

ORIGINAL RESEARCH

Empathy levels among dental students and professors from a dental school in the Dominican Republic

Empatía en estudiantes y profesores de una escuela de odontología de República Dominicana

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Abstract

Introduction: The concept of empathy has been incorporated as one of the key elements for the achievement of the teaching-learning process goals in health science students.

Objective: To estimate and compare the levels of empathy among dental students and professors in the undergraduate dental medicine program at the Universidad Central del Este (Dominican Republic).

Materials and methods: Cross-sectional study. The study population (n=264) was divided into two groups: the first consisted of students in their first to fifth year of dental school (N=223; n=215), distributed in two areas (basic-preclinical and clinical courses), while the second group comprised professors working in both areas in the dental school of the university (N=53; n=49). The Jefferson Scale of Empathy (S-Version) was used. The descriptive analysis of the data included the estimation of means, standard deviations and percentages, and the reliability of the data was estimated using Cronbach's alpha. In addition, a two-way ANOVA was performed, calculating the effect size and the statistical power of the test; furthermore, when the Fisher's exact test was significant for any factor, Tukey's test was used to estimate differences between means. A significance level of $\alpha < 0.05$ and $\beta < 0.20$ was established.

Results: Overall empathy scores and compassionate care dimension scores among the professor group did not differ significantly from the scores obtained by the students (basic-preclinical and clinical area), but there were differences between students from both areas ($p < 0.05$). There were no significant differences between the three subgroups in the Perspective Taking and Walking in the Patient's Shoes dimensions ($p = 0.428$ and $p = 0.866$).

Conclusion: The levels of empathy and compassionate care dimension of professors are similar to those of students in general (regardless of the area).

Resumen

Introducción. El concepto de empatía se ha integrado como uno de los elementos centrales para el logro final del proceso de enseñanza-aprendizaje en estudiantes de ciencias de la salud.

Objetivo. Estimar y comparar los niveles de empatía entre estudiantes y profesores de pregrado de odontología de la Universidad Central del Este (República Dominicana).

Materiales y métodos. Estudio transversal. La población de estudio (n=264) se dividió en dos grupos: el primero, compuesto por estudiantes de primero a quinto año de la carrera de odontología (N=223; n=215) distribuidos en dos áreas (básica-preclínica y clínica), y el segundo, por los docentes de ambas áreas en la escuela de odontología de la universidad (N=53; n=49). Se utilizó la Escala de Empatía Médica de Jefferson (Versión-S). El análisis descriptivo de los datos incluyó la estimación de medias, desviaciones estándar y porcentajes, y la confiabilidad de los datos se estimó mediante α de Cronbach; además, se realizó un ANOVA bifactorial, calculándose el tamaño del efecto y la potencia de la prueba, y en los casos en que la prueba exacta de Fisher fue significativa para algún factor, se utilizó la prueba de Tukey para estimar las diferencias entre las medias. El nivel de significancia estadística utilizado fue $\alpha < 0.05$ y $\beta < 0.20$.

Resultados. Los valores globales de empatía y de la dimensión Cuidado con compasión en los profesores no difirieron significativamente con los obtenidos por los estudiantes (área básica-preclínica y clínica), pero sí hubo diferencias entre los estudiantes de ambas áreas ($p < 0.05$). En las dimensiones Adopción de perspectiva y Ponerse en los zapatos del otro no existieron diferencias entre los tres subgrupos ($p = 0.428$ y $p = 0.866$).

Conclusión. Los niveles de empatía y de la dimensión Cuidado compasivo de los profesores no difieren de los de los estudiantes en general (ambas áreas).



