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Self-assessment of students in performing clinical competencies of pediatric dentistry during the COVID-19 pandemic

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ABSTRACT

Background: Students' self-assessment of clinical competencies can be a criterion to evaluate the students' clinical training needs. The present study aimed to investigate dental students' self-assessment of their ability in clinical competencies in the pediatric dentistry of Babol Faculty of Dentistry during the COVID-19 pandemic.

Methods: 71 students participated in this correlation-descriptive study. The researcher-made questionnaire with examined validity and reliability included three parts: 1. personal characteristics, 2. self-assessment questions of students regarding their ability in clinical competencies, 3. and questions about the number of treatments performed by students. The data were entered into SPSS software (22) and were analyzed with independent t-tests, ANOVA, Spearman's correlation coefficient, and descriptive indices.

Results: A significant correlation was observed between female gender and latex In this study, among the 12 groups of clinical competencies examined, the highest level of ability was related to the extraction of deciduous teeth (80.63 ± 20.78), and the lowest level of ability was related to treating patients with systemic problems (36.61±25.99) followed by abscess of deciduous teeth treatment (49.64±24.45) and child behavior control (58.80±21.17).

Conclusion: Students studying during the COVID-19 pandemic evaluated their ability to perform clinical competencies in pediatric dentistry as generally medium to high. However, competency in treating patients with systemic problems, treating abscesses of deciduous teeth, and controlling child behavior did not have a suitable rank compared to competency in other groups of clinical competencies. This issue shows the necessity of planning to compensate for not achieving educational goals in the era of COVID-19.

Keywords: Self-assessment, pediatric dentistry, clinical competency, COVID-19.

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Introduction

Oral and dental problems can affect growth (physical and mental), self-confidence, socialization, learning ability, and children's daily activities as future builders of society (1).

There is concern that a barrier to children's access to dental care may result from inadequate pediatric dentistry education at the general level (2). Because the inadequacy of clinical experience in any field during the general education period leads to a decrease in students' learning, increasing stress and fear of disability, and finally, refusing to do clinical work after graduation (3).

According to the findings, in recent years, the pandemic of COVID-19 has become a big challenge for dentists, physicians, and medical and dental students in all the involved countries. The professional activity of dentists is associated with a potential risk for the spread of COVID-19, and following its outbreak, the necessary instructions to prevent and control the infection until the availability of a suitable vaccine or medicine were communicated to all dental associations. The closure of universities prevented dental students from providing clinical experiences, and the virtual classroom could not replace clinical experiences even at their highest quality. No one can deny that theoretical knowledge and clinical competency are two different outcomes of education. Clinical competency includes the practitioner's knowledge, skills, values, and attitudes. The number of patients decreased with the resumption of activities of dental schools due to the necessity of social-physical distancing and screening of patients for any COVID-19 symptoms before starting dental treatment. Also, dental schools could not provide students with a sufficient number and variety of patients. Therefore, significant limitations in the field of clinical and surgical activities in dentistry significantly impacted dental students' education. Specifically, it disrupted students' clinical experiences (4-7). In this regard, Hattar et al. showed in their study that from the point of view of 87% of dental students, the quarantine caused by the COVID-19 pandemic had the most negative effect on clinical education among different educational fields (5). In Van Doren et al.'s study, most respondents stated that they had little clinical practical experience in dental school following the COVID-19 pandemic, and many stated that virtual discussions taught critical thinking but did not replace practical clinical experience (8).

In medical sciences, clinical education is a basic and important part of education, and improving the quality of clinical education depends on periodic and continuous review, recognition of strengths, and correction of weaknesses(9). One of the evaluation methods is self-assessment, which students do, and means the student's evaluation of what he has learned (10). Today, studies have shown that student self-assessment of clinical competencies has more value than routine university assessments, including written and practical exams. Therefore, in many universities, in addition to the professor's evaluation of the student, the student also does a self-assessment (11). For example, in Taravati et al.'s study at Jundishapur University of Medical Sciences, Ahvaz, students reported that they were lacking in the field of trauma control and pulp treatment of immature permanent teeth, which indicated the need for more emphasis in this field in the education of students (12). In the study of Bahrololomi et al., the success rate in creating competency of stainless steel coating (SSC), choosing the case of the spacer, and designing the type of spacer was not enough from the perspective of the students; The necessity of revising the educational curriculum of general dental doctorate courses was emphasized by these two study and other studies (12-15).

