



Fecha de recepción: 15 de marzo de 2024
Fecha de aceptación: 29 de abril de 2024

ARTÍCULO ORIGINAL

<https://dx.doi.org/10.14482/sun.40.03.320.968>

Institutional Accreditation Process and Empathic Attitude in Dental Students in Two Different Academic Years

Proceso de acreditación institucional y actitud empática en estudiantes de odontología en dos años académicos diferentes

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ABSTRACT

Objective: To compare the levels of empathy evaluated in two different years at a university undergoing continuous and successful accreditation processes.

Material and methods: Exploratory and longitudinal research. The empathy measurements, in two moments (2016 and 2022), of dentistry students in a university undergoing successful institutional accreditation processes (2017 and 2022) were compared. Empathy data were obtained using the Jefferson Empathy Scale (student version). The reliability was estimated, and the compliance of the three-dimensional model of empathy and invariance of the model in the analyzed groups were checked. Empathy comparisons were performed using a trifactorial analysis of variance. The significance level used was $\alpha < .05$ and $\beta > .80$.

Results. The reliability of the data, the presence of the three-dimensional model, and the invariance of the model were verified. The values of empathy and the *Perspective* and “*Walking in Patient’s Shoes*” dimensions do not differ between the compared years, but the *Compassionate Care* dimension did. The classification of the observed empathy values, places it as “medium level”.

Conclusions. The levels of empathy, classified as medium level, did not vary between the two studied moments. The study allows us to say that, possibly, the systematic absence of teaching empathy could be a factor why this attribute has not increased.

Keywords: Empathy, dentistry, student, health education.

RESUMEN

Objetivo: Comparar los niveles de empatía evaluados en dos años diferentes en una universidad en proceso de acreditación continuo y exitoso.

Material y métodos: Investigación exploratoria y longitudinal. Se compararon las mediciones de empatía en dos momentos (2016 y 2022) con estudiantes de odontología de una universidad que se encontraban en procesos exitosos de acreditación institucional (2017 y 2022). Los datos de empatía se obtuvieron utilizando la Escala de Empatía de Jefferson (versión para estudiantes). Se estimó la confiabilidad, se comprobó la conformidad del modelo tridimensional de empatía y la invarianza del modelo en los grupos analizados. Las comparaciones de empatía se realizaron mediante un análisis de varianza trifactorial. El nivel de significancia utilizado fue $<0,05$ y $>0,80$.

Resultados: Se verificó la confiabilidad de los datos, la presencia del modelo tridimensional y la invarianza del modelo. Los valores de empatía y las dimensiones “*Perspectiva*” y “*Caminar en los zapatos del paciente*” no difieren entre los años comparados, pero sí la dimensión “*Atención Compasiva*”. La clasificación de los valores de empatía observados la sitúa como “nivel medio”.

Conclusiones: Los niveles de empatía, clasificados como “nivel medio”, no variaron entre los dos momentos estudiados. El estudio permite decir que posiblemente la ausencia sistematizada de la enseñanza de la empatía podría ser un factor para que este atributo no se haya incrementado.

Palabras clave: Empatía, odontología, estudiante, educación para la salud.

INTRODUCTION

There is agreement among researchers that two components participate in the architecture of empathy: the cognitive and the emotional one.¹⁻⁶ Empathy is a complex dynamic relationship^{6,9} between these components, and it is a product of the interaction of neural structures through connective systems¹⁰. The neural complexity of empathy, and the interaction between its components, substantiate the possibility of concretization of intersubjectivity between the dental professional and the patient¹⁻⁷. As a result, attitudes between the professionals and patients and vice versa are generated; those attitudes produce positive effects on the patient care process.¹⁻⁶

The development of empathy in dental students is problematic in Latin America. One of these problems is the existence of variability in the distribution of empathy across the courses (empathic declination), and also between the sexes.¹¹ The presence of at least five different forms of the distribution of the means of empathy levels across the courses has been observed, and not all of them reflect the classic empathic decline.¹⁻⁹ Such findings extend to the dimensions of Empathy (Compassionate Care, Perspective Talking or Perspective Adoption, and “Walking in Patient’s Shoes”).^{3,7,11} These results constitute empirical evidence that the classical process of decline is not universal, and that the causes that determine empathic erosion do not operate in the same way in different populations of dental students.^{3,7,11} This also happens with the average values of empathy (and its dimensions) between the sexes^{8,11,13}, and such empirical evidence contradicts the “premise” that women are necessarily more empathetic than men, at least in Latin America.^{1-9,11,13} The presence of variability of the empathic response implies that the processes of empathic intervention depend more on the singular and particular processes¹⁻⁹ that occur within each university (including each faculty and career), the culture of the country, and, in general, the effects of the ontogeny process to which the students have been exposed.¹² As a consequence, an “empathy diagnosis” is necessary before applying intervention. The concrete and specific findings presented by said diagnosis constitute the compass that allows a serious and responsible intervention to

be built.^{9,13,14} However, such diagnoses are not considered within the parameters to be evaluated in the accreditation processes at universities in Latin America, and even less within the natural actions derived from the diagnosis. Therefore, the responsibility that universities have regarding the development of empathy is not subject to scrutiny in the accreditation processes. This situation must have an undesirable effect in the development of empathy.

Under the previously described conditions, it will be interesting to determine if there is an increase in the empathy of the dental student from the application of a well-constructed curriculum aimed at the professional improvement of the student. If this were to happen, the certification of accreditations in universities would have, as a side effect, an increase in empathy in students. Consequently, the objective of this study is to compare the levels of empathy assessed in two different years at a university subjected to continuous and successful accreditation processes in 2017 and 2022.

MATERIAL AND METHODS

Design

The type and design: exploratory, non-experimental, and longitudinal (two cross-sectional measurements)¹⁵

Population and Sample

Population: comprised by all students officially enrolled in the Doctor of Dental Surgery program in the years 2016 and 2022 (from the first to the fifth year, and from the first to the seventh year, respectively) belonging to the School of Dentistry of Universidad Evangélica de El Salvador (UEES). Sample: comprised by all the students who agreed to participate and voluntarily sign the informed consent. The samples are not probabilistic, samples for convenience were considered. In both measurement moments, all students were exposed to the same pedagogical strategy making a strong emphasis on teaching human values.

