



ORIGINAL ARTICLE

Levels of empathy, empathy decline and differences between genders in medical students of Cartagena (Colombia)



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KEYWORDS

Empathy;
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Abstract

Introduction: Empathy helps to develop an appropriate doctor–patient relationship, which, according to the literature is susceptible to decline. Therefore, the purpose of the present study was to estimate the levels of empathy in general, and the potential for the growth of empathy in medical students.

Materials and methods: This exploratory and cross-sectional study included students from the first to fifth academic year of the University Corporation Rafael Nunez (Cartagena, Colombia) ($N=971$, $n=756$, 77.86% of the population studied). Participants were given the Jefferson Scale of Empathy, Spanish version for medical students, validated and adapted in Colombia. A bifactorial variance analysis (model III) was used to find the mean differences between courses and genders, and the interaction between these two factors. Data was described using simple arithmetic graphs and processed with SPSS 20.0 to estimate the total potential for growth.

Results: Differences were found between academic years and gender in empathy in general and in the component of “compassionate care”.

Conclusion: The levels of empathy are relatively low, and the behavior of empathy levels does not match the concept of empathy decline. There are no gender differences and there is a considerable potential for growth of empathy, as well as its components.

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PALABRAS CLAVE

Empatía;
Componentes de la
empatía;
Crecimiento de la
empatía potencial;
Estudiantes de
medicina;
Erosión empática

Niveles de empatía, declinación empática y diferencias entre géneros en estudiantes de medicina en Cartagena, Colombia

Resumen

Introducción: La empatía permite la adecuada relación médico-paciente y se plantea que es susceptible de disminuir según lo informado en la literatura. El propósito del presente estudio fue estimar los niveles de empatía en general y el potencial para el crecimiento empático en estudiantes de medicina.

Materiales y métodos: Este estudio exploratorio y transversal, incluyó estudiantes desde el primero al quinto año académico de la Corporación Universitaria Rafael Núñez, Cartagena, Colombia ($n=971$, $n=756$, 77,86% de la población estudiada). Los participantes recibieron la escala de empatía de Jefferson, versión en español para estudiantes de medicina, validada y adaptada en Chile. Se aplicó un análisis de varianza bifactorial (modelo III) para encontrar diferencias de medias entre cursos, géneros y la interacción entre estos 2 factores. Los datos se describieron usando gráficos aritméticos simples y se procesaron con SPSS® Statistics v.20.0 para estimar el potencial total de crecimiento.

Resultados: Se encontraron diferencias entre los años académicos y el género en la empatía en general, y en el componente de «atención compasiva».

Conclusión: Los niveles de empatía son relativamente bajos, y el comportamiento de los niveles de empatía no coincide con el concepto de disminución empática. No hay diferencias de género, y la estimación del potencial de crecimiento de la empatía y la de sus componentes plantea la necesidad de un urgente cambio curricular.

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Introduction

Medicine is a profession that services human beings. It cultivates human values in general, developing interpersonal skills and empathy that are fundamental elements for the medical practice.¹ Empathy in health care is a cognitive and behavioral attribute, which makes it possible to understand the patient and communicate that understanding.²⁻⁵ It is argued that empathy can be modified and can be developed intentionally,^{6,7} as a consequence, the development of empathic capacities during the academic training of medical students should be considered throughout the formative process (to be started in undergraduate and continue in the training of the medical specialist). However, in order to achieve this objective, it is necessary to make a good diagnosis of the behavior of empathy so that the intervention is performed in accordance with the observed reality.

At the present, there is no agreement that empathic decline constitutes a generalized behavior of the distribution of values of empathy as courses years increase⁸⁻¹⁰ and that women are necessarily more empathic than men.^{11,12} As a consequence of the above, the objectives of the present work are: a) to make a diagnosis about the empathic behavior of the medical students of Corporación Universitaria Rafael Núñez (Cartagena, Colombia); B) verify if empathic decline occurs and c) corroborate whether there are differences in levels of empathy between genders.

Material and methods

This exploratory and cross-sectional study was governed bioethically by the norms of Helsinki. The study

population consisted of medical students from the first to fifth academic year of the University Corporation Rafael Nunez (Cartagena, Colombia) ($N=971$, $n=756$, 77.86% of the population studied). This stratification was observed by the following years: First = 186; Second = 175; Third = 101; Fourth = 166 and Fifth = 128. In gender, there were: Female = 434 and Masculine = 322. Data was collected during September 2016.

