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Empathy unmasked: the compassion quotient of dental students

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Abstract

Background Despite an empathic doctor patient relationship being of utmost importance to improve health care outcomes, this aspect is scarcely explored in dental students of Pakistan. This primary objective of the present study was to assess the reliability and validity of the Jefferson Scale of Empathy- Health Professions Student (JSE- HPS) version in a sample of Pakistani dental students. The study also compared the differences in empathy levels of dental students studying in different academic years.

Methods This comparative cross-sectional study was conducted on a sample of 304 students from first to final year from selected 02 private and 02 public dental colleges of Karachi, Pakistan from December 2021- January 2022. The self-administered Jefferson Scale of Empathy- Health Professions Student (JSE-HPS) version was used for data collection. This questionnaire includes 20 items that can be answered on a 7-point Likert scale. After attendance sheets were obtained, random student names were marked, and questionnaire distributed by hand to these students. All forms were collected right after to maximize response rate.

Results A total of 304 forms with complete data were returned, a response rate of 86.9%. Females (97.79 ± 15 94) were more empathetic than males (94.16 ± 12.13) ($p = 0.001$). Students of third-year were the most empathetic ($p = 0.000$). Internal consistency of questionnaire was acceptable (Cronbach's α- 0.77). Factor analysis revealed factor related to belief that patient's perspectives improve health outcome had 14 items with factor coefficient > 0.4 contributing to largest proportion of variance (23.15%).

Conclusions Our study shows JSE- HPS to have acceptable internal consistency. Structural validity of the scale evaluated by confirmatory factor analysis reported results that were in concordance to those suggested by developers of this scale. In our study population, like other studies, females were more empathic than males. Third-year dental students were more empathetic than students of other undergraduate years.

Keywords Dental students, Empathy, JSE-HPS, Jefferson Scale of empathy- health professions student, Validity, Reliability

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Introduction

The role of a health care provider as an effective communicator is gaining attention in dentistry [1, 2]. A major element of effective communication is demonstration of empathy. Empathy has been defined in various perspectives. Fields et al. [3] define empathy as an emotional process that involves appreciating what a patient is saying and feeling and communicating this understanding verbally to the patient. On the other hand, Williams et al. [4] argued that empathy is predominately cognitive; 'comprising of understanding patients' experiences, apprehensions, perspectives, along with a capacity to communicate this understanding with an intent to help'.

According to American Dental Education Association (ADEA), the ability to be empathetic is an important clinical competency for dentists [5]. Empathy has been reported to decrease dental treatment apprehension, increase patient satisfaction with emergency dental care, restorative treatment as well as extractions. It has a positive effect on the compliance of orthodontic treatment and impacts treatment outcomes positively in patients with temporomandibular joint disorders [6].

Several studies have reported a steady decay in empathy levels in students due to various factors, as they progress in their academic years [6–8]. Some of these factors include inadequate role models in clinical settings, increased workload, high expectations when entering the profession and adverse experiences during clinical rotations. Some healthcare educators have hypothesized that emphasis on evidence-based practices have led students to lose the empathetic perspective in patient-provider relationship [6, 7].

In Pakistan, little or no formal education is imparted to the undergraduate dental student on basics of empathy and interpersonal relationships. Much of what the students learn in terms of communication skills is what they pick up from their mentors and supervisors in the clinical settings. A plethora of research has been done on empathy practices of various health care professionals including doctors, nurses, paramedic staff as well as medical and dental students in global setting [3, 8–11]. Even though many studies have observed empathy levels of health care professionals and medical students in Pakistan, there is paucity of studies that have assessed empathy of dental students in this context [12–15].