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Introduction

Empathy is considered to be one of the key formative elements in the teaching-learning processes of dental students¹ and in health sciences programs in general. In this sense, professors can be role models for their students and influence them by creating the bases for an interaction that stimulates and promotes meaningful learning, as well as prosocial bonds that contribute to the comprehensive training of their students.^{1,2} A strong empathy structure in professors can lead to a greater capacity to understand the personal and social conditions of students and patients; to feel concern in response to both positive and negative emotions; and to respond with compassion without losing sight of the teaching-learning process and avoiding emotional contagion.²

The educational process is relational in nature and empathy is involved in the construction of shared meanings. In this regard, the idea of distant professors with no emotional contact with students and patients is a concept alien to the teaching-learning processes and to current considerations on the need for comprehensive training of students in higher education.^{2,3}

Empathy in professors (developed and put into practice in their daily practice) is an important factor that contributes significantly to the success of their students, considering that it will favor a positive climate in the classroom and in the clinical area. In this way, professors positively affect their students when they act as role models through the constant practical demonstration of the skills that are intended to be inculcated and strengthened in the training process.^{4,5}

Some authors⁶⁻⁹ state that healthcare based on an empathetic relationship between patients and dentists results in a high degree of patient and professional satisfaction, as well as positive repercussions on the success of a treatment. It follows that the development of empathy in students should be a permanent concern in educational institutions and that this concern should be expressed through an effective and efficient policy related to the integration of empathy in the training of cross-cutting competencies in all health programs.¹⁰ Thus, the American Dental Education Association (ADEA)¹⁰ has stated that empathy is the second most important clinical competence for dentists. However, while its inclusion in the curriculum is essential, it is not sufficient to promote its development.

Empathy training implicates a process that requires preparation and time, because it is not a skill that can be improvised due to its complexity^{11,12} and dynamism and because it is influenced by several factors,¹¹⁻²³ including the example of professors.¹ In this regard, it is worth mentioning that the teaching-learning process of empathy has a cross-cutting nature and affects the training of all health science students.^{14,15,18-23}

In view of the above, it might certainly be inferred that empathy levels in professors should be higher than in students,¹ but such inference does not have to be considered an axiom. In this context, the aim of the present study is to estimate and compare empathy levels among undergraduate dental students and professors at the Universidad Central del Este (Dominican Republic).

Materials and methods

Context

This study was conducted at the Dental School of the Universidad Central del Este, located in San Pedro de Macorís, Dominican Republic. The dental program at this institution has a duration of 13 academic periods, 12 of which are distributed equally in 3

cycles or areas: basic area (first to fourth period), pre-clinical area (fifth to eighth period), and clinical area (ninth to twelfth period), plus one period for developing the thesis. For analysis purposes, in the present study, the basic and preclinical areas were grouped as a single area and compared with the clinical area.

Study type and population

Cross-sectional study. Data collection was carried out between May and June 2019 for both groups analyzed (students and professors).

The study population consisted of 264 people who voluntarily agreed to participate in the research and respond to the instrument to be administered. The study population was divided into two groups: the first was composed of students from the first to the fifth year of the dental program (N=223; n=215) distributed in two areas (basic-preclinical and clinical), and the second comprised the professors of both areas in the dental school of the university (N=53; n=49). Thus, 92.5% of professors and 96.4% of students who were part of the dental school in 2019 were included in the study.

The only inclusion criterion for selecting the samples was voluntary participation in the study and filling out the instrument in its entirety.

Instrument

Empathy was measured using the Jefferson Scale of Empathy-Medical Student Version (JSE-S), a self-administered instrument²⁴ that had previously been validated in Spanish in Dominican dental students.²⁵ This scale has a stable reliability (0.70-0.90) and consists of 20 items that measure the 3 dimensions of empathy (E): Compassionate Care (CC) (7 items); Perspective Taking (PT) (10 items) and Walking in Patient's Shoes (WPS) (3 items). It should be noted that the CC dimension belongs to the affective component, while the PT and WPS dimensions belong to the cognitive component.

Procedures

Once approved by the university ethics committee, the research project was submitted to the dental school management office to coordinate the logistics for its execution; in this way, the schedules of the students and professors and their distribution in the classrooms were established in order to collect the data. The instrument was administered between the third week of May and the second week of June 2019, so that the mid-term exams of the academic calendar were not interrupted.

A person who was not a member of the research team administered the scale face-to-face, in the classrooms, in a peaceful surrounding, and without external distraction (neutral operator). This person was trained to answer any questions that could arise and to verify that the questionnaires were returned with all questions answered and the informed consent form had been signed. The minimum time required to complete the questionnaire was 20 minutes.