The students were given the Jefferson Scale of Physician Empathy (JSPE), the Spanish version for medical students (version S), validated in Mexico¹³ and adapted in Colombia for medical students.^{14,15} Before being applied, the JSPE was submitted to reviewers (three relevant medical professionals in order to verify cultural and content validity).¹³ The application was confidential (with a neutral operator) and students' understanding of the culturally adapted scale was performed through a pilot test.

The data were subjected to normality tests (Kolmogorov-Smirnov) and homoscedasticity (Levene). Internal reliability of the data was estimated using the Cronbach's α and as each of the elements were removed, intraclass correlation coefficient, Hotelling's T^2 and Tukey non-additive test, were estimated for the mean and standard deviation. A bifactorial (model III) analysis of variance (ANOVA) was used with the purpose of observing if there were differences of means in the factor of academic year, gender and in the interaction between them. Data was described using simple arithmetic graphs and processed with the statistical program SPSS 20.0®. Total potential for growth was estimated by the quotient of two magnitudes: the actual difference between the observed scores of fifth-year students minus the score of first-year students

(D1), with respect to the possible difference between the highest value of empathy afforded by the instrument (140) and the effective value of the empathy of first year students (D2). As a consequence, Potential Growth = D1/D2. This indicator allows to evaluate the magnitude of advancement, regression or stagnation of empathy and can be used both in cross-sectional research (especially when the value of R^2 is low), as well as longitudinal. The significance level used was $\alpha \leq 0.05$ and $\beta < 0.20$ in all cases.

Results

The Kolmogorov–Smirnov and Levene tests were not significant ($p > 0.05$): the data were distributed in a normal manner, with equal variances. Cronbach's α values were satisfactory (untyped = 0.787 and typed = 0.795), confirming the existence of internal reliability. The value of the total Cronbach's α , if an element were removed, fluctuated between the values [0.764; 0.796] and is consistent with high reliability. Hotelling's T^2 test ($F = 102.34$) and Tukey's non-additive ($F = 39.39$) were highly significant ($p < 0.001$).

In the first case, it is inferred that there are differences between the means of the questions: not all questions contribute equally to the overall mean of the same (mean = 5.16) and, in the second case, the need to increase the power of the tests to achieve the additive character of the data. However, this task is difficult, since the populations studied are finite and small, and cannot be artificially increased. The results of the estimation of the means (total and combined by factor), standard deviation and sample size for each level of the two factors studied are shown below (Table 1).

Regarding the results of the ANOVA applied to empathy in general and to each of its components, we observed that the "Course" factor (C) in empathy in general ($p = 0.0005$) was highly significant; the eta-square value (0.056) was satisfactory and the observed power (1.0) was good; however in the Gender factor (G), the eta-square of 0.005 and the power of 0.45 were unsatisfactory: the mean and standard error of the mean of the women was 104.47 ± 0.73 and that of the men of 102.46 ± 0.82 ; for which the R^2 value explains only 5.6% of the variation of the empathy variable. In the component of "Compassionate Care" (CC), highly significant differences were found in the C factor ($p = 0.0001$); the eta-square value (0.064) and the observed power (1.0) were highly significant. The gender factor was also highly significant, the mean of the women was 36.57 ± 0.42 and the men of 34.64 ± 0.47 (from a maximum of 49 points); the R^2 value accounts for only 7.1% of all the variability of empathy.

In the component of "Perspective Taking" it was observed that the C factor was also highly significant ($p = 0.001$) with eta-square values of 0.026 and potency of 0.963, which are satisfactory; the values of empathy in the women were 56.82 ± 0.42 and of the men were 56.74 ± 0.48 (out of a maximum of 70 points): the R^2 value explains only 2.2% of the whole variability of empathy.

Finally, in the component the "Ability to Stand in the Patient's Shoes", no significant differences were found in any of the factors, as well as in the interaction ($p > 0.05$). Women achieved a value of 11.08 ± 0.17 and men of 10.7 ± 0.19 (from a maximum of 21 points). These results

should be discussed with caution, especially where the eta-square and potential value were not entirely satisfactory (Table 2).