While being flexible in the curriculum, exams, and qualification evaluation, training dentists with scientific and professional qualifications remains the responsibility of the Faculty of Dentistry. After significant restrictions in dental clinical activities following the pandemic of COVID-19, few types of research were conducted on the clinical competency evaluation of dental students worldwide, and little information is available in this field. On the other hand, students' self-assessments can provide a valuable feedback mechanism for evaluating educational needs and, subsequently, the continuous improvement of the educational system. Therefore, the present study was conducted to investigate students' ability to perform clinical competencies in the pediatric dentistry department of Babol Dental

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School by self-assessment method during the pandemic of COVID-19 in the academic year 2021-2022. Another goal of this study was to evaluate the needs of pediatric dentistry clinical education from the student's point of view during the COVID-19 pandemic to provide a basis for new curriculum planning to improve clinical education during the crisis.

Methods

This correlation-descriptive study was conducted on dental students who had completed the pediatric practical course according to the curriculum of 2017 until the end of the academic year 2021-2022 at the Faculty of Dentistry in Babol. The sampling method was a census, and 75 students participated. Out of this number, four refused to complete the questionnaire and were excluded from the study, and finally, the number of samples remained at 71.

After preparing the list of students, the researcher distributed the questionnaire by attending the clinic departments and collecting the information. To increase the participation rate, oral explanations were given regarding confidentiality and the importance of their participation in the program to attract the students' opinions.

The mentioned questionnaire was designed based on the questionnaire of studies of Taravati, Bahrololomi, Horri, and Nematollahi (12, 13, 16, 17) and the opinions of respected professors of Babol Dental School. The questionnaire consisted of three parts. The first part about the individual characteristics of the students included four variables: gender, faculty of dentistry or international branch of the faculty, the average grade point average of their first 9 semesters in three subgroups: a) 17-20, b) 14-16.99, and c) 13-12.99) and their basic science test scores in three subgroups a) 140-200, b) 100-139, and c) below 100). The second part was the self-assessment questions of the student's ability to perform clinical competencies in the pediatric dentistry department of Babol Dental School, which was compiled based on the curriculum of the pediatric dentistry clinical unit and the files related to the patients of the pediatric dentistry department. The questionnaire included all the diagnostic and treatment steps taught to the general dental doctorate students. The questions designed in this section were divided into 12 groups of clinical competencies as follows:

Group 1: examination (detailed oral and dental examination of the child, diagnosis, and treatment plan), Group 2: controlling the child's behavior, Group 3: prevention (providing health and proper diet education, performing dental prophylaxis and fluoride therapy), Group 4: advanced prevention (fissure sealant, Preventive Resin Restoration (PRR)), Group 5: anesthesia injection, Group 6: restoration (deciduous and permanent teeth restoration), Group 7: Placing Stainless Steel Crown (SSC), Group 8: Perform pulpotomy treatment, Group 9: Perform pulpectomy treatment, Group 10: Extraction of deciduous teeth, Group 11: Treatment of abscess of deciduous teeth and group 12: treatment of patients with systemic problems. Students rated their clinical competence in five levels: "I can't at all", "low", "moderate", "good," and "very good". First, the scores of the ability level in clinical competencies were calculated based on the score of each question out of four, between 0 and 88. Then, for more intuitive analysis and interpretation, it was converted into a zero to hundred scale [100 x (score - lowest value)/(highest value - lowest value)]. The third part was 19 questions about how many treatments the student had done in the pediatric dentistry department. Due to the destruction of the students' logbooks in the pediatric dentistry department at the end of each semester and the researchers' lack of access to the logbooks, the students also completed this part.

The validity of the questionnaire was checked and confirmed by 9 respected professors of the University of Medical Sciences, including 6 respected professors of the pediatric dentistry department of Babol Dental School, 2 respected professors of the Department of Oral Health and Social Dentistry of Babol Dental School and 1 respected professor of the Medical Education Development Center of Babol University of Medical Sciences and CVR=98.1 and CVI=98.3 were obtained.

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After verifying the validity, for the reliability of the questionnaire, 20 people from the last group of graduate students were asked to answer the questionnaire electronically every two weeks. The ICC index measured the reliability of the questionnaire, and the internal consistency was measured by Cronbach's alpha index of 85%.After collecting the data, they were entered into Spss software (22). They were analyzed with independent t-tests, ANOVA, Spearman's correlation coefficient, and descriptive indices (frequency, percentage, mean, and standard deviation). $P < 0.05$ was considered significant.

