BMC Medical Education

RESEARCH

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Empathy ability and influencing factors among pediatric residents in China: a mixed-methods study

Pingping Li[1†], Ling Weng[2†] and Lu Dong[1*]

Abstract

Background Empathy is one of the fundamental factors enhancing the therapeutic effects of physician–patient relationships, but there has been no relevant research in China on the pediatric resident physicians' capacity for empathy or the influencing factors.

Methods A mixed-methods study was undertaken. The student version of the Jefferson Scale of Empathy was used to assess 181 postgraduate residents at Shanghai Children's Medical Center and Shanghai Children's Hospital. Differences in empathy ability among pediatric resident physicians of different genders and specialties were analyzed using independent sample t-tests and Mann–Whitney U tests. A one-way analysis of variance was used to analyze the differences in empathy ability at different educational levels and years of medical residency training. Seven third-year postgraduate pediatric residents from Shanghai Children's Medical Center participated in semi-structured interviews exploring the influencing factors. We analyzed the interview transcripts using thematic analysis.

Results The scale was completed by 154 pediatric residents. No statistically significant differences in empathy were found between educational level, postgraduate year, gender, or specialty. The factors influencing empathy in doctor–patient communication included the person who accompanied the child to see the doctor, how the children cooperated with doctors for medical treatment, the volume of pediatric outpatient and emergency visits, and the physician's ability to withstand pressure. All interviewed resident physicians regarded learning empathy as important but rarely spent extra time learning it.

Conclusions The evaluation results of resident physicians on changes in empathy after improving clinical abilities vary according to their understanding of empathy, and the work environment has an important impact on pediatricians' empathy ability. Their empathy score is relatively low, and this requires exploration and intervention.

Keywords Empathy ability, Factor, Pediatric residents

[†]Pingping Li and Ling Weng contributed equally to this work and should be considered co-first authors.

*Correspondence:
Lu Dong
scmcjxb@126.com
[1]Department of Pediatric Clinical Medicine School, Shanghai Children's Medical Center, School of Medicine, Shanghai Jiao Tong University, Shanghai 200127, China
[2]Department of Science and Education, Fujian Maternity and Child Health Hospital, Fujian 350000, China

Background

There has been a long-standing tension in the physician–patient relationship in pediatric clinics in China [1]. There are complex reasons for this, but research has found that 80% of doctor–patient disputes result from poor communication, often due to a lack of empathy during interactions [2, 3]. The current medical literature defines empathy as the ability to understand the patient's perspective and feelings, as well as sharing and acting on this understanding during interpersonal interactions [4]. Studies show that empathy is linked with enhanced patient satisfaction and treatment compliance [5]. High levels of empathy in healthcare professionals are connected to positive clinical prognoses for patients by reducing mental stress, improving self-awareness, and reducing anxiety and depression [6, 7].

Residency training is mandatory for doctors to qualify to practice independently [8]. In China, standardized residency training began nationwide in 2013; seven government ministries jointly issued the policy document, "Guidance on the Establishment of a Standardized Residency Training System" [9]. All clinicians, including pediatricians, are required to undergo three-year residency training after graduating from medical school. During these three years, residents study in different departments.

The Chinese Medical Doctor Association recommends six core competencies for medical residents based on the content and standards for standardized residency training (2022 version): professionalism, clinical professionalism, managing patients, communication, teaching, and learning. While professionalism necessarily involves knowledge and skill, the unique characteristic of medical professionalism is empathy [10], a capacity that is also strongly related to communication. Thus, cultivating empathy is important for medical residents.

The student version of the Jefferson Scale of Empathy (JSE-S) was specifically developed as a self-report scale for the assessment of empathy in medical students [11, 12]. Some studies have reported a decline in empathy among medical students [13–15], while some have noted that students in their final year scored higher for empathy than did first-year medical students [16, 17] and others have reported little change in empathy scores across the years [18]. However, there is little comparable research for China.

Some studies have shown that the work environment can affect the development of empathy [19], and pediatric departments recorded a high incidence of doctor–patient disputes [20]. According to the 2019 National Medical Injury Liability Dispute Case Big Data Report, pediatrics is a high-risk area for doctor–patient disputes.

Therefore, this study aimed to analyze whether there are differences in the ability to empathize among pediatric resident physicians of different grades and whether the pediatric medical environment affects that ability. A mixed-methods approach was used: We assessed empathy scores using the JSE-S and then conducted a semi-structured survey to discuss the influencing factors.