Variables under Study

Dependent variable: Empathy (E). Dimensions of empathy: Compassionate Care (CC), Perspective Talking (PT) or Perspective Adoption (PA) and “Walking in Patient’s Shoes” (WIPS). Independent

variables (fixed factors): Years (2016 and 2022), Level (first to fifth:2016; first to seventh:2022), Sex (female and Male).

Data Collection

The data collection process, for both moments under study, was carried out between the months of September and November 2016² and 2022, respectively.

Inclusion Criteria

All those students who agreed to respond to the instrument voluntarily, regular student status (basic, preclinical, or clinical levels) who were present when the instrument was applied.

Exclusion Criteria

Not signing the informed consent.

Collection Strategy

The data were collected by Dental School professors. The informed consent and the instrument measuring empathy were applied in paper format and in person during class moments. Professors were trained for the correct application and reception of the answers.

Instrument

The measurement of empathy levels was performed using the Jefferson Scale of Empathy (JSE) (S version).^{16,17} Before its application the instrument was submitted to judges' criteria (dental surgeons, psychologists, pedagogues, and experts in higher education). Pilot test: applied to 30 students from all courses, including both sexes.² The psychometrics studies of the 2016 sample were satisfactory and published.¹⁷ The estimation of internal reliability, validity of the construct and invariance of the model (psychometrics) in the moments 2016^{2,18} and 2022 were processed with the same statistical tests.

Ethics Committee

The study was conducted under the Helsinki Ethical Standards (2013). The research project, as well as the informed consent, were approved by the Ethics Committee of the Dental School of

the Universidad San Sebastián de Chile: Final Report 2016-2 and by the Ethics Committee of the UEEs: Act N° 307/08/2022. All socio-demographic and personal data and the responses of the instrument applied are confidential.

Statistical Analysis

Psychometrics of the Data Observed in the 2022 Sample

For the Confirmatory Factor Analysis (CFA, the Robust Maximum Likelihood estimator (MLR) was used¹⁸, which is characterized by being robust in the absence of data normality.¹⁹ To evaluate the fit of the models, the Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI) indices were used. For the RMSEA and SRMR indices, values less than 0.08 were considered acceptable.²⁰ For the CFI and TLI indices, values greater than 0.90 were considered acceptable.²¹ The evaluation of the reliability of the scale was performed through Cronbach's alpha coefficient (α) and the omega coefficient (ω), where a value $\omega > 0.80$ is adequate.²²

The Multi-group Confirmatory Factor Analysis (MGCEFA) was used to test the factor invariance of the scale according to sex, where a sequence of four hierarchical variance models was proposed: (1) configural invariance (reference model), (2) metric invariance (equality of factor loads), (3) scalar invariance (equality of factor load and intercept), and (4) strict invariance (equality of factor loads, intercept and residuals). A modeling strategy was used to compare the sequence of models, using the differences in the RMSEA (Δ RMSEA), where differences less than < 0.015 evidence the invariance of the model between the groups.²⁴ The differences in the CFI (Δ CFI) was also used where values less than < 0.010 show the invariance of the model between the groups.²³ The RStudio environment was used for the statistical analysis²⁴ and R.²⁵ Specifically the package "lavaan" was used²⁶ to perform the AFC and the "semTools" package to verify the factor invariance.²⁷

Comparison of Empathy Levels between the 2016 and 2022 Samples

After having studied the aforementioned psychometric properties, the mean and standard deviation of empathy levels (and their dimensions) were calculated in each of the three studied factors: Year(Y), Grade(C), and Sex(S). The comparisons between the courses were made from the first to the fifth year in both measurements. The descriptive data found in 2016² and 2022 were compa-

red using a trifactorial analysis of variance (ANOVA) in order to evaluate the presence of differences between the compared years, between the courses of both academic years, and between the sexes. The effect size was calculated (η^2 =eta squared)²⁸ to determine if the differences between the variables of the compared samples were large or small. And, to determine the magnitude of the type II error ($1-\beta$), the test power (PT) was calculated.²⁹ The results at this stage were processed using the statistical software SPSS 25.0.

The significance level used in all cases was $\alpha < .05$ and $\beta > .80$.

RESULTS

Descriptive analysis: The first measurement of Empathy (2016)² was made up of a sample of 148 (n) students out of a total of 240 (N) (61.67% of the studied population), between the first and fifth year of the degree. In relation to sex, the sample was made up as follows: male =43 (29.05%), and female =105 (70.94%). In relation to age (in years), it turned out to have a mean=20.54; standard deviation=2.06.² The second measurement (2022) was made up of a sample of 397 (n) students, out of a total of 462 (N) (85.93% of the studied population), between the first and seventh level. Regarding sex, the composition of the sample was as follows: female=293 (73.8%) and male=104 (26.20%). The age (in years) turned out to have a mean=21.49; standard deviation=2.79.

Table 1 shows that all items have asymmetry (As) and kurtosis (Ku) values within the expected limits ($As < \pm 2$; $Ku < \pm 7$).³⁰

Table 1. Descriptive analysis of the items of the Jefferson Scale of Empathy (S version)

