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Empathy and Personality Styles in Medical Students

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Abstract

This study established the relationship between empathy and personality styles in medical students, considering the differences by gender. The participants were 278 students of the medical career of the Universidad del Azuay, Ecuador. The evaluation involved the Jefferson empathy scale and the Millon Index of Personality Styles. Relationships between empathy and personality styles were examined using Pearson's correlation coefficient and Hierarchical Multiple Linear Regression analysis, for comparisons by gender and educational levels, with both Student's *t*-test and analysis of variance used respectively. Results indicated that the factor structure of the empathy scale is invariant between men and women, noticing gender differences in care with compassion and total empathy, with women presenting a higher mean. Differences are visible by educational level, where the general empathy in the first three years grows progressively, and then slightly decrease. Concluding, female students present an average score of total empathy greater than men, with differences of empathy according to educational level.

Keywords: empathy, medical, men, women, personality, students.

Empatía y Estilos de Personalidad en Estudiantes de Medicina

Resumen

Esta investigación estableció la relación entre empatía y estilos de personalidad en estudiantes de medicina según género. Participaron 278 estudiantes de la carrera de medicina de la Universidad del Azuay, Ecuador. Se aplicó la escala de empatía de Jefferson y el índice de estilos de personalidad de Millon. Las relaciones entre empatía y estilos de personalidad se examinaron utilizando el coeficiente de correlación de Pearson y el análisis jerárquico de regresión lineal múltiple. Las comparaciones por género y niveles educativos se analizaron con la prueba *t* de Student y el análisis de varianza. La estructura factorial de escala de empatía no varía entre hombres y mujeres, sin embargo, se notaron diferencias de género en cuidado con compasión y empatía total, presentando las mujeres una media más alta. Existen diferencias por nivel educativo, se observó que la empatía general en los primeros tres años crece y luego disminuye. Finalmente, las estudiantes presentan una puntuación media de empatía total mayor que los hombres, con diferencias según el nivel educativo.

Palabras clave: empatía, estudiantes de medicina, hombres, mujeres, personalidad.

Literature shows that empathy has an innate or genetic component (García, González, & Maestú, 2011), an environmental component (Díaz-Narváez et al., 2014; García et al., 2011) or one of social and cultural environment (Delgado-Bolton, San Martín, Alcorta-Garza, & Vivanco, 2016). Therefore, empathy is a result of the interaction between these components. Empathy has a multidimensional internal structure formed by three components: *perspective adoption*, *compassionate care*, and *ability to put oneself in the shoes of the other* (Hojat, Gonnella, Nasca, Mangione, Vergare et al., 2002; Paro, Daud-Gallotti, Tibério, Pinto, & Martins, 2012). These attributes are involved in the physician-patient relationship, being associated with both improvements in patient care and good clinical outcomes (Batt-Rawden, Chisolm, Anton, & Flilckinger, 2013; Mercer & Reynolds, 2002), being an essential attribute for the practice of medicine (Vecchi, 2016). There is controversy regarding the measurement of results from the distribution of empathy between genders (Díaz-Narváez et al., 2015; Merino-Soto, López-Fernández, & Grimaldo-Muchotrigo, 2019), between educational levels (Silva, Arboleda, & Díaz, 2014) and between faculties of medicine, health sciences, and countries (Díaz-Narváez et al., 2014), existing several factors that affect it.

One of these factors is personality, which, beyond its multiple definitions, can be understood as a distinctive style of adaptive functioning that a member of a species tends to relate to its typical spectrum of environments (Millon, 1994); being the personality styles of the individual strategies that the human being uses to adapt to the environment, which can be grouped into three major areas (Dresch, Sánchez, & García, 2005; Millon, 2003): *motivational goals*, *cognitive modes*, and *interpersonal behaviors*.

Motivational goals have to do with the desires and goals that guide people towards the end and lead them to act in a certain way. *Cognitive modes* allude to the way of transforming information and the sources used to acquire knowledge about

life, importing what is taken into account when experimenting and learning, or what people do to make this knowledge meaningful and useful; it is the capacity for reflection to transcend the concrete and immediate, and symbolically represent the events and processes that are translated into potential for change and adaptation (Millon & Davis, 1996). *Interpersonal behaviors* refer to the preferred ways that people use to interact with others, a style of social behavior that derives in part from the interaction between *motivational goals* and *cognitive modes* (Millon, 2003).

Empathy is a multidimensional construct that includes all the processes of putting oneself in the place of the other and the associated affective and non-affective responses (Davis, 1983). In the context of health care, it involves cognitive aspects that encompass an understanding of the experiences, concerns, and perspectives of the patient being treated, as well as the ability to communicate such understanding to the person (Hojat et al., 2002), thus implying personality styles, such as information processing in a logical and analytical way (thought), the judgments conceived from their own affective reactions and personal values (feeling), the lack of emotion or social indifference (withdrawal), or the motivation to satisfy the needs of the other (protection), among other features and personality styles that necessarily participate in the expression of empathy (Dresch et al., 2005).

Current literature has established a relationship between empathy and personality in the field of health professionals, revealing a positive association between empathy and collaborative interprofessional work in physicians who are beginning their specialization (San-Martín et al., 2017). Other studies relate the model of the five big personality factors (Big Five) and empathy, finding a medium size effect when associating both variables, achieving predictive affective and cognitive empathy from the dimension of agility and consciousness (Melchers et al., 2016). In turn, personality differs according to gender and interacts with empathy and other socio-affective variables;

in a study on personality in Chilean university students it was found that women have higher academic self-realization than men, but in turn a lower self-esteem and resolute self-efficacy (Castellanos, Guerra, & Bueno, 2014).

In this context, we seek to analyze the relationship between empathy and its dimensions with the different personality styles presented by medical students, taking into account the differences by gender and educational level, improving understanding of the phenomenon of empathy, and providing backgrounds that contribute to the comprehensive training of doctors and other health science professionals.

Method

In order to establish the association between empathy, its dimensions, and the different personality styles; a non-experimental, descriptive, cross-sectional study was designed.

Participants

The study included 278 students from the medical school of the University of Azuay, (Cuenca, Ecuador), corresponding to 98% of those enrolled during the academic year of 2016. 166 were women (59.7%) and 112 were men (40.3%), with an age range of 18 to 41 years ($M = 20.88$, $SD = 2.78$), distributed in the six levels of the career: first year ($n = 72$), second year ($n = 92$), third year ($n = 24$), fourth year ($n = 45$), fifth year ($n = 17$), and sixth year ($n = 28$). Only 2% of the students in the school did not participate, either because they were absent or did not give their informed consent to participate.