In empathy in general, we observed that there were no significant differences between the first, second, and third years ($p = 0.246$) and between the third and fourth year ($p = 0.165$) and between the fourth and fifth year ($p = 0.985$); but the fourth year does not differ from third, but it does from the first and second; the fifth year does not differ from the fourth, but from the other courses and, therefore, it can be affirmed that the values of empathy in general increased consistently as the years of the career pass. However, if we consider that the growth potential of first year students was 40.23 (140–99.77); then, the difference between the empathy of fifth and first year students (108.00–99.77) was 8.23 points, that is to say, only 20.27% of the total growth potential was for empathy.

In the component of "Compassionate Care" it was observed a situation analogous to the behavior of empathy in general. Three well-defined groups were formed with significant differences ($p < 0.05$). If we consider that the growth potential of first year students was 13.56 (49–35.44); then, the difference between the empathy of the fifth and first-year students (38.99–35.34) was 3.65 points, that is, 26.92% of the total growth potential of this component. In the ANOVA, the levels of the rest of the components of empathy did not present significant differences between the levels of the factors nor in their interaction ($p > 0.05$) (Table 3).

Finally, the behavior of the means in the levels of factors C and G, it was found that in empathy in general, women have a constant increase of this attribute until the fifth year, that declines some points, retaining an average greater than the courses prior to the fourth year. Men have practically a constant increase from the first to fifth year (Fig. 1A). An inverse situation occurs in "Compassionate Care"; women have steady growth, while men decline in second and third, but increase in the remaining courses (Fig. 1B). In the case of the component of "perspective-taking", women decline in second and fifth years, whereas men do in second and fourth years (Fig. 1C). Finally, in the component the "ability to put themselves in the patient's shoes", women grow steadily and men decline in the third year (Fig. 1D). A general feature in all cases is that the values of empathy and that of its components in both genders, the corresponding means in fifth year are always greater than the first year (Fig. 1).

Discussion

The observed reliability and the specific use of the statistical tests used are justified since the objective of this work was to estimate the parameters (with the least possible bias of the levels of empathy) that allow a good diagnosis of the empathic behavior of the students with the patient and establish the comparisons. In addition, the risk of non-compliance with the data requirements and statistical tests were explicitly stated. We note that empathy levels are relatively low (relative to those found in other publications),^{16–22} both in empathy in general as well as in the components of empathy, all of which create the need for future intervention in the curriculum, as well as in teaching-learning processes of this attribute.

Table 1 Estimation of means, standard error of the mean and confidence interval of the mean in the empathy in general and in each one of its components.

Course	Gender	Median	Standard error	Confidence interval of 95%	
				Lower limit	Upper limit
<i>GE</i>					
First	Female	100.1	1.3	97.3	102.6
	Male	99.3	1.7	95.9	102.7
Second	Female	100.9	1.4	98.1	103.7
	Male	98.3	1.7	94.9	101.7
Third	Female	105.1	1.9	101.2	108.9
	Male	101.1	2.1	97.0	105.3
Fourth	Female	109.2	1.4	106.2	112.1
	Male	104.3	1.7	101.0	107.7
Fifth	Female	107.1	1.7	103.5	110.5
	Male	109.1	1.8	105.4	112.6
<i>CC</i>					
First	Female	33.2	0.7	31.7	34.7
	Male	33.4	0.9	31.5	35.4
Second	Female	34.5	0.8	32.9	36.1
	Male	32.5	0.9	30.5	34.4
CompaThird	Female	37.1	1.1	34.8	39.2
	Male	32.8	1.2	30.4	35.2
Fourth	Female	38.7	0.8	37.0	40.4
	Male	35.6	0.9	33.6	37.5
Fifth	Female	39.2	1.1	37.2	41.2
	Male	38.7	1.1	36.6	40.8
<i>PT</i>					
First	Female	56.2	0.7	54.6	57.7
	Male	54.9	0.9	52.9	56.9
Second	Female	55.3	0.8	53.7	56.9
	Male	54.4	1.0	52.4	56.4
Third	Female	56.9	1.1	54.6	59.1
	Male	58.3	1.2	55.9	60.7
Fourth	Female	59.2	0.8	57.5	61.0
	Male	57.5	0.9	55.5	59.4
Fifth	Female	56.3	1.0	54.3	58.3
	Male	58.5	1.1	56.4	60.5
<i>ASPS</i>					
First	Female	10.6	0.3	9.9	11.2
	Male	10.8	0.4	10.1	11.6
Second	Female	11.1	0.3	10.4	11.7
	Male	11.4	0.4	10.6	12.2
Third	Female	11.1	0.4	10.2	12.0
	Male	10.0	0.4	9.0	10.9
Fourth	Female	11.1	0.3	10.4	11.8
	Male	11.2	0.4	10.4	12.0
Fifth	Female	11.4	0.4	10.5	12.2
	Male	11.8	0.4	10.9	12.6