Despite an empathic doctor patient relationship being of utmost importance to improve health care outcomes, this aspect is scarcely explored in dental students of Pakistan. A multitude of scales have been cited in literature to assess empathy levels of health professionals and health care provider students. One such scale is Jefferson Scale of Empathy (JSE), which is the first psychometrically sound instrument used to measure empathy of healthcare professionals [16]. One version: JSE; Jefferson Scale of Empathy, Health-Care Provider Student version (JSE-HPS), is designed to assess empathy levels in students of health care sciences other than medicine. Validity and reliability of this instrument has been established in studies worldwide [3, 11, 15, 17]. Even though different scales have been used to assess empathy in medical and dental students in Pakistan, but to the best of our knowledge, we could not find any study that has evaluated reliability and validity of JSE- HPS version in a sample of Pakistani dental students and empathy levels in dental students of Karachi, Pakistan [13, 15, 18, 19].

The objectives of our study were:

- To assess the reliability and validity of JSE- HPS version in a sample of Pakistani dental students.
- To compare differences in empathy levels of dental students studying in different academic years of selected dental colleges of Karachi.
- To compare empathy levels of dental students according to gender and types of dental college (public and private) attended.

We hope that outcomes of this study will guide educationists and policy makers to integrate professionalism and communication skills in undergraduate dental curricula and develop strategies to strengthen empathy among students.

Methods

This comparative cross-sectional study was conducted in private and public sector dental colleges of Karachi, Pakistan from December 2021- January 2022. Our target population included all undergraduate dental students studying in public and private dental colleges of Pakistan, while the accessible population included dental students enrolled in the undergraduate colleges of Karachi, Pakistan. A list of recognized public and private dental colleges of Karachi was obtained from the regulatory body (Pakistan Medical and Dental Council) of the country to define our sampling frame. This included five public sector and nine private sector dental institutes, with a total number of approximately 1500 students and 2000 students respectively. From within both strata (public and private), two public and private colleges were selected randomly for data collection, with consideration to have an approximately equal number of students from both sectors, based on the number of enrollments in each selected college. Open Epi v.3.01 was used for sample size calculation. According to a study by Tariq N et al. [13] JSE scores of 1st year medical students in Pakistan were 4.86 ± 0.61 and those of final year students were 4.63 ± 0.80. Keeping these values as reference and 95% confidence interval and 20% bound on error, the sample size requirement turned out to be 302 students.

Approval was taken from the ethical review board (Ref # JSMU/IRB/2020/379) of the university before commencement of the study. Permission to conduct study in the premises of the dental colleges selected was received from the administration of these colleges before they were approached for data collection. All students from first year to final year studying in public and private dental colleges of Karachi were included in the study, while students who had migrated from another college in their undergraduate years were excluded from the study. Students were also excluded if they had a with a conflict of interest (personally knowing any of the researchers).

The self-administered Jefferson Scale of Empathy, Health-Care Provider Student version (JSE-HPS) questionnaire was used for data collection. This questionnaire has been developed by Hojat et al. to measure empathy of health professions students and has been widely used in medical education research worldwide. Even though abundance of evidence is reported in literature in support of the psychometrics (validity and reliability) of this questionnaire in various populations of the world [3, 11, 15, 17], one of the objectives of our present study was to assess the validity and reliability of this instrument in Pakistani dental students. This standardized, self-administered questionnaire helped to minimize information bias. This data collection instrument was divided into two parts. Part I included the sociodemographic details of the students. This included the age, gender, year of study and type of dental college (public/ private) of the study participants. Part II of the instrument was the JSE-HPS questionnaire. This questionnaire includes 20 items that are to be answered on 7- point Likert scale scored from 1 (strongly disagree) to 7 (strongly agree). Ten items in the JSE-HPS are positively phrased and linked to "Perspective Taking". Out of the ten negatively phrased items, eight relate to "Compassionate Care" and two assess the students' perspective on "Standing in the Patients' Shoes." As this questionnaire is copyrighted, permission was sought and granted via email to collect the data using the questionnaire.