Instruments

The Jefferson Scale of Physician Empathy (JSPE-S) was applied, Spanish version for medical students, which measures the attitudes of medical students towards medical empathy in patient care situations (Hojat et al., 2001). The instrument consists of 20 items valued through a Likert-type scale, of seven points, from 1 (*strongly disagree*) to 7 (*strongly agree*). The scale gives scores ranging

from 20 to 140 points and does not establish a cut-off point to constitute categories of high or low empathy. The instrument was previously subjected to cultural validation by judges, four experts whom examined the questions in order to adjust the concepts to the cultural environment and avoid confusion or subjective influences that distort the students' answers. A pilot study was performed prior to the final application that was carried out in March 2015.

The Millon Index of Personality Styles (MIPS) was also used (Millon, 1994), Spanish version, consisting of 180 items of dichotomous response (true/false) that allows the measurement of 12 pairs of poles that provide 24 features that determine the styles of personality, which in turn are grouped into three areas: *motivational goals* (openness, preservation, modification, accommodation, individualism, and protection), *cognitive modes* (extroversion, introversion, sensation, intuition, reflection, affectivity, systematization, and innovation), and *interpersonal behavior* (withdrawal, communication, hesitation, firmness, discrepancy, conformism, submission, control, dissatisfaction, and agreement). The scales measure personality in adults, older than 18 years, who function normally, thus moving away from a pathological perspective (Millon, 1994).

Procedure

This study was ethical approved by the Azuay University Faculty of Medical Sciences Research Ethics Committee. Written informed consent was obtained from each of the participants in accordance with research ethical principles, establishing a voluntary and anonymous participation. The measurements were made by a neutral investigator, using a paper form, in the regular class schedule of the students.

Data Analysis

A statistical analysis to describe the sample and the measured variables, central tendency, and dispersion statistics were calculated. Cronbach's

alpha coefficient and McDonald's omega coefficient were used to estimate the internal consistency of the scales and their dimensions. The Student's t-test for independent samples was applied to compare the mean empathy scores of men and women, by estimating the d of Cohen's formula as a measure of effect size (Cohen, 1992). One-way ANOVA was used to compare the empathy means according to educational level, calculating the square Eta (η^2) as a measure of effect size. Prior to the calculation of the Student t-test and the ANOVA, the Shapiro-Wilk test was used to test the normality of the variables and the Levene test to evaluate homoscedasticity. The correlations between empathy scores, and its three dimensions, with personality styles, were calculated using Pearson's linear correlation coefficient (r_{xy}), establishing the association for both the total sample and the sample segmented by gender. To predict empathy values and their dimensions, Hierarchical Multiple Linear Regression models were estimated, using the different measures of personality styles as predictor variables. A Multiple Group Confirmatory Factor Analysis was performed to analyze the factorial invariance of empathy measurement models, considering each gender as a sample to evaluate the goodness of fit of the models used for the Chi-square statistic, the Goodness of Fit Index (GFI) and the Root Mean Square Error of Approximation (RMSEA) as absolute adjustment measures,

the Adjusted Goodness of Fit Index (AGFI), the Tucker-Lewis Index (TLI), Confirmatory Fit Index (CFI), and the Akaike Information Criterion (AIC). It is not possible to apply Confirmatory Factorial Analysis (CFA) to the measures of the MIPS since the factors are not independent when sharing weighted items in a differentiated manner between one factor and another. The significance level used in all cases was $\alpha \leq .05$. All statistical analyzes were performed with IBM SPSS Statistics V.22 (IBM Corp., 2013) and AMOS 21.

Results

Table 1 presents the descriptive statistics and the reliability coefficients of alpha of Cronbach and omega of McDonald of the empathy scale and its dimensions, considering the total sample ($n = 278$).

Regarding the measure of empathy, the invariance of the factorial structure between female and male students was analyzed, the goodness of fit indices allows acceptance of the equivalence of the measurement models between the two samples. Although the Chi-square value allows rejecting the hypothesis of invariance ($\chi^2 = 287.121$), the other indices support the unrestricted model of invariance (GFI = .970, CFI = .983, RMSEA = .035, AIC = 416.102). The goodness of fit for each population is presented (Table 2) and the goodness of fit of the invariance models (Table 3).

Table 1
Descriptive Statistics and Reliability of Empathy and its Dimensions

Empathy	Min.	Max.	Mean	S.D.	Median	Alpha	Omega
Perspective adoption	35	70	60.65	7.295	62	.734	.746
Compassionate care	18	49	40.94	6.580	43	.627	.646
Putting oneself in the shoes of another	3	21	10.53	3.472	10	.364	.439
General empathy	67	140	112.12	12.464	114	.733	.773

Table 2
Goodness-of-fit Indices of the AIC of the Measure of Empathy for Women and Men, and Factorial Invariance

Model	χ^2	GFI	RMSEA	AGFI	TLI	CFI	CMIN/DF	AIC
3 Factor model (Women)	118.750	.970	.050	.949	.976	.983	2.527	180.750
3 Factor model (Men)	173.350	.977	.054	.952	.977	.984	3.668	237.048

Table 3
Goodness-of-fit Indices for Factorial Invariance Models

	χ^2	DF	GFI	NFI	CFI	RMSEA	AIC
Model without Restrictions	292.101	94	.970	.976	.983	.037	416.101
Metric invariance	350.388	104	.965	.971	.979	.039	454.388

Table 4
Descriptive Statistics of Empathy and Comparison According to Educational Levels

	1°	2°	3°	4°	5°	6°	Total	F	p
Empathy	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)			
Putting oneself in the shoes of another	10.69 (3.58)	10.71 (3.75)	10.33 (4.37)	9.71 (2.78)	10.0 (3.12)	11.29 (2.42)	10.53 (3.47)	.939	.456
Perspective adoption	58.62 (7.73)	60.76 (6.40)	61.67 (7.0)	60.87 (6.70)	62.76 (6.60)	63.04 (9.47)	60.65 (7.30)	3.339	.041
Compassionate care	38.60 (6.55)	41.51 (6.64)	45.0 (5.33)	41.38 (6.46)	40.35 (5.11)	41.25 (6.65)	40.94 (6.58)	4.263	.001
General empathy	107.92 (13.77)	112.98(11.41)	117.0 (11.89)	111.96 (11.13)	113.12 (9.45)	115.57 (14.04)	112.12 (12.46)	2.394	.011