Methods

Study design

Quantitative and qualitative methodologies were used to analyze empathy and influencing factors among pediatric residents, incorporating a survey for the quantitative analysis and interviews for the qualitative assessment.

Quantitative methodology

Data collection: survey

In July 2023, all residents of the Shanghai Children's Medical Center, affiliated with Shanghai Jiao Tong University School of Medicine, and the Children's Hospital affiliated with Shanghai Jiao Tong University School of Medicine, were surveyed using an anonymous online questionnaire. Informed consent was obtained from all participants. The survey was available online for one week, and after three days, the residents were sent reminders via WeChat by staff members from the two hospitals.

The JSE-S was used in this study [21] The scale consists of 20 items, measured using a seven-point Likert scale ranging from 1=completely disagree to 7=completely agree but with items 1, 3, 6, 7, 8, 11, 12, 14, 18, and 19 reverse scored. The total score of the scale comprises the total score for all items, with higher scores indicating higher levels of empathy. The scale is subdivided into three dimensions: perspective-taking, compassionate care, and standing in the patient's shoes [12, 21]. The maximum score on the JSE is 140, and the minimum score is 20. Other data collected as part of the JSE survey included sex and years of medical resident training, specialty, and education.

Data analysis

Independent samples t-tests were performed to assess differences in mean JSE scores between sexes. The Mann–Whitney U test was used to compare the differences in mean JSE scores between specialties. A one-way analysis of variance (ANOVA) was performed to compare the differences between the different years of medical residency training and different levels of education. All analyses were performed using the IBM SPSS Statistics Version 25.0. The data are presented as mean±standard deviation (SD) unless otherwise stated.

Table 1 Overview of study participants

Participant number	Gender	Specialty
P1	M	Pediatric
P2	F	Pediatric Surgery
P3	F	Pediatric
P4	M	Pediatric
P5	M	Pediatric Surgery
P6	F	Pediatric
P7	M	Pediatric Surgery

Table 2 The interview guide

dimensions	state
Work Environment	The impact of pediatric medical environment on empathy
Residents standardized training	Standardized training for resident physicians to cultivate empathy skills Cultivating residents' empathy ability during standardized resident training
Open questions	The most memorable cases of smooth and unsmooth communication with patients during the standardized training

Table 3 Study population characteristics

	N/%	M ± SD
Overall	154	81.41 ± 5.43
Year residency training		
PGY1	60(39.0)	81.33 ± 4.45
PGY2	48(31.1)	80.75 ± 4.08
PGY3	46(29.9)	82.20 ± 7.48
Gender		
Female	111(72.1)	81.65 ± 5.44
Male	43(27.9)	80.79 ± 5.43
Specialty		
Pediatric	112(72.7)	81.27 ± 5.84
Pediatric Surgery	42(27.3)	81.79 ± 4.21
Education		
Undergraduate	63(40.9)	80.95 ± 5.57
Master	69(44.8)	82.42 ± 5.67
Doctor	22(14.3)	79.54 ± 3.45

*PYG = postgraduate year

Qualitative methods

Data collection: interviews

As the third-year postgraduate (PGY3) pediatric residents who entered standardized training for pediatric resident physicians in 2020 had completed their training, in August 2023, PGY3 pediatric residents at the Shanghai Children's Medical Center were asked to participate in the interviews. Seven consented to participate (Table 1).

Two researchers (LPP and WL) conducted individual face-to-face semi-structured interviews. The interviews lasted 50–70 min (60-minute average) and were audio recorded and transcribed verbatim by a professional service. The interview guide (Table 2) included three aspects: work environment, residents' standardized training, and open questions. The open-ended questions explored the most memorable cases of smooth and unsmooth communication with patients.

During the interviews, the research followed the guidelines of the interview outline and interviewees' actual situations. The order and method of questioning were adjusted according to the context and the value of the questions. The language used by the interviewees was accepted without judgment, and no inducements or interventions were made. To protect the privacy of the respondents, their names have been replaced by numbers.