After formal approval was granted from the heads of the colleges, attendance sheets were obtained from the administration, random student names were marked, and the questionnaire was then distributed by hand to these students at the end of their lecture. This was done for all students from first year to final year in the public and private dental colleges who fulfilled the inclusion criteria. This sample selection by probability random sampling helped reduce sampling and selection bias. A covering letter explaining the purpose of the study and written informed consent were attached alongside. Trained data collector personnel were present to clarify any ambiguity that the students had when filling out the form. All the forms were collected right after to maximize response rate and minimize non-response bias. To maintain confidentiality, students had the option of not mentioning their names. Provision was also given to only write public or private dental college without mentioning the name of the institute.

Statistical analysis

Data was analyzed by SPSS version 23.0. Mean±SD of age, total empathy scores and mean empathy scores were recorded. Frequency distribution of categorical variables i.e. gender, type of college and year of study were determined. Difference in empathy levels among different years of students was tested using ANOVA. Difference in empathy levels among gender and college type was tested using Independent sample t-test. Internal consistency was analyzed using Cronbach's alpha. KMO measure of sampling adequacy was applied to check feasibility of factor analysis. Factor analysis was then done using a principal component factoring method with varimax rotation. Level of significance was kept at $p<0.05$.

Results

Out of the 350 questionnaire forms distributed, we received a total of 304 forms with complete data, giving a response rate of 86.9%. There were 90 (29.6%) males and 214 (70.4%) females. Out of the total 304 participants, 181 (59.5%) were from public and 123 (40.5%) from private dental colleges. There were 68 (22.4%) first year students, 74 (24.3%) second year students, 86 (28.3%) third year students and 74 (25.0%) students of final year BDS.

The mean total empathy score was 96.71±14.98. The empathy scores ranged from 52 to 131. There was a statistically significant difference between the empathy scores based on gender, with females having greater empathy score (97.79±15.94) as compared to males (94.16±12.13). Students of public dental colleges (99.55±14.90) had greater empathy than those studying in private dental colleges (92.54±14.16). The results are shown in Table 1. Differences in total and mean empathy scores according to year of study are shown in Table 2. Third year dental students had the greatest empathy (101.73±17.24), while 1st year dental students had the lowest empathy scores (94.46±12.73). Mean empathy scores of the individual

Table 1 Overall and mean empathy scores based on gender and type of college

Gender	*n*	**Empathy score**	**Mean score**	*p*-value*
Males	90	94.16±12.13	4.71±0.60	0.001
Females	214	97.79±15.94	4.89±0.80	
Type of college				
Public	181	99.55±14.90	4.98±0.74	0.000
Private	123	92.54±14.16	4.63±0.71	

* Independent sample t-test applied. Level of significance- *p*<0.05

n- number of students in each group

Table 2 Overall and mean empathy scores based on year of study

	n	Empathy score	Mean Score	*p*-value*
1st Year	68	94.46 ± 12.73	4.72 ± 0.64	0.003
2nd Year	74	94.55 ± 15.32	4.73 ± 0.77	
3rd Year	76	101.73 ± 17.24	5.01 ± 0.86	
4th Year	86	95.17 ± 95.17	4.76 ± 0.75	

* One way ANOVA and Tukey test applied. Level of significance- *p* < 0.05

n- number of students in each year of study

items i.e. positively phrased items linked to "Perspective Taking" and negatively phrased items linked to "Compassionate Care" and "Standing in Patients' Shoes" stratified on the basis of gender are shown in Table 3.

Cronbach-α value of 0.77 meant that internal consistency of questionnaire was acceptable. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was conducted, giving a value of 0.8; indicating high level of correlation between the variables and a sufficient sample size, and hence factor analysis could be conducted. In addition, Bartlett's Test of Sphericity was applied, showing favorable inter-correlation matrix [(χ 2−190)=1279.3, *p*<0.05)], indicating that our data was suitable for reduction though factor analysis. Eigenvalues>1, based on the Kaiser criterion of factor selection [20], were obtained for four factors at 4.63, 1.99 and 1.33, and 1.2, but after observing the Scree plot for an 'elbow' point, it was determined to analyze the first three factors further [9]. These factors made up almost 39.7% of total variance. A loading factor of 0.4 was decided as minimum salient factor loading [6]. The loading of these factors on each individual item of the scale is shown in Table 4. The first and principal factor relates to the belief that considering patients' perspective will elevate health outcomes, while factor two relates to understanding experiences and emotions of patients. The third factor corresponds to 'standing in patients' shoes [9]. For the first factor, a total of 14 items emerged having a factor coefficient>0.4 (23.15% of variance) contributing to the largest proportion of variance before rotation, while for the other two factors, four and one items had the most significant factor loading, indicating a variance of 10% and 6.68% respectively.