Table 5
Comparison of Empathy Means and their Different Dimensions According to Gender

	Men (n=112)		Women (n=166)		ic 95% dif.				
	Mean	s.d.	Mean	s.d.	t	p	li	ls	d
Perspective adoption	60.06	6.99	61.05	7.49	-1.11	.26	-2.7	.76	-.13
Compassionate care	39.76	6.54	41.73	6.51	-2.47	.01	-3.5	-.41	-.30
Putting oneself in the shoes of another	10.05	3.20	10.84	3.62	-1.86	.06	-1.6	.04	-.23
General empathy	109.9	12.2	113.6	12.45	-2.48	.01	-6.7	-.79	-.30

Note: d=Cohen's d (Effect size); s.d.= Standard Deviation.

When using a one-way ANOVA to compare the means of empathy and its dimensions according to educational levels (Table 4), there is no statistically significant difference between the means in the ability of the dimension to *put oneself in the shoes of the other* ($p > .05$, $\eta^2 = .017$), presenting differences only between the means of *perspective adoption* ($p < .05$, $\eta^2 = .059$), *compassionate care* ($p < .001$, $\eta^2 = .073$), and in the *general empathy scale* ($p < .05$, $\eta^2 = .042$). Showing an average effect in the *Eta square* (η^2) of the three variables, in which differences between the means are observed.

When comparing the average scores of the empathy scale and its dimensions according to gender, it is evident that there are no statistically

significant differences in *perspective adoption* and *putting oneself in the shoes of the other* ($p > .05$), which is confirmed by the confidence interval for the differences between the means and a small effect size (d), there being only differences with *compassionate care* and in the total empathy score, where women have higher means than men, although a small size is retained of the effect (Table 5).

The personality styles that stand out with the greatest presence in medical students are *control*, *conformism*, *reflection*, *sensation*, and *firmness*, with average prevalence greater than 68, of them, *sensation* is higher in women than in men ($p < .001$, $d = -.408$), and *reflection* is greater in men ($p < .001$, $d = .739$), there being statistically

significant differences between men and women in slightly more than half of the personality styles, as seen in Table 6.

Table 7 shows the results of the Pearson correlation between personality styles and the total empathy score, considering the total sample and the sample segmented by gender. Showing low eminently associations, but significant, in most established relationships. From the perspective of *motivational goals*, total empathy presents a direct relationship with *openness*, *modification*, and *protection* and an inversely proportional relationship with *preservation*, *accommodation*, and *individualism*. Associations remain in the subsample of men, except for the scale of *individualism* and lack of association with empathy in the dimensions of *openness*, *preservation*, and *accommodation* in the subsample of women. From

the perspective of the *cognitive modes* of medical students general empathy is not associated with *intuition* and *innovation*, both for the total sample and for the sample segmented by gender, maintaining a direct and significant association with *extroversion* ($r = .130, p = .015$), *affectivity* ($r = .145, p = .008$), and *systematization* ($r = .110, p = .033$) and an inverse relationship with *introversion* ($r = -.164, p = .003$), *sensation* ($r = -.102, p = .045$), and *reflection* ($r = -.162, p = .003$). When examining the correlation between general empathy and cognitive modes according to gender the association with *extroversion*, *introversion*, and *systematization* only turn out to be significant in men, with *sensation* being the only cognitive mode that is significant and inversely proportional in women ($r = -.151, p = .007$), indicating that women with greater empathy have less orientation to obtain knowledge of

Table 6
Descriptive Statistics and Comparison of Personality Styles According to Gender

MIPS	Total			Men (n=112)		Women (n=166)		t	p	d
	Mean	SD	α	Mean	SD	Mean	SD			
Openness	65.6	19.8	.72	66.8	20.7	64.9	19.32	0.78	.431	.096
Preservation	33.6	20.1	.83	29.9	20.6	36.1	19.41	-2.53	.012	-.308
Modification	60.6	19.9	.71	57.2	20.2	62.9	19.59	-2.34	.020	-.286
Accommodation	39.9	20.7	.67	44.8	22.2	36.7	19.06	3.14	.002	.390
Individualism	62.1	25.1	.74	65.5	26.7	59.8	23.91	1.81	.072	.224
Protection	46.6	23.6	.75	40.4	25.8	50.8	21.15	-3.54	.001	-.442
Extroversion	49.8	24.5	.74	51.9	24.8	48.5	24.33	1.13	.257	.139
Introversion	48.0	27.0	.70	47.9	27.3	48.1	26.96	-0.07	.944	-.008
Sensation	68.9	20.6	.65	63.9	21.2	72.3	19.55	-3.36	.001	-.408
Intuition	33.2	21.7	.75	40.7	22.3	28.2	19.91	4.90	.001	.593
Reflection	71.1	21.9	.70	80.2	20.2	64.9	20.93	6.03	.001	.739
Affectivity	37.5	24.1	.79	32.2	25.2	41.2	22.73	-3.04	.003	-.376
Systematization	62.9	21.2	.68	58.7	24.0	65.6	18.68	-2.55	.011	-.320
Innovation	35.6	22.6	.77	43.9	21.6	30.0	21.70	5.23	.001	.640
Retreat	48.3	25.9	.81	48.1	26.5	48.5	25.60	-0.11	.907	-.014
Communicability	56.8	24.2	.80	63.9	22.8	51.9	24.06	4.15	.001	.511
Hesitation	39.3	24.1	.77	38.8	24.4	39.6	24.03	-0.25	.803	-.031
Firmness	68.3	21.3	.68	68.1	23.7	68.5	19.68	-0.13	.894	-.017
Discrepancy	46.1	23.1	.76	48.9	21.3	44.3	24.24	1.65	.099	.205
Conformism	71.2	19.6	.75	74.3	19.3	69.1	19.60	2.19	.029	.269
Subjection	28.7	22.4	.60	28.7	24.0	28.7	21.43	0.00	.997	.000
Control	71.5	20.6	.61	71.4	23.4	71.6	18.65	-0.08	.936	-.010
Dissatisfaction	44.2	24.9	.74	48.5	24.2	41.3	25.01	2.37	.018	.291
Agreement	50.1	23.2	.66	43.0	23.9	55.0	21.55	-4.36	.001	-.527

