



ORIGINAL ARTICLE

# Chilean Dentistry students, levels of empathy and empathic erosion: Necessary evaluation before a planned intervention

## Levels of empathy, evaluation and intervention



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### KEYWORDS

Empathy;  
Dental student;  
Empathic evaluation

**Abstract Objectives:** To estimate the general empathy levels and the potential for empathic growth in Dentistry students and demonstrate that the empathic erosion model is not med.

**Material and methods:** Exploratory and cross-sectional study. Population: First- to fifth-year Dentistry students at Universidad San Sebastián, Santiago Campus (Chile). The total student population (N) was 800. The participants completed the Jefferson Scale of Empathy in its Spanish version for medical students, validated and adapted in Chile. A two-factor analysis of variance (model III) was applied to find differences in the means between academic years, between genders, and in the interaction between these two factors. The data were described using simple arithmetic graphs and then processed with SPSS 22.0. The total growth potential was estimated.

**Results:** The Sample (n) consisted of 534 students (66.88% of the population studied, 2016). Differences were found between academic years and genders in general empathy and some of its components.

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*Conclusion:* The behavior of empathy levels is not in line with the concept of empathic erosion. This suggests that empathic erosion is a particular and not a general phenomenon. There exists a considerable growth potential for empathy and its components.

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## 1. Introduction

The dentist-patient relationship has been regarded as an interaction between two people with different personal interests (Dörr, 2004). Therefore, this relationship must be established from both a clinical and a human perspective, because it contains subjective and intersubjective elements that contribute to the patient's recovery process. The above has forced medical science to incorporate analysis theories of a psychodynamic and biopsychosocial nature, not only to explain the origin, maintenance, and resolution of diseases (Ardila, 2004), but also to contribute to the patient's general care process (González-Martínez et al., 2015). Therefore, dentists need to be able to engage in an empathetic communication with their patients (Mofidi et al., 2003).

Empathy in health care can be regarded as a cognitive and behavioral attribute that concerns a person's ability to understand how the patient's experiences and feelings influence and are influenced by the disease and its symptoms, as well as the ability to communicate this understanding to the patient (Hojat et al., 2002). The literature shows that empathy has been linked to a number of attributes, including prosocial behavior, the ability to obtain the patient's clinical history, an increase in the patient's and the doctor's satisfaction level, better therapeutic relationships, and good clinical outcomes (Alcorta et al., 2005). Several measurements of empathy have been psychometrically assessed for research uses (by health sciences students and practicing medical doctors). These measurements have not yielded sufficient evidence for the predictive validity of these instruments as parameters in MD selection processes. However, other available measurements can sufficiently back the use of this tool in the study of empathy in medical training and the clinical care of patients (González-Martínez et al., 2015; Mestre et al., 2009).

The aims of the present study was to estimate the general empathy levels (and those of each of its components or dimensions) of Dentistry students at Universidad San Sebastián, Santiago Campus, Chile, considering two factors: year and gender, along with the interaction between them, comparing the estimated empathy values between the different factors studied.

## 2. Material and methods

This study is exploratory and cross-sectional. Bioethically, it adheres to the Declaration of Helsinki. The population consists of first- to fifth-year Dentistry students at Universidad San Sebastián, Santiago Campus (Chile). The total student population was 800. The participating students belonged to the following years: first = 109, second = 118, third = 119, fourth = 86, and fifth = 103. The Gender factor was distributed in the sample thus: female = 349 and male = 186. Data collection was carried out from July to September

2016. The participants completed the Jefferson Scale of Empathy in its Spanish version for medical students (JSE-version S), validated and adapted in Chile for Dentistry students (Rivera et al., 2011). Before it was administered, the JSE was examined by three experts (leading academics with a Dentistry degree) in order to verify its cultural and content validity (Rivera et al., 2011). The scale was confidentially administered (by a neutral operator and not by the authors). Students' understanding of the culturally adapted scale was measured through a pilot test.

