

Children's Anxiety Levels and Their Perspectives on Dental Experiences in Students' Clinical Evaluation

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ABSTRACT

Aim: The purpose of this study is to present a framework for the potential implementation of children's anxiety levels and perspectives of their experiences receiving treatment from dental students through interviews and drawing into the clinical assessment of dental students.

Materials and methods: A total of 51 patients between the ages of 5 and 8 years were included in the study. Pulp therapy and/or restorative treatment was performed during the first therapeutic session for all participants. Children were asked to draw about themselves at the dentist's and then verbally explain their drawings. Drawings were analyzed using Child Drawing: Hospital (CD: H) to determine the child's anxiety score. Interviews were analyzed using thematic analysis to establish the factors contributing to the patient having a positive/negative experience. The relationships between the children's level of anxiety and their experience were analyzed using correlation and regression analyses against the student clinical assessment data.

Results: Most children in the study exhibited average levels of anxiety and had an overall positive perception of the dentist. The correlation and regression analyses determined that when children presented higher levels of anxiety, the students received statistically significant higher scores in evidence-informed practice (EIP), skills, and their tolerance for error during procedures. No other rubric item was related to the children's anxiety or whether their experience was positive/negative.

Conclusion: Although this study provided a framework for exploring children's anxiety levels and perspectives of their experiences in teaching clinical settings, more research is needed to refine the method for student evaluation.

Clinical significance: This study will enable dental students to meet the needs of child patients, which consequently increases treatment motivation and adherence to dental services as well as reduces the likelihood of patient anxiety and improves patient self-care skills over time.

Keywords: Anxiety, Art, Dental, Education, Patient satisfaction, Pediatric dentistry.

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INTRODUCTION

Advances in communication assessment techniques are essential for developing future dental health professionals' competence.¹ Children's opinions can offer invaluable and meaningful insight into their perspective of the dental experience² and student performance, such as the quality of student interaction. Incorporating this insight may also provide an alternative assessment of students' interpersonal and communication skills.^{3,4} This is important as the student's ability to meet the needs of patients can increase treatment motivation and adherence to dental services,⁵ reduce the likelihood of patient anxiety, and improve patient self-care skills over time.¹ Moreover, effective communication and higher patient satisfaction allow for more positive appointments, a decreased risk of litigation, and lower levels of burnout in dentists and dental students.⁶

Therefore, a thorough understanding of child psychological development in pediatric dentistry is an important requirement in addition to the knowledge of preventive measures as well as technical skills.^{7,8} Being well-versed in child psychology development will enable dentists to identify patients with various levels of dental anxiety and manage such stressful occasions. To achieve this goal, dental practitioners need to recognize both patients' perceptions and fears to meet their needs and provide them with the best care in a way that reduces anxiety.⁹ Studies suggest that increasing the frequency of opportunities for patient feedback in health education curricula may help normalize patient-centered principles throughout students' careers and prepare them for being receptive to and welcoming of patient

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feedback, which is now becoming a standard for professional development.¹⁰

However, the collection of feedback through traditional qualitative methods such as verbal interviews can be problematic for children.¹¹ As such, methods like arts-informed inquiry¹² and other projective methodologies that utilize multiple approaches to gathering perspectives are starting to come to the forefront of children's research. Art and projective methods allow young patients to use symbols to express what they are experiencing, thinking, and feeling.¹² In this way, projective methods serve to complement verbal components by helping participants recollect

and organize thoughts and perspectives, thus providing the researcher with richer data than with interviews alone.¹³

In pediatric dental education, there is limited research on children's perceptions of dental students and how these perceptions can be captured as formative feedback and evaluation.¹⁴ A significant barrier in gathering children-specific feedback on dental experiences is the lack of validated instruments available. This is mainly because the development of validated tools for evaluating pediatric health consultations has broadly focused on parental or instructor perspectives^{15,16} and used conventional quantitative patient feedback tools, such as Likert-scales or short answer surveys, which tend not to be designed for children.²

By providing alternative avenues for pediatric patient expression, combined approaches lead to more robust patient feedback on student performance.³ Projective methods also serve to shift the clinical setting power balance by transferring the focus from the participant to the art piece,¹⁷ allowing the child to be more comfortable with the clinician or the researcher.

Drawing is a way to assess children's emotional reflection. Previous studies have focused on the usual drawings of children in terms of cognitive development and have considered it as a physical ability.¹⁸ However, more recently, drawing activity has been accepted as a cognitive ability as well as a precious tool for recognizing the psychological status of children.¹⁹ The first widely used drawing test—Machover's test, uses drawings of body parts, sizes, and shapes for assessing the unconscious feelings of a child.²⁰ One limitation of this approach is its inefficiency to explain a normal child who lacks drawing ability.⁹

Studies have successfully analyzed children's drawings in health research settings. Human drawing assessments, such as the Goodenough–Harris drawing test,²¹ draw-a-person,²² Child Drawing: Hospital (CD: H),²³ and human figure drawing²⁴ are valid and reliable instruments for inquiring into children's emotions, thoughts, and perspectives.^{25,26} CD: H measured the anxiety of school-age children admitted to the hospital and Clatworthy et al.²³ stated drawing as a suitable way to assess the mental emotions of hospitalized children. They reported that both unpleasant emotions such as fear and anxiety and wishes and joyful feelings can be easily revealed through painting.²³ These drawing tests are cost-effective and straightforward tools for identifying the subjective feelings of pediatric dental patients with no need for special training.²⁷ Studies have also shown that the CD: H has potential as a self-report measure and as a tool for assessing anxiety in pediatric patients.^{27,28}

Although several studies have evaluated children's drawings in health-related fields, only a handful of studies have been conducted to explore the use of pediatric patient drawings in dental student education.^{14,28–30} Thus, the purpose of this study is to provide a framework for the clinical evaluation of dental students by identifying the level of children's anxiety and perspective of their experiences through drawing and interviews.