Statistical analysis

Primary data were subjected to reliability studies (standardized and unstandardized Cronbach's alpha) with their respective 95% confidence interval (95%CI), as well as intraclass correlation coefficient (ICC), including Fisher's with its respective 95%CI. In

addition, descriptive statistics were used to estimate means, standard deviations and percentages.

The psychometrics of the JSE-S scale have already been studied in this population and the results were published by Díaz *et al.*²⁶ The presence of three latent dimensions or three theoretical factors was studied using a confirmatory factorial analysis: (CC, PT, and WPS);²⁷ the presence of this three-factor model in both sexes was studied using an analysis of invariance.²⁸ Comparisons between the means of the different factors (areas, sex, and the interaction between them) were made through a two-way analysis of variance (ANOVA).²⁹

Eta squared effect size (η^2) and power of the test ($PP=1-\beta$) were estimated to determine the degree of statistical differences and the probability of type II error, respectively. In cases where Fisher's exact test was significant for any factor, Tukey's test was used to estimate differences between means. Moreover, graphs of empathy behavior and dimensions are shown. The significance levels used were $\alpha < 0.05$ and $\beta < 0.20$

Ethical considerations

This study took into account the ethical principles for research involving human subjects established by the Declaration of Helsinki.³⁰ Similarly, the protocol was approved by the Research Ethics Committee of the Universidad Central del Este, in accordance with Resolution 01/2018 of July 1, 2018.

Prior to signing the informed consent, participants were explained the contents of this document and reminded that participation was voluntary, that their decision not to participate did not affect in any way their academic and/or professional relationship with the institution, and that their responses would be anonymous and therefore it was not necessary to provide personal details.

Results

The descriptive characteristics of the sample, in relation to sex and age, are presented in Table 1. Cronbach's alpha values were satisfactory (unstandardized: 0.762, standardized: 0.778), so an acceptable internal consistency was assumed.

Table 1. Participants' scores on the Jefferson Scale of Empathy (S version): mean and standard deviation of the overall scale and its components.

Area	Sex	n	Empathy		Compassionate care		Perspective taking		Walking in the patient's shoes	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD
Basic-preclinical (students)	Female	144	103.05	13.97	31.94	9.70	60.34	8.41	10.76	3.95
	Male	22	97.23	13.69	29.50	8.69	57.77	9.04	9.95	3.58
	Total	166	102.28	14.03	31.62	9.57	60.00	8.51	10.66	3.91
Clinical (students)	Female	37	107.95	15.43	35.54	9.73	61.51	7.22	10.89	3.99
	Male	12	112.08	13.55	37.92	8.95	62.83	4.75	11.33	3.37
	Total	49	108.96	14.96	36.12	9.51	61.84	6.68	11.00	3.82
Professors	Female	38	108.34	15.32	36.82	9.03	60.16	10.13	11.37	3.44
	Male	11	102.91	17.71	31.27	15.20	62.55	5.13	9.09	3.02
	Total	49	107.12	15.86	35.57	10.80	60.69	9.25	10.86	3.46
Total	Female	219	104.79	14.60	33.40	9.77	60.51	8.52	10.89	3.87
	Male	45	102.58	15.67	32.18	11.04	60.29	7.54	10.11	3.42
	Total	264	104.42	14.78	33.19	9.98	60.47	8.35	10.76	3.80

SD: standard deviation.

Note: the maximum possible scores for the total scale and each of the 3 dimensions are as follows: Empathy: 140, Compassionate Care: 49, Perspective taking 70, and Walking in the patient's shoes: 21.

Source: Own elaboration.

The total Cronbach's alpha value for E was 0.778 and ranged from 0.743 to 0.797; therefore, it is inferred that the test maintained acceptable reliability. Likewise, intraclass correlation was 0.762 ($F=4.203$; $p=0.005$ 95%CI: 0.718-0.802), which ratified the observed internal reliability.