Note: α = Cronbach alpha, d=Cohen's d (Effect size).

the concrete, tangible or observable and that men who are more empathetic tended to be extroverted rather than introverted, and tend to systematize and organize their experience and be more efficient. Likewise, in the different scales that reveal the styles of interpersonal behavior, there is an absence of correlation between empathy with *conformism* ($p = .238$), *subjection* ($p = .078$), and *control* ($p = .412$), showing directly proportional correlations with *communication* ($r = .102, p < .05$), *firmness* ($r = .174, p < .01$), and *concordance* ($r = .110, p < .05$), and inverse correlations with *withdrawal* ($r = -.180, p < .01$), *hesitation* ($r = -.174, p < .01$), *discrepancy* ($r = -.186, p < .01$), and *dissatisfaction* ($r = -.193, p < .01$), associations that are mostly confirmed in the subsample of men where *control* is added ($r = .151, p < .05$), and *conformism* ($r = .166, p < .05$), canceling the associations between empathy and most of the scales of interpersonal behavior in the subsample of women, where only a significant and inversely proportional association with *discrepancy* ($r = -.180, p < .05$) and *dissatisfaction* ($r = -.212, p < .05$), and a direct relationship with *concordance* ($r = .164, p < .05$).

Table 8 shows that, of the six personality styles referred to as the *motivational goals*, only *protection* shows an association directly proportional to *perspective adoption* ($r = .163, p < .01$), an association that is confirmed in the subsample of women ($r = .217, p < .05$) where in addition an inverse relationship with *individualism* is added ($r = -.260, p < .01$); associations that are not observed in men where the *perspective adoption* is positively associated with *modification* ($r = .199, p < .01$). *Perspective adoption* is positively associated with *affectivity* in both men ($r = .141, p < .05$), and women ($r = .157, p < .05$), showing association with the bipolar dimension of *extroversion-introversion* only in men, where *perspective adoption* is positively associated with *extroversion* ($r = .163, p < .05$) and negatively with *introversion* ($r = -.205, p < .01$). In the styles of *interpersonal behaviors*, associations differentiated between men and women are presented, where *perspective adoption* presents an

inverse association with *discrepancy* ($r = -.121, p < .05$) and *dissatisfaction* ($r = -.098, p < .05$), and a direct association with *agreement* ($r = .061, p < .01$) in the subsample of women; associations that do not present in men, in whom *perspective adoption* is associated directly with *communicability* ($r = .216, p < .01$), *firmness* ($r = .223, p < .01$), and *conformism* ($r = .172, p > .05$) and inversely with *withdrawal* ($r = -.199, p < .01$) and *hesitation* ($r = -.178, p < .05$).

Table 8

Correlation Between Personality Styles and the Dimension Perspective Adoption According to Gender

Personality styles	Perspective adoption		
	Total	Women	Men
Motivational goals			
Openness	.096	.081	.112
Preservation	-.041	-.009	-.081
Modification	.076	-.135	.199**
Accommodation	-.097	-.043	-.118
Individualism	-.055	-.260**	.100
Protection	.163**	.217*	.106
Cognitive modes			
Extraversion	.116*	.057	.163*
Introversion	-.141**	-.043	-.205**
Sensation	-.060	-.151	-.024
Intuition	-.002	.059	-.012
Reflection	-.068	-.068	-.031
Affectivity	.157**	.157*	.141*
Systematization	.052	.052	.097
Innovation	-.019	-.019	.029
Interpersonal behaviors			
Retreat	-.140**	-.140	-.199**
Communicability	.113*	.113	.216**
Hesitation	-.101*	-.101	-.178*
Firmness	.116*	.116	.223**
Discrepancy	-.121*	-.121*	-.079
Conformism	.101*	.101	.172*
Subjection	-.009	-.009	-.039
Control	.008	.008	.118
Dissatisfaction	-.098*	-.098*	-.015
Agreement	.061	.061*	-.037

Note: * $p < .05$; ** $p < .01$

Table 9 presents the association of the dimension *compassionate care* with the different personality styles. From the perspective of *motivational goals*, an inverse association with *preservation* is observed in both men ($r = -.276, p < .01$) and women ($r = -.172, p < .05$), which implies that as

Table 9
Pearson Correlation Between Personality Styles and the Dimension Compassionate Care According to Gender

Personality style	Compassionate care		
	Total	Women	Men
Motivational goals			
Openness	.187**	.114	.257**
Preservation	-.205**	-.172*	-.276**
Modification	.087	-.136	.211**
Accommodation	-.207**	-.117	-.239**
Individualism	-.112*	-.220**	-.005
Protection	.125*	.125	.073
Cognitive modes			
Extraversion	.085	.043	.133*
Introversion	-.091	-.023	-.141*
Sensation	-.066	-.202*	-.023
Intuition	-.071	.044	-.088
Reflection	-.147**	-.154*	-.071
Affectivity	.023	.020	-.022
Systematization	.069	-.024	.108
Innovation	-.016	-.030	.071
Interpersonal behaviors			
Retreat	-.120*	-.088	-.148*
Communicability	.062	-.043	.196**
Hesitation	-.183**	-.064	-.272**
Firmness	.186**	.039	.309**
Discrepancy	-.151**	-.146	-.135*
Conformism	-.030	-.132	.069
Subjection	-.116*	-.028	-.185**
Control	.048	-.119	.190**
Dissatisfaction	-.156**	-.167*	-.118
Agreement	.059	.141	-.066

Note: *p<.05; **p<.01

care increases, attention decreases towards the pessimistic visibility of the problems of life. This also shows an inversely proportional association with *accommodation* and *individualism*, and a direct association with *openness* and *protection*. In cognitive modes, only reflection has an inverse association with *compassionate care* ($r = -.147, p < .01$), which in turn occurs in the subsample of women ($r = -.154, p < .05$), an association that does not exist in the sample of men. From the perspective of *interpersonal behaviors*, an inversely proportional relationship of *compassionate care* with *withdrawal* stands out ($r = -.120, p < .05$), *hesitation* ($r = -.183, p < .01$), *discrepancy* ($r = -.151, p < .01$), *submission* ($r =$

Table 10
Pearson Correlation Between Personality Styles and the "Ability to put Oneself in Each Other's Shoes" According to Gender