Items	M	SD	g1	g2
1. The understanding that health professionals have about the feelings of their patients and their families does not influence in the treatment outcome.	4.28	2.04	-.13	-1.23
2. Patients feel better when the health professional understands their feelings.	5.90	1.38	-1.37	-.53
3. It is difficult for health professionals to see things from the perspective of his patients.	3.80	1.61	.15	-.53
4. Understanding body language is as important as verbal communication in the relationship between a health professional and his patients.	5.95	1.34	-1.35	1.57
5. A health professional's sense of humor contributes to better clinical outcomes.	5.49	1.56	-.88	.01
6. Because people are different, it is difficult to see things from the patients' perspective.	3.46	1.57	.34	-.22
7. Paying attention to the emotions of patients is not important during the anamnesis.	4.95	2.15	-.64	-1.05
8. Considering the personal experiences of patients does not influence the treatment outcomes.	4.33	2.03	-.14	-1.21
9. Health professionals should try to put themselves in their patients' shoes when caring for them.	5.48	1.49	-.81	-.05
10. Patients value when health professionals show understanding of their feelings, which is therapeutic in itself.	5.75	1.41	-1.16	.94
11. Patients' diseases can be cured only by specific treatments; therefore, the emotional bond between health professionals and their patients have no significant influence on the outcome of specific treatments.	4.17	1.89	.05	-1.08
12. Asking patients about what is happening in their personal lives does not help in understanding their physical problems.	4.17	2.03	-.04	-1.24
13. Health professionals should try to understand what is going on in the minds of their patients by paying attention to nonverbal aspects and body language.	5.33	1.56	-.77	-.13
14. I think emotions have no relevance in the treatment of medical illness.	4.58	1.99	-.32	-1.13
15. Empathy is a therapeutic skill without which the success of the health professional is limited.	5.90	1.38	-1.21	.79
16. The health professional's understanding of the emotional state of his patients, as well as that of their families, is an important component in the relationship between the health professional and his patients.	5.61	1.39	-.89	.27
17. Health professionals should try to think like their patients in order to provide better care.	5.44	1.49	-.69	-.18
18. Health professionals should not allow themselves to be influenced by strong personal ties with their patients and their families.	3.24	1.81	.47	-.68
19. I don't like reading non-medical literature or the arts.	4.62	1.95	-.28	-1.11
20. I believe empathy is an important therapeutic factor in the treatment of patients.	6.07	1.43	-1.71	2.48

Note. M: Arithmetic Mean; SD: Standard Deviation; g1: asymmetry; g2: Kurtosis.

Source: own elaboration.

In table 2, the results of the mean and standard deviation of the levels of E, CC, PT or PA, and WIPS in the Y, C, S factors, and the combinations of the levels of these factors are presented.

Table 2. Results of the estimation of the mean and standard deviation of Empathy, Compassionate care, Perspective taking or Perspective Adoption and Walking in Patient's Shoes in the factors evaluated academic year, course, sex, and their combinations

	Course	Sex	Year 2016			Year 2020		
			Mean	SD	N	Mean	SD	n
Empathy	First	Female	88.82	16.714	25	97.04	15.246	69
		Male	97.72	23.207	11	97.19	18.210	26
		Total	95.00	21.596	36	97.08	16.011	95
	Second	Female	86.00	11.497	22	101.19	16.928	37
		Male	100.86	15.441	12	91.09	10.377	11
		Total	95.62	15.740	34	98.88	16.149	48
	Third	Female	111.92	13.035	23	101.15	18.675	40
		Male	114.48	15.834	12	90.50	12.049	12
		Total	113.60	14.789	35	98.69	17.847	52
	Fourth	Female	105.67	23.544	16	103.11	15.073	57
		Male	106.63	19.026	3	94.08	15.190	13
		Total	106.47	19.062	19	101.43	15.396	70
	Fifth	Female	110.60	21.824	19	107.14	14.631	28
		Male	103.42	17.366	5	105.38	14.735	8
		Total	104.92	18.103	24	106.75	14.461	36
	Sixth	Female	-	-	-	93.11	11.888	37
		Male	-	-	-	89.16	15.156	19
		Total	-	-	-	91.77	13.086	56
	Seventh	Female	-	-	-	96.92	17.149	25
		Male	-	-	-	100.67	17.694	15
		Total	-	-	-	98.33	17.226	40
Total	Female	98.19	18.948	105	99.76	16.030	293	
	Male	104.44	19.148	43	95.05	15.982	104	
	Total	102.62	19.237	148	98.53	16.132	397	

Continúa...

Compassionate care	First	Female	29.36	5.732	25	33.64	9.622	69
		Male	34.80	11.011	1	34.50	11.392	26
		Total	33.14	9.949	36	33.87	10.082	95
	Second	Female	30.08	8.490	22	35.14	10.973	37
		Male	36.23	9.102	12	31.45	6.089	11
		Total	34.06	9.254	34	34.29	10.127	48
	Third	Female	42.92	7.982	13	36.38	10.217	40
		Male	44.39	11.452	12	29.42	5.435	12
		Total	43.89	10.295	35	34.77	9.745	52
	Fourth	Female	43.67	15.503	16	35.79	9.584	57
		Male	40.75	11.305	3	31.92	12.339	13
		Total	41.21	11.593	19	35.07	10.164	70
	Fifth	Female	44.00	10.173	19	37.61	9.570	28
		Male	38.95	12.474	5	36.63	9.334	8
		Total	40.00	12.007	24	37.39	9.394	36
	Sixth	Female	-	-	-	33.22	7.882	37
		Male	-	-	-	29.53	10.244	19
		Total	-	-	-	31.96	8.838	56
	Seventh	Female	-	-	-	35.96	11.356	25
		Male	-	-	-	31.73	14.195	15
		Total	-	-	-	34.38	12.489	40
Total	Female	36.05	10.569	43	35.14	9.830	293	
	Male	38.86	11.427	105	32.13	10.621	104	
	Total	38.04	11.222	148	34.35	10.117	397	

Continúa...