Table 2 presents the results of the ANOVA analysis, which showed that there were highly significant differences between the means of E and the CC dimension ($p=0.003$ and $p=0.008$, respectively) in the area factor. In both cases, the effect size values were very satisfactory, and the differences found were large (exceeding the value of 0.16 for a two-way ANOVA). On the other hand, the power of the test exceeded the value of 0.80, which showed that the probability of committing the type II error was low. The sex factor and the interaction between area and sex factors (A*S) did not show significant differences ($p>0.05$). No significant differences were found in the PT and WPS dimensions ($p>0.05$).

Table 2. Results of ANOVA application, F-value, potential η^2 , and potential.

Measurement		F	P	η^2	Potential
Empathy	Area (A)	6.03	0.003	0.963	1.00
	Sex (S)	0.86	0.355	0.003	0.152
	A*S	1.57	0.21	0.012	0.332
Compassionate care	Area (A)	4.90	0.008	0.037	0.802
	Sex (S)	1.176	0.279	0.005	0.191
	A*S	1.486	0.228	0.011	0.316
Perspective taking	Area (A)	2.024	0.134	0.015	0.416
	Sex (S)	0.067	0.797	0.0005	0.293
	A*S	1.309	0.272	0.01	0.282
Walking in the patient's shoes	Area (A)	0.607	0.546	0.005	0.151
	Sex (S)	1.728	0.19	0.007	0.258
	A*S	1.124	0.327	0.009	0.247

p=probability of committing type I error; *symbol of interaction between the area and sex factors.

Source: Own elaboration.

Table 3 presents the results of the multiple comparison of means (Tukey's test). For E and CC, it is possible to see that there is a hierarchical order. Regarding E, students in the clinical area have the highest mean score, but it does not differ significantly from that of professors ($p=0.754$); at the same time, there was no statistically significant difference between the mean score of professors and students in the basic-preclinical area ($p=0.143$), but there were significant differences in the mean score between students in the clinical area and those in the basic-preclinical area ($p<0.05$). The same occurs in the CC dimension.

Finally, in the PT and WPS dimensions, there are no significant differences between the means of the three subgroups ($p=0.428$ and $p=0.866$, respectively).

Table 3. Comparison of empathy means and its components for the three areas analyzed.

Measurement/Area		n	Subset	
			(Differences between subsets: $p < 0.05$)	
			1	2
Empathy	Basic and preclinical students	166	102.80	-
	Professors	49	107.12	107.12
	Clinical students	49	-	108.96
	Intra-group significance	-	0.143	0.754
Compassionate care	Basic and preclinical students	166	31.62	-
	Professors	49	35.57	35.57
	Clinical students	49	-	36.12
	Intra-group significance	-	0.06	0.946
Perspective taking	Basic and preclinical students	166	60.00	-
	Professors	49	60.69	-
	Clinical students	49	61.84	-
	Intra-group significance	-	0.428	-
Walking in the patient's shoes	Basic and preclinical students	166	10.66	-
	Professors	49	10.86	-
	Clinical students	49	11.00	-
	Intra-group significance	-	0.866	-

Note: subsets 1, 2 and 3 are categories created by the means, with three subsets for Empathy, two for the dimensions Compassionate Care and Perspective Taking, and one for the dimension Walking in Patient's Shoes.

Source: Own elaboration.

Discussion

The premise that professors should have higher levels of empathy (and its dimensions) than their students was not confirmed in the present study.

According to the literature reviewed, at the time of the present study, no research was found comparing the levels of empathy among dental students and professors, with the exception of the work by Carvajal *et al.*,¹ who reported that, in a sample of 116 fourth and fifth year dental professors, 346 students from the basic and preclinical areas, and 189 from the clinical area, the average values for E, CC, and PT were higher among professors (E=119.09, CC=44.17, and PT=62.78) compared to students in the clinical area (E=114.95, CC=42.63 and PT=60.10); the latter were higher than those obtained by students in the basic-preclinical area in E and CC (E=109.47, CC=37.57 and PT=60.13). It is worth noting that these values were for the total number of participants in each group, that is, without stratifying by sex, and that no significant differences were found between men and women within the same group (professors and students in the clinical area and in the basic-preclinical area).

