Empathy in Iranian medical students: Measurement model of the Jefferson Scale of Empathy

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Empathy in Iranian medical students: Measurement model of the Jefferson Scale of Empathy

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Abstract

Background: Empathy is an important factor in patient–physician relationship that has beneficial effects in medical practice. Jefferson Scale of Empathy (JSE) has been specifically designed to assess empathy in health professionals (HP-version) and related students (S-version). Few validation studies have been performed on S-version of the scale.

Aims: To examine empathy in a large sample of Iranian medical students, and also to study factor structure and psychometric properties of the Persian translation of the S-version of the JSE.

Method: 1187 medical students (759 female) from 16 universities around the country participated in the study during 2009. Independent sample *t*-test, multivariate analysis of variance, and confirmatory factor analysis (CFA) were performed to analyze the data.

Results: Female students outscored male students in empathy. The trend for empathy had a negative relationship with years of education. JSE showed an acceptable internal consistency and test re-test reliability. CFA upheld the original three-factor structure – Perspective Taking, Compassionate Care, and Standing in the Patient's Shoes – consisting 20 items.

Conclusion: The decrease in empathy during medical education is consistent with previous studies. The Persian version of JSE is a valid and reliable measure to tap empathy in a Persian-speaking medical student.

Introduction

Empathy is an important factor in patient–physician relationship (Hojat 2007) and has also been considered as one of the specific elements of medical professionalism (Veloski et al. 2005; Jha et al. 2007). Because of the beneficial effects of empathy in medical practice, many efforts have been done to clearly define it and also to design valid and reliable instruments for its evaluation. Jefferson Scale of Empathy (JSE) is a widely studied instrument that has been specifically designed to assess empathy in health professionals (HP-version) and related students (S-version) (Hojat et al. 2009) and is currently translated to 38 languages including Persian (Hojat et al. 2010). The JSE has been shown to have acceptable construct validity, criterion-related validity, predictive validity, internal consistency, and test–retest reliability (Hojat et al. 2001, 2002a, 2002b, 2005; Hojat 2007).

Furthermore, a factor structure of JSE (both health professionals (HP) and related student (S) versions) has been evaluated using Exploratory Factor Analysis (EFA) and a three-factor structure has been suggested, including perspective taking, compassionate care, and ability to stand in patients' shoes (Hojat et al. 2002b; Hojat 2007). This three-factor structure has been replicated in several studies and on different groups of subjects. However, because of the nature of EFA, which allows every item to be loaded on any of the factors regardless of the theoretical possibility of the

Practice points

- Factor structure of the Persian version of JSE (s-version) fits with the proposed model by the developers
- JSE seems to measure the same attributes regardless of the differences of samples
- Female students have higher scores of empathy than male students
- Empathy score decreases with increase in the years of education of medical students in both large and small universities
- Cultural factors does not seem to affect the underlying attributes of empathy

association, it is predictable to witness discrepancies across studies on items loaded on extracted factors (Sherman and Cramer 2005; Di Lillo et al. 2009; Ward et al. 2009; Shariat et al. 2010), and sometimes, even on the factors themselves (Kwon Hesieh et al., 2006).

Meanwhile, confirmatory factor analysis (CFA) is a more powerful statistical method that could be used to verify whether or not a predetermined factor structure fits with a specified data. Contrary to EFA, this analysis does not allow items to load on any factor except for the theoretically defined factors (Floyd & Widaman 1995; Ullman 2006).

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Most of the validation studies to date have been performed on HP-version of JSE, and few studies on S-version are available. A recent study has performed CFA on JSE in a sample of English students (Tavakol et al. 2011). However, this study has not tested the previous model proposed by the test developers; instead, the authors have performed an EFA and then have tested the fitness of their elicited model using CFA on the same sample. Therefore, results of EFA of this study remain its main findings and CFA has not added much to EFA. As a result, we suppose that the current study is the first study that uses CFA to assess the factor structure of JSE, as its developers have proposed. Furthermore, to our knowledge, this is the largest study to date that assesses empathy using JSE in medical students selected from several universities across a country. We intended to assess empathy in Iranian medical students, as well as to determine the measurement model and psychometric properties of JSE in Iranian students using CFA.