GE: General Empathy; CC: Compassionate Care; PT: Perspective Taking; ASPS: Ability to stand in the patient's shoes.

The "general" behavior that empathy increases across courses, is not consistent with the "empathic erosion" (declination) model proposed by Hojat et al. in medical student.¹ Similar results, in relation to the lack of consistency with this model in students of dentistry and medicine, have been reported.²²⁻²⁶ From this result it can be inferred that

"empathic erosion" is a particular case of several forms of empathic behavior between courses. From the previous inference emerges another, that any intervention that tries to increase the levels of empathy in the students, cannot be applied on the basis of a standard pattern, unless by a necessary and strict diagnosis of the behavior of this attribute

Table 2 ANOVA application, the value of F , eta-square, potential and R^2 of the test used and corrected.

General empathy	F	(p)	eta-square
<i>Potential</i>			
Course (C)	11.12	0.0005	0.056
1.0	0.056		
Gender (G)	3.3	0.06	0.00
0.4			
C * G	1.23	0.29	0.007
0.4			
<i>Beware of compassion on empathy</i>			
Course (C)	12.8	0.0001	0.06
1.0	0.071	Gender (G)	
9.4	0.002	0.01	0.8
C * G	1.6	0.2	0.009
0.5			
<i>Taking perspective on empathy</i>			
Course (C)	4.9	0.001	0.026
0.9	0.022		
Gender (G)	0.02	0.9	0.008
0.052			
C * G	1.4	0.2	0.008
0.4			
<i>Ability to stand in the patient's shoes (on empathy)</i>			
Course (C)	2.003	0.092	0.011
0.602	0.004		
Gender (G)	0.009	0.992	0.002
0.299			
C * G	0.937	0.442	0.005
0.299			

P =probability of committing type I error. * Symbol of interaction between factors C and G.

Table 3 Multiple comparisons of means in empathy in general and in each of its components.

	n	Subset ($p < 0.05$ within subset)		
		1	2	3
<i>General empathy course</i>				
First	186	99.7		
Second	175	99.9		
Third	101	103.2	103.2	
Fourth	166		107.1	107.1
Fifth	128			108.0
Significance within subset		0.3	0.2	0.9
<i>Compassionate care</i>				
First	186	35.3		
Second	175	33.7		
Third	101	35.1	35.1	
Fourth	166		37.4	37.4
Fifth	128			38.9
Significance within subset		0.4	0.14	0.5