Discussion

This study reported a mean empathy score of 96.71±14.98 for all the dental students using the JSE-HPS scale, with a statistically significant difference (p=0.000) in between students of public and private sector dental colleges. Females in our study showed greater empathy (*p*=0.001) as compared to males. Additionally, confirmatory factor analysis concluded that the structural validity of this scale for our population is in concordance to suggestions by the developers of this scale.

Not only was the level of empathy determined using the JSE-HPS scale, but the correlation between the academic year with the increase or diminishment of empathy was also evaluated. Globally, a multitude of studies have assessed empathy levels in various health professional students as well as health care providers [3, 8–11]. Literature on empathy reports greater empathy scores in females compared to males [3, 4], and a decline in empathy as a student progresses through their academic years [8, 13]. Contrary to results of empathy levels of health professions students of Australia and USA [3, 4], Babar et al. [9] reported that male dental students in Malaysia had greater empathy scores and empathy levels of final year dental students were greatest compared to the students in first, second and third years of dental school. In our study, we found that female students had a greater score on the empathy scale as compared to males in line with other studies conducted in USA and Australia [3, 4].

Empathy score of students in public sector dental institutes was greater as compared to those studying in private sector colleges. Multiple reasons could be attributed to this observation. Students in the public sector colleges usually deal with patients with low socio-economic backgrounds, and hence may develop more empathy towards their patients on observing their destitute condition. In addition, public sector institutes have larger dental outpatient departments (OPDs) with a greater number of patients visiting for dental treatment. Interaction with more patients could also result in the development of empathy in these dental students, as well as the possibility of more focus on the display of empathy in such institutions. In the local context, the effect of the students' own socio-economic background may have a significant impact on the display of empathy. Students in private sector institutions may suffer from stresses related to the higher tuition fee that they pay, which may lead to a decreased level of empathy in them [21]. A recent study on Malaysian dental students reported that students of public sector university had greater empathy scores than those studying in private institutes [9]. Contrary to our findings, Irfan [14] and Jehan [21] have reported greater empathy levels in students of private sector institutes. The variability in these findings could also be attributed to the possible difference in curriculum or teaching strategies between private and public sector institutes in various parts of the world and highlights the necessity to address empathy in the curricula in a more structured manner.

Observing the empathy scores from different academic years, the results matched closely for students in first, second and fourth year of dental college, with only slightly better scores for third year dental students. This is the academic year where the students have their first encounter with patients in the dental OPD, hence