Personality styles	Ability to put oneself in each other's shoes		
	Total	Women	Men
Motivational goals			
Openness	.054	-.057	.135*
Preservation	-.055	.065	-.161*
Modification	.043	-.024	.060
Accommodation	-.082	.008	-.113
Individualism	-.178**	-.081	-.227**
Protection	.139**	.059	.164*
Cognitive modes			
Extraversion	.063	.038	.092
Introversion	-.118*	-.023	-.178*
Sensation	-.113*	-.134	-.142*
Intuition	-.032	.068	-.045
Reflection	-.159**	-.092	-.151*
Affectivity	.145**	.143	.118
Systematization	.157**	-.006	.259**
Innovation	-.094	.075	-.146*
Interpersonal behaviors			
Retreat	-.123*	-.089	-.147*
Communicability	.013	.062	.030
Hesitation	-.066	.101	-.170*
Firmness	.030	-.066	.098
Discrepancy	-.126*	.078	-.218**
Conformism	.001	-.113	.091
Subjection	-.066	-.025	.095
Control	-.061	-.058	-.067
Dissatisfaction	-.192*	-.001	-.282**
Agreement	.154*	.103	.151*

Note: * p<.05; ** p<.01

$-.116, p < .05$), and *dissatisfaction* ($r = -.156, p < .01$), for which many of these associations are confirmed in the subsample of men, but not in women, where only *dissatisfaction* has an inverse correlation ($r = -.167, p < .05$), being the only *interpersonal behavior* in women that correlates with *compassionate care*.

Table 10 presents the association of the different personality styles with the ability to *put oneself in the shoes of the other*, highlighting for the total sample a direct correlation with *protection* ($r = .139, p < .01$) and inverse with *individualism* ($r = -.178, p < .01$), being the only *motivational goals* that present statistical significance; those that are confirmed in the subsample of men, but not in women where no

Table 11
Hierarchical Multiple Linear Regression to Predict Empathy

	Model	β	EE	β_e	t	Sr
General empathy	Constant	116.825	3.340		34.98**	
	Protection	.112	.029	.220	3.81**	.220
	Sensation	-.075	.034	-.128	-2.18*	-.126
	Accommodation	-.113	.034	-.195	-3.32*	-.191
Perspective adoption	Constant	56.129	1.554		36.11**	
	Protection	.054	.017	.191	3.23**	.191
	Firmness	.034	.019	.110	1.85*	.110
Compassionate care	Constant	41.195	2.215		18.60**	
	Protection	.063	.023	.240	2.80**	.161
	Reflection	-.064	.020	-.225	-3.15**	-.181
	Affectivity	-.075	.025	-.289	-3.05**	-.176
	Firmness	.064	.017	.219	3.74**	.216
Ability to put oneself in each other's shoes	Constant	10.961	.533		20.58**	
	Dissatisfaction	-.027	.008	-.190	-3.23**	-.190
	Affectivity	.020	.009	.138	2.34*	.138

Note: * $p < .05$; ** $p < .01$; β_e : Beta standardized coefficient; Sr: Semi partial correlation

personality style, through the three great areas of personality, shows a significant association with *putting oneself in the shoes of the other*. From the perspective of *cognitive modes*, of the total sample, there is a direct correlation where *affectivity* is observed ($r = .145, p < .01$) and *systematization* ($r = .157, p < .01$), and inverse with *introversion* ($r = -.118, p < .05$), *sensation* ($r = -.113, p < .05$), and *reflection* ($r = -.159, p < .01$), which are eminently replicated in the subsample of men. Regarding *interpersonal behaviors*, inverse correlations with *withdrawal* are presented ($r = -.123, p < .05$), *discrepancy* ($r = -.126, p < .05$), and *dissatisfaction* ($r = -.192, p < .05$), with a direct correlation with *concordance* ($r = .154, p < .05$).

To determine the personality styles associated with empathy and its different dimensions and to predict the values of empathy, several models of Hierarchical Multiple Linear Regression were tested. The ANOVA of the regression model indicates that it is possible to predict the total empathy score from the personality styles of *protection*, *sensation*, and *accommodation* ($F = 9.72, p < .001$), which as a whole can explain 9.7% of the variance ($R^2 = .097$). It is possible to predict *perspective adoption* from the styles of *protection* and *firmness* ($F =$

$6.83, p < .001$), which as a whole explain 4.8% of the variance ($R^2 = .048$). The styles of *protection*, *reflection*, *affection*, and *firmness* are variables that allow to predict *compassionate care* ($F = 7.78, p < .001$), which as a whole explains 10.3% of the variance ($R^2 = .103$). The ability to *put oneself in the shoes of the other* is possible to be predicted from the *dissatisfaction* and *affectivity* ($F = 8.17, p < .001$), which as a whole can explain 5.7% of the variance ($R^2 = .057$). The coefficients of the different models and their statistical significance are presented in Table 11.

Discussion and Conclusions

This study analyzes the association that exists between empathy and personality styles in medical students at the University of Azuay. In general, there are low to moderate correlations, which vary from + .10 to + .32 between the different personality styles and the general empathy score, depending on whether the general sample or the sample segmented by gender is valued, moderate associations concordant with those found in other studies with medical students (Song & Shi, 2017).

Perspective adoption is not homogeneous when comparing the first academic year with

the students of the final academic year, however *compassionate care*, *the ability to put in oneself in the shoes of the other*, and the *total empathy* do not differ statistically between the academic levels of first to sixth year of students in medicine, these last two results concur with the conclusions of the JSPE-s applied to 1188 students of medicine (Quince et al., 2016). There are still contradictory results regarding the evolution of empathy along academic levels, where sometimes no differences have been found (Montilva, García, Torres, Puer-tas, & Zapata, 2015) or others in which there are differences between some levels (Wen et al., 2013).

