significant difference between the first period and the sixth year (worker/judge: *p*=0.021; judge: *p*=0.028). In the remaining analyzes with C segmented scores, however, we found no statistically significant differences between the students' scores in the three course periods.

In an analysis with category classification using the C total scores of the original MCT, as defined by Lind [12], we observed that 64% of the students were classified in the lower categories ("none," "very low," or "low"), ranging from 60.4% in the 1st period to 66.1% in the last year, whereas 15.1% were in the "high to very high" category, ranging from 22.4% to 11.1% (Table 2). Such a decline showed no statistical significance in the three periods evaluated (*p*=0.601).

Table 2. Comparative analysis between MCT C total score category classification and course period

Classification	MCT C score	Course period							
		1st year		3rd year		6th year		General	
		n	%	n	%	n	%	n	%
None	0.0 to 4.9	6	10.4	6	16.7	8	17.8	**20**	**14.4**
Very low	5.0 to 9.9	9	15.5	4	11.1	8	17.8	**21**	**15.1**
Low	10.0 to 19.9	20	34.5	14	38.9	14	31.1	**48**	**34.5**
Sufficient	20.0 to 29.9	10	17.2	9	25.0	10	22.2	**29**	**20.9**
High to very high	30.0 to 100	13	22.4	3	8.3	5	11.1	**21**	**15.1**
TOTAL		**58**	**100.0**	**36**	**100.0**	**45**	**100.0**	**139**	**100.0**

Database: 139 students (1st period: 58 students ; 5th period: 36 students; and 11th/12th periods: 45 students).

p=*0.601*; p: *probability of significance referring to Pearson's chi-square test*

Segmentation phenomenon

ANOVA, based on repeated measures planning, was used to evaluate whether the course period and the dilemmas influenced the moral competence score (MCTxt). The analysis did not confirm the influence of course periods on the dilemma-segmented MCTxt C scores, but showed a statistically significant influence, independent of the dilemma factor, on the mean of the MCTxt C scores, that is, regardless of the student's course period and the interaction between dilemma and course period, demonstrating the "segmentation phenomenon" [12].

Table 3. Evaluation of the influence of course period and dilemma factors on MCTxt C segmented mean scores

Period descriptive measures	Dilemma	Course				
		n	Minimum	Maximum	Mean	Standard deviation
1st period	Worker	58	2.1	81.2	39.4	22.6
	Doctor	58	0.7	88.0	22.9	17.7
	Judge	58	0.0	90.8	38.7	23.3

continues...

Table 3. Continuation

Period descriptive measures	Dilemma	n	Minimum	Maximum	Mean	Standard deviation
			Course			
5th period	Worker	36	1.3	82.6	40.3	20.8
	Doctor	36	2.5	57.1	20.5	15.5
	Judge	36	0.5	74.5	30.0	21.0
11th/12th periods	Worker	45	1.4	83.0	35.0	19.9
	Doctor	45	0.0	76.3	20.6	17.1
	Judge	45	2.2	64.6	28.3	17.3
ANOVA result based on a model with 2 independent factors:						
Variation source:	Period – ($F_{2; 118}$=1.225; p=0.298)					
	Dilemma×period – ($F_{4; 236}$=1.065; *p*=0.374)					
	Dilemma – ($F_{2; 236}$=21.656; *p*<0.001)					