Perspective taking or perspective adoption	First	Female	51.36	13.662	25	55.65	9.816	69
		Male	54.72	14.602	11	55.54	10.005	26
		Total	53.69	14.212	36	55.62	9.814	95
	Second	Female	49.50	10.032	22	58.35	11.312	37
		Male	57.50	9.471	12	53.73	9.737	11
		Total	54.68	10.280	34	57.29	11.047	48
	Third	Female	61.83	6.780	23	56.92	12.404	40
		Male	63.04	8.037	12	54.83	8.526	12
		Total	62.63	7.550	35	56.44	11.582	52
	Fourth	Female	54.67	9.074	16	60.19	8.061	57
		Male	59.94	10.686	3	55.85	9.881	13
		Total	59.11	10.402	19	59.39	8.522	70
	Fifth	Female	57.20	10.895	19	61.75	7.462	28
		Male	57.32	9.551	5	62.50	7.502	8
		Total	57.29	9.594	24	61.92	7.369	36
	Sixth	Female	-	-	-	52.68	10.078	37
		Male	-	-	-	52.21	10.539	19
		Total	-	-	-	52.52	10.143	56
	Seventh	Female	-	-	-	54.32	12.595	25
		Male	-	-	-	63.00	5.438	15
		Total	-	-	-	57.58	11.241	40
Total	Female	54.67	11.135	105	57.14	10.474	293	
	Male	58.39	11.046	43	56.31	9.676	104	
	Total	57.31	11.163	148	56.92	10.266	397	

Continúa...

Walking in patient's shoes	First	Female	8.09	1.814	25	7.75	2.815	69
		Male	8.20	2.708	11	7.15	2.880	26
		Total	8.17	2.444	36	7.59	2.830	95
	Second	Female	6.42	2.811	22	7.70	2.707	37
		Male	7.14	3.075	12	5.91	2.508	11
		Total	6.88	2.962	34	7.29	2.744	48
	Third	Female	7.17	2.823	23	7.85	2.887	40
		Male	7.04	3.111	12	6.25	3.361	12
		Total	7.09	2.974	35	7.48	3.045	52
	Fourth	Female	7.33	3.786	16	7.12	2.680	57
		Male	5.94	2.695	3	6.31	2.323	13
		Total	6.16	2.814	19	6.97	2.621	70
	Fifth	Female	9.40	1.949	19	7.79	2.283	28
		Male	7.16	2.794	5	6.25	3.012	8
		Total	7.63	2.763	24	7.44	2.501	36
	Sixth	Female	-	-	-	7.22	2.709	37
		Male	-	-	-	7.42	2.735	19
		Total	-	-	-	7.29	2.695	56
	Seventh	Female	-	-	-	6.64	2.325	25
		Male	-	-	-	5.93	3.348	15
		Total	-	-	-	6.37	2.733	40
Total	Female	7.47	2.622	105	7.48	2.686	293	
	Male	7.19	2.922	43	6.62	2.874	104	
	Total	7.27	2.832	148	7.25	2.759	397	

Note. n = Size of the sample observed in each of the factors and levels of the factors examined; SD= Standard deviation.

Source: own elaboration.

Reliability: The dimensions of the empathy scale have adequate reliability indices: PT or PA ($\alpha=0.89$; $\omega=0.89$), CC ($\alpha=0.79$; $\omega=0.79$), and WIPS ($\alpha=0.68$; $\omega=0.68$). Similarly, in the sample of women, all three dimensions have acceptable reliability indices: PA ($\alpha=0.89$; $\omega=0.89$), CC ($\alpha=0.77$; $\omega=0.77$), and WIPS ($\alpha=0.64$; $\omega=0.64$). In the sample of males, the three dimensions also present adequate adjustment indices: PA ($\alpha=0.89$; $\omega=0.89$), CC ($\alpha=0.83$; $\omega=0.83$), and WIPS ($\alpha=0.74$; $\omega=0.75$). **Validity based on the internal structure:** It was evident that the original model

of three related factors presents adequate adjustment indices ($\chi^2 = 329.87$; $df = 167$; $p < .01$; $IFC = .92$; $TLI = .91$; $RMSEA = .056$ [90 % CI.047 – .064]; $SRMR = .057$). In addition, in figure 1, that the factor weight of most of the items was adequate.

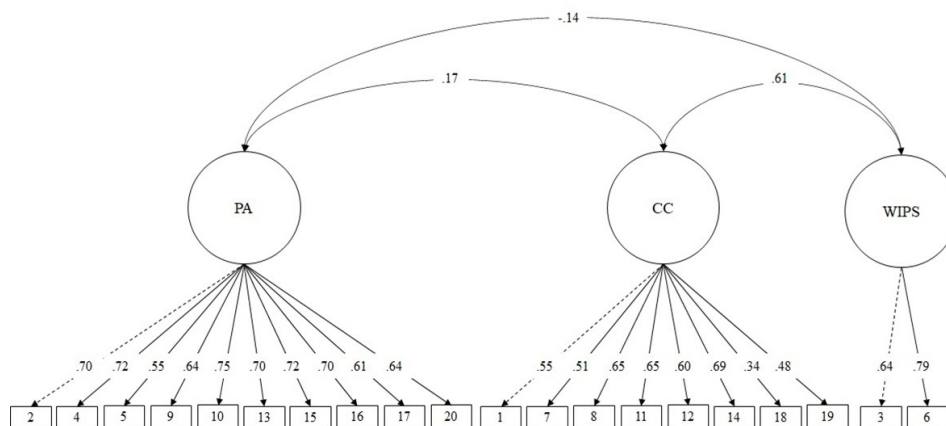


Figure 1. Confirmatory Factor Analysis of the Scale

It is, also, clear that the dimensions are related to each other. **Factorial Invariance:** In table 3 it is observed that the factorial structure of the scale has shown evidence of being strictly invariant for the groups of men and women in the sequence of proposed invariance models: metric invariance ($\Delta CFI = -.001$; $\Delta RMSEA = -.002$), scalar ($\Delta CFI = -.010$; $\Delta RMSEA = .002$) and strict ($\Delta CFI = -.003$; $\Delta RMSEA = -.001$).