Results

In this research, 71 dental students who had completed the pediatric practical course until the end of the academic year 2021-2022 in Babol Dental School participated. 53.5% were students of the faculty of dentistry students, and 46.5% were students of the international branch of the faculty. 57.7% of the participants were girls, and 42.3% were boys. The average grade point mean of the first 9 semesters of 84.5% was 14-16.99, and their basic science test score of 73.2% was 100-139.

Independent samples t-test was used to investigate the difference in students' self-assessment in performing dental clinical competencies according to their average GPA. The independent samples t-test was performed assuming the equality of variances to compare the student's ability to perform clinical competencies in two groups; the mean average of the total GPA was 17-20 and 14-16.99. The results showed no statistically significant difference ($P = 0.456$) in the ability to perform clinical competencies between students with average GPAs of 17-20 and 14-16.99 (Table 1).

Table 1. Examining the relationship between the student's ability to perform clinical competencies in the pediatric dentistry department and the average grade point average of their first 9 semesters

average grade point average of their first 9 semesters	Ability level (scale 0-100)		P-Value
	Mean	Standard deviation	
17-20	72.10	13.43	0.456
14-16.99	69.33	10.84	

Next, ANOVA analysis of variance test was used to analyze the hypothesis that there is a significant difference in students' self-assessment in performing dental clinical competencies according to their basic science test scores. The results showed a significant statistical difference ($P = 0.021$) between students' assessment of their ability to perform clinical competencies and their scores in the basic science test (Table 2). According to Tukey's post hoc test results, this significant relationship was due to the difference between students with a basic science test score below 100 and students with a basic science test score of 100-139 ($P=0.016$).

Table 2. Examining the relationship between the student's ability to perform clinical competencies in the pediatric dentistry department and the basic science test score

Basic science test score	Ability level (scale 0-100)		P-Value
	Mean	Standard deviation	
140-200	71.02	11.54	0.021
100-139	67.83	10.34	
Below 100	77.99	12.16	

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The results of the independent t-test statistical test to analyze the hypothesis of the difference in the ability of students to perform groups of clinical competencies in pediatric dentistry according to their average GPA showed that only in the treatment of deciduous teeth abscess (P = 0.038) there is a significant difference between students with average GPA of 17-20 and 14-16.99. Students with a higher average GPA (17-20) considered themselves more capable, and in other cases, no significant difference was observed (P < 0.05) (Table 3).

The results of ANOVA analysis of variance to analyze the hypothesis of the difference in the ability of students to perform groups of clinical competencies in pediatric dentistry according to their basic science test scores showed that in anesthesia injection (P = 0.041) and restoration (P = 0.005) groups, there was a significant difference between the ability of students with different basic science test scores. In both cases, the highest level of ability was related to students with a basic science test score below 100, and the lowest level of ability was related to students with a basic science test score of 100-139. In other cases, this difference was not significant (P < 0.05) (Table 4).

Table 3. Examining the relationship between the ability of students in the clinical competency groups in the pediatric dentistry department of Babol University of Medical Sciences during the COVID-19 pandemic and the average grade point average of their first 9 semesters

Groups of clinical competencies	Ability level		P-Value
	Average GPA 17-20 M ± SD	Average GPA 14-16.99 M ± SD	
Examination	5.27 ± 1.27	5.60 ± 1.01	0.347
Controlling the child's behavior	2.27 ±0.78	2.37 ± 0.86	0.738
Prevention	5.82 ± 1.40	5.77 ± 1.28	0.904
Advanced prevention	6.36 ± 1.20	6.17 ± 1.53	0.688
Anesthetic injection	2.82 ± 0.75	2.88 ± 0.71	0.784
Restoration	25.18 ± 4.89	23.58 ±4.03	0.247
SSC	2.91 ± 0.94	2.67 ± 0.87	0.407
Pulpotomy	3.0 ± 0.775	2.90 ± 0.706	0.672
Pulpectomy	2.64 ± 0.92	2.50 ± 0.89	0.645
Extraction of deciduous teeth	2.91 ±0.94	3.28 ±0.80	0.172
Deciduous teeth abscess treatment	2.55 ± 0.82	1.88 ±0.97	0.037
Treatment of patients with systemic problems	1.73 ± 0.90	1.43 ± 1.06	0.366