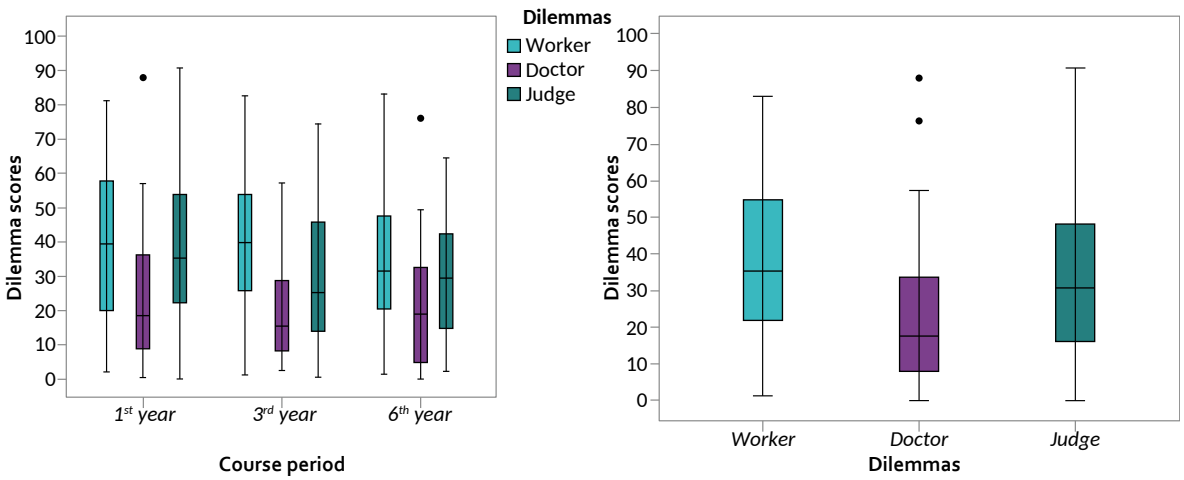
Conclusion for dilemma: (worker=judge)>doctor, regardless of course period

Database: 139 students (1st period: 58 students; 5th period: 36 students; and 11th/12th periods: 45 students).

p: *probability of significance of the analysis of variance based on a repeated measures model*; F: *analysis of variance statistics based on a repeated measures model*

Table 3 shows that, on average, MCTxt C segmented scores for the "worker's dilemma" and the "judge's dilemma" do not differ significantly from each other; however, their mean scores are significantly higher than the C segmented scores for the "doctor's dilemma"—(worker=judge)>doctor—, regardless of course period. Figure 1 demonstrates the discordant behavior of the "doctor's dilemma," with scores always lower than the others, regardless of period, characterizing the "segmentation phenomenon" of the moral judgment competence[9].

Figure 1. Boxplot with MCTxt C segmented scores by course period (1) and by dilemma (2)



Database: 139 students (1st period: 58 students; 5th period: 36 students; and 11th/12th periods: 45 students).

Note: the symbol "●" in the graph refers to a value considered "extreme"

Research

Sociodemographic and academic aspects

To evaluate whether students' sociodemographic and academic variables would be related to moral competence scores, we applied a multiple linear regression model to the C total and dilemma-segmented scores of the MCTxt. We selected ten variables (course period, gender, race/ethnicity, marital status, family income, education of the person financially responsible for the family, scholarship holder, living with family, intended specialty, and completion of a humanities/social course), considered as possible independent/predictor variables.

In most situations analyzed, the variables showed little probability of significance, with low joint relationship with the outcome variable of interest, except for "living with family," which would be associated with higher scores, showing statistical significance in the C total score (p=0.044) and in the judge's dilemma (p=0.029). Another highlight was the "intended specialty," with the option for clinical specialty showing non-significant correlation (p=0.062) only in the worker's dilemma. However, these variables do not seem to sufficiently explain the variability of the score, given the low explained variability (R^2) of the model.

Discussion

Considerations on the population and study design

The highly homogeneous socioeconomic profile of the study population, with a predominance of white, single, childless individuals and families with high income and schooling, may have been influenced by the private status of the educational institution, and does not represent the social diversity of the Brazilian university population, as described by the National Institute of Educational Studies and Research Anísio Teixeira (Inep) [13].

The lower percentage of scholarship recipients (or equivalent) in the 1st period may be due to the fact that the freshmen data were collected before the release of the required benefits—which can occur after the start of classes—and/or to changes in the national school funding policy. In comparing course periods, we observed that the participants have similar sociodemographic characteristics, except for age and being a scholarship holder (or equivalent).

The reduced number of male individuals may somehow compromise the scores, given the possible influence of gender on the C score (MCT), as found by Rego [10] and Feitosa and collaborators [14,15]. Moreover, the homogeneity of the sample and the low frequency of participation in extracurricular activities may have impacted the analysis of the correlation of these factors with the scores, which hindered drawing profiles or defining clusters among students that could be related to the development of moral competence.