Table 3. Sex invariance indices of the empathy scale

According to sex	χ^2	df	p	SRMR	TLI	CFI	RMSEA [CI 90%]	$\Delta\chi^2$	Δdf	p	ΔCFI	$\Delta RMSEA$
Women	298,69	167	< .01	.063	.90	.91	.058 [.048 – .069]	–	–	–	–	–
Men	255,86	167	< .01	.079	.87	.88	.073 [.055 – .090]	–	–	–	–	–
Configural	558,69	334	< .01	.067	.89	.90	.063 [.053 – .072]	–	–	–	–	–
Metric	580,37	351	< .01	.070	.89	.90	.061 [.052 – .070]	20.26	17	.261	-.001	-.002
Scalar	621,15	368	< .01	.072	.89	.89	.063 [.054 – .071]	42.93	17	.000	-.010	.002
Strict	642.07	388	< .01	.075	.89	.89	.062 [.053 – .070]	24.36	20	.227	-.003	-.001

Note. χ^2 = Chi square; df = degrees of freedom; SRMR: Standardized Root Mean Square Residual; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; $\Delta\chi^2$ = Differences in Chi square; Δdf = Differences in degrees of freedom; $\Delta RMSEA$ = Change in Root Mean Square Error of Approximation; ΔCFI = Change in Comparative Fix Index.

Source: own elaboration.

Comparative analysis: The results of comparing the dependent variables between the levels of the factors examined are shown in table 4.

Table 4. Results of the comparison of the levels of the following factors: Empathy (E), Compassionate Care (CC), Perspective Taking (PT), and Walking in Patient's Shoes (WIPS), and between the combined levels of two to more factors

Factors and combination of levels	F	Sig.	η^2	PPO	R2
E					
Y	3.529	.061	.007	.466	.136
C	5.707	.000	.062 (B)	.998 (A)	
S	.0005	.990	.0005	.050	
CC					
Y	11.261	.001	.021 (B)	.998 (A)	.112
C	3.837	.001	.042 (B)	.967 (A)	
S	1.101	.294	.002	.182	
PT or PA					
Y	.418	.518	.001	.099	.103
C	4.194	.0005	.046 (B)	.979 (A)	
S	2.794	.095	.005	.385	
WIPS					
Y	1.207	.273	.002	.195	.054
C	1.830	.091	.021	.686	
S	4.942	.027	.009 (B)	.602 (M)	

Note. E= Empathy; CC= Compassionate care; PT or PA= Perspective taking or Perspective adoption; WIPS= Walking in patient's shoes; A= Year; C= Course; S= Sex; η^2 = Eta squared; PPO= Power of the observed test; (B)= low; (M)= medium; (A)= high.

Source: own elaboration.

The values of the means of E, between both measurements, was not significant (figure 2a), but differences were observed between the two measurements made in relation to the distribution of the means of empathy between C (figure 2a). In CC, differences were found between the years of both measurements (Y) and between the courses (C) (figure 2b). In PA no differences were observed between the means (figure 2c) and in WIPS (figure 2d), there were only differences in the S factor.

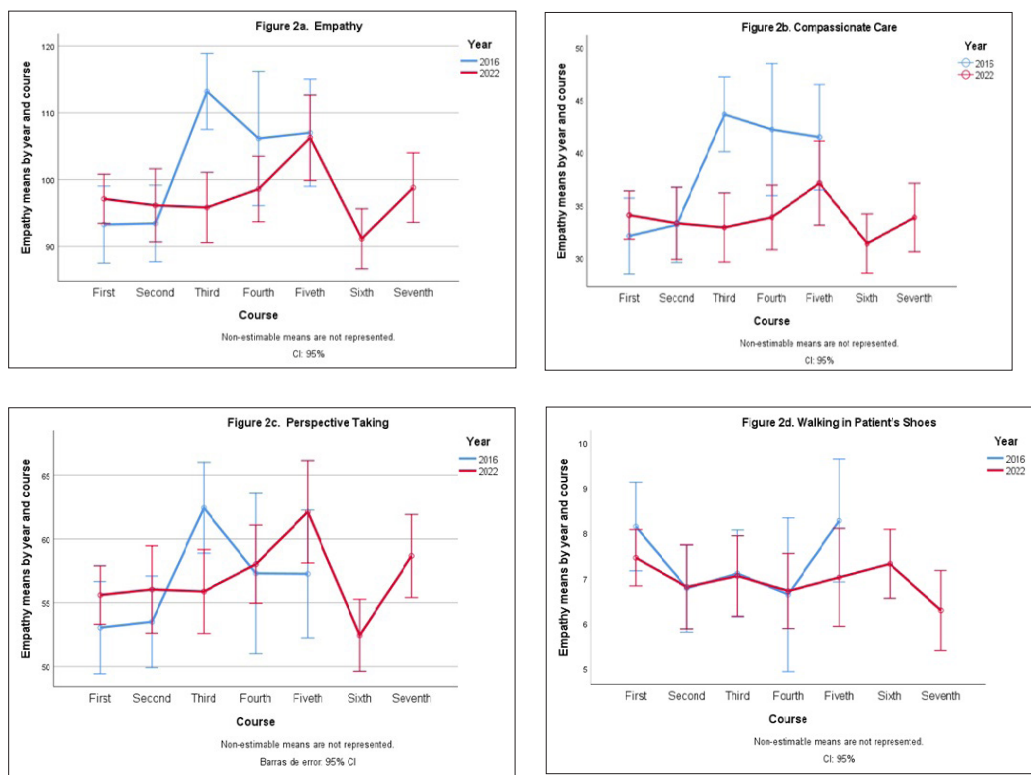


Figure 2. Results of the distribution of the course averages according to the two years under study

The comparison between the interactions of the levels of the dependent variables (factors) were not considered because most of them were not significant ($p > .05$), or they were significant ($p < .05$) but with very low effect size values (< 0.01). In general, the effect size was low in empathy and its dimensions and the power of the test was, in general, high or medium. The coefficient of determination, in empathy, was found to be of 13.6%, which means that the factors explain little of its variation. This same coefficient, estimated in the dimensions of empathy, was lower than that of empathy; therefore, it explains little of the variance of the data in these dimensions.