Method

Participants

We performed the study in the spring semester of 2009. Participants of this study were 1187 medical students from 17 Iranian medical universities from Tehran (with three large universities) and 14 other provinces of Iran. Both large and small universities were represented in the sample, including five large and 12 small universities. The mean age of the sample was 22.6 years, (SD = 2.8, range 17–45 years). Most of the subjects were females (759 subjects, 63.9%), 403 were males (34.0%) and 25 students (2.1%) did not mention their gender.

Measures

JSE is a self-report questionnaire developed to assess empathy in medical students. It consists of 20 Likert-type items that are answered on a seven-point scale from *strongly disagree* to *strongly agree*. Persian translation and preliminary assessment of psychometric properties of the HP version of the scale have been performed in previous studies on general practitioners and residents of clinical specialties (Shariat et al. 2010; Shariat & Keikhavani 2010). We used the same translation in this study, taking into account the minor changes of the S-version. Additionally, questions on age, gender, and year of study were included in the questionnaire.

Procedure

To perform sampling, we needed a research assistant in each of the medical universities located out of Tehran; however, we were able to find such individuals in only 14 universities. Together with the three large universities located in Tehran, 17 universities were selected for sampling. Because of the difference in the number of medical students in various universities, we selected 200, 100, and 50 subjects from universities in Tehran, larger universities out of Tehran, and smaller universities out of Tehran, respectively.

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Research assistants were asked to invite a predetermined number of medical students of different years to participate in the study using convenient sampling. Response rates in different universities ranged from 26% to 100% with a total response rate of 76.7%. We received 1212 completed questionnaires, however, only 1187 of them were analyzed in the study. Twenty-five forms were excluded because of incorrect scoring or evident chance completion.

Statistical analyses

We used independent sample t-test and multivariate analysis of variance (MANOVA) to assess the effect of gender on scores of JSE and its three factors. We also performed a CFA using LISRbm, version 8.72 (Jöreskog & Sörbom 2005) to examine the three-factor structure of the JSE, as suggested in the original version (Hojat et al. 2002b; Jöreskog & Sörbom 2005). CFA offers a variety of statistical tests and indices designed to assess the "goodness-of-fit" of identified models (Cole 1987; Mulaik et al. 1989). We evaluated the goodness-of-fit by using the following statistics: the goodness-of-fit index (GFI > 0.9), the adjusted goodness-of-fit index (AGFI > 0.9), the non-normal fit index (NNFI > 0.9), the comparative fit index (CFI > 0.9), the root mean square residual (RMSR < 0.08), the normal chi-square ($3 > \chi^2/df < 2$), and the root mean square error of approximation (RMSEA) and its 90% confidence interval (< 0.05) (Cole 1987; Mulaik et al. 1989). To evaluate the test–retest reliability of the JSE, we calculated intra-class correlation coefficients at two time points over two weeks for the total scale and three sub-scales. Cronbach's alpha and mean inter-item correlation coefficients were calculated for total JSE score and sub-scales.

Results

Mean score of JSE in the sample was 101.4 (SD = 14.5). The mean scores for male and female students were 98.94 (SD = 15.23) and 102.75 (SD = 13.94), respectively. Female students scored significantly higher than males on the total scores of JSE ($t(1160) = 4.3$, $p < 0.001$).

We also calculated the mean scores for each of the three factors of the scale (Table 1). In order to evaluate the effects of gender on the three factors of JSE, we performed a MANOVA. The result of MANOVA showed a significant effect, Hotelling's Trace = 0.078, $F(3, 1158) = 8.32$, $p < 0.001$. Subsequent tests of between-subjects effects showed that the female group scored significantly higher on Perspective taking ($F(1, 1160) = 24.75$, $p < 0.001$) and Compassionate care ($F(1, 1160) = 4.12$, $p < 0.05$) but the difference was not significant on standing in the patients' shoes ($F(1, 1160) = 0.04$, $p > 0.05$).

We also compared the JSE mean score in the following three groups of students: those who have not yet entered clinical training in hospitals (first three years of study), those in clinical trainings (fourth, fifth, and first half of the sixth year), and interns (second half of sixth year and seventh year) (Table 2). The comparison of the three groups using the analysis of variance showed a decreasing score of empathy with the increase in the years of study (F(2, 1098) = 32, $p < 0.001$). Polynomial contrast calculation showed a

significant decreasing linear trend in the score of empathy with increasing years of education ($F = 61.4$, $p < 0.001$).