### 2.1. Statistical analysis

The data underwent normality (Kolmogorov-Smirnov) and homoscedasticity (Levene) tests. The internal reliability of the data was estimated with Cronbach's alpha, both in general and considering the values yielded as the researchers eliminated each of the elements (questions), the intraclass correlation coefficient, Hotelling's T-squared distribution, Tukey's test of additivity. Means and standard deviation were also estimated. A two-factor analysis of variance (model III) was applied to find differences in the means between academic years, between genders, and in the interaction between these two factors. The data were described using simple arithmetic graphs and then processed with SPSS 20.0. The total growth potential (TGP) was defined as the quotient of two magnitudes: (a) the effective difference between the scores of fifth-year students and those of first-year students (D1) and (b) the possible difference between the highest empathy value allowed by the instrument (140) and the actual empathy score of first-year students (D2):  $TGP = D1/D2$ . This indicator makes it possible to assess the magnitude of the increase, decrease, or stagnation of empathy and can be used in cross-sectional and longitudinal studies. The significance level used was  $\alpha \leq 0.05$  and  $\beta < 0.20$  in all cases.

## 3. Results

The sample (n) consisted of 534 students (66.88% of the population studied, 2016). The Kolmogorov-Smirnov and Levene tests were not significant ( $p > .05$ ); the data, therefore, are normally distributed and homoscedasticity was verified. Cronbach's alpha was satisfactory (non-standardized = 0.803 and standardized = 0.817), which indicates that the data are internally reliable. The total Cronbach's alpha value, if one element (question) is eliminated, ranged from [0.792 to 0.807]; thus, it can be inferred that the test's reliability is guaranteed regardless of the elimination of an element. The intraclass correlation coefficient found was 0.803 ( $F = 5.081$ ;  $p = .001$ ), which ratifies the adequate reliability of the data. Hotelling's T-squared distribution ( $F = 125.8$ ;  $p = .001$ ) and Tukey's test of non-additivity ( $F = 1.79$ ;  $p = .181$ ) make it possible to infer, first, that the means of the questions differ from one another, which demonstrates that they contribute unequally

to the global mean (5.57) and that the instrument's answers are variable; and second, that the data are of an additive nature, which shows that the analysis methods used were suitable. The means (total and combined by factor), standard deviation, and sample size estimated for each level of the two factors studied are presented in Table 1.

Table 2 presents the results of the ANOVA applied to general empathy and to each of its components. It was observed that, for general empathy, the factors Year and Gender were highly significant ( $p = .0005$  and  $p = .021$  respectively), the

value of eta-squared (0.056) was satisfactory, and the power observed (0.998) is good. Nevertheless, for Gender, the eta-squared value reached 0.01 with a power of 0.64, with both values not being wholly satisfactory: the mean for women was 112.52 and that of men reached 109.33. In the Compassionate Care component, significant differences were only observed for the Year factor ( $p = .0005$ ); the eta-squared value (0.147) and the power observed (1.0) were highly satisfactory. Women's mean was 39.74, while that of men was 38.66 (out of a total of 49 points). In the Perspective Adoption