DISCUSSION

The general characteristics of the two measurements carried out (2016 and 2022) differ in the size of the sample studied and the number of assessed courses; however, they are similar in terms

of sex ratio and age. The asymmetry and kurtosis values of the items of both measurements are similar to each other and allow for the comparison of both samples on the basis of these characteristics. The observed results of the internal reliability of the data, allowed to guarantee the degree of stability (consistency of the responses) and it is evidence that the items are measuring the empathy between the student and the patient.³² The results of the validity of the construct in the 2022 sample guaranteed that the model of empathy is constituted by three dimensions, and these are correlated with each other. In addition, the fact that the invariance of the model has been demonstrated makes it possible to guarantee that comparisons between the groups lead to reliable results. The same results are also presented in the 2016 sample.^{2,17} In general, the values of the kurtosis and asymmetry of the data, the internal reliability, the validity of the model based on the three-dimensional structure, and the presence of invariance between the sexes constitute a robust and necessary methodological basis that allows for the comparison of the two measurements tested in this work. This procedure could be useful for conducting comparative studies of empathy, whether these are within the same population or among populations of students of the same specialty or different specialties.^{3, 7,17, 32-35}

The fact that the statistical procedure has found that the three dimensions of empathy are related to each other reflects a complex neurobiological phenomenon. In fact, several authors^{2,3,8} have argued that the study of the dimensions of empathy separately constitutes an admitted and necessary research approach, from the methodological point of view. However, the fact that empathy is an attribute whose concrete expression arises from the interaction between its dimensions cannot be disregarded. The CC dimension is associated with the limbic system, with the emotions of the subject, and its construction occurs from the early stages of the evolution of human beings (phylogeny).⁸ The PA dimension prevents emotional contagion from occurring, and, therefore, allows the subject to recognize that he differs from another person (from the sufferer, from the patient). The WIPS dimension consists of the property of actively observing a patient and penetrating into his thinking. Therefore, CC is associated with the emotional component, while PT and WIPS with the cognitive one, whose neuroanatomical substrate is located in the front part of the brain and appears subsequently to the limbic system on the evolutionary scale.^{8,36} As a consequence, it could be inferred that there is no such thing as an “emotive empathy” and a “cognitive empathy”. Empathy is the dialectical interaction (the synthesis) of all its dimensions actively working.^{8,37} In extreme cases, when one of its dimensions “fails” (to one degree or another), then

empathy, as a system, becomes unbalanced (empathic deficit), and, when the damage is severe, it can lead to psychopathies.^{38,39}

Considering the aforementioned, it is possible to infer that empathy is modulated by interactions of a different order: a) an internal one, determined by the interaction between its dimensions, and b) said interaction is also modulated by external factors (ontogeny) that condition the form of interaction of the emotional and cognitive components.^{2,3,8,40-44} Essentially, empathy is the product of a strong association between exogenous and endogenous factors that are interacting, and whose dialectic consists of the active unity that occurs in the convergence between “close” (ontogeny) and “distant” (phylogeny) processes.^{12,45} However, it is possible that the processes of ontogeny, at this time, have a greater influence on the modulation of empathy.^{8,12} As a consequence, empathy is a complex attribute and this characteristic should be considered when considering the application of an empathic intervention.¹³

The observed categorization of the size of the effect and the power of the estimated test, in the significant comparisons, allow us to affirm that these differences exist, but they are small and that the probability of committing the Type II error is relatively low. On the other hand, the values found in the coefficients of determination of empathy (and their dimensions) allow us to infer that the factors studied are not the only ones that are influencing empathy (multifactorial modulation on empathy).

It was found that there were no differences in E, PA, and WIPS between the years (table 2); but there was a decrease in CC levels in 2022 compared to the 2016 measurement (table 2 and table 4). If the levels of Empathy are compared with the cut-off points established in dentistry students in Latin American countries¹⁷, it is observed that the Empathy of the examined students can be qualitatively classified in the middle level range [61-107], and, specifically, in 2016 they are placed in the 75th Percentile (P_{75}), and, in 2022, in the 50th Percentile (P50). The CC values, on the other hand, can be classified in the range of high levels [28-56] in both moments, and, specifically, 2016= P90 and 2002=P25. In PA, as happened with CC, it can be classified in the range of high levels [42-70]; specifically, 2016 and 2022= P50. Finally, in WIPS, the values can be classified at low levels [2-7]; specifically, 2016 and 2022= P95. The absence of differences found in sex in relation to Empathy and in the CC and PT dimensions allow for the inference that there were no substantial changes between the studied moments, despite the small difference found in the WIPS

dimension in favor of women (table 2 and table 4). These classifications of the empathy scores, and their dimensions, from a quantitative perspective, allowed to appreciate that the CC values decreased in the measurement of the year 2022, but maintained their classification of high levels; the WIPS values maintained their classification of low levels and PA retained their respective values in the range of high values. These results allow to infer that the classification of the average levels of empathy, observed in the examined dental students, depend on the decrease of the values of CC (emotional dimension) and the low values of WIPS (cognitive dimension).

It should be expected that the parameters evaluated in successful accreditations will show a positive evolution (quantitative, and, especially, qualitative increases). However, despite the fact that the UEES accreditation process was successful in 2017 and 2022, dental students did not exceed the average levels of empathy that characterized them in both analyzed stages, and there was no qualitative change in empathy. The current institutional accreditation of universities in El Salvador does not include the requirement of empathic training of students, and the same happens in most universities in Latin America. The “parameter” empathy is not included in this process, despite the importance given to this attribute as an indispensable element in the training of dentists.^{1-9,46-48} Nonetheless, universities have a social responsibility to provide correct professional and humanized training,⁴⁹ therefore, the introduction of the teaching-learning of empathy should be demanded and systematized in any accreditation process.

CONCLUSIONS

It was found that the levels of empathy were classified at the average level in both moments under study. The study allows us to say that possibly the systematic absence of teaching empathy could be a factor why this attribute has not increased. The introduction of the teaching-learning of empathy should be systematized and evaluated in the institutional accreditation processes at universities. The replication of this study in other Dental Schools in Latin America is recommended. The limitations of this study are related to the fact that the conclusions drawn cannot be mechanically extrapolated to other populations of dental students.

Financial disclosure statement. Financed by the authors themselves.

Conflict of interest. The authors have no conflicts of interest relevant to this article to disclose.