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Table 4. Examining the relationship between the ability of students in the clinical competency groups in the pediatric dentistry department of Babol University of Medical Sciences during the COVID-19 pandemic and the basic science test score

Groups of clinical competencies	Ability level			P-Value
	Basic Sciences 140-200 M ± SD	Basic Sciences 100-139 M ± SD	Basic Sciences Below 100 M ± SD	
Examination	5/63 ±0/916	5/46 ± 0/99	5/91 ± 1/37	0/436
Controlling the child's behavior	2/75 ±0/46	2/23 ±0/87	2/64 ±0/80	0/130
Prevention	5/50 ±1/30	5/69 ±1/27	6/36 ±1/28	0/241
Advanced prevention	5/63 ± 1/50	6/13 ± 1/45	6/91 ± 1/44	0/147
Anesthetic injection	2/88 ± 0/64	2/77 ± 0/67	3/36 ± 0/80	0/041
Restoration	24/38 ±4/92	23/0 ± 3/79	27/36 ± 3/80	0/005
SSC	3/13 ±0/64	2/62 ± 0/86	2/82 ± 1/07	0/288
Pulpotomy	3/38 ± 0/51	2/83 ± 0/67	3/0 ± 0/89	0/116
Pulpectomy	2/38 ±0/74	2/50 ± 0/87	2/73 ± 1/10	0/666
Extraction of deciduous teeth	3/13 ± 0/64	3/15 ± 0/82	3/64 ± 0/92	0/205
Deciduous teeth abscess treatment	2/25 ± 0/88	1/94 ± 0/93	2/0 ±1/26	0/715
Treatment of patients with systemic problems	1/50 ±1/19	1/37 ± 0/92	1/91 ± 1/37	0/291

According to Spearman's correlation coefficient, there was a significant positive correlation between students' assessment of their ability to perform PRR, amalgam and composite restorations of Class II caries of deciduous teeth, pulpotomy, pulpectomy, SSC, and treatment of abscess of deciduous teeth with the number of times each of these treatments were performed during the outbreak of COVID-19 ($P< 0.05$). In other cases, this relationship was not statistically significant ($P> 0.05$) (Table 5).

This research showed that 59.2% of students evaluated their ability as high, 39.4% as average, and only 1.4% as low. The average level of student's ability to perform all clinical competency groups except treating patients with systemic problems, treating abscesses of deciduous teeth, and controlling child behavior was above 60. The lowest level of ability was related to treating patients with systemic problems (36.61±25.99), followed by deciduous teeth abscess (49.64±24.45) and child behavior control (58.80±21.17) (Chart 1).

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Table 5. Checking the correlation between the number of times clinical competencies performed and the ability to perform them

Variable	r	P-Value
The number of filings files and examinations and the ability to accurately examine the child's oral and dental	-0/010	0/933
The number of filings files, and examinations and the ability to diagnose and plan treatment	0/110	0/360
The number of dental prophylaxis and fluoride therapy and the ability to do it	0/108	0/369
The number of fissures sealant and the ability to do it	0/200	0/095
The number of PRR (preventive resin restoration) and the ability to do it	0/283	0/017
The number of anesthetic injections and the ability to perform them	0/225	0/059
The number of amalgam restorations of Class I deciduous teeth caries and the ability to do it	0/104	0/389
The number of composite restorations of class I deciduous teeth caries and the ability to do it	-0/033	0/785
The number of amalgam restorations of Class II deciduous teeth caries and the ability to do it	0/268	0/024
The number of composite restorations of Class II deciduous teeth caries and the ability to do it	0/346	0/003
The number of amalgam restorations of Class I caries of permanent teeth and the ability to do it	-0/041	0/737
The number of composite restorations of class I caries of permanent teeth and the ability to perform it	0/154	0/201
The number of amalgam restorations of class II caries of permanent teeth and the ability to do it	0/009	0/938
The number of composite restorations of class II caries of permanent teeth and the ability to perform it	-0/007	0/953
The number of pulpotomy treatments and the ability to perform them	0/243	0/041
The number of pulpectomy treatments and the ability to do it	0/337	0/004
The number of deciduous teeth extraction and the ability to perform it	0/286	0/015
The number of SSC (Stainless Steel Crown) and the ability to do it	0/262	0/027
The number of deciduous teeth abscess treatments and the ability to do it	0/419	0
Number of treatments of patients with systemic problems and ability to do it	0/221	0/064