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

Year	Gender	Arithmetic average	Typical error	95% confidence interval	
				Lower limit	Upper limit
<i>Empathy</i>					
First Year	Female	106.544	1.622	103.358	109.73
	Male	108.39	2.088	104.228	112.493
Second Year	Female	109.176	1.55	106.122	112.23
	Male	104.477	2.016	100.517	108.438
Third Year	Female	115.392	1.505	112.437	118.348
	Male	109.900	2.114	105.746	114.054
Fourth Year	Female	117.357	1.787	113.847	120.868
	Male	110.833	2.441	106.037	115.630
Fifth Year	Female	114.667	1.576	111.571	117.763
	Male	115.290	2.402	110.572	120.009
<i>Compassionate care</i>					
First Year	Female	35.721	0.847	34.057	37.384
	Male	37.415	1.091	35.272	39.557
Second Year	Female	36.689	0.812	35.094	38.284
	Male	33.909	1.053	31.841	35.977
Third Year	Female	40.911	0.786	39.368	42.455
	Male	39.975	1.104	37.806	42.144
Fourth Year	Female	43.821	0.933	41.988	45.655
	Male	40.967	1.275	38.462	43.471
Fifth Year	Female	42.222	0.823	40.605	43.839
	Male	43.129	1.254	40.665	45.593
<i>Perspective adoption</i>					
First Year	Female	58.147	0.876	56.427	59.867
	Male	58.854	1.128	56.638	61.069
Second Year	Female	61.568	0.839	59.919	63.216
	Male	58.841	1.089	56.703	60.979
Third Year	Female	62.595	0.812	60.999	64.191
	Male	58.675	1.142	56.432	60.918
Fourth Year	Female	60.375	0.965	58.48	62.27
	Male	58.967	1.318	56.377	61.556
Fifth Year	Female	60.236	0.851	58.564	61.908
	Male	60.355	1.297	57.807	62.902
<i>Putting oneself in the other's shoes</i>					
First Year	Female	11.324	0.301	10.733	11.915
	Male	10.805	0.387	10.044	11.566
Second Year	Female	10.081	0.288	9.515	10.648
	Male	10.727	0.374	9.993	11.462
Third Year	Female	11.228	0.279	10.680	11.776
	Male	11.100	0.392	10.329	11.871
Fourth Year	Female	11.839	0.332	11.188	12.491
	Male	10.833	0.453	9.944	11.723
Fifth Year	Female	11.458	0.292	10.884	12.033
	Male	11.161	0.446	10.286	12.037

**Table 2** Results of ANOVA application; F, eta-squared, and power of the test used.

Empathy	F	(p)	Eta-squared	Power
Year (Y)	7.829	0.0005	0.056	0.998
Gender (G)	5.395	0.021	0.01	0.64
Y*G	1.91	0.107	0.014	0.579
<i>Compassionate care</i>				
Year (Y)	22.535	0.0001	0.147	1.0
Gender (G)	1.537	0.216	0.003	0.236
Y*G	2.119	0.077	0.016	0.629
<i>Perspective adoption</i>				
Year (Y)	1.368	0.244	0.010	0.428
Gender (G)	4.767	0.029	0.009	0.587
Y*G	1.814	0.125	0.014	0.553
<i>Putting oneself in the other's shoes</i>				
Year (Y)	2.411	0.048	0.018	0.694
Gender (G)	1.312	0.253	0.002	0.208
Y * G	1.437	0.22	0.011	0.448

p = probability of making type I errors.

\*Symbol of the interaction between the factors Y and G.

component, it was observed that the Year factor was not significant ( $p = .244$ ), although Gender was ( $p = .029$ ), with eta-squared and power values of 0.009 and 0.587 respectively, both being rather unsatisfactory. Women's empathy value was 60.67, while that of men reached 59.08 (out of a maximum of 70 points). Lastly, in the component Putting Oneself in the Other's Shoes, only the Year factor was found to be significant ( $p = .048$ ), with eta-squared and power values of 0.018 and 0.694 respectively, which is rather unsatisfactory. Women scored 11.15, while men reached 10.91 (out of a maximum of 21 points). These results must be cautiously weighed, especially when the eta-squared and power values obtained were not wholly satisfactory.

Table 3 presents the results of the multiple comparison of the means of the Year factor for general empathy and each of its components. For general empathy, no significant differences are observed between first and second year ( $p = 1$ ), and the same is true of the means from third to fifth year ( $p = .92$ ); however, significant differences exist between these two groups of means ( $p < .05$ ) and it can thus be stated that general empathy values rose during the last three years of the Dentistry program. However, if we consider that the growth potential for first-year students was 32.76 (140–107.24), the difference between the empathy of fifth-year students and that of first-year ones (115.08–107.24) was 7.84 points; that is, only 23.93% of the total growth potential for empathy was met.