REFERENCES

1. Torres-Martínez PA, Barrios-Penna CA, Fonseca-Molina JF, Díaz-Narváez VP, González-Cruz SA. Levels of empathy in dental students at Universidad San Sebastián in Concepción, Chile. *Rev. Fac. Med.* 2017; 65(2):219-225. English. <https://doi.org/10.15446/revfacmed.v65n2.61444>.
2. 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. *Pesqui Bras Odontopediatria Clin Integr.* 2017; 17(1): 1-11. <http://dx.doi.org/10.4034/PBOCI.2017.171.40>
3. Díaz-Narváez VP, Amezaga-Avitia AC, Sarabia-Álvarez 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.* 2018; 30(2): 117-124. <https://doi.org/10.1016/j.sdentj.2017.11.004>
4. Varela de Villalba T, Ulloque MG, Villalba S, Villalba R, Díaz-Narváez V.P. Levels of empathy in dentistry students: measurement and comparison in two academic periods. Universidad Católica de Córdoba (UCC) Argentina. *Salud Uninorte.* 2018; 34(3): 641-651.
5. Díaz-Narváez VP, Silva-Vetri MG, Stocklin B, González-Díaz E, Calzadilla-Núñez A, Torres-Martínez P, et al. Empathy levels among dental students and professors from a dental school in the Dominican Republic. *Rev Fac Med.* 2022; 70(2): e90850, <https://doi.org/10.15446/revfacmed.v70n2.90850>.
6. Fortich-Mesa N. Díaz-Narváez VP. Empathetic attitude in dentistry students at Corporación Universitaria Rafael Núñez in Cartagena. *Rev. Cienc. de la Salud.* 2018; 16 (1): 129-143. <https://doi.org/10.12804/revistas.urosario.edu.co/revsalud/a.6495>
7. Díaz-Narváez VP, Erazo Coronado AM, Bilbao JL, Padilla M, Calzadilla-Núñez A, Silva-Vetri MG, et al. Reconsidering the 'Decline' of Dental Student Empathy within the Course in Latin America. *Acta Med Port.* 2017; 30(11):775-782. <https://doi.org/10.20344/amp.8681>
8. 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;115(6):556-561. <https://doi.org/10.5546/aap.2017.eng.556>.
9. 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/10.12804/revistas.urosario.edu.co/revsalud/a.9258>

10. Moya-Albiol L, Herrero N, Bernal MC. Bases neuronales de la empatía. *Rev Neurol*. 2010; 50 (2): 89-100.
11. González-Díaz ES, Silva-Vetri MG, Díaz-Calzadilla P, Calzadilla-Núñez A, Reyes-Reyes A, Díaz-Narváez VP. Decline in empathy levels and sex differences in medical students from the Caribbean. *Rev Fac Med*. 2021; 69(4): e86227. <https://doi.org/10.15446/revfacmed.v69n4.86227>.
12. Díaz-Narváez VP, Calzadilla-Núñez A, Alonso LM, Torres-Martínez, Cervantes-Mendoza M, Fajardo-Ramos E. Empathy and Ontogeny: A Conceptual Approach. *West Indian Med J*. 2017; 66 (3): 1-12. <https://doi.org/10.7727/wimj.2046.344>.
13. Díaz-Narváez VP, 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*. 2021; 70(1): e91207. <https://doi.org/10.15446/revfacmed.v70n1.91207>.
14. Duran E, Padilla M, Utsman R, Reyes-Reyes A, Calzadilla-Núñez A, Díaz-Narváez. Analysis of the relationship between empathy and family functioning in dentistry students of the Latin American University of Science and Technology (ULACIT), San José, Costa Rica. Proceedings of EDULEARN17 Conference 3rd-5th July 2017, Barcelona, Spain. ISBN: 978-84-697-3777-4. pp. 9632-9639. <https://doi.org/10.21125/edulearn.2017.0816>
15. Díaz-Narváez VP. El Informe de Investigación, UEES editores. En: Díaz-Narváez VP. Metodología de la Investigación Científica y Bioestadística para Profesionales y Estudiantes de Ciencias de la Salud. 1ra edición. El Salvador. Editorial UEES. 2019. p223-234.
16. Huberman J, Rodríguez M, González S, Díaz-Narváez VP. 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. <http://dx.doi.org/10.1016/j.piro.2014.11.001>
17. Díaz VP, Reyes A, Calzadilla A, Torres PA, González E, Bilbao JL, et al. Psychometry and estimation of cutoff points of Jefferson Scale of empathy in dental students. *J Dent Educ*. 2020;1-9. <https://doi.org/10.1002/jdd.12444>
18. Yuan KH, Bentler PM. Three likelihoodbased methods for mean and Covariance structure analysis with nonnormal missing data. *Sociol. Methodol*. 2000; 30(1): 165-200. <https://doi.org/10.1111/0081-1750.00078>

19. Franco-Martínez A, Alvarado JM, Sorrel MA. Range Restriction Affects Factor Analysis: Normality, Estimation, Fit, Loadings, and Reliability. *Educ Psychol Meas*. 2022. <https://doi.org/10.1177/00131644221081867>
20. Kline RB. Principles and Practice of Structural Equation Modeling. (4th ed). The Guilford Press. 2015.
21. Schumacker RE, Lomax RG. A Beginner's Guide to Structural Equation Modeling. Fourth Edition (4th ed.). Routledge. 2015.
22. Raykov T, Hancock GR. Examining change in maximal reliability for multiple-component measuring instruments. *Br J Math Stat Psychol*. 2005;58(1):65–82. <https://doi.org/10.1348/000711005X38753>
23. Chen FF. Sensitivity of goodness of fit indexes to lack of measurement invariance. *Struct Equ Modeling*. 2007; 14(3): 464–504. <https://doi.org/10.1080/10705510701301834>
24. RStudio Team. RStudio: Integrated Development Environment for R. RStudio.; Inc. 2018. <http://www.rstudio.com/>
25. R Core Team. A language and environment for statistical computing (R version 3.6.1). R Foundation for Statistical Computing. 2019. <http://www.r-project.org/>
26. Rosseel Y. lavaan: An R Package for Structural Equation Modeling. *J. Stat. Softw*. 2012; 48(2): 1–36. <https://doi.org/10.18637/jss.v048.i02>
27. Jorgensen TD, Pornprasertmanit S, Schoemann AM, Rosseel Y, Miller P, Quicket C, et al. semTools: Useful tools for structural equation modeling. R package version 0.5-1. 2018. <https://cran.r-project.org/package=semTools>.
28. Cárdenas-Castro M, Arancibia-Martini H. Potencia estadística y cálculo del tamaño del efecto en G*Power: Complementos a las pruebas de significación estadística y su aplicación en psicología. *Salud & Sociedad*. 2014; 5(2): 210-224.
29. González-Lutz MI. Potencia de Prueba: La gran ausente en muchos trabajos científicos. *Agron. Mesoam*. 2008; 19(2): 309-313. <https://www.redalyc.org/articulo.oa?id=43711425018>
30. Finney S, DiStefano, C. Non-normal and Categorical data in structural equation modeling. In G. r. Hancock y R. O. Mueller (Hrsg.). Structural equation modeling: a second course (S. 269–314). Greenwich, Connecticut: Information Age Publishing. 2006.