It should also be noted that in the study by Carvajal *et al.*,¹ the average WPS score of female students in the basic-preclinical area (11.81) was lower than that of female students in the clinical area, which in turn was similar to that of female professors (12.62 vs. 12.58), whereas in men, the score of male tutors (11.61) did not differ much from that of male students (basic-preclinical: 11.70 and preclinical: 11.36). In addition, in this dimension, female students had a higher score than male students, regardless of the area (basic-preclinical: 11.81 vs. 11.70 and clinical: 12.62 vs. 11.36).

Explaining the findings of Carvajal *et al.*¹ is not an easy task. On the one hand, if WPS is an empathy dimension whose "function" provides the subject the ability to understand the emotions, feelings and thoughts of the other (in this case, the patient)³¹ and if, on the other hand, empathy can be considered a systemic concept,^{8,9,12,15,19,21} then these findings would mean that empathy as a system is "unbalanced," and it would be logical to infer

that the professors included in the study would have difficulty when training empathy in their students (especially male tutors). In the case of this research, then, there will be the same limitations regarding the degree of ability of professors and dental students in both areas to recognize the emotions, feelings and thoughts of the patient. Nevertheless, this dimension is associated with the cognitive phase of empathy³² and, therefore, its levels could be raised by the introduction of psychological techniques that enable a cognitive restructuring of students to improve their understanding of the other.

The introduction of these techniques alone does not necessarily solve this imbalance. A process of interaction and integration of all the dimensions of empathy is also required for taking a “leap” or achieving a qualitative restructuring of the relationship between the components of the empathy system, which will allow for a better functioning of said system. This process (dynamic assembly of the three dimensions) is relatively slow and involves continuous testing of the student’s improvement, not only in this dimension (WPS), but in its interaction with the other two dimensions, which will allow for an effective increase in the level of empathy.

However, the results of this work show a more complex scenario than the one described above. The consistent finding that the levels of E and CC in professors (107.12 and 35.57, respectively) are between the values of the students in the clinical area (108.96 and 36.12) and in the basic-preclinical area (102.28 and 31.12) is far from the expected idea that professors would have higher values both in E and in its 3 dimensions compared to their students.

In general, the results of the present study could indicate that the levels of E in students in both areas are essentially dependent on the values obtained in the CC dimension. At this point, it should be noted that this dimension is particularly complex and is associated with cultural and moral processes, with family functioning,^{31,33-37} and the emotional phase of empathy; in other words, it is associated with the affective component of empathy.

On the other hand, it must be borne in mind that the emotions and feelings that a given individual has depend, to a large extent, on the ontogenetic development to which they have been subjected and on how ontogenetic factors interact with the development of the neural and biological bases of empathy;^{36,37} this interaction occurs from the first contacts of the child with their environment, especially in the mother-child relationship.³⁸ Consequently, it can be inferred that the CC dimension is not as susceptible to being “taught” with pedagogical techniques as if it can be done with the dimensions associated with the cognitive aspect of empathy.

This means that the affective structure of an individual (and the cultural and moral aspects that derive from this structure) is more difficult to “teach” and, therefore, to be positively transformed. However, it is well known that the last window for modifying the levels of empathy in individuals is the university, since there is some consensus that neural development ends at around the age of 25³⁹ (while still considering the existence of cerebral plasticity); as a result, universities have a social responsibility to take on the training of empathy in their students.

Furthermore, the lack of significant differences in the PT and WPS dimensions among the three groups analyzed confirms that, in general, there is an intricate empathetic scenario that must be studied by the corresponding university authorities.

Professors are expected to have higher levels of empathy, as an indispensable condition, in order to transmit to their students attitudes and behaviors conducive to empathic training. If the levels of students and professors are equal, the possibility of such transmission is limited. Thus, the results of the present study directly demonstrate the need to establish urgent empathetic interventions that not only involve students. In this regard, some authors have pointed out that, given its complexity, any empathetic intervention

should encompass the entire curriculum of a program and include an evaluation of professors to ensure systemic empathy training, among many other aspects.^{15,40}

Although it is not the aim of this paper, it is necessary to stress that due to the complexity of the empathy construct, it follows that interventions must be preceded by a precise empathic diagnosis and a clear strategy (strictly derived from the diagnosis). They should consider firstly, all possible factors that stimulate or undermine empathy or any particular dimension (indirectly manifested through the “empathy levels”) and, secondly, all teaching-learning techniques capable of achieving the positive transformation of effective empathy in students and professors themselves.