In the Compassionate Care component, the behavior observed resembled that of general empathy. Two well-defined groups with significant differences are formed ( $p < .05$ ), one made up by first- and second-year students and another by students from the remaining three years. If we consider that the growth potential for first-year students was 12.24 (49–36.36), the difference between the empathy of fifth-year students and that of first-year ones (49–42.5) was 6.5 points; that is, only 53.1% of the total growth potential for empathy was met. Regarding Perspective Adoption, the only significant difference ( $p < .05$ ) was observed between first year (mean = 58.41) and third year (mean = 61.28), while the other years do

**Table 3** Multiple comparison of means in empathy and each of its components.

Empathy	n	Subset ( $p < .05$ between subsets)	
		1	2
First Year	109	107.24	
Second Year	118	107.42	
Third Year	119		113.55
Fifth Year	103		114.85
Fourth Year	86		115.08
Significance within subset		0.949	0.141
<i>Compassionate care</i>			
Second Year	118	35.65	
First Year	109	36.36	
Third Year	119		40.60
Fifth Year	103		42.50
Fourth Year	86		42.83
Significance within subset		0.20	0.627
<i>Perspective adoption</i>			
First Year	109	58.41	
Fourth Year	86	59.88	59.88
Fifth Year	103	60.27	60.27
Second Year	118	60.0	60.25
Third Year	119		61.28
Significance within subset		0.21	0.633

not differ from one another ( $p > .05$ ). In the ANOVA, the levels of the factors analyzed did not differ among years; however, it is known that Tukey's test for the multiple comparison of means is more powerful than ANOVA. As in the analysis of the previous component, the growth potential for empathy in this component reached 11.59 points; thus, the difference between first and fifth year was 1.86, with the growth potential for this component being 16.03%. In the component Putting oneself in the Other's Shoes, the only significant differences

( $p < .05$ ) were observed between the means of the second year and those of the fourth and fifth years. The growth potential for this empathy component was 9.63, while its actual growth reached 15.84%.

Lastly, Fig.1a–d show the behavior of the mean levels of the Year and Gender factors. It was found that women behave differently in second, third, and fourth year, as their values are the highest for general empathy and surpass those of men, although the situation tends to be more balanced in first and fifth year. Regarding the Compassionate Care component, it was found that differences between men and women in the Year factor are reduced compared to general empathy, although they follow the same pattern described above. Nevertheless, in the two remaining components, the behavior of the genders in different years does not match such patterns, although women always score higher. In the Perspective Adoption component, inter-gender differences become more marked between second and fourth year, while in the component Putting Oneself in the Other’s Shoes females surpass males in nearly all years (except for the second).

4. Discussion

The need to provide an overview of the reliability of the data examined and the statistical tests applied is in line with the nature of these data. Such a decision is justified by the fact that the aim of this study was to estimate the parameters of the Empathy Levels variable with the smallest error possible in order to properly diagnose the empathic behavior of the students examined. Therefore, we deemed it necessary to calculate the reliability of the data by estimating Cronbach’s alpha, effect size, and type II error probability (power of the test:  $1 - \beta$ ), among other measures. When the parameters of the reliability tests used are partially or totally unknown, it becomes harder to obtain conclusions leading to clear diagnoses. In the present study, we have found that in most cases the data meet the requirements for estimating reliability parameters, diagnosing empathic behavior, and establishing relevant comparisons; in addition, it was explicitly noted when the data and the statistical tests conducted were at risk of not fulfilling the required conditions.