Table 3 Comparison of mean empathy scores of individual items based on gender

		Gender	n	Mean ± SD	p-value*
	Compassionate Care" - negatively scored				
q1	HCPs' understanding of patients' feelings doesn't influence treatment outcome	Male	90	4.67 ± 1.88	0.693
		Female	214	4.57 ± 1.98	
		Total	304	4.60 ± 1.95	
q7	Attention to patient's emotions isn't important when interviewing patient	Male	90	4.75 ± 1.61	0.010*
		Female	214	5.29 ± 1.66	
		Total	304	5.13 ± 1.66	
q8	Attentiveness to patients' personal experiences doesn't influence treatment outcome	Male	90	4.56 ± 1.59	0.245
		Female	214	4.80 ± 1.70	
		Total	304	4.73 ± 1.67	
q11	Emotional ties with patients have no influence on treatment outcomes	Male	90	4.31 ± 1.71	0.312
		Female	214	4.53 ± 1.76	
		Total	304	4.47 ± 1.74	
q12	Asking patients about happenings in their lives isn't helpful to understand their physical complaints	Male	90	4.48 ± 1.54	0.187
		Female	214	4.76 ± 1.74	
		Total	304	4.67 ± 1.68	
q14	Emotion has no place in medical illness treatment	Male	90	4.39 ± 1.79	0.008*
		Female	214	5.00 ± 1.81	
		Total	304	4.82 ± 1.82	
q18	HCPs shouldn't be influenced by personal bonds with patients	Male	90	4.11 ± 1.83	0.103
		Female	214	3.72 ± 1.94	
		Total	304	3.84 ± 1.91	
q19	I don't enjoy reading non-medical literature/ arts	Male	90	4.34 ± 1.83	0.013*
		Female	214	4.91 ± 1.78	
		Total	304	4.74 ± 1.81	
	"Standing in the Patients' Shoes"- negatively scored				
q3	It is difficult for HCP to view things from patients' perspectives	Male	90	4.60 ± 1.70	0.272
		Female	214	4.38 ± 1.56	
		Total	304	4.44 ± 1.60	
q6	As people are different, it is difficult to see things from their perspective	Male	90	4.22 ± 1.68	0.040*
		Female	214	3.79 ± 1.64	
		Total	304	3.92 ± 1.67	
	"Perspective Taking"- positively scored				
q2	Patients feel better if HCP understand their feelings	Male	90	5.19 ± 1.73	0.062
		Female	214	5.58 ± 1.66	
		Total	304	5.47 ± 1.68	
q4	Understanding body language is as important as verbal communication in HCP-patient relationship	Male	90	5.01 ± 1.57	0.075
		Female	214	5.37 ± 1.64	
		Total	304	5.27 ± 1.62	
q5	HCP's sense of humor contributes to improved clinical outcomes	Male	90	5.01 ± 1.69	0.989
		Female	214	5.01 ± 1.67	
		Total	304	5.01 ± 1.67	
q9	HCPs should try & stand in patients' shoes when providing care	Male	90	4.90 ± 1.62	0.524
		Female	214	5.04 ± 1.75	
		Total	304	5.00 ± 1.71	
q10	Patients value HCP's understanding of their feelings	Male	90	4.80 ± 1.57	0.325
		Female	214	5.00 ± 1.69	
		Total	304	4.94 ± 1.65	
q13	HCP should understand what's going on in patients' minds by being attentive to body language	Male	90	4.93 ± 1.73	0.139
		Female	214	5.26 ± 1.74	
		Total	304	5.16 ± 1.74	

Table 3 (continued)

		Gender	n	Mean±SD	p-value*
q15	Empathy is a therapeutic skill without which HCP's success is limited	Male	90	4.97±1.53	0.168
		Female	214	5.24±1.62	
		Total	304	5.16±1.60	
q16	Understanding emotional status of patients is important in HCP-patient relationship	Male	90	4.62±1.67	0.004*
		Female	214	5.20±1.56	
		Total	304	5.03±1.61	
q17	HCPs should try and think like patients to provide improved care	Male	90	4.84±1.46	0.959
		Female	214	4.86±1.72	
		Total	304	4.85±1.65	
q20	Empathy is an important factor in patients' treatment	Male	90	5.13±1.82	0.064
		Female	214	5.53±1.67	
		Total	304	5.41±1.72	

* Independent sample t-test was applied. Level of significance- $p < 0.05$

n- number of participants; SD- Standard deviation; HCP- Health Care Professional

Table 4 Rotated factor loadings for JSE- HPS for dental students ($n = 304$) by Principal component analysis