The students present a mean score of total empathy of 112 points ($SD = 12.46$), higher than the measurements made in Japan, South Korea, China, Kuwait, India, Iran, UK, Australia, Colombia, and Dominican Republic, that vary between 101.4 and 110.09 (Roff, 2015) and lower than that found in Brazil ($M = 114.95$, $SD = 12.41$) (Paro et al., 2012), Portugal ($M_{\text{global average}} = 114.4$, $SD_{\text{rank}} = 10.43-11.57$) (Duarte, Raposo, Rodrigues, & Branco, 2016), USA average between years 2002 and 2012 ($M = 114.3$, $SD = 10.4$) (Hojat & Gonnella, 2015) and sample composed of students first and second years medical school of UK, New Zealand, and Ireland ($M = 113.03$, $SD = 10.30$) (Quince et al., 2016). In the present study men had a mean of empathy of 109.88 ($SD = 12.20$) and women a mean of 113.63 ($SD = 12.45$), quite similar to those found in Portugal and the United Kingdom (Alcorta-Garza, González-Guerrero, Tavitas-Herrera, Rodríguez-Lara, & Hojat, 2005) showing women had an average score slightly higher than that of men, as has already been observed in other samples of medical students (Leombruni et al., 2014; Wen et al., 2013), a trend consistent with 11 other countries in which the JSPE-s has been used in medical students (Quince et al., 2016), which differs from that observed in professional doctors where empathy does not present significant differences according to gender (Delgado et al., 2016; Hojat et al., 2002; Montilva et al., 2015), diminishing the differences in the extent to which the profession is exercised.

From the perspective of personality styles, *dissatisfaction*, understood as a tendency to be passive-aggressive and ill humored, presents a negative association with general empathy, both at the level of the total sample and the sample according to gender, which is consistent with evidence that inversely relates neurotic traits to empathy and its dimensions (Song & Shi, 2017).

The results of the study reveal that different personality styles are significantly associated with empathy and that it is possible to predict the general empathy of the students from the styles of *protection*, *sensation*, and *accommodation*, which explains the 9.75 of the variance of the total score of empathy, predictions slightly lower than those reported with Chinese medical students, associating empathy and its dimensions with the five major personality factors (Song & Shi, 2017). There is a diversity of personality style respect to which the association they present with empathy and its components as well as gender differences is unclear, as occurs for example with the *introversion-extroversion* or *firmness* dimension what requiring more research about it.

It is observed that people with a high degree of empathy find it easy to accept the ups and downs of life, be optimistic about the future, trying to change their environment to achieve their goals and being motivated to satisfy others first; with a low orientation toward pessimism, lack of initiative, self-centeredness, and the satisfaction of their own needs. Female students present higher levels both in general empathy and in the dimension of *compassionate care*, which is inversely associated with the presence of an individualistic style, with *sensation* and *preservation*, an association that in general does not occur in the subsample of male students, who stand out for their *firmness* and *hesitation*.

It has been taken with great precaution to examine the invariance of measures of empathy according to gender, accepting that the factorial structure is invariant, which contributes to the validity of comparisons based on gender. This

also yields a Cronbach's alpha of .733, similar to .74 reported in the original Spanish version (Alcorta-Garza et al., 2005) and reliability coefficients for the scale of personality styles slightly lower than those established by Millon (1994), which reports values which vary between .69 and .85 for the different dimensions; showing thus the measures used an acceptable reliability when estimated in the sample under study.

One limitation of this study was its cross-sectional design, which does not allow establishing the evolution of the development of empathy in students during their medical training, or establishing causal relationships between variables, requiring a longitudinal study that accounts for the relationship of both constructs. A second limitation is associated with the lack of comparability of the study with other studies that relate empathy with personality, since a different measure was used to establish the personality construct, and studies that used the Big Five (Song & Shi, 2017), the NEO-FFI inventory (Mooradian, Davis, & Matzler, 2011) or the MMPI, but not the MIPS that was used in the present study. Despite this, it is worth considering that the MIPS is an index that measures personality styles from a non-pathological perspective (Millon, 2003) and in that sense can be considered a more appropriate measure to be used in the population of university students, also providing a more detailed measurement to the limitations that the more global measurements based on the five big factors (Big Five) (Mooradian et al., 2011; Paunonen, Jackson, Trzebinski, & Forsterling, 1992). Existing in turn difficulty of generalizing the results or their conclusions to populations of medical students from other countries, requiring new studies to establish the regularities or singularities between countries. A final observation necessary to consider is related to the reliability coefficients that show some dimensions of the personality styles scale, which are lower than a desirable value of .70, which however is consistent with that reported in the literature regarding the reliability of personality tests, which do not respond adequately to the

methods provided by the classical test theory. In addition, the assumption for estimating Cronbach's alpha is not fulfilled given that the personality style and empathy scales are multidimensional, violating the one-dimensional assumption of the construct, where the items are highly correlated with each other (Welch & Comer, 1988).

Despite the abovementioned, the study advances in unveiling the relationship between empathy and personality of students, that in spite of the ample literature on empathy, there are still very few studies that relate it to personality, expanding the information necessary to strengthen the various curricular measures, the formation or training that are being carried out to promote or enable the development of empathy of medical students, with the various benefits that this may bring to the doctor-patient relationship or to the effectiveness of medical treatments, or in methods of assessing the quality of care (Mercer & Reynolds, 2002), assessing empathy and personality styles as relevant elements in this context.

Some authors have argued that the attribute empathy is the result of a complex dialectical relationship between its components or dimensions (Calzadilla-Núñez et al., 2017; Díaz-Narváez, Estrada-Méndez, Arévalo-López, Calzadilla-Núñez, & Utsman-Abarca, 2017), all of which are influenced, in turn, by many different factors (Díaz-Narváez, Alonso-Palacios et al., 2017), of which, one of them is the personality. At the same time, the construction of this attribute has depended on the evolution of man (Decety & Harris, 2011) and the processes of ontogeny (Díaz-Narváez, Calzadilla-Núñez et al., 2017). The theoretical inference that is feasible to infer from the postulates of these authors is that empathy does not depend on a relevant variable, but on many variables acting at the same time and each of them contributes to its construction, but with different intensities due to different external means in which the subject develops. This situation is consistent with the results observed in several Latin American countries (Bilbao et al., 2015; Díaz-Narváez et al., 2014; Silva et al., 2014).

On the other hand, differences have been found in the levels of empathy among students of different dental schools within a country, as well as differences among students from different countries (Díaz-Narváez, Erazo et al., 2017). In all these cases it is observed that the variables studied explain little about the behavior of the empathy. The aforementioned complexity, in the determination of empathy allows another complex inference to be made, consisting of the fact that the teaching-learning processes associated with it could not depend on a universal strategy and strictly standardized methods, but rather that such a teaching strategy (and the corresponding methods) must emanate from the specific characteristics of the empathic situation of each student population.