The cross-sectional design led to the comparison of different students at three course stages and limited the evaluation of the development of moral competence over the undergraduate training. A longitudinal cohort study, although more costly, might allow us to analyze the same students and monitor them throughout the course. Thus, it would be possible to evaluate more accurately individual characteristics that influence, positively or negatively, the development of moral competence.

Score evaluation

We found low moral competence scores in the three analyzed course stages, with a mean MCTxt C total score of 13.1 (dropping from 15.7 in the first period to 11 in the last year).

Using the original MCT (two dilemmas), which allows for better comparison with international studies, we identified a mean C score of 17.4 (ranging from 19.4 to 15.6). As for the C segmented score with the worker/judge dilemmas—excluding the doctor's dilemma with the worst performance—, we observed a mean score of 20.7, dropping from 24.3 (sufficient) to 16.8 (low). Regardless of the C score variation chosen, mean scores are lower than those presented by national studies and, even worse, by international ones.

When analyzing the results classified into Lind [12] categories, means were situated at the "low" level of moral competence in all periods, with most students in the "low" (or lower) categories, except when excluding doctor's dilemma from the score, in which case they would be classified as having a "sufficient" level of moral competence.

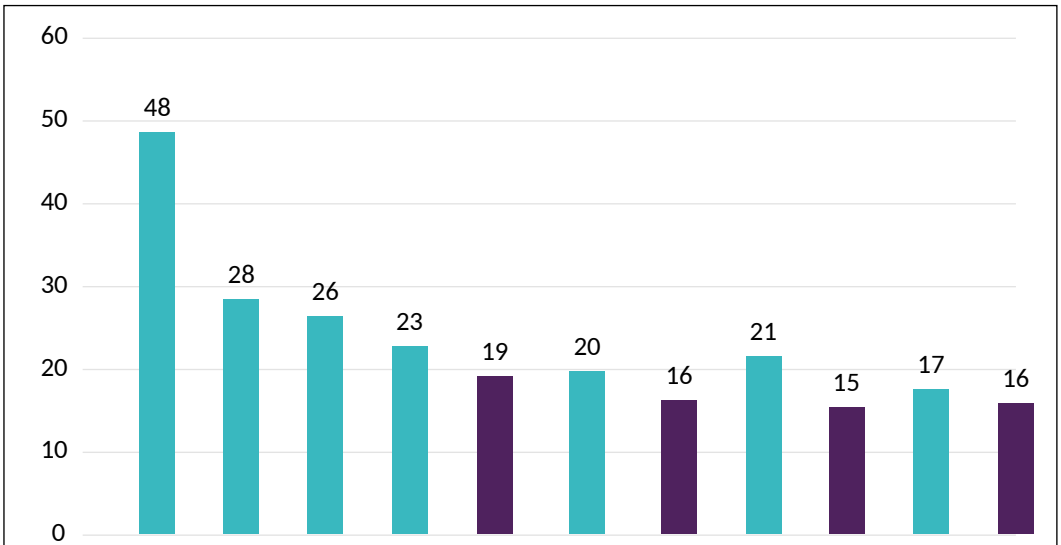
Medical students

Comparing our results with those of other national and international studies of similar design and carried out at different times, we observed different levels of scores. In Brazil, Feitosa and collaborators [14] report, at a university in the Northeast region, MCT C score dropping from 26.2 to 20.5, from the first to the eighth period (mean of 23.4). In a public school in São Paulo, Serodio, Kopelman, and Bataglia [16] observed MCT C score ranging from 22.6 to 20.3, and MCTxt score ranging from 19 to 17.7.

The present scores are about six points below than those found in the Northeast study (MCT) and four and five points below than those of São Paulo (MCT and MCTxt, respectively). Simultaneous to the present study, Otani [17], in a study carried out in two medical schools in Paraná using MCTxt, observed very similar scores, with means of 16 and 15.2, respectively, in the public and private institutions. When calculated using MCT (with two dilemmas), the means were slightly higher: 19.5 and 21.3, respectively.