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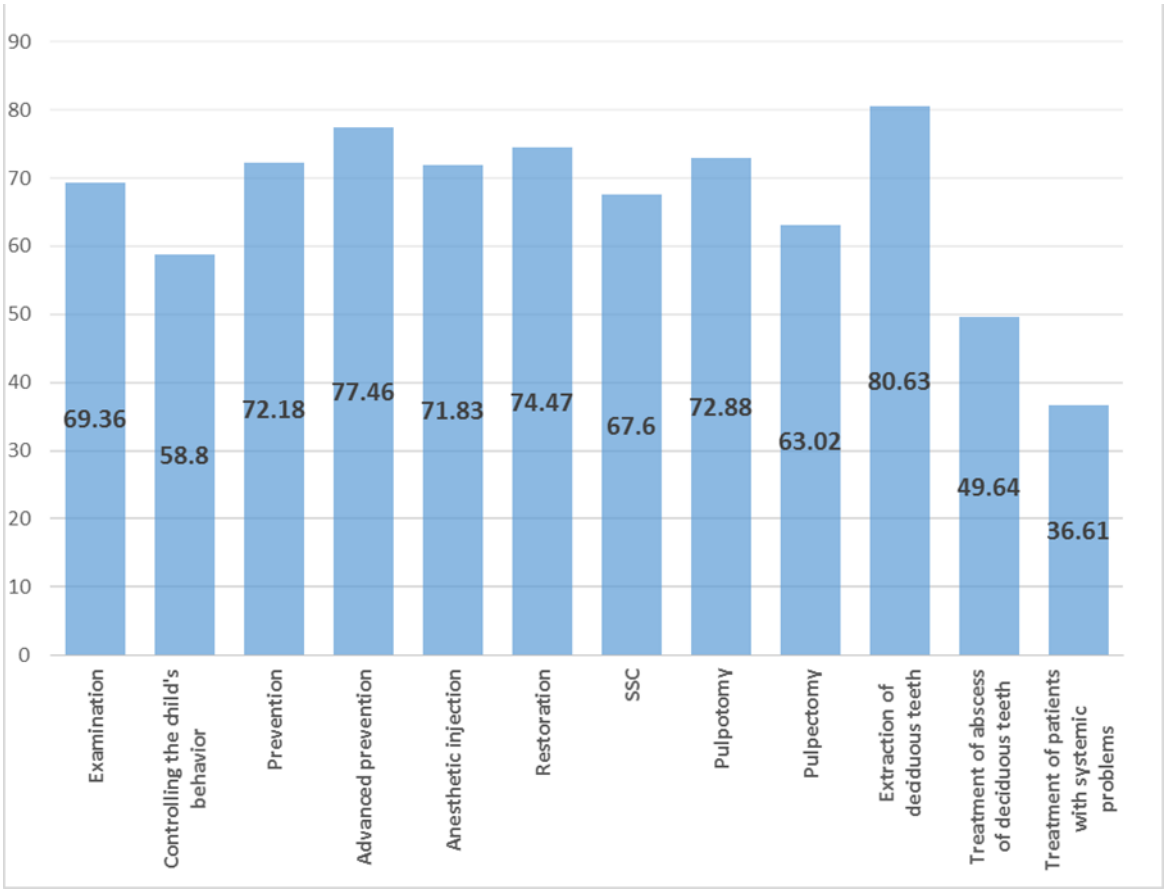

Chart 1. The average level of Babol dental students' ability in the clinical competency groups

Discussion

The results of our study showed that the general dentistry students of Babol University of Medical Sciences studying during the COVID-19 pandemic were generally satisfied with their ability to perform the competencies related to pediatric dentistry. However, competency in treating abscesses of deciduous teeth, treating patients with systemic problems, and controlling child behavior did not have a suitable rank compared to competency in other groups of clinical competencies. Considering the COVID-19 situation, the limited attendance of patients, especially children, as well as the shortening of the attendance time of students in the clinical departments, this issue was not far from expected.

It is necessary to mention that the lack of studies on students' self-assessment of clinical competency in the pediatric department during the COVID-19 pandemic to compare with the results of the present study forced us to compare with studies before the COVID-19 era.