Finally, this study analyzes the relationship between empathy and its dimensions, and the different personality styles, in a sample of Ecuadorian medical students. The results show moderate to low relationships, but significant, of the different personality styles, showing total empathy as a positive association with *protection* and a negative association with *sensation* and *accommodation*. Achieving prediction for *perspective adoption* from the style of perspective *protection* and *firmness*; *compassionate care* from *protection*, *reflection*, *affection*, and *firmness*; and the ability to *put oneself in the shoes of the other* can be predicted from *affection* and *dissatisfaction*. From the perspective of the academic training of medical students, we agree with other authors who state that empathy can be improved and taught, that it is possible to approach and integrate different styles or personality factors that allow improving empathy in the medical education, setting pedagogical objectives oriented to the development of empathy or proposing individualized strategies of intervention based on personality traits, understanding that any intervention strategy must be comprehensive due to the complexity of the attribute intervened.

The results found are consistent with other works carried out in Latin America and allow visualizing a consistent tendency in which this

attribute has a multifactorial character and it is important to study all the variables that influence it and determining its specific weight to correctly guide all possible pedagogical intervention.

References

- Alcorta-Garza, A., González-Guerrero, J.F., Tavitas-Herrera, S.E., Rodríguez-Lara, F.J., & Hojat, M. (2005). Validación de la escala de empatía médica de Jefferson en estudiantes de medicina mexicanos. *Salud Mental*, 28, 57-63.
- Batt-Rawden, S.A., Chisolm, M.S., Anton, B., & Flickinger, T.E. (2013). Teaching Empathy to Medical students: An updated, systematic review. *Academic Medicine*, 88, 1171-1177. <https://doi.org/10.1097/ACM.0b013e318299f3e3>
- Bilbao, J.L., Iglesias, J.E., Díaz-Narváez, V.P., Crespo-Camacho, E., Alonso, L.M., & Alcocer, A. (2015). Orientación empática en estudiantes de medicina de las Universidades Libre y San Martín, Barranquilla, Colombia. *Revista de la Facultad de Medicina*, 63, 657-663. <https://doi.org/10.15446/revfacmed.v63.n4.49715>
- Calzadilla-Núñez, A., Díaz-Narváez, V.P., Dávila-Pontón, Y., Aguilera-Muñoz, J., Fortich-Mesa, N., Aparicio-Marenco, D., ... & Reyes-Reyes, A. (2017). Erosion of empathy during medical training by gender. A cross-sectional study. *Archivos Argentinos de Pediatría*, 115, 556-561. <https://doi.org/10.5546/aap.2017.eng.556>
- Castellanos, S., Guerra, P., & Bueno, J.A. (2014). Gender differences in effective personality in Chilean university students. *International Journal of Developmental and Educational Psychology*, 5, 131-140. <https://doi.org/10.17060/ijodaep.2014.n1.v5.655>
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155-159. <https://doi.org/10.1037//0033-2909.112.1.155>
- Davis, M.H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44, 113-126. <https://doi.org/10.1037//0022-3514.44.1.113>

- Decety, J., & Harris, I.B. (2011). The neuroevolution of empathy. *Annals of the New York Academy of Sciences*, 1231, 35-45. <https://doi.org/10.1111/j.1749-6632.2011.06027>
- Delgado-Bolton, R., San-Martín, M., Alcorta-Garza, A., & Vivanco, L. (2016). Medical empathy of physicians-in-training who are enrolled in professional training programs. A comparative intercultural study in Spain. *Atención Primaria*, 48, 565-571. <https://doi.org/10.1016/j.aprim.2015.10.0050212-6567>
- Díaz-Narváez, V.P., Alonso, L.M., Caro, S.E., Silva, M.G., Arboleda, J., Bilbao, J.L., & Acosta, J.I. (2014). Empathic Orientation among medical student from three universities in Barranquilla, Colombia and one university in the Dominican Republic. *Archivos Argentinos de Pediatría*, 112, 41-49. <https://doi.org/10.5546/aap.2014.eng.41>
- Díaz-Narváez, V.P., Alonso-Palacios, L.M., Caro, S.E., Silva, M., Arboleda-Castillo, J., Bilbao, J., ...& Fajardo, E. (2017). Compassionate Care Component of the Construct Empathy in Medical Students in Colombia and Dominican Republic. *Acta Médica Mediterránea*, 33, 115-121. <https://doi.org/10.19193/0393-6384>
- Díaz-Narváez, V.P., Calzadilla-Núñez, A., Alonso, L.M., Torres-Martínez, P., Cervantes-Mendoza, M., & Fajardo-Ramos, E. (2017). Empathy and Ontogeny: A Conceptual Approach. *West Indian Medical Journal*, 66, 1-4. <https://doi.org/10.7727/wimj.2046.344>
- Díaz-Narváez, V.P., Estrada-Méndez, N., Arévalo-López, Y., Calzadilla-Núñez, A., & Utsman-Abarca, R. (2017). *Pesquisa Brasileira em Odontopediatria e Clínica Integrada*, 17, e3759. <https://doi.org/10.4034/PBOCI.2017.171.40>
- Díaz-Narváez, V.P., Erazo, A.M., Bilbao, J.L., González, F., Padilla, M., Calzadilla-Núñez, A., & Varela, T. (2017). Reconsidering the 'Decline' of Dental Student Empathy within the Course in Latin America. *Acta Médica Portuguesa*, 30, 775-782. <https://doi.org/10.20344/amp.8681>
- Díaz-Narváez, V.P., Erazo, A.M., Bilbao, J.L., González, F., Padilla, M., Howard, M., ...& Utsman, R. (2015). Empathy Gender in Dental Student in Latin América: An exploratory and cross-Sectional Study. *Health*, 7, 1527-1535. <http://doi.org/10.4236/health.2015.711166>
- Dresch, V., Sánchez, M.P., & García, M.E.A (2005). El inventario de Estilos de Personalidad de Millon (MIPS) en Brasil. *Revista Iberoamericana de Diagnóstico y evaluación Psicológica*, 19, 9-29.
- Duarte, M.I., Raposo, M.L., Rodrigues, P.J., & Branco, M.C (2016). Measuring empathy in medical students, gender differences and level of medical education: An identification of a taxonomy of students. *Investigación en Educación Médica*, 5, 253-260. <https://doi.org/doi:10.1016/j.riem.2016.04.007>
- García, E., González, J., & Maestú, F. (2011). Neuronas espejo y teoría de la mente en la explicación de la mente. *Ansiedad y Estrés*, 17, 265-279.
- Hojat, M., & Gonnella, J.S. (2015). Eleven years of data on the Jefferson Scale of Empathy-Medical Student version (JSE-S): Proxy norm data and tentative cutoff scores. *Medical Principles and Practice*, 24, 344-350. <https://doi.org/10.1159/000381954>
- Hojat, M., Gonnella, J.S., Nasca, T.J., Mangione, S., Veloksi, J.J., & Magee, M. (2002). The Jefferson Scale of Physician Empathy: Further psychometric data and differences by gender and specialty at item level. *Academic Medicine*, 77, 58-60. <https://doi.org/10.1097/00001888-200210001-00019>
- Hojat, M., Gonnella, J.S., Nasca, T.J., Mangione, S., Vergare, M., & Magee, M. (2002). Physician empathy: Definition, components, measurement and relationship to gender and specialty. *The American Journal of Psychiatry*, 159, 1563-1569. <https://doi.org/10.1176/appi.ajp.159.9.1563>
- Hojat, M., Mangione, S., Nasca, T.J., Cohen, M.J.M., Gonnella, J.S., Erdmann, J.B., ...& Magee, M. (2001). The Jefferson Scale of Physician Empathy: Development and Preliminary Psychometric Data. *Educational and Psychological Measurement*, 61, 349-365. <https://doi.org/10.1177/00131640121971158>
- Leombruni, P., Di Lillo, M., Miniotti, M., Picardi, A., Alessandri, G., Sica, C., ...& Torta, R. (2014). Measurement properties and confirmatory factor analysis of the Jefferson Scale of Empathy in Italian medical students. *Perspectives on Medical*