Data analysis

In accordance with a constructivist approach, the analyses tapped into the sense that the participants made of their experiences of communicating with patients. Inductive thematic analysis [22] was used to identify themes. The interviews were audio recorded and transcribed verbatim by a professional service (iFLYTEK). WL and LPP read and reread transcripts for immersion and familiarization. Two authors (WL and LPP) iteratively coded the data deemed relevant to the current study using Nvivo14 [23]. Disagreements were discussed with another author (DL). The next step was to group related codes into potential themes. Subsequently, three authors (LPP, WL, and DL) jointly reviewed the themes to ensure that the codes in each theme were coherent and that the codes in different themes could be clearly distinguished.

Results

Quantitative research results

Study population characteristics

In total, 154 residents responded to the survey, a response rate of 85.1% (154/181). The participating pediatric residents included 60 (39.0%) residents from postgraduate year 1 (PGY1), 48 (31.1%) from postgraduate year 2 (PGY2), and 46 (29.9%) from PGY3. A total of 111 participants (72.1%) were women, and 43 (27.9%) were men. A total of 112 (72.7%) participants were pediatric residents, and 42 (27.3%) were pediatric surgery residents. There were 63 (40.9%) undergraduate residents, 69 (44.8%) master's residents, and 22 (14.3%) doctoral degree residents in this study. The mean JSE-S score for the overall study population was 81.41 ± 5.43.

Based on the independent samples t-test and Mann–Whitney test, we found no differences in pediatrics' sex ($t = 0.878$, $p = 0.381$) or specialty ($z = -0.981$, $p = 0.327$).

The education levels of different residents were not significantly different ($f = 1.455$, $p = 0.237$) (Table 3).

Empathy competencies of pediatric residents with different pediatric standardized training years

The empathetic recognition mean JSE-S score was 81.41±5.43. Compared to PGY1 (81.33±4.45) and PGY2 (80.75±4.08), PGY3 had a high JSE-S score (82.2±7.48), but there were no significant differences between different years of medical residency training (f=0.839, p=0.434) (Table 4).

In the perspective-taking scale, the mean JSE-S score was 54.66±6.70, and the one-way ANOVA revealed significant differences between PGYs (f=3.51, p=0.032). There were significant differences between PGYs for three items: "Physicians' understanding of the emotional status of their patients, and that of their families is an important component of the physician–patient relationship" (f=4.391, p=0.014); "Physicians should try to stand in their patients' shoes when providing care to them" (f=4.697, p=0.010); and "I believe that empathy is an important therapeutic factor in medical treatment" (f=250.996, p=0.000).

The mean JSE-S score on the compassionate care scale was 20.76±5.97. PYG1, PYG2, and PYG3 scored

Table 4 One-way ANOVA comparing JSE-S mean scores across different years of medical training

Dimensions	NO.	Items	PGY1	PGY2	PGY3	Total
perspective taking	2	Patients feel better when their physicians understand their feelings	5.95±0.85	5.81±1.02	5.93±0.93	5.90±0.93
	4	Understanding body language is as important as verbal communication in physician–patient relationships	6.25±0.88	6.08±1.01	6.17±0.8	6.18±0.89
	5	A physician's sense of humor contributes to a better clinical outcome	5.27±1.18	4.98±1.3	5.09±1.33	5.12±1.26
	9	Physicians should try to think like their patients in order to render better care	6.08±0.77	5.79±0.97	5.67±1.1	5.87±0.95
	10	Patients value a physician's understanding of their feelings, which is therapeutic in its own right	4.17±1.30	4.23±1.48	4.50±1.50	4.29±1.42
	13	Physicians should try to understand what is going on in their patients' minds by paying attention to their non-verbal cues and body language	5.85±1.07	5.83±0.86	5.61±1.11	5.77±1.02
	15	Empathy is a therapeutic skill without which the physician's success is limited	5.85±1.04	5.71±0.87	5.65±1.27	5.75±1.06
	16	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	5.37±1.44	5.92*±0.79	5.91±0.91	5.70±1.14
	17	Physicians should try to stand in their patients' shoes when providing care to them	6.10*±0.75	5.56±0.94	5.72±1.15	5.82±0.97
	20	I believe that empathy is an important therapeutic factor in medical treatment	2.03±0.88	5.63±0.96	5.76*±1.14	4.27±2.04
	total		52.92±6.09	55.54±6.87	56.02*±6.92	54.66±6.70
compassionate care	1	Physicians' understanding of their patients' feelings and the feelings of their patients' families does not influence medical or surgical treatment	2.27±1.54	2.50±1.75	2.72±1.78	2.47±1.68
	7	Attention to patients' emotions is not important in history-taking	1.72±0.88	2.02±0.79	2.17±1.35	1.95±1.03
	8	Attentiveness to patients' personal experiences does not influence treatment outcomes	2.03±0.99	2.08±0.96	2.43±1.38	2.17±1.12
	11	Patients' illnesses can be cured only by medical or surgical treatment; therefore, physicians' emotional ties with their patients do not have a significant influence on medical or surgical treatment	2.22±1.04	2.33±1.36	2.13±1.17	2.23±1.18
	12	Asking patients about what is happening in their personal lives is not helpful in understanding their physical complaints	2.13±0.96	2.06±1.04	2.13±1.07	2.11±1.01
	14	I believe that emotion has no place in the treatment of medical illness	1.90±0.86	2.29±1.17	2.11±1.18	2.08±1.07
	18	Physicians should not allow themselves to be influenced by strong personal bonds between their patients and their family members	5.95±0.83	3.96±1.70	3.85*±1.58	4.70±1.7
	19	I do not enjoy reading non-medical literature or the arts	4.20±1.48	2.17*±0.93	2.46±1.49	3.05±1.62
	total		22.42±4.48	19.42*±6.17	20.00±7.00	20.76±5.97
Standing in the patient's shoes	3	It is difficult for a physician to view things from patients' perspectives	3.00±1.37	2.81±1.3	2.85±1.21	2.90±1.29
	6	It is difficult for a physician to view things from patients' perspectives Because people are different, it is difficult to see things from patients' perspectives	3.00±1.41	2.98±1.34	3.33±1.45	3.09±1.40
	total		6.00±2.52	5.79±2.42	6.17±2.48	5.99±2.47
total			81.33±4.45	80.75±4.08	82.2±7.48	81.41±5.43