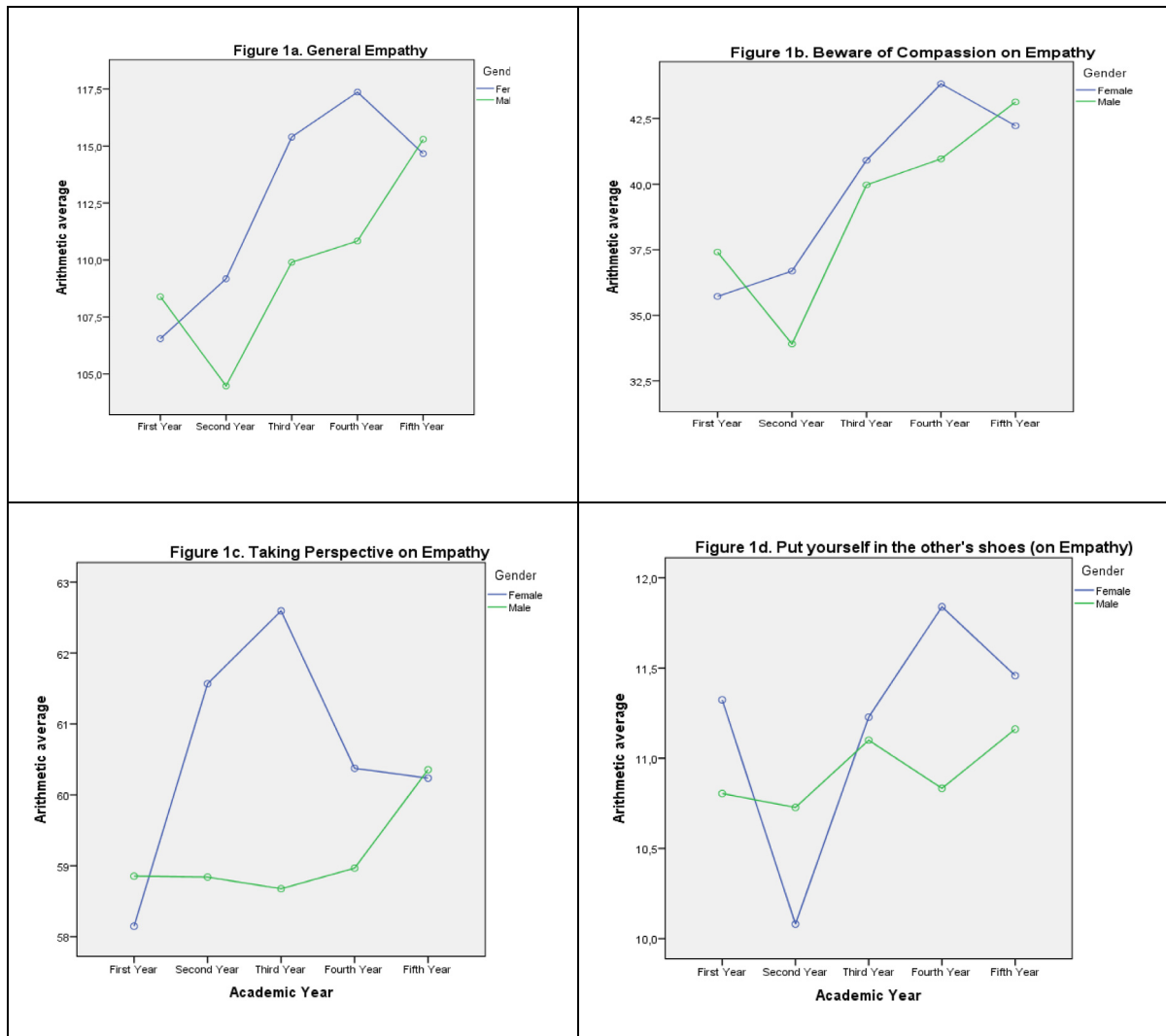


Fig. 1 Results of the distribution of general empathy levels and in each of the components in the genders examined.

It was observed that empathy levels are relatively high (compared to those reported in other publications) both for general empathy and for the Compassionate Care component; however, empathy levels in the components associated with cognitive processes are not high, which warrants a separate (Bilbao et al., 2013; Díaz-Narváez et al., 2014; Hojat et al., 2004, 2009; Howard et al., 2013; Bullen et al., 2015; Huberman et al., 2014; Silva et al., 2013; Silva et al., 2013).