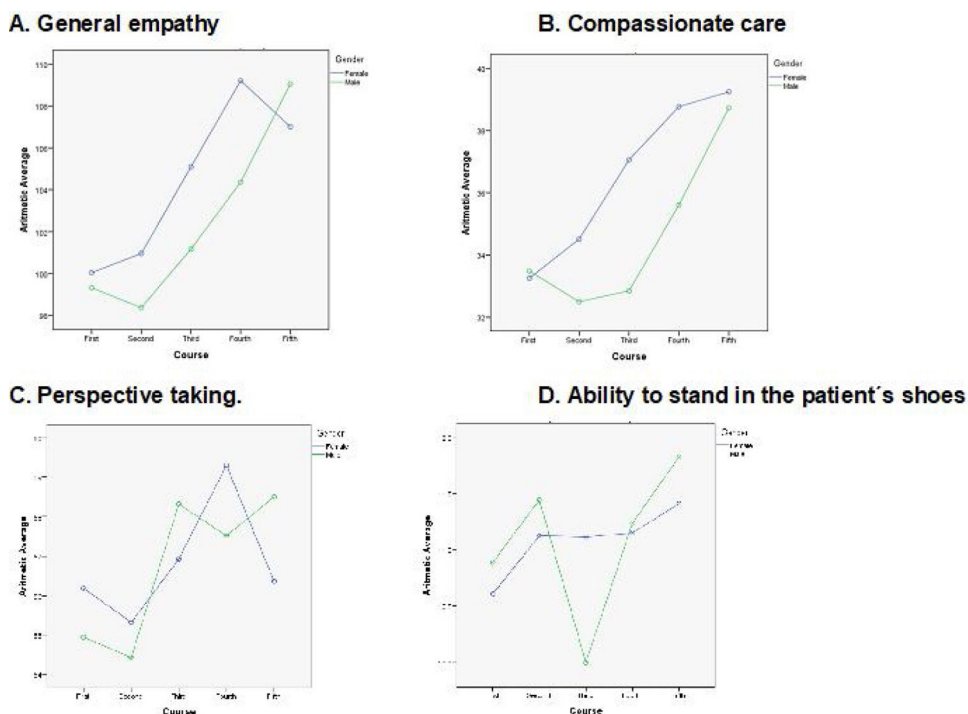


Figure 1 Distribution of the means of the years and genders in general empathy and in each of its components.

in the students. The absence of statistical differences found between genders favors the female in all courses in terms of absolute values except for the fifth (Fig. 1A).

The existence of the variability of empathic response in relation to gender was observed by Diaz-Narváez et al.¹² in dental faculties in Latin America. As a consequence, it can be argued that women are more empathic than men in all populations studied has no empirical basis. A new contradiction is then generated, in which other authors consider that the difference of empathy in favor of women constitutes a "natural" state.^{2,27-30} The value of T^2 and the low R^2 value estimated in our medical student, constitute evidence of the existence of variability in relation to the instrument responses, respectively, and that the factors studied explain very little about the overall variation of empathy in general. In most studies, the determination of the coefficient is not reported and, therefore, suggests the need to include other factors that help explain empathic behavior. There is potentially a significant margin of "empathic growth", as seen in only 20.27% of growth in respect to the in total growth potential (100%) in our medical students, which can be evaluated qualitatively as low and quantitatively confirms the need for the above-mentioned intervention. It does not seem that there are such estimates in the literature that demonstrate the "margin" of empathic growth that as a consequence, it is not possible to establish comparisons with other works in this regard.

The increase in the levels of empathy (in our medical students) associated with "Compassionate Care" was very similar to that of empathy in general (Fig. 1B). This "coincidence" can be explained in the same way as "empathy in general", because it is a component of

empathy itself. Such similarity could be associated with the statistical difference observed in the genera, in favor of the women, and that both are ascending, with a small decline in the men described in the results. The PTCP was the largest of all components: 26.92%, but its growth margin is still large and requires careful attention. The differences between gender in relation to this component have been discussed previously.²⁷ In the case of "Taking Perspective", the behavior is different from that of "Empathy in General" and "Compassionate Care" (Fig. 1C). The empathic decline in this component is not met and there are no substantial differences between the genders. A similar situation occurs with the component of the "Ability to Stand in the Patient's Shoes" (Fig. 1D). This generates contradictions with some studies that suggest that the cognitive components are more developed in the male gender.²⁶

A first generalization shows the following possible aspects, on the basis that the analysis of the components separately is only an abstraction, since the empathy is product of the dialectical interaction between its components²⁷: (a) The results reflect relatively low levels of empathy in the medical students examined, but emphasize the ascending form of empathic behavior in general and, especially, the "Compassionate Care" component; (b) It requires intervention in the curriculum and teaching-learning processes with the purpose of raising the levels of this attribute; (c) These same results suggest that the greater development observed in "Compassionate Care" may be associated with a greater growth of sympathy in students and not of cognitive empathy in particular and (d) The model of empathic decline and the "natural" difference between genders in relation to empathy are not fulfilled.

Conclusions

The levels of empathy of the medical students, in general, examined are low and therefore an intervention in the curriculum and in the teaching-learning processes is required to raise the levels of this attribute.

The results of our work suggest that the process of empathic decline is not met in the students examined and favors the hypothesis of the existence of different models for the evolution of empathy throughout the courses.

There is no difference in general empathy between genders, except for the findings found in the "Compassionate Care" component.

Compliance with ethical principles

The authors state that the procedures were followed in accordance with established regulations and approval of the CURN Clinical Ethics Committee Code CURN06-2015 and the Helsinki Declaration of the World Medical Association.