Such a strategy must be able of stimulating the factors that positively develop empathy (and its dimensions) and transform or eliminate those that suppress it, and, at the same time, it must consider that its success will only be evident in the long term with all the methodological and research design implications that derive from the situation described. Accordingly, the only plausible strategy resulting from the above-mentioned background is that any empathetic intervention must be planned in an interdisciplinary manner, must include the entire curriculum, and must be present from the first to the last year of the program. In this sense, and given that the intervention is long and complex, its results can only be measured in the concrete praxis of the professional, that is, during patient care.

The limitation of the present study is that, due to its cross-sectional design, the results constitute a partial view of a dynamic phenomenon; however, they can be considered as trends of empathetic behavior in the studied groups and allow, then, to make informed inferences. In this regard, it is recommended to carry out a study with the same characteristics but of a longitudinal nature.

Conclusion

The levels of E and the CC dimension of professors do not differ from those of students in both the pre-clinical and basic areas, but the latter have higher levels of empathy than the other group. In the PT and WPS dimensions, no differences were found between the studied areas.

Availability of data and material

The data generated and/or analyzed during the study are not publicly available, but they may be requested from the corresponding author.

Conflicts of interest

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References

1. Carvajal M, López S, Sarabia-Alvarez P, Fontalba J, Padilla M, Sumi J *et al*. Empathy Levels of Dental Faculty and Students: A Survey Study at an Academic Dental Institution in Chile. *J Dent Educ*. 2019;83(10):1134-41. <https://doi.org/gg8cr8>.
2. Meyers S, Rowell K, Wells M, Smith BC. Teacher Empathy: A Model of Empathy for Teaching for Student Success. *Coll Teach*. 2019;67(3):160-8. <https://doi.org/gf6df6>.
3. Suksudaj N, Lekkas D, Kaidonis J, Townsend GC, Winning TA. Features of an effective operative dentistry learning environment: students' perceptions and relationship with performance. *Eur J Dent Educ*. 2015;19(1):53-62. <https://doi.org/h5h3>.
4. Warren CA. Empathy, teacher dispositions, and preparation for culturally responsive pedagogy. *Journal of Teacher Education*. 2018;69(2):169-83. <https://doi.org/gdfmff>.
5. Goroshit M, Hen M. Teachers' empathy: can it be predicted by self-efficacy? *Teachers and Teaching*. 2016;22(7):805-18. <https://doi.org/gkk6xm>.
6. Narang R, Mittal L, Saha S, Aggarwal VP, Sood P, Mehra S. Empathy among dental students: A systematic review of literature. *J Indian Soc Pedod Prev Dent*. 2019;37(4):316-26. <https://doi.org/h5h6>.
7. Uziel N, Meyerson J, Giryas R, Eli I. Empathy in dental care-the role of vicarious trauma. *Int Dent J*. 2019;69(5):348-53. <https://doi.org/h5h7>.
8. Varela-de Villalba T, Ulloque MJ, Villalba S, Villalba R, Díaz-Narváez VP. Levels of empathy in dentistry students: measurement and comparison in two academic periods. *Universidad Católica de Córdoba (UCC) Argentina. Salud Uninorte*. 2018;34(3):641-51. <https://doi.org/h5sx>.