**General empathy levels:** The observed increase in general empathy as students progress in the Dentistry program is not consistent with the “empathic erosion” model (externally manifested by a decrease in empathy levels) proposed by Hojat et al. (2004, 2009). Other authors have also reported the poor applicability of this model in the case of Medicine and Dentistry students (Howard et al., 2013; Bullen et al., 2015; Huberman et al., 2014; Silva et al., 2013; Bilbao et al., 2013; Bilbao et al., 2015), which suggests that “erosion” is only a particular case of several models of empathic behavior over the course of a study program (Díaz-Narváez et al., 2014) and that any intervention aimed at improving students’ empathy levels, by any university, cannot follow a standardized model, but instead requires a thorough diagnosis of this attribute in students. Differences between genders reveal an advantage for women from second to fourth year in terms of absolute values (Fig. 1a), but not from a statistical perspective. In this regard, Díaz-Narváez et al. (2015), in a study conducted in 18 Latin American faculties of Dentistry, demonstrated the absence of gender-linked variability in empathic response; therefore, it cannot be categorically stated that women are more empathic than men in all the populations studied. These results lead to another contradiction, given that several authors claim or consider that the “natural” result is for women to be more empathic than men (Hojat et al., 2002; Roh et al., 2010; Shariat and Habibi, 2013; Vera, 2014; Wen et al., 2013).

This variability must be examined as soon as possible, because it has a direct effect on curricular configuration. The T2 results observed and the low  $R^2$  value estimated in this study support the existence of variability regarding participants’ responses to the instrument and indicate that the factors Year and Gender explain very little of the total variation of empathy. All of this is consistent with the results of other studies summarized by Vera (Vera, 2014). This situation results in most studies not considering the latter coefficient ( $R^2$ ) and therefore obviating the need to include other factors that help explain empathic behavior, which could also have an alternative and complementary impact (Díaz-Narváez, 2009) on the manifestation of this attribute. For example, research that included students from several faculties of Dentistry in Chile (Díaz-Narváez et al., 2016) and medical students from two countries in the Caribbean region (Díaz-Narváez et al., 2014) has shown that empathy levels vary among faculties, with differences being linked to gender and year of university.

On the other hand, the results of the present study suggest that a potentially large margin for “empathic growth” exists, inasmuch as only 23.93% of growth was observed relative to the total growth potential (100%), which can be qualitatively classed as low. Reflection is needed to initiate actions leading to conditions that can foster more marked growth in the empathy levels of the students assessed. We are not aware of any estimations in the literature that could reveal the “margin”

for empathic growth; therefore, it is not possible to establish comparisons between our results and those of analogous studies.

The increase in empathy associated with Compassionate Care was very similar to that of general empathy (Fig. 1b). Nevertheless, this “coincidence” cannot be explained in the same manner as the case of general empathy, because it is a component of empathy itself. This similarity could be linked to the TGP, which was the largest of all components (across all years of the Dentistry program and regardless of gender), but this is a merely numeric interpretation. A more specific discussion is needed, which lies beyond the aims of this study. The behavior of Perspective Adoption differs from that of General Empathy and Compassionate Care (Fig. 1c). Empathic erosion, as described by Hojat et al. (2009), is clearly manifested in women, but not in men. This generates some contradictions with studies that assert that cognitive components are more developed in the male gender (La, 2012; Retuerto, 2004). This finding cannot be explained in the present study. On the other hand, the TGP is very low, which appears to indicate that, in general, this cognitive component is weakly developed and that this dimension could be improved in students in order to increase their empathy levels. Lastly, the case of “Putting One-self in the Other’s Shoes” (Fig. 1d), also with a low TGP, shows that women acquire greater levels of this component than men in their last three years of study.

A first generalization reveals the following possible aspects: (a) Although the individual analysis of components is merely an abstraction, given that all three are closely linked and interact with each other (Díaz-Narváez et al., 2015; Díaz-Narváez et al., 2017), it could be supposed that the greater development observed in Compassionate Care could be associated with a greater increase in sympathy and not cognitive empathy in particular, and (b) the differences between the degree of potential development observed in Compassionate Care and that of the other components could be due to a curriculum that does not consider the incorporation of active learning through teaching-learning processes conducive to an improved acquisition of empathy and a balanced development of its components.