Data confidentiality

The authors declare to have followed the protocols in use of the core of this work with respect to the publication of data from the participants.

Authors' contributions

All stated authors meet the requirements of the Educación Médica to fully declare their authorship.

Conflicts of interest

All authors declare no personal or financial conflicts of interest. This project was supported by the CURN (Cartagena), Colombia and USS (Santiago), Chile.

References

- Hojat M, Vergare M, Maxwell K, Brainard G, Herrine S, Isenberg G, et al. The devil is in the third year: a longitudinal study of erosion of empathy in medical school. *Acad Med*. 2009;84:1182–91, <http://dx.doi.org/10.1097/ACM.0b013e3181b17e55>.
- Hojat M, Gonnella JS, Nasca TJ, Mangione S, Vergare M, Magee M. Physician empathy: definition, components, measurement, and relationship to gender and speciality. *Am J Psychiatry*. 2002;159:1563–9, <http://dx.doi.org/10.1176/appi.ajp.159.9.1563>.
- Hojat M, Gonnella JS, Mangione S, Nasca TJ, Magee M. Physician empathy in medical education and practice: experience with the Jefferson Scale of Physician Empathy. *Semin Integr Med*. 2003;1:25–41, [http://dx.doi.org/10.1016/S1543-1150\(03\)00002-4](http://dx.doi.org/10.1016/S1543-1150(03)00002-4).
- San-Martín M, Roig-Carrera H, Villalonga-Vadell RM, Benito-Sevillano C, Torres-Salinas M, Claret-Teruel G, et al. Empatía, habilidades de colaboración interprofesional y aprendizaje médico permanente en residentes españoles y latinoamericanos que inician los programas de formación médica especializada en España. Resultados preliminares. *Atem Primaria*. 2017;49:6–12.
- Delgado-Bolton R, San-Martín M, Alcorta-Garza A, Vivanco L. Empatía médica en médicos que realizan el programa de formación médica especializada Estudio comparativo intercultural en España. *Atem Primaria*. 2016;48:565–71.
- Gönüllü I, Erden S, Gökmen. Evaluation of student empathy level during the first five years of medical education at Ankara University. *J High Educ Sci*. 2017;7:651–6, <http://dx.doi.org/10.5961/jhes.2017.241>.
- Ghosh SK, Chakraborty S. Assessment of empathy among first-year medical student: a knowledge, attitude and practice study. *IJAE*. 2018;123:1–16, <http://dx.doi.org/10.13128/IJAE-22983>.
- Roff S. Reconsidering the "decline" of medical student empathy as reported in studies using the Jefferson Scale of Physician Empathy-Student version (JSPE-S). *Med Teach*. 2015;37, <http://dx.doi.org/10.3109/0142159X.2015.1009022>.
- Neumann M, Edelhäuser F, Tauschel D, Fischer MR, Wirtz M, Woopen C, et al. Empathy decline and its reasons: a systematic review of studies with medical students and residents. *Acad Med*. 2011;86:996–1009.
- Bratek A, Bulska W, Bonk M, Seweryn M, Krysta K. Empathy among physicians, medical students and candidates. *Psychiatr Danub*. 2015;27(S1):48–52.
- Rueckert L, Naybar N. Gender differences in empathy: the role of the right hemisphere. *Brain Cogn*. 2008;67:162–7.
- Silva MG, Arboleda J, Díaz-Narváez VP. Orientación empática en estudiantes de Medicina en una Universidad de República Dominicana. *Educ Med Sup*. 2014;28:74–83.
- Alcorta-Garza A, González-Guerrero JF, Tavitas-Herrera SE, Rodríguez-Lara FJ, et al. Validación de la Escala de Empatía Médica de Jefferson en Estudiantes de Medicina Mexicanos. *Salud Ment*. 2005;28:57–63.
- Alonso LM, Caro SE, Erazo AM, Díaz-Narváez VP. Evaluación de la orientación empática en estudiantes de medicina de la Universidad del Norte Barranquilla (Colombia). *Rev Cient Salud Uninorte*. 2013;29:22–33.
- Bilbao JL, Iglesias JE, Díaz-Narváez VP, Crespo-Camacho E, Alonso LM, Alcocer A. Orientación empática en estudiantes de medicina de las Universidades Libre y San Martín, Barranquilla, Colombia; 2015, <http://dx.doi.org/10.15446/revfacmed.v63.n4.49715>.
- Hojat M, Mangione S, Nasca TJ, Rattner S, Erdmann JB, Gonnella JS, et al. An empirical study of decline in empathy in medical school. *Med Educ*. 2004;38:934–41, <http://dx.doi.org/10.1111/j.1365-2929.2004.01911.x>.
- Parra-ramírez GJ, Cámara-Vallejos RM. Nivel de empatía médica y factores asociados en estudiantes de medicina. *Inv Ed Med*. 2017;6:221–7, <http://dx.doi.org/10.1016/j.riem.2016.11.001>.
- Moreto G, González-Blasco P, Pessini L, Craice-de Benedetto MA. La erosión de la empatía en estudiantes de Medicina: reporte de un estudio realizado en una universidad en São Paulo, Brasil. *Aten Fam*. 2014;21:16–9, [http://dx.doi.org/10.1016/S1405-8871\(16\)30005-0](http://dx.doi.org/10.1016/S1405-8871(16)30005-0).
- Santos MA, Grosseman S, Morelli TC, Giuliano ICB, Erdmann TR. Empathy differences by gender and specialty preference in medical students: a study in Brazil. *Int J Med Educ*. 2016;21:149–53, <http://dx.doi.org/10.5116/ijme.572f.115f>.
- Magalhães E, Salgueira AP, Costa P, Costa MJ. Empathy in senior year and first year medical students: a cross-sectional study. *BMC Med Educ*. 2011;29:52, <http://dx.doi.org/10.1186/1472-6920-11-52>.
- Batt-Rawden SA, Chisolm MS, Anton B, Flickinger TE. Teaching empathy to medical students: an updated, systematic review. *Acad Med*. 2013;88:1171–7, <http://dx.doi.org/10.1097/ACM.0b013e318299f3e3>.
- Díaz Narváez VP, Alonso Palacio LM, Caro SE, Silva MG, Arboleda J, et al. Empathic orientation among medical students from