*Bolded values indicate statistical significance; *PYG=postgraduate year

22.42±4.48, 19.42±6.17, and 20.00±7.00, respectively, indicating significant differences between them (f=4.053, p=0.019). Significant differences were found for years of pediatric residency training for "Physicians should not allow themselves to be influenced by strong personal bonds between their patients (f=40.158, p=0.000) and their family members" and "I do not enjoy reading non-medical literature or the arts." (f=37.236, p=0.000).

The standing in the patient's shoes dimension of the JSE-S showed no significant differences between the PGYs.

Qualitative research results

The influence of pediatric visiting environment on physicians' empathy ability

Because children are unable to express their discomfort or illness well, they should be accompanied by parents or grandparents when attending hospital. Doctors, therefore, have to communicate with the parents or grandparents, and their circumstances, including their education level, familiarity with the child, physical health status, communication and understanding skills, and attitude toward doctors, can affect empathy between doctors and patients.

> *Compared to adult hospitals, the empathy ability of doctors in children's hospitals may be slightly reduced because we are dealing with parents, not patients themselves, and many of them are brought for treatment by elderly people. Elderly people do not understand the child's disease or may have difficulty hearing clearly, which can greatly affect communication, let alone empathy. (P1, M)*
>
> *Some elderly people may regard their children's condition unnecessarily seriously, resulting in us not being able to understand the symptoms of the child properly. (P2, F)*
>
> *Parents tend to have a good understanding of the child's condition. If grandparents with a low education or if other relatives bring them over, the process of consultation may not be very smooth. (P3, F)*
>
> *The child might be brought over on the first day of treatment by their parents but subsequently by older relatives. Because the child is still running a fever for two or three days, they will be very anxious. When they communicate this to us, their attitude is often poor. (P4, M)*
>
> *If an elderly person brings a child to see a doctor, I often ask the elderly person to call the parents on the spot so I can listen to them. It is better this way. (P7, M)*

Some resident physicians said that the language of the patients' parents significantly impacted their ability to empathize:

> *Because I am not from Shanghai and grandparents who accompany their children may speak the local dialect, we are unable to communicate. This is challenging for me and many colleagues because most of us cannot understand the Shanghai dialect. (P2, F)*

The child's upbringing and willingness to cooperate with treatment were also identified as important:

> *Some parents may spoil their children, some children start acting spoiled as soon as they arrive at the clinic, and some even make a scene, which can interfere with the medical treatment. (P2, F)*

The volume of pediatric outpatient and emergency visits and the self-regulation ability of physicians facing strong workloads can also affect communication and empathy between doctors and patients:

> *Outpatient hours may limit our communication with patients. Generally, you need to finish one within 5–10 min. Otherwise, the patient's visit may be too long, and you may not be able to see all registered patients before leaving work. For example, last summer, our two doctors saw an average of around 130–150 patients a day, while I saw an average of 80–90 patients per day. That was during the pandemic last year, and there will definitely be more this year. (P7, M)*
>
> *The doctor is very tired and has a large number of patients. If the patients are in a hurry, you need to see them within a short period. If our resident physician's self-regulation ability is not good, it will affect communication. (P5, M)*

Standardized training for resident physicians to cultivate empathy skills

The three resident physicians interviewed believed that in their first year of participating in standardized resident training, they felt more empathy for patients due to their lack of clinical knowledge. By contrast, after three years of clinical practice and improvements in their clinical knowledge, they viewed the patient's condition more rationally and from a medical perspective.

> *Because you have learned systematic knowledge about diseases, you know what the likely outcome will be objectively. Consequently, your empathy regarding the intermediate treatment process and*

patients may decrease, and you have to think about the treatment from a doctor's professional perspective. (P2, F)

When I first entered standardized training for resident physicians, I lacked clinical experience and was not familiar with the treatment process for many diseases. When I encountered critically ill patients, I felt that they were so pitiful. After three years of training, however, these diseases have become more familiar. I know the treatment processes for each disease and feel that empathy has decreased. (P3, F)

The two residents felt that empathy followed a curved path. Residents who have just entered clinical practice have relatively high empathy. However, as their clinical abilities and understanding of diseases increase, coupled with the busy workload of clinical work, their empathy decreases. However, empathy may improve after becoming a physician.

When I went to the outpatient clinic with my supervisor, I felt that my supervisor, who was already a chief physician, had reached a very high level of empathy. I think his empathy ability was much stronger than mine; that is, regardless of the patient's attitude, he could think from the patient's perspective. As a resident physician, I still cannot reach the level of empathy that my supervisor possesses. Perhaps I need to acquire some experience in my career to reach the level of empathy that my supervisor possesses, but the process may be a bit complex. (P2, F)

As a physician, I think that empathy is a curved process, initially high, but as your clinical abilities improve and work experience increases, empathy may decrease. The attending physician is very busy, and at some point, the value of empathy may be underestimated, but it increases again with age. Perhaps at a certain point or stage, you suddenly feel it is important, and you become very focused on the ability to empathize. (P3, F)

Two interviewees believed that after three years of standardized training for resident physicians, their empathy skills had improved. Three years ago, they only thought about the disease. Today, they are able to think from the perspective of the patient and stand in their shoes.

For example, parents who come to the surgical emergency department are very anxious. As a physician, I can understand their feelings. Some common diseases that you have seen before have a likely trajectory. Although you are also anxious about their diseases, you know how to treat different disease symptoms and have the ability to handle them. I know why parents are anxious, and I can think from their perspective. (P4, F)

As you gain an understanding of diseases and as your own abilities and clinical experience improve, your feelings toward the patient change. Because I know how a disease like Mycoplasma pneumonia, for example, develops, when I was in PGY1, I felt that the child's cough was very severe, which made the parents very anxious. At the time, I was also quite anxious. Now, however, I know that the course of this disease is long. If parents are very anxious, I will explain this disease to them and comfort them. I have had more contact with patients, and I will consider the problem more from their perspective. (P6, F)

Cultivating residents' empathy ability during standardized resident training

Self-study: The residents believed it important to learn theories relevant to doctor–patient communication and empathy. The interviews revealed that most of them improved their communication skills in clinical practice, and a few residents spent time studying how to communicate with patients. Only one student bought a book about communication, and one student paid attention to the ability to communicate with patients because they had to take an exam on doctor–patient communication.

When I was admitted for training, there was a medical teacher talking about doctor–patient disputes, which was quite scary at the time. I bought relevant books but did not read them. (P1, M)

I have not bought any books related to doctor–patient communication, but I think in clinical practice, it is necessary to participate more in the conversation process with superiors, listen more to their conversations, listen more to how they communicate with patients, and then try to learn how to better communicate with patients on my own. (P2, F)

This year's standardized training and graduation assessment for resident physicians added an assessment of doctor–patient communication. I have paid attention to this knowledge, but I have not delved into it. (P3, F)

Training course: It is necessary to set courses to cultivate residents' empathy ability, such as theoretical training courses, case-sharing groups, and scenario simulations.