In our study, in the pediatric dentistry department of Babol University of Medical Sciences, the ability of students with a GPA of 17-20 was evaluated higher than that of students with a GPA of 14-16.99. Still, this relationship was significant only in treating abscesses of deciduous teeth. The lack of significant superiority of self-assessment of the ability of students with higher GPAs probably indicates that there was not much difference between the effort and the self-confidence of students with different educational levels in clinical competencies.

In this study, despite the expectation, the highest level of ability was related to students with a basic science test score below 100 and the lowest was related to students with a basic science test score of 100-139 (P=0.016). These results may be due to the mismatch between the content of basic science

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courses and the practical training goals of dentistry. On the other hand, after entering the pre-clinic and clinic, more influential factors will affect the student's attitude toward their clinical competencies.

In our study, there was a significant positive correlation between students' ability to perform PRR, amalgam and composite restorations of Class II caries of deciduous teeth, pulpotomy, pulpectomy, extraction of deciduous teeth, SSC, and treatment of abscess of deciduous teeth with the number of times each of these treatments are performed. In the study of Taravati et al., there was only a significant positive correlation between the method of prevention and fluoride therapy with the number of times it was performed (12). It is possible that the difference in the educational environment in the two studies led to the difference in the results. On the other hand, recall bias may have influenced the difference in results, considering the lack of access to logbooks in both studies.

In our research, most of the dental students of Babol University of Medical Sciences evaluated their ability to perform the competencies related to pediatric dentistry as medium and high. In Horri et al.'s study, most of the students expressed their mastery in dealing with the problems of pediatric and adolescent dentistry problems after passing all the pediatric department's practical units (16).

In this research, the students saw the lowest level of their ability to treat patients with systemic problems. This could be because the treatment of these patients requires consultation from a physician and is mostly done in the specialized department of children, so more than half of the students mentioned not treating these patients. In Taravati et al.'s study, students understated their ability to treat patients with systemic problems (12).

In the present study, the students evaluated their ability to treat the abscess of deciduous teeth relatively poorly, which was not far from expected considering that 31 of the students failed to perform it in the children's department due to the small number of cases for this treatment.

Behavioral control is vital in pediatric dentistry because performing any treatment without general anesthesia depends on proper communication with the child and behavioral control. The results of this study indicate that the ability to control the child's behavior did not have a suitable rank compared to the ability in other clinical competency groups (rank 10 out of 12 clinical competency groups). Also, about half of the students evaluated their ability as average or lower. Similar results were obtained in the studies of Sodagar, Taravati, Nematollahi, and Bahrololomi (12, 13, 17, 18). Also, in the study of Najafpour et al., students were not sufficiently satisfied with the way professors taught them about controlling child behavior (9). It should be noted that in the Faculty of Dentistry, behavior control competency should be taught in the practical unit of children 3, which is not possible due to the time limit of students' presence in the children's department and the referral of uncooperative patients with little cooperation to the specialized department. However, in Stewart et al.'s study, students treated an average of 30 children and a minimum of 19 children, and according to these authors, all students gained experience in controlling child behavior (19).

Deficiencies in the educational experiences of treating patients with systemic problems, treating abscesses of deciduous teeth, and especially controlling the behavior of children are problematic because the quality of educational experiences in pediatric dentistry is related to the attitude and professional behavior of dentists and their desire to provide different types of treatment for children. This issue emphasizes the need for planning by the relevant officials to compensate for the lack of achievement of educational goals in the COVID-19 era. According to the self-assessment of students with a lower basic science score to be more capable in this study, it is suggested to investigate this relationship in future studies. Suppose similar results are obtained in other studies. In that case, the relevant authorities should review the content of the basic science courses in dentistry or their teaching methods.

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Limitation

The present study has several limitations. Several students of our study community refused to complete the questionnaire.The lack of access to the students' logbooks in the pediatric dentistry department due to their destruction at the end of each academic semester forced us to Classification of the number of treatments performed by students so that students could complete of third part of the questionnaire more easily, which led to not receiving accurate information about the number of treatments performed. There was also a possibility of recall bias in remembering the number of treatments performed. The lack of studies on students' self-assessment of clinical competency in the pediatric department during the COVID-19 pandemic to compare with the results of the present study forced us to compare with studies before the COVID-19 era.

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Competing Interests: This study has no conflict of interest for the authors.

Data availability: The data that supports the findings of this study are available from the corresponding author upon reasonable request.

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