To see if empathy score is different in large versus small universities, we compared the students of the five large universities with those of 12 smaller universities. Comparison showed that the score of JPE was significantly higher in large universities in preclinical students ($t = 2.17$, $p = 0.03$) and interns ($t = 2.22$, $p = 0.03$), but not in clinical trainees ($t = -1.1$, $p = 0.28$). However, decreasing trend in empathy scores existed in both large and small universities from preclinical to clinical trainees and interns (Table 2).

Reliability

Internal consistency of JSE was calculated by Cronbach's alpha and was acceptable (male students: 0.8, female students: 0.78, total sample: 0.79). For test–retest reliability, 31 Students (13 male) completed the scale again two weeks later. Intra-class correlation coefficient between the two assessments was 0.95.

CFAs of JSE Items

We examined the fitness of three models to our sample data using LISREL, version 8.72 (Jöreskog & Sörbom 2005); a one-factor model (M_1) in which all 20 items were forced to load on a single factor of general medical students empathy factor; a three-factor orthogonal model (M_2); and a three-factor oblique model (M_3), as reported in the EFA procedure by Hojat et al. (2002b). The oblique model was used because we expected factors to be theoretically correlated. For all Models, the variance of each factor was set to 1. Preliminary analysis of data to test normality hypothesis showed that normality was violated. Z score for the univariate skewness values ranged from -11.61 [Item 2, "Patients feel better when their physicians understand their feelings"] to 4.98 [Item 18 "Physicians should not allow themselves to be influenced by strong personal bonds between their patients and their family members"] (Table 3), and relative multivariate kurtosis (1.136) and test of multivariate normality for skewness and kurtosis ($\chi^2 = 1282.097$, $p < 0.001$) confirmed it. In theory, the maximum likelihood robust (MLR) with a correct weight matrix should produce correct estimates of standard errors and chi-squares, but this requires a very large sample. Regarding non-normality of data and large sample size, we applied the MLR estimation method because it is less sensitive to the lack of normality of the data (Bentler & Bonnet 1980). We used PRILIS to estimate the polychoric correlations and their asymptotic covariance matrix (ACM) of the sample variance and covariance.

Results of the fit estimates for the one-factor, and three-factor models are given in Table 4. One-factor model and three-factor orthogonal model did not meet the former specified fit criteria. The three-factor oblique model provided a better and satisfactory fitness ($\chi^2/df = 3.57$; CFI $= 0.95$; NNFI $= 0.95$; and RMSEA $= 0.05$ ([CI] 90% $= 0.046$–0.054)). Correlations between latent variables including PT and CC was 0.74 ($p < 0.05$), CC, and SPS was 0.17 ($p < 0.05$), and the SPS and PT was -0.03 ($p > 0.05$). All covariances between measurement errors of the indicators were fixed in this model. As can be seen, this hypothesized model fits the data well. The fitness of the models one, two, and three (M_1, M_2, and M_3) (Table 4) were compared, using the parsimonious principle. The result of this comparison based on χ^2 (Corrected for non-normality) indicates that models M_1 and M_2 ($\Delta\chi^2 = 169.18$, df $= 1$, $p < 0.0001$), M_2 and M_3 ($\Delta\chi^2 = 137.69$, df $= 3$, $p < 0.0001$), and M_1 and M_3 were significantly different $\Delta\chi^2 = 243.91$, df $= 4$, $p < 0.0001$).

Factor loadings for the three-factor (unmodified) oblique model, and R^2 values for PT, CC, and SPS items ranging from 0.12 to 0.41; -0.06 to 0.69 and 0.55 to 0.65, respectively, are presented (Table 3) and each item shows adequate loading on related factor, except item 18 on CC, which showed negatively non-significant relation.

As such, fitness of a one-factor, first-order model, in which all the items were forced to load on a single factor, was tested. In addition, a three-factor orthogonal, first-order model, in which the factors were not allowed to be correlated, was examined. Finally, a three-factor oblique, first-order model, in which the first-order factors were allowed to be correlated, was tested. We computed chi-square difference tests by comparing the oblique model with alternative models (Table 4).

Accordingly, it was found that the three-factor oblique unmodified model (M_3) met all criteria (see the lower line

Table 1. Mean and standard deviation of empathy score in each of the three factors of JSE in male and female Iranian students.

Subscales	Female		Male	
	Mean	(SD)	Mean	(SD)
Perspective taking	52.49	(9.10)	49.59	(10.06)
Compassionate care	42.15	(6.79)	41.27	(7.56)
Standing in the patient's shoes	8.1	(2.59)	8.07	(2.67)

Table 2. Mean scores of JSE in Iranian medical students in different stages of training and in large and small universities.