I think it's necessary to set courses for residents to teach us how to communicate, how to express the appropriate level of empathy to patients, etc. (P1, M)

I think theoretical teaching in this area is possible, but it cannot be a single output of this teaching mode. Instead, we could hold some doctor–patient communication and sharing meetings, where residents or specialists could share their cases in clinical work and learn from each other. (P3, F)
Maybe establish some scenario simulation courses for training. (P5, M)

Sharing the most memorable cases during resident training

Due to the fact that resident physicians undergo rotational training in different clinical departments over 3 years, clinical departments, patient situations, work environments, and severity of diseases may vary. By conducting interviews with resident physicians during the training period, the factors that affect the empathy ability of resident physicians can be further explored by allowing them to profoundly impact the departments where communication with patients is not smooth or smooth. The results are shown in Table 5.

DISCUSSION

Clinical empathy and number of years of standardized training

Some studies have shown that empathy scores are associated with ratings of clinical competence [24]. From the results of the questionnaire survey, the JSE-S scores of PGY1, PGY2, and PGY3 showed no significant differences. From the interview results, seven respondents compared the changes in their empathy skills between the beginning and completion of the standardized resident physician training. Five pediatric resident physicians believed that their empathy skills had decreased with the improvement in their medical skills, while two resident physicians believed that their empathy skills improved after receiving standardized resident physician training. The results of the interviews seem to confirm the results of the questionnaire survey that different physicians have different understandings of the relationship between the improvement of clinical abilities and empathy. These two perspectives may be due to different perspectives on empathy. A resident physician who believes that empathy decreases may believe that the physician's empathy toward patients is more about the patient's illness. As their medical abilities improve, they can treat the patient's illness and believe that it will eventually be cured, so the need for empathy decreases. Some studies have reported that doctors who sympathize with their patients share their suffering, which could lead to emotional fatigue and a lack of objectivity [25]. However, one resident physician believed empathy had improved by progressing from learning about diseases from books during their medical student stage to the realities of clinical practice, seeing the impact of diseases on patients, families, and even society.

Clinical empathy and the pediatric work environment

Doctor–patient communication in pediatrics is more complex and difficult than when treating adults, meaning that pediatricians bear higher risks. The probability of medical disputes in pediatrics is much higher than in other departments; pediatricians are often insulted and even physically threatened [26]. Physician empathy is at the heart of doctor–patient communication and significantly influences patient outcomes [27]. This study explored the factors that influence empathy between pediatricians and patients. In patient terms, the level of cooperation from the child and the characteristics of the person accompanying the child are factors. As for the doctors, they can be confronted with pressure and the need to communicate effectively in the face of high outpatient volumes, which can affect their expressions of empathy, a finding similar to that of previous studies [28, 29].

Further analysis of direct doctor–patient communication and empathy among pediatric resident physicians in different rotating departments showed that communication between doctors and patients was seen to be smoother in the Rheumatology and Immunology, General Surgery, and Special Diagnosis Departments, while difficulties were encountered in Outpatients and Emergency, Hematology and Oncology, Surgical Oncology, and Cardiology. The reasons may be complex, but

Table 5 The clinical departments where the most memorable cases of empathy with patients happened for the interviewed residents

Participant number	Gender	Specialty	The departments which the most memorable cases about the empathy with patients happened during the residents' training	
			Good	Bad
P1	M	Pediatric	Special Diagnosis Department	Outpatient and Emergency Department
P6	F	Pediatric	Special Diagnosis Department	Outpatient and Emergency Department
P3	F	Pediatric	Rheumatology and Immunology Department	Cardiovascular Department
P4	M	Pediatric	Rheumatology and Immunology Department	Hematology and Oncology Department
P5	M	Pediatric Surgery	General Surgery Department	Outpatient and Emergency Department
P2	F	Pediatric Surgery	General Surgery Department	Outpatient and Emergency Department
P7	M	Pediatric Surgery	General Surgery Department	Surgical Oncology Department