31. Frías-Navarro D. Apuntes de estimación de la fiabilidad de consistencia interna de los ítems de un instrumento de medida. Universidad de Valencia. España. 2022. <https://www.uv.es/friasnav/AlfaCronbach.pdf>
32. Aparicio LE, Ramos AE, Mendoza J, Utsman-Abarca R, Calzadilla-Núñez A, Díaz-Narváez, VP. Levels of empathy, empathy decline and differences between genders in medical students of Cartagena (Colombia). *Educ. Med.* 2019; 20(2): 136-143. <https://doi.org/10.1016/j.edumed.2018.06.004>
33. Díaz-Narváez V, Oyarzún-Muñoz M, Reyes-Reyes A, Calzadilla-Núñez A, Martínez PT, González-Valenzuela C, et al. Psychometry and empathy levels and its dimensions in postgraduate students of dental specialties. *Eur J Dent Educ.* 2021; 00:1–11. <https://doi.org/10.1111/eje.1265>
34. Castellón-Montenegro H, Barraza-Ospino D, 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. <https://doi.org/10.1590/1980-265X-TCE-2018-0314>
35. Díaz-Narváez VP, Calzadilla-Núñez A, Reyes-Reyes A, Silva-Vetri MG, Torres-Martínez P, González-Díaz E, et al. Psychometry and Cut-off Points of the Jefferson Scale of Empathy in Medical Students in Central America and the Caribbean. *PRHSJ*; 2022; 41(1): 22-28.
36. Lee Y, Seomun G. Development and validation of an instrument to measure nurses' compassion competence. *Appl Nurs Res.* 2016; 30:76-82. <http://doi.org/10.1016/j.apnr.2015.09.007>
37. Decety J, Jackson PL. The functional architecture of human empathy. *Behav Cogn Neurosci Rev.* 2004; 3(2):71-100. <http://doi.org/10.1177/1534582304267187>.
38. Díaz-Narváez VP, Alonso-Palacio LM, Caro S, 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 Medica Mediterr.* 2017; 33(1): 115-121. http://doi.org/10.19193/0393-6384_2017_1_018
39. Pisano S, Muratori P, Gorga C, Levantini V, Iuliano R, Catone G, et al. Conduct disorders and psychopathy in children and adolescents: aetiology, clinical presentation and treatment strategies of callous-unemotional traits. *Ital J Pediatr.* 2017; 20;43(1):84. <http://doi.org/10.1186/s13052-017-0404-6>.
40. Nummenmaa L, Lukkarinen L, Sun L, Putkinen V, Seppälä K, Karjalainen T, et al. Brain Basis of Psychopathy in Criminal Offenders and General Population. *Cereb Cortex.* 2021; 31(9):4104-4114. <http://doi.org/10.1093/cercor/bhab072>.

41. Kelly M, Svrcek C, King N, Scherpbier A, Dornan T. Embodying empathy: A phenomenological study of physician touch. *Med Educ.* 2020; 54(5):400-407. <http://doi.org/10.1111/medu.14040>.
42. Huang H, Su Y. Peer acceptance among Chinese adolescents: the role of emotional empathy, cognitive empathy and gender. *Int J Psychol.* 2014; 49(5):420-424. <http://doi.org/10.1002/ijop.12075>.
43. Winch S, Henderson A, Jones J. Recognizing the dialectic of compassionate care in the workplace: feedback from nurse educators. *J Contin Educ Nurs.* 2015; 46(5):228-232. <http://doi.org/10.3928/00220124-20150420-03>.
44. 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): 360-363. <https://doi.org/10.14482/sun.35.3.152.41%20>
45. Caponi G. *Episteme.* Porto Alegre. 2001; 12: 23-46.
46. Sanguida A, Tamim TK, Fahi AI. Investigating Empathy: The Unresolved Enigma - A Multicenter Study among Dental Students in South India. *Asian Pac. J. Health Sci.* 2022; 9(2):29-32. <https://doi.org/10.21276/apjhs.2022.9.2.07>
47. Nazir M, Alhareky M, Alqahtani A, Alsulaimi L, Alotaibi R, Yousef N, et al. Measuring Empathy among Dental Students and Interns: A Cross-Sectional Study from Dammam, Saudi Arabia. *Int J Dent.* 2021; 2021: ID5584423. <https://doi.org/10.1155/2021/5584423>.
48. Naguib GH, Sindi AM, Attar MH, Alshouibi EN, Hamed MT. A Cross-Sectional Study of Empathy among Dental Students at King Abdulaziz University. *J Dent Educ.* 2020; 84(1):22-26. <https://doi.org/10.21815/JDE.019.160>.
49. Huang YK, Chen YT, Chang YC. Initiating narrative medicine into dental education: Opportunity, change, and challenge. *J Formos Med Assoc.* 2021;120(12): 2191-2194. <https://doi.org/10.1016/j.jfma.2021.06.008>.