	Number	All of the sample	Large universities	Small universities
		Mean (SD)	Mean (SD)	Mean (SD)
Preclinical students	423	105.5 (13.2)	106 (13.3)	101.6 (11.7)
Clinical trainees	471	99.7 (14.6)	98.8 (13.2)	100 (15.4)
Interns	207	96.8 (15.1)	100.3 (16.2)	95.3 (14.4)
Total	1101	101.4 (14.5)	103.2 (14)	98.9 (14.9)

Table 3. Parameter estimates from CFA of the three-factor oblique model ($N = 1187$).						
Items	FL Hojat	FL	R^2	SE of FL	US	TPE
Factor 1: Perspective taking						
Physicians' understanding of the emotional status of their patients, as well as that of their families is one important component of the physician-patient relationship (16)	0.70	0.62	0.38	0.04	−2.36	22.35
Physicians should try to understand what is going on in their patients' minds by paying attention to their non-verbal cues and body language (13)	0.62	0.51	0.26	0.05	−2.47	16.83
I believe that empathy is an important therapeutic factor in medical treatment (20)	0.60	0.64	0.41	0.04	−5.60	23.94
Empathy is a therapeutic skill without which the physician's success is limited (15)	0.58	0.64	0.41	0.04	−4.19	24.07
Patients value a physician's understanding of their feelings which is therapeutic in its own right (10)	0.58	0.58	0.34	0.04	−5.00	21.27
Patients feel better when their physicians understand their feelings (2)	0.50	0.49	0.24	0.03	−11.61	16.71
Understanding body language is as important as verbal communication in physician-patient relationships (4)	0.48	0.50	0.25	0.04	−5.89	16.66
Physicians should try to stand in their patients' shoes when providing care to them (9)	0.46	0.54	0.29	0.05	−1.87	18.64
A physician's sense of humor contributes to a better clinical outcome (5)	0.45	0.44	0.19	0.04	−4.25	14.97
Physicians should try to think like their patients in order to render better care (17)	0.46	0.35	0.12	0.06	0.98	10.90
Factor 2: Compassionate care						
Patients' illnesses can be cured only by medical or surgical treatment; therefore, physicians' emotional ties with their patients do not have a significant influence in medical or surgical treatment (11)	0.60	0.70	0.49	0.04	−7.34	26.47
Attentiveness to patients' personal experiences does not influence treatment outcomes (8)	0.59	0.28	0.08	0.06	−3.69	8.21
Attention to patients' emotions is not important in history taking (7)	0.545	0.59	0.35	0.04	−8.73	20.77
I believe that emotion has no place in the treatment of medical illness (14)	0.50	0.69	0.48	0.04	−7.34	25.03
Physicians should not allow themselves to be influenced by strong personal bonds between their patients and their family members (18)	0.44	0.06	0.004	0.06	4.98	−1.79
Physicians' understanding of their patients' feelings and the feelings of their patients' families does not influence medical or surgical treatment (1)	0.43	0.36	0.13	0.05	−6.55	11.55
I do not enjoy reading nonmedical literature or experiencing the arts (19)	0.37	0.40	0.16	0.05	−11.38	12.13
Asking patients about what is happening in their personal lives is not helpful in understanding their physical complaints (12)	0.37	0.53	0.28	0.05	−4.35	17.01
Factor 3: Standing in the patient's shoes						
It is difficult for a physician to view things from patients' perspectives (3)	0.74	0.65	0.42	0.17	−0.35	6.08
Because people are different, it is difficult to see things from patients' perspectives (6)	0.66	0.55	0.30	0.15	0.08	6.11

Notes: All parameter estimates were significant at $p < 0.05$. FL Hojat: Factor loadings for items as reported by Hojat et al. (2002b); FL: factor loadings for items; R^2: coefficient of determination of parameter estimation for items; SE: standard error; US: Test of univariate normality for linear transformed skewness of items; TPE: *t*-value for parameter estimation.