		Component[a]		
		Patients' Perspective	Understanding Patient Experiences	Standing in Patient Shoes
q02	Patients feel better if HCP understand their feelings	**0.683**	−0.036	0.265
q04	Understanding body language is as important as verbal communication in HCP-patient relationship	**0.660**	−0.169	0.232
q15	Empathy is a therapeutic skill without which HCP's success is limited	**0.629**	−0.190	0.031
q10	Patients value HCP's understanding of their feelings	**0.604**	−0.208	−0.193
q07	Being attentive to patient's emotions isn't important when interviewing patient	**0.585**	**0.456**	0.167
q20	Empathy is an important factor in patients' treatment	**0.566**	−0.127	0.010
q16	Understanding emotional status of patients is important in HCP-patient relationship	**0.549**	−0.325	0.215
q14	Emotion has no place in medical illness treatment	**0.533**	0.210	−0.456
q09	HCPs should try standing in patients' shoes when providing care	**0.498**	−0.187	0.067
q08	Being attentive to patients' personal experiences doesn't influence treatment outcomes	**0.464**	**0.453**	−0.094
q05	HCP's sense of humor contributes to improved clinical outcome	**0.437**	−0.219	**0.449**
q11	Emotional ties have no influence in treatment outcome	**0.436**	0.388	−0.153
q12	Asking patients about happenings in their lives isn't helpful to understand their physical complaints	**0.425**	0.255	−0.456
q13	HCP should understand what is going on in patients' minds by being attentive to body language/ non-verbal cues	**0.429**	−0.278	−0.515
q17	HCPs should try to think like patients to provide quality care	**0.420**	−0.284	−0.060
q03	It is difficult for HCP to view things from patients' perspectives	0.100	**0.493**	0.310
q06	As people are different, it is difficult to see things from their perspective	−0.096	**0.489**	0.190
q01	HCPs' understanding of patient's feelings doesn't influence treatment outcome	0.350	0.393	0.167
q19	I don't enjoy reading non-medical literature/ arts	0.379	0.326	0.014
q18	HCPs shouldn't be influenced by personal bonds with patients	−0.220	0.325	−0.129

a. 3 components extracted

n- number of participants; SD- Standard deviation; HCP- Health Care Professional

experiencing empathy in the 'real world'. This is in contrast to other studies, where a steady decline in the level of empathy is seen as the student progress in the academic ladder, with a possible lack of interpersonal skills where a higher patient exposure may be an attributing factor [22, 23]. Evidence shows that if students are exposed to, interact with and listen to a larger number of patients, they may develop a greater sense of empathy, since it is a skill that can be developed as well as improved with practice [24, 25]. In addition, when the dental students develop confidence in their clinical skills, they can shift their focus on improving their communications skills and perhaps a better display of empathy. This was also demonstrated in a study where dental educators

who were already proficient in dental clinical skills exhibited greater empathy as compared to dental students. This underscores the need for systematic, gradual patient exposure to better prepare students for this attribute [26].

If empathy is considered a cognitive attribute, it may be assumed that it can be taught as well [4]. Therefore, effective educational programs may help in facilitating and enhancing empathy skills of students. A study reported 81% of students felt "better prepared" after empathy-based training [10]. Strategies that have been mentioned in literature that can be implemented to improve empathy among dental students include the use of focused teaching and learning material encompassing lectures and video based on empathy development [27]. In addition, training and role playing can be incorporated in the curriculum, where the students can take on the role of the patients and practitioners in various scenarios, helping them develop interpersonal skills and identifying areas where improvement can be made [25]. This would also pave the way for self-analysis and reflection, whereby the students can identify their own biases, emotions, feelings and inhibitions in displaying empathy and discuss ways to overcome them to become empathetic health care providers [28].

In our study, the analysis of individual items shows that the highest mean score for the various items in the questionnaire was for question 2, which indicated that the students were aware of the importance of a health care provider understanding the feelings and emotions of the patients found similarly in another study [29]. This is a paramount realization and goes a long way in patient care, since it has been shown that patients who find their health care provider to be empathetic display improved compliance, better health outcomes and are more satisfied with their treatment plan [14]. To become life-long professionals associated with patient care, this should be an important motivator for dental students, where the prognosis of their treatment based on patient compliance and cooperation would be greatly improved [30].