four principal issues can be identified. First, the duration of communication between doctors and patients and the environment of medical treatment; in the Special Diagnosis Department, for example, patients are able to communicate and interact with doctors for a long time, and the medical environment is very good, whereas Outpatients and Emergency see a rapid turnover and high workload. Second, the level of familiarity between patients and physicians can play a role. In Rheumatology and Immunology Departments, for example, there are often patients with chronic diseases who have been hospitalized for a long time; doctors and patients are very familiar with each other, and some studies have shown empathy is easier to generate when closer interpersonal relationships develop [30]. Third, different teaching methods may have an impact. Better training on the wards can make residents feel more confident in communicating with patients, whereas Outpatients and Emergency can require residents to face patients alone, generating anxiety or even burnout [31]. Fourth, disease severity can play a role. In some departments, such as Hematology and Oncology, patients may not have a high hope of recovery but may have high expectations of the treatment. This may not only put a lot of pressure on doctors but also make it difficult to communicate effectively with patients; research has indicated that there is still a gap between the actual and expected disclosure of "bad news" about cancer among healthcare workers, patients, and family members, leading to various disclosure dilemmas [32].

Clinical empathy across different settings

The mean empathy levels found in this study (81.41 ± 5.43) are lower than those reported [33] in most similar studies around the world. Similar lower JSE scores have been seen in undergraduate medical students in China; the average JSE score among medical students from Sun Yat-sen University was 84 [34]. This finding is concerning. The shortage of pediatricians, [35] low wages, [36] severe occupational burnout, [37] and the influence of Asian parental culture [38] may partly explain our findings. Further investigations are required to determine the factors associated with such low scores so that steps can be taken to address the situation.

Cultivating empathy among pediatric residents

Our research shows that resident physicians believe that empathy is important, even though their self-rated empathy scores are less than ideal. Interventions to further investigate the teaching and learning of empathy were discussed [39]. Many training courses have proven to be beneficial in enhancing the empathy skills of resident physicians. The teaching innovation "How to act-in-role" has been shown to be effective not only in increasing medical students' self-reported empathy but also in their competence in consultation skills [40]. The addition of narrative medicine-based education in standardized training improved empathy and may have improved the professional knowledge of residents [41, 42] The use of Balint group activities [43] with residents has shown significant improvements in empathy across all dimensions. Medical schools should design appropriate training courses and implement interventions at all stages (from the admission process to curricula to residency) and levels (explicit and implicit curricula) depending on the empathy levels of their resident physicians.

Conclusion

Our findings suggest that, based on the different understandings of empathy among resident physicians, the clinical empathy level of pediatric resident physicians is not closely related to an improvement in clinical abilities. Rather, the working environment of pediatricians significantly impacts their empathy ability. Empathy is lower among pediatric residents in China when compared to their European counterparts, and further research into the underlying factors associated with such low scores is necessary to plan interventions to cultivate empathy among pediatric residents.

Limitations

One important weakness of this study is that it was based in one medical school with two specialized children's hospitals; the limited sample size of the investigation and interviews may mean that the study is not representative of pediatric residents in China. Moreover, the cross-sectional survey precluded us from identifying a causal relationship; thus, a prospective longitudinal study with a larger sample size of pediatric residents is warranted.

Acknowledgements

None.

Author contributions

L.P.P. conceptualized the idea of this study. L.P.P. and W.L. contributed to design of the project and survey preparation and dissemination. L.P.P. contributed to investigate. D.L. contributed to writing-review and agreed to be accountable for all aspects of the work. All authors reviewed the manuscript.

Funding

This work was financed by Postgraduate Medical Education Project in 2022 (BYH20220412); The 2022 Science and Technology Innovation Project (Humanities and Social Sciences) Project of Shanghai Jiao Tong University School of Medicine (WK2217); Fujian Medical University Education Reform Project: Application Research on the Intelligent Teaching Platform for Clinical Teachers under the Background of "New Medical Science" (J22021).

Data availability

The questionnaire data that support the findings of this study are available in the Baidu Netdisk repository, https://pan.baidu.com/s/1hRjCKulVVry79HwTzxB_bA with the primary accession code e9hp.The interview datasets analysed during the current study are not publicly available due to privacy concerns but are available from the corresponding author upon reasonable request.

Declarations

Competing interests
The authors declare no competing interests.

Ethics approval and consent to participate
Ethical approval for this study was obtained from the institutional research ethics committee of Shanghai Children's Medical Center Affiliated to Shanghai Jiao Tong University School of Medicine(NO: SCMCTRB-K2023147-1). All participants received written explanations about the study in advance and signed a written consent form to participate.

Consent for publication
Not applicable.

Competing interests
None declared.

Received: 29 April 2024 / Accepted: 2 August 2024
Published online: 02 September 2024

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