9. Díaz-Narváez VP, Amezaga-Avitia AC, Sarabia-Alvarez PA, Lagos-Elgueta M, Saavedra-Madrid M, Silva-Reyes P, *et al*. Chilean Dentistry students, levels of empathy and empathic erosion: Necessary evaluation before a planned intervention: Levels of empathy, evaluation and intervention. *Saudi Dent J*. 2017;30(2):117-24. <https://doi.org/h4cc>.
10. Huberman J, Rodríguez M, González S, Díaz V. Niveles de orientación empática en estudiantes de odontología de la Universidad del Desarrollo, sede Santiago (Chile). *Rev Clin Periodoncia Implantol Rehabil Oral*. 2014;7(3):169-74. <https://doi.org/f2wr4h>.
11. Decety J, Jackson PL. The functional architecture of human empathy. *Behav Cogn Neurosci Rev*. 2004;3(2):71-100. <https://doi.org/bhd7x7>.
12. Díaz-Narváez VP, Calzadilla-Núñez A, Alonso-Palacio LM, Torres-Martínez PA, Cervantes-Mendoza M, Fajardo-Ramos E. Empathy and Ontogeny: A Conceptual Approach. *West Indian Med J*. 2017;66(3). <https://doi.org/c8qt>.
13. Heyes C. Empathy is not in our genes. *Neurosci Biobehav Rev*. 2018;95:499-507. <https://doi.org/gfsfbf>.
14. Arispe-Alburqueque C, Yace-Martínez J, Díaz-Narváez V, Calzadilla-Núñez A, Utsman, R, Reyes-Reyes A. Empathy and Components of Empathy in Obstetrics Students. *Rev haban cienc méd*. 2020;19(1):143-53.
15. 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 Pediat*. 2017;115(6):556-61. <https://doi.org/hx9k>.
16. Ali K, Slade A, Kay E, Zahra D, Tredwin C. Preparedness of undergraduate dental students in the United Kingdom: a national study. *Br Dent J*. 2017;222(6):472-7. <https://doi.org/f94zwf>.
17. Findyartini A, Felaza E, Setyorini D, Mustika R. Relationship between empathy and motivation in undergraduate medical students. *GMS J Med Educ*. 2020;37(4):Doc43. <https://doi.org/h5tc>.
18. Dávila-Pontón Y, Vélez-Calvo X, Celleri-Gomezcoello A, Aguilera Muñoz J, Díaz-Narváez V, Calzadilla-Núñez, *et al*. Empathy and family functioning in University medical students from Azuay, Cuenca, Ecuador. *Salud Uninorte*. 2020;36(1):571-86. <https://doi.org/hx9f>.
19. Díaz-Narváez VP, Bilbao JL, Estrada-Méndez N, Ulloque J, Calzadilla-Núñez A, Barrera-Gil D. Consideraciones acerca de la declinación empática en estudiantes de medicina en Latinoamérica. *Rev Cienc Salud*. 2020;18(2):1-16. <https://doi.org/hzds>.
20. Castellón-Montenegro H, Barraza-Ospino DP, Borré-Ortiz YM, Lastre-Amell G, Erazo-Coronado AM, Díaz-Narváez VP. Empathy in nursing students from the Metropolitana University of Barranquilla (Colombia). *Texto Contexto Enferm*. 2020;29:e20180314. <https://doi.org/h5td>.
21. Barraza MA, More C, Calzadilla-Núñez A, Aguilera F, Díaz-Narváez VP. Empatía, componentes de la empatía y declinación empática en estudiantes de nutrición y dietética. *Salud Uninorte*. 2019;36(1):360-73.
22. Díaz-Narváez VP, Estrada-Méndez N, Arévalo-López Y, Calzadilla-Núñez A, Utsman-Abarca R. Empathy, Components of Empathy and Curricular Evaluation of the Faculty of Dentistry, Evangelical University of El Salvador. *Pesq Bras Odontoped Clin Integr*. 2017;17(1):e3759. <https://doi.org/hx87>.
23. Ávila-Alarcón V, Carrasco-Alfaro C, Osorio-Cerda L, Calzadilla-Núñez A, Díaz-Narváez VP. Estudio transversal de empatía con el paciente en estudiantes de kinesiología. *Educ Med Super*. 2020;34(2):e1919.