Given the findings presented, the first step towards establishing strategies for guaranteeing the most grounded training possible is to recognize the values promoted by the type of education provided, as well as any weaknesses in students and graduates. With respect to curricular design and the adoption of academic experiences capable of improving empathic values during health sciences training, some authors have suggested the inclusion of workshops or activities related to “mind-body practices” in order to increase psychological well-being. A student with lower stress levels may show more compassion and empathy, communicating more effectively with his/her patients. Bond et al. (Bond et al., 2013) used this strategy with a group of 27 medical students who, after 11 weeks, displayed favorable changes according to several instruments, including the Jefferson scale. Enriching the curriculum with activities that promote self-regulation and reflection could help improve empathy and effective communication with patients. However, it has not been confirmed, on the one hand, whether this positive change in empathy levels is permanent (and, even more so, whether these increases can provide positive feedback or require constant pedagogical “reinforcement”), and, on the

other, whether this increase in empathy results from the development of cognitive and/or emotive components. It has been suggested that the Compassionate Care component is the least susceptible of being developed in young older adults (Díaz-Narváez et al., 2017), given that it is strongly associated with other factors such as a subject's religion, moral principles, and world view, as well as the society in which he/she lives. This component is likely to have the least potential for growth in subjects after being shaped throughout their early ontological development. The existence of a dialectical relationship between these components makes it possible to infer a new problem: establishing whether it is possible to increase general empathy levels if a subject has certain levels of Compassionate Care.

Chen and Kumar (2016) describe that one of the reasons for students to display less empathy (or erosion in one of its constituent attributes) is academic workload, which, in turn, can lead to stress and depression. In a study with medical students, a direct association was established between stress levels and a drop in empathy which was not solved by including a well-being course during the first year. The authors concluded that attention must be paid to the rise in depression in order to improve student empathy. However, it is theoretically possible to find students without stress or depression who also display low empathy levels and vice versa. It can be inferred that stress and depression are factors that contribute to decreasing empathy, but do not determine its definitive "value" and may only partially affect a person's empathic attitude.

Empathy is regarded as a communicative competence by some authors. Srivastava and Das (2016) state that reinforcing the act of listening to patients in medical sciences programs can increase empathy. They have even suggested concrete exercises, such as supervised role plays with peers, identifying emotive elements in conversation. Such exercises can be recorded to later perform a self-evaluation and identify areas for improvement in the simulated interaction. However, researchers have yet to identify which component of empathy receives the most stimulation with the acquisition of this competence.

Practical activities, especially those in which students spend time with patients in clinical environments, have been shown to improve students' perception of their empathic ability. An educational process conducted in people's own environment appears to be a suitable tool for improving empathy. This approach was validated by the University of South Carolina School of Medicine, where strengthening social experiences with patients improved tolerance and empathy indicators (Russ-Sellers and Blackwell, 2017).

Therefore, it appears to be possible to adapt or update the academic curriculum in order to alter the behavior of empathy indicators, thus decreasing erosion in general or on a per-component basis. This has already been observed and documented, for example, with the curricular change at the Dental School of the Universidad Latinoamericana de Ciencia y Tecnología, in Costa Rica. There, after modifying extra-campus experiences and engaging students in clinical practice earlier, a positive change was observed in empathy levels, thus nullifying the process of the classical empathy erosion model (Padilla et al., 2017).

On the other hand, it still remains to be determined whether the use of clinical simulators or clinical simulation environments can strengthen empathic abilities, and, if so, to which

extent they actually influence these abilities (Schweller et al., 2014).

## 5. Conclusions

The empathic erosion model is not met. The empathy levels of the students examined are relatively high; however, it was demonstrated that a considerable growth potential exists for empathy and its components. Such results strongly suggest that the authorities of every university must take measures, both curricular and methodological, involving the pedagogical processes associated with the teaching of dentistry. The modifications required (in the two areas noted, as well as in others affecting specific elements of dentistry teaching) should be devised with a comprehensive approach allowing for the longitudinal assessment of empathy and the examination of the influence of the new curriculum on other attributes intrinsic to the health care activities of dentistry professionals. In brief, empathy cannot be regarded as a variable isolated from others belonging to the same complex structure.

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## Conflicts of interest

All authors declare no personal or financial conflicts of interest.

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