When compared with European studies, the difference is even greater (Figure 2). Portuguese students [16] had a mean MCT C score of 29.7 (ranging from 28.3 in the first to 31.3 in the eighth period), whereas German students [8] had a mean MCT C score ranging from 48, 4 to 44.6 throughout the course. In these comparisons, we found a difference greater than 12 points below the Portuguese average (40% lower) and about 30 points below the German study average (60% lower). Even if we consider the score of the two best performing dilemmas (that is, excluding the doctor's dilemma), the result is quite inferior, with about nine points below the Portuguese study and more than 25 points below the German students.

Figure 2. Comparison of first-period medical students' moral evaluation scores in different contexts



Location	Germany	Portugal	Northeast	São Paulo	São Paulo	Paraná A	Paraná A	Paraná B	Paraná B	Minas Gerais	Minas Gerais
Instrument	MCT	MCT	MCT	MCT	MCTxt	MCT	MCTxt	MCT	MCTxt	MCT	MCTxt
Collection	1990	2000-2012				2018					
Reference	Lind; 2000 [8]	Feitosa and collaborators; 2013 [15]		Serodio, Kopelman, Bataglia; 2016 [16]		Otani; 2018 [17]		Otani; 2018 [17]		Castro; 2019 [18]	

MCT: Moral Competence Test; MCTxt: Moral Competence Test extended version

Compared to Brazilian studies on public schools, the present article presents lower scores from the first year, which may be related to the private and less competitive nature of the studied institution in relation to public universities. According to Bataglia, Morais and Lepre [7], this is due to the fact that students from more competitive universities (that is, more sought-after institutions) have higher moral competence scores.

In comparing national and international studies, we observed a difference between the scores of studies conducted in Portugal and Brazil and those conducted in Germany. Lind [8] discusses the influence of religion (Catholic versus Protestant) and obedience to authority and institutions, as well as the experience of societies exposed to wars and revolutions on moral competence. These regional, historical, political, and cultural differences are also reflected in different MCT performances, with the "segmentation phenomenon" possibly influencing negatively the score of Latin countries, especially Americans, reflecting a possible limitation of the instrument in this population.

One must also consider the potential impact of generational issues in the score. Most of the German studies [8] were developed in the 1990s, addressing groups of students from the well-known generation X, which includes individuals born between 1965 and 1980. In contrast, the studies by Feitosa and collaborators [14,15] and by Serodio and collaborators [16], developed in the 2010s, represent the generation Y (internet generation, or millennials), born between 1981 and 1994. Finally, the present study and that of Otani [17] address individuals born between 1995 and 2010, representing generation Z.

According to Calliari [18], generations can have an impact on the educational process, and the prevalence of technologies is an important differentiating factor between them. Studies have described, for example, reduced reading habits as opposed to an increased exposure to electronic and technological resources. This different interaction with technology seems to impact information processing and thinking models, as well as social and professional interests.

Perception and social interaction also appear to be changing over generations, including in Brazil [19], where generation Z is seen as more sociable, but society is perceived as more egocentric, with less universal values than the previous ones.

This characterization in generations [19] is not restricted to the temporal unit, nor is it a deterministic or homogeneous variable, but rather contemplates specific collective identities and reflects the historical-social context of each population group. Some authors [20,21] claim that generational issues, especially between generations Y and Z, would strongly impact teaching-learning processes and the development of attitudes and skills among medical students.

Conversely, the frequently used moral evaluation instrument—the MCT—has the premise of valuing the humanitarian approach as a reference for higher moral levels. Thus, one may question whether the apparent decline in scores observed in the studies, which include samples from different generations, is related to generational changes.