Table 4. Goodness-of-fit indexes for CFA of JSE in Iranian medical students.										
Model	NNFI	RMR	RMSEA	CFI	AGFI	GFI	$\chi^{2\,a}$	$\chi^{2\,b}$	df	χ^2/df
M_1	0.89	0.17	0.07	0.90	0.87	0.89	1181.95	840.93	171	4.95
M_2	0.03	0.34	0.07	0.13	0.89	0.91	9269.82	1010.11	170	5.94
M_3	0.95	0.12	0.05	0.95	0.92	0.94	663.10	597.02	167	3.57

Notes: [a] Satorra–Bentler.
[b] Corrected for non-normality.

of Table 4). In addition, the three-factor oblique model provided a better fit for the present sample (all p's < 0.001).

Discussion

The present study on the factor structure of the Persian version of JSE showed that the multidimensional three-factor model suggested by Hojat et al. (2002b) fitted the data well. Other psychometric properties of the scale including test–retest reliability, correlation of items to factors, and correlation of factors with each other, were also acceptable.

The observed cross-cultural validity of JSE is a significant finding that has some implications. First, it would mean that the translation process has faithfully transformed the concepts of the scale from English to Persian without significant distortions. Second, it would imply that the instrument is measuring the same attributes in Iran as in the US where the scale has been developed. Finally, it would suggest that similar attributes really seem to exist in the studied sample and in the American samples, which come from two different countries with many differences in their culture.

The item loadings (mean of item loadings for the PT $= 0.53$, CC $= 0.43$, PSP $= 0.60$; see Table 1) of the multidimensional three-factor model in the Iranian sample using CFA was slightly lower compared with the study by Hojat et al. (2002b) using EFA (mean of item loadings for PT $= 0.54$, CC $= 0.48$, PSP $= 0.7$; see Table 3).

Several studies have suggested that female physicians (Hojat et al., 2002b; Shariat et al. 2010) and female medical students (Hojat et al. 2002a, 2009; Kataoka et al. 2009) gain a higher score of empathy and show a more positive attitude toward empathy with patients. The current study also showed a similar finding, and female students scored significantly higher than male students. On the other hand, few studies have shown no gender difference in empathy (Di Lillo et al. 2009; Shariat & Keikhavani 2010). We also sought the gender difference of empathy in the three factors of the scale and observed that the difference exists only in two of the three factors of JSE (i.e., perspective taking and compassionate care). However, Table 4 shows that the observed gender difference is mainly due to the first factor or "perspective taking". It is interesting to note that factor one is composed of the positively worded items of JSE. Therefore, it seems that negatively worded items have not been as successful in revealing the assumed gender difference.

Another finding of the study was the decreasing trend of empathy score from preclinical to clinical trainees and to interns. This pattern has been observed in both cross-sectional and prospective studies (Hojat et al. 2004, 2009; Chen et al. 2007). The current study shows that the decline of empathy in medical education is not limited to medical schools in the Western world. Several reasons have been suggested for the decrease in empathy in medical students, including "lack of role models, a high volume of materials to learn, time pressure, and patient and environmental factors" (Hojat et al. 2009). Furthermore, overreliance on computer-based diagnostic and therapeutic technology, emphasis of modern medical education on emotional detachment and clinical neutrality, and experiencing a demanding and hostile educational environment might also play a role in erosion of empathy in medical students (Hojat et al. 2009). However, a recent study has been criticized the finding and has suggested that the current evidence only shows a questionable and small decline in mean ratings of empathy (Colliver et al. 2010). On the other hand, test developers have refuted the criticism by questioning the method used for comparisons in the review, which did not consider effect size of the differences (Hojat et al. 2010).

We also observed that the decreasing trend of empathy took place in both large and small universities. However, this occurred in different points in time in large universities versus small universities. In large universities the erosion of empathy took place in transition from preclinical to clinical training, whereas in the small universities, it happened after some years of clinical training and the beginning of internship period. This difference between large and small universities could be partly explained by the different roles and responsibilities of interns in the universities. In large universities, interns almost always work under the supervision of residents, but in small universities, interns should bear the main responsibility of the patients themselves. This point needs replication and further evaluation in future studies.

Limitations

This study had some limitations that should be considered. This was a cross sectional study, which is not an ideal method for assessing trends. Additionally, we used convenient sampling to gather the data. This could limit the generalizability of the findings.

Conclusions

Using CFA we showed that the factor structure of the Persian version of JSE (student version) fits with the proposed model by the developers. Furthermore, the scale has sound psychometric properties and could reliably be used for further studies on Persian speaking medical students. Women outscored men in empathy; there was also a decreasing trend for empathy with the increase in the years of education.

Acknowledgments

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