- three universities in Barranquilla Colombia and one university in the Dominican Republic. *Arch Argent Pediatr.* 2014;112:41–9.
23. Roh MS, Hahm BJ, Lee DH, Suh DH. Evaluation of empathy among Korean medical students: a cross-sectional study using the Korean version of the Jefferson scale of physician empathy. *Teach Learn Med.* 2010;22:167–71.
 24. Shariat SV, Habibi M. Empathy in Iranian medical students: measurement model of the Jefferson Scale of Empathy. *Med Teach.* 2013;35:e913–8.
 25. Ferreira-Valente A, Monteiro JS, Barbosa RM, Salgueira A, Costa P, Costa MJ. Clarifying changes in student empathy throughout medical school: a scoping review. *Adv Health Sci Educ Theory Pract.* 2017;22:1293–313, <http://dx.doi.org/10.1007/s10459-016-9704-7>.
 26. Calzadilla-Núñez A, Díaz-Narváez VP, Dávila-Pontón Y, Aguilera-Muñoz J, Fortich-Mesa N, Aparicio-Marengo D, et al. Erosion of empathy during medical training by gender. A cross-sectional study. *Arch Argent Pediatr.* 2017 Dec 1;115:556–61, doi: 10.5546/aap.2017.
 27. Díaz-Narváez VP, Alonso-Palacio LM, Caro SE, Arboleda-Castillo J, Bilbao J, Iglesias-Acosta J, et al. "Compassionate care" component of the construct empathy in medical students in Colombia and Dominican Republic. *Act Med Mediterr.* 2017;33:101–7.
 28. Bond AR, Mason HF, Lemaster CM, Shaw SE, Mullin CS, Holick EA, et al. Embodied health: the effects of a mind-body course for medical students. *Med Educ Online.* 2013;18, <http://dx.doi.org/10.3402/meo.v18i0.20699>, 20699.
 29. Chen AK, Kumar A, Haramati A. The effect of Mind Body Medicine course on medical student empathy: a pilot study. *Med Educ Online.* 2016;21:31196, <http://dx.doi.org/10.3402/meo.v21.31196>.
 30. Srivastava K, Das RC. Empathy: process of adaptation and change, is it trainable? *Ind Psychiatry J.* 2016;25:1–3, <http://dx.doi.org/10.4103/0972-6748.196055>.