24. Hojat M, Mangione S, Nasca TJ, Cohen MJ, Gonnella JS, Erdmann JB, *et al.* The Jefferson Scale of Physician Empathy: development and preliminary psychometric data. *Educ Psychol Meas.* 2001;61(2):349-65. <https://doi.org/dbs>.
25. Silva MG, Arboleda-Castillo J, Díaz-Narváez VP. Orientación empática en estudiantes de odontología de la Universidad Central del Este. *Odontoestomatología.* 2013;15(22):24-33.
26. Díaz VP, Reyes A, Calzadilla A, Torres PA, González E; Bilbao JL, *et al.* Psychometry and Estimation of Cut-Off Points of Jefferson's Scale of Empathy in Dental Students. *J Dent Educ.* 2021;85(3):322-30. <https://doi.org/hx86>.
27. Hojat M, DeSantis J, Shannon SC, Mortensen LH, Speicher MR, Bragan L, *et al.* The Jefferson Scale of Empathy: a nationwide study of measurement properties, underlying components, latent variable structure, and national norms in medical students. *Adv Health Sci Educ Theory Pract.* 2018;23(5):899-920. <https://doi.org/gfr4xc>.
28. Cheung GW, Rensvold RB. Evaluating Goodness-of-Fit Indexes for Testing Measurement Invariance. *Struct Equ Modeling.* 2002;9(2):233-55. <https://doi.org/fd4n2m>.
29. Díaz-Narváez VP. Metodología de la Investigación Científica y Bioestadística para Profesionales y Estudiantes de Ciencias de la Salud. 2nd ed. Santiago de Chile: Ril Editores; 2009.
30. World Medical Association (WMA). WMA Declaration of Helsinki – Ethical principles for medical research involving human subjects. Fortaleza: 64th WMA General Assembly; 2013.
31. Díaz-Narváez VP, Alonso-Palacio LM, Caro SE, Silva M, Arboleda-Castillo J, Bilbao J, *et al.* Compassionate Care Component of the Construct Empathy in Medical Students in Colombia and Dominican Republic. *Acta Med Mediterr.* 2017;33(1):101-7. <https://doi.org/hx9j>.
32. Barraza MA, More C, Calzadilla-Núñez A, Aguilera F, Díaz-Narváez VP. Empatía, componentes de la empatía y declinación empática en estudiantes de nutrición y dietética. *Salud Uninorte.* 2019;35(3):360-73.
33. Decety J. The Neurodevelopment of Empathy in Humans. *Dev Neurosci.* 2010;32(4):257-67. <https://doi.org/cx8q36>.
34. López MB, Aran-Filippetti V, Richaud MC. Empatía: desde la percepción automática hasta los procesos controlados. *Av Psicol Latinoam.* 2014;32(1):37-51. <https://doi.org/d8mv>.
35. Decety J. The neural pathways, development and functions of empathy. *Curr Opin Behav Sci.* 2015;3:1-6. <https://doi.org/gfj8k2>.
36. Decety J, Michalska KJ, Kinzler KD. The Contribution of Emotion and Cognition to Moral Sensitivity: A Neurodevelopmental Study. *Cereb Cortex.* 2012;22(1):209-20. <https://doi.org/fmzx34>.
37. Decety J, Cowell JM. The complex relation between morality and empathy. *Trends Cogn Sci.* 2014;18(7):337-9. <https://doi.org/f58x9h>.
38. Dörr A, Banz C. Ventanas de oportunidad y capacidad de establecer vínculo afectivo en niños ferales v/s niños abandonados en instituciones. *Rev GPU.* 2010;6(1):38-45.
39. Gogtay N, Giedd JN, Lusk L, Hayashi KM, Greenstein D, Vaituzis AC, *et al.* Dynamic mapping of human cortical development during childhood through early adulthood. *Proc Natl Acad Sci U S A.* 2004;101(21):8174-9. <https://doi.org/bnzt2r>.
40. Díaz-Narváez V, Miranda-Carreño F, Galaz-Guajardo S, Sepúlveda-Navarro W, Zúñiga-Mogollones M, Calzadilla-Núñez A, *et al.* Variability of empathy among dental students. Implications not yet understood in Latin America. *Rev. Fac. Med.* 2022;70(1):e91207. <https://doi.org/h5tk>.