The lowest mean score was when queried about the influence of personal bonds between patient and family members with their healthcare provider. The score depicted the ambiguity in the dental students regarding how to approach or manage such patients. This is similar to findings of studies conducted in Turkey and France [29, 31]. The relationship between the physician and a patient who is a family member, or an acquaintance is a sensitive issue when providing treatment is concerned. In terms of the health care provider, this bond could influence decision making, objective critical thinking by either committing to providing treatment which is beyond their expertise or feeling obliged to manage such patients, despite being uncomfortable [32]. On the other hand, such patients may also feel reluctant while giving history

for sensitive issues or undergoing examination or treatment with someone they are familiar with, particularly for issues of a sensitive nature. It is essential that physicians do not allow themselves to be led by their personal feelings towards any patient, and maintain a professional boundary allowing them to provide treatment within their areas of expertise, resulting in optimum patient care [33]. The low score for this item in our study could depict that dental students are unaware or unsure about how their relationship with the patients could affect their decision making or treatment planning. It is essential that this crucial aspect of doctor-patient dynamics is highlighted in training sessions so the dental students are clear on how they should proceed while treating a family member or an acquaintance.

The internal consistency of the scale was found to be acceptable for our cohort. In addition, the statistical tests i.e. KMO and Bartlett's Test of Sphericity, indicated adequate sample size and that factor analysis could be conducted on the collected data. The total variance as demonstrated by three dimensions of the empathy scale was slightly lower than that observed in a similar study where it was reported as 47.9%. The three factor that were identified and on which factor analysis was conducted also similar to other studies done to assess empathy of dental and nursing students [9, 34]. The number of factors were chosen not only through Kaiser criteria of factor selection, as has been done in other studies [6, 9, 34, 35] but also through observing the Scree plot, which helped to retain only those factors with the most significant loading of items.

Overall, the scores of the dental students of Karachi as measured on the JSE were greater as compared to studies done in other parts of the world like Malaysia and India but lesser as compared to those in USA and Thailand [9, 23, 36, 37]. However, one study from India has reported a greater score of empathy [6]. There may be variability in results owing to how empathy is taught to dental students in the explicit or implicit curriculum, but it may still prove a good indicator of the emphasis that should be placed on the development of empathy within dental students.

Study limitations

Because the JSE scale assesses the self-perception of students regarding their empathy, it may not accurately measure the empathy that the students may possess in reality. There are inherent limitations of the scale itself, where only particular domains like compassionate care, perspective taking, and the ability to stand in patients' shoes are focused upon for determining empathy scores. Limiting the assessment of empathy to only these domains may not provide relevancy in various aspects of clinical care for dental students. In addition, since the

study was conducted in the dental colleges in urban setting only, therefore results cannot be generalized to dental students studying in various settings across Pakistan. A larger study sample from other parts of the country would be needed for this purpose.

Conclusions

The present study showed JSE- HPS to have good internal consistency. The structural validity of the scale evaluated by the confirmatory factor analysis reported results that were in concordance to those suggested by the developers of this scale. In our study population, similar to other studies, females were more empathic than males. Third year dental students were more empathetic than students of other undergraduate years. Dental students in public colleges were significantly more empathetic than students in private colleges. Keeping the low scores of the students in this study in mind, it is high time that professionalism and communication skills is integrated as an essential part of the 'explicit curriculum' in undergraduate years so that empathy can be improved among these students once they graduate. Longitudinal studies can be conducted in future to assess change in empathy of the same cohort of students as they progress from induction into the dental college to their graduation.

Author contributions
MML- study conception and design, data entry and analysis, drafting the paper and writing the final version. SA, MEH- data acquisition, interpretation of results, drafted paper, MAL, IS and MI- refined the study concept, helped in data acquisition, critically analysed the paper. SYAA- Initial study conception, critically reviewed and revised the paper. All authors approved its final version.

Data availability
The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This comparative cross-sectional study was conducted after approval from ethical review board of Jinnah Sindh Medical University (Ref # JSMU/IRB/2020/379).

Consent for publication
N/A.

Competing interests
The authors declare no competing interests.

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