- Education*, 3, 419-430. <https://doi.org/10.1007/s40037-014-0137-9>
- Melchers, M.C., Li, M., Haas, B.W., Reuter, M., Bischoff, L., & Montag, C. (2016). Similar Personality Patterns Are Associated with Empathy in Four Different Countries. *Frontiers in Psychology*, 7, 290. <https://doi.org/10.3389/fpsyg.2016.00290>
- Mercer, S.W., & Reynolds, W.J. (2002). Empathy and quality of care. *British Journal of General Practice*, 52, 9-12.
- Merino-Soto, C., López-Fernández, V., & Grimaldo-Muchotrigo, M. (2019). Invarianza de medición y estructural de la Escala Básica de Empatía Breve (bes-b) en niños y adolescentes peruanos. *Revista Colombiana de Psicología*, 28, 15-32. <https://doi.org/10.15446/rcp.v28n2.69478>
- Millon, T. (1994). *Inventario de Estilos de Personalidad*. Buenos Aires, Argentina: Paidós.
- Millon, T. (2003). *Millon Index of Personality Styles. Manual Revised*. San Antonio, Texas: The Psychological Corporation.
- Millon, T., & Davis, R.D. (1996). *Disorders of personality: DSM-IV and beyond*. New York, NY: Wiley Interscience.
- Montilva, M., García, M., Torres, A., Puertas, M., & Zapata, E. (2015). Empatía según la escala de Jefferson en estudiantes de Medicina y Enfermería en Venezuela. *Investigación en Educación Médica*, 4, 223-228. <https://doi.org/10.1016/j.riem.2015.04.006>
- Mooradian, T.A., Davis, M., & Matzler, K. (2011). Dispositional Empathy and the Hierarchical Structure of Personality. *The American Journal of Psychology*, 124, 99-109. <https://doi.org/10.5406/amerjpsyc.124.1.0099>
- Paro, H., Daud-Gallotti, R.M., Tibério, I.C., Pinto, R.M., & Martins, M.A. (2012). Brazilian version of the Jefferson Scale of Empathy: Psychometric properties and factor analysis. *BMC Medical Education*, 12, 1-7. <https://doi.org/10.1186/1472-6920-12-73>
- Paunonen, S.V., Jackson, D.N., Trzebinski, J., & Forsterling, F. (1992). Personality structure across cultures. A multimethod evaluation. *Journal of Personality and Social Psychology*, 62, 447-456. <http://doi.org/10.1037/0022-3514.62.3.447>
- Quince, T.A., Kinnersley, P., Hales, J., Da Silva, A., Moriarty, H., Thiemann, P., ... & Benson, J. (2016). Empathy among undergraduate medical students: A multi-center cross-sectional comparison of students beginning and approaching the end of their course. *BMC Medical Education*, 16, 92. <https://doi.org/10.1186/s12909-016-0603-7>
- Roff, S. (2015). Reconsidering the “decline” of medical student empathy as reported in studies using the Jefferson Scale of Physician Empathy-Student version (JSPE-S). *Medical Teacher*, 37, 1-4. <https://doi.org/10.3109/0142159X.2015.1009022>
- San-Martín, M., Roig-Carrera, H., Villalonga-Vadell, R.M., Benito-Sevillano, C., Torres-Salinas, M., Claret-Teruel, G., ... & Vivanco, L. (2017). Empathy, inter-professional collaboration, and lifelong medical learning in Spanish and Latin-American physicians-in-training who start their postgraduate training in hospitals in Spain. Preliminary outcomes. *Atención Primaria*, 49, 6-12. <https://doi.org/10.1016/j.aprim.2016.02.007>
- Silva, M.G., Arboleda, J., & Díaz, V.P. (2014). Orientación empática en estudiantes de Medicina en una universidad de República Dominicana. *Educación Médica Superior*, 28, 74-83.
- Song, Y., & Shi, M. (2017). Associations between empathy and big five personality traits among Chinese undergraduate medical students. *PLoS One*, 12, e0171665. <https://doi.org/10.1371/journal.pone.0171665>
- Vecchi, C. (2016). Empathy, burnout and... professional competence. Some reflections. *Archivos Argentinos de Pediatría*, 114, 468-471. <http://doi.org/10.5546/aap.2016.468>
- Welch, S., & Comer, J.C. (1988). *Quantitative Methods for Public Administration: Techniques and Applications*. Chicago, Illinois: Dorsey Press.
- Wen, D., Ma, X., Li, H., Liu, Z., Xian, B., & Liu, Y. (2013). Empathy in Chinese medical students: Psychometric characteristics and differences by gender and year of medical education. *BMC Medical Education*, 13, 130. <https://doi.org/10.1186/1472-6920-13-130>