Stagnation and decline of moral competence in medical undergraduate training

By correlating the MCTxt scores (total or segmented) to the course periods in the univariate analysis, we identified statistically significant drops in the score between the first period and the others, when considering the C total scores (with three dilemmas), the C segmented scores with two dilemmas (worker/judge), and the judge's scores. In contrast, the multivariate analysis, which evaluated the interaction between scores, dilemmas, and periods, found no influence of the period on the scores. Moreover, analysis of the relationship between categories and periods showed no statistically significant differences.

Some univariate sub-analyzes showed a drop in moral competence scores, characterized as "moral decline" during medical training, as widely cited in national and international literature [2,10,14,22,23], described by some authors as "ethical erosion" [24]. Importantly, this decline occurred mainly between the first and fifth periods, corroborating the study by Hojat [25], which claims that the "demon is in the third year," period considered critical for moral regression.

Although the multivariate analysis did not confirm such a decline, it identified moral

stagnation due to the absence of the expected moral competence development. Thus, whether as decline or stagnation, the present research corroborates studies by authors such as Self, Baldwin, and Wolinsky, according to which the *experience of medical education appears to inhibit the increase in moral reasoning of medical students that otherwise would be expected in young adults of this age and education level* [26].

This observation contrasts with Piaget's and Kohlberg's propositions, for which, as Bataglia, Morais and Lepre [7] point out, moral development should follow educational levels. Similarly, according to Lind, *several studies on adolescent students show moderate to high correlations between levels of education and moral development* [27]. Therefore, our study proves the absence of progression (or even decline) in the development of moral competence, characterized by the non-occurrence of expected C score (MCT) progression during academic education.

Importantly, the observed decline or stagnation data start from low (or very low) levels of moral scores, contrary to what Feitosa and collaborators [14] and Lind [8] discussed, with reservations, about a possible "ceiling effect" to justify the non-progression of moral competence in European medical students, since they already presented very high scores at the start of the course, which could impair the perception of moral development.

In the present study, however, the opposite can be argued, that is, whether such low levels of C score since freshmen year could not be impairing the perception of a more significant moral regression, thus suggesting a possible "floor effect."

Finally, other extrinsic aspects should be considered, such as: the potential impact of recent changes in the National Curriculum Guidelines for Undergraduate Medical Education [3], which could be influencing a smaller decline in moral competence scores than those cited in other national studies; or the influence of the studied institution's curriculum model, which adopts a PBL methodology, but without evidence that this curricular model actually interferes in attitudinal issues, such as moral behavior.

Applicability of MCT and the "segmentation phenomenon"

This study observed a distinct performance of the dilemmas, based on the discordant behavior of the doctor's dilemma in relation to the others, confirming the "segmentation phenomenon" [7,12] well described in Latin America. The multivariate analysis showed that the worker's and judge's dilemmas behaved equivalently, regardless of course period evaluated, and tend to present similar scores to each other, but significantly higher than those of the doctor's dilemma: (worker=judge)>doctor.

In turn, the univariate analyses showed that the C segmented scores for the worker's and the judge's dilemmas behaved similarly, whereas the doctor's dilemma presented very distinct and always lower values (see Table 1 and Figure 1). The inclusion of the doctor's dilemma seems to limit the perceived decline of the C score, since it reduces the scores that include it.

Considering that *internal consistency is based on the principle that each part of the test should be consistent with the other parts* [11], we highlight the fact that the divergence between the dilemma scores can compromise the internal consistency or reliability of the test. Thus, suppressing the doctor's dilemma could contribute to improve its consistency and validity.

The C score is also negatively influenced by the number of dilemmas used (the C score calculated with three dilemmas is always smaller than the one calculated with two dilemmas, which is smaller than each dilemma separately). As Lind argues, *if the C-score is calculated only for each dilemma separately, it will be higher, because the variation due to the dilemma's context is omitted* [12].

Thus, the C segmented score with the best performing MCTxt dilemmas in Brazil (worker and judge) could reproduce a score level more comparable to the MCT C score in Europe. Thus, both scores with two dilemmas would support more equivalent values, higher than the MCTxt (with three dilemmas) and without the negative influence of the doctor's dilemma in this context.

Classification by categories is also impaired with MCTxt, as these are not appropriated by calculations with three dilemmas, as already

described by Lind [12], nor by the MCT score, which is distorted by the negative influence of the doctor's dilemma. In both situations, classification would bring negative falsified results. In Brazil, therefore, the use of the C segmented score with the worker's and the judge's dilemmas would allow for a categorization more comparable with that of the original MCT in Europe.

Sociodemographic and academic aspects

To better understand the reports of "ethical erosion" in medical education, cited by several authors, we sought to identify variables related to the students' life history that could explain them. The linear regression model developed showed a correlation of moral competence scores only with the variable "living with family." Despite being associated with higher scores, this variable does not sufficiently explain the variability of the scores but may directly or indirectly reflect other variables that better explain it.

Thus, our study signals a variable that can be broken down or that allows to identify correlated conditions that explain the variation in scores. This result was probably not more elucidative as a result of the homogeneous socioeconomic profile of the sample and the low participation in extracurricular activities. Therefore, gaps remain in the explanation of factors that influence inadequate moral development during medical education.

Factors can still be related to the students' life history, including socioeconomic, cultural, and academic aspects, especially variables concerning living with family and/or distance from the family structure. Further research should expand these analyzes by comparing samples of students (and institutions) with greater heterogeneity, which better represents the diversity of the Brazilian population, and seek other approaches related to family ties/dynamics, student mental health, self-esteem, spirituality, metacognition, among others.

Given the importance of the educational environment, cited by Lind [26] as a determinant of students' moral development, studies should focus on other issues concerning educational organizations that provide environments conducive to moral development, including moral evaluation of the student body and its correlation with students' moral status.

Professors are, admittedly, seen as role models with the potential to influence students in the development of attitudes and values, especially regarding ethical and moral aspects, which are still relegated to the hidden curriculum. But the challenge remains to understand how these institutions and their faculty have acted to meet the demands arising from generational changes and the impact of new curricular platforms being implemented.

Final considerations

This study identified, among the students evaluated, low moral competence scores in all course periods from admission to medical school, with values lower than those of previous studies described in the literature, suggesting a possible generational trend related to contemporary aspects.

In comparing the course periods, we observed a significant drop in scores, with a reduction both in the C total score and in some segmented sub-analyses, showing a regression of moral competence between the first and final years.

The classification by categories showed no significant difference between course periods, with most students in all periods presenting low or very low levels of moral competence. Similarly, the multivariate analysis did not confirm the influence of course period on moral competence scores. Both situations indicated moral stagnation, understood as the non-occurrence of the expected moral development during undergraduate education.

In evaluating the performance of the moral competence assessment tool, we observed that the MCTxt C segmented scores of the worker's and the judge's dilemmas do not differ significantly from each other. But the mean scores for these two dilemmas are significantly higher than the C segmented scores of the doctor's dilemma—(worker=judge)>doctor—, regardless of course period. These findings point to the "segmentation phenomenon" of the MCTxt, already well reported in Latin America, observed based on the discordant behavior of the "doctor's dilemma," with mean

scores lower than the other two, and negatively influencing the global score.

Regarding the sociodemographic, academic, and extracurricular variables, analyzed by linear regression model, only the variable "living with family" showed a statistically significant association with the scores. However, the model failed to sufficiently explain the variability of the scores and determine a relevant correlation between these variables and the moral competence score.

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Marcio Rodrigues de Castro – Master – marcioinfecto@terra.com.br
0000-0001-7180-555X

Alexandre de Araújo Pereira – Master – alex68@uol.com.br
0000-0002-4166-9312

Patrícia Unger Raphael Bataglia – PhD – patriciaurbataglia@gmail.com
0000-0002-2575-3020

Correspondence
Marcio Rodrigues de Castro – Av. Japão, 309, Cariru CEP 35160-068. Ipatinga/MG, Brasil.

Participation of the authors
Marcio Rodrigues de Castro was responsible for the study design, data collection and analysis, and manuscript writing. Alexandre de Araújo Pereira and Patrícia Unger Raphael Bataglia participated in the theme conception, discussion of the results, manuscript writing and final review.

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