MATERIALS AND METHODS

The university research ethics office (Pro00086015) granted ethics approval for this study. Statistical analysis was performed using Statistical Package for the Social Sciences version 24 (IBM Corporation, 2016). A total of 51 pediatric patients between the ages of 5 and 8 years who underwent pulpotomy/restorative treatment at a pediatric dentistry clinic between March and July 2019 were recruited in the study. Consent was obtained from all participants'

guardians. Children who did not understand or speak English were excluded from the study.

After the dental appointment was completed, participants were brought to a room inside the clinic that contained drawing materials—one sheet of paper and one open box of 96 crayons, so participants could see all the crayons available. Following a brief explanation of the study, children who chose not to participate were returned to their guardian(s). The participants were then prompted—"Can you draw a picture that shows all about you at the dentist today?" The research team informed participants that there was no right or wrong way to participate, as the activity was about their own experiences. All interactions and interviews were recorded using an audio recorder.

Anxiety Scoring

Scoring of the participants' anxiety was done using the CD: H instrument, which was designed to measure child anxiety in hospital settings through their drawings of themselves.³¹ This instrument was previously validated by Aminabadi et al.²⁸ for use in dental settings. Scoring of the drawing is divided into three parts—(1) elements of the drawing (i.e., color, placement, facial expression, etc.) scored out of 10, (2) elements indicating higher levels of anxiety such as omitting body parts; exaggeration or de-emphasis, distortion, transparency, and shading, and (3) a gestalt rating out of 10 from the rater's overall perspective of the drawing. The total score represents their anxiety level and is interpreted based on thresholds from the manual—<43 very low, 44–83 low, 84–129 average, 130–167 above average, and ≥168 very high.³¹

Interview

After the participants completed their drawings, they were asked about their drawings using a combination of deductive and inductive forms of thematic analysis.^{32,33} The process of analyzing the interviews was iterative and concurrent with the data-gathering phase of the study. Following Neale's³² approach of Iterative Categorization, audio recordings from the interviews were transcribed into documents. First, codes were briefly counted for frequency of occurrence. Neale³² refers to this process as the "charting" of the data. Second, line-by-line detailed coding was conducted, searching for repeated and interesting content. This dual process was then compared to determine the consistency of its occurrence in the transcripts. Two raters reviewed the transcripts individually and then discussed them together to categorize broader codes and collapse them into distinct codes. Each category and code were discussed until a consensus was reached between the two raters. The raters organized and named the codes under overarching domains and formulated a definition for each, which comprised the final codebook.

Once the final set of codes was determined and defined in the codebook, codes related to the dental experiences were assigned a positive, negative, or neutral ranking depending on their context in each interview transcript. This method of analysis was proposed by Frauches et al.³⁰ to allow for additional insight into the factors that attributed to the children having a positive or negative experience. Lastly, the interview in its entirety was appointed an overall positive, negative, or neutral rating depending on the context.

Student Performance

To evaluate children's perception of student performance, correlation analyses were performed between the child variables from their drawing (their anxiety level, if their experience was

positive or not) and their age and sex, as well as between these child variables and the student's performance on the clinical rubric using the Phi coefficient.³⁴ The rubric items used for student performance included technical skills (skills), evidence-informed practice (EIP), tolerance for procedural error (TPE), time management (time), instructor intervention (intervention), communication and professionalism (communication), and overall progression (OP). Rubric items were each graded separately.

After the Phi coefficient analysis, a series of binary logistic regressions were conducted for each of the criteria items (skills, EIP, TPE, time management, intervention, communication, OP, and score) as outcome variables and with the child variables as predictors. The full model for the binary logistic regression of an outcome variable is presented below:

$$Outcome_i = \frac{1}{1 + e^{\beta_0 + \beta_1 Anxiety_i + \beta_2 Positive_i + \beta_3 older_i + \beta_4 Female_i + u_i}},$$

$i = 1, 2, 3, \dots, 51$

Each of the models went through a backward stepwise iterative maximum likelihood procedure, beginning with a full model. How well each model performed in relation to another model was measured using their sense of prediction, Akaike information criterion, and the Bayesian information criterion.

RESULTS

Data were collected from 61 participants. Ten participants were removed from the study because of incomplete data, parental involvement, and/or not following study instructions. The mean age of participants in the study was 7 years [standard deviation (SD) = 1.0]. Participants were divided into two age-groups—the younger category included ages 5 and 6 (age-group 1) and the older category included ages 7 and 8 (age-group 2).

The sex of the participants was evenly distributed, with 25 male and 26 female participants. In the younger age-group, nine of the children were male and two were female (11 total). In the older age-group, 16 were male and 24 were female (40 total). The distribution of participants by age and sex is presented in Table 1.

Anxiety Scoring

Average total CD: H scores between the two raters for each participant was calculated. Using the CD: H thresholds outlined in the manual,²³ each participant's average total CD: H score was assigned a level of anxiety—(1) very low, (2) low, (3) average, (4) above average, and (5) very high. The mean average anxiety score was 2.3 (SD = 0.8) with a maximum score of 4 and a minimum of 1. Of the participants, none received a score indicative of very high levels of anxiety and 3 (6%) received a level 4 (above average anxiety levels). The most common level of anxiety was level 2 (low anxiety), which was present in 24 participants (47%), followed by

level 3 (average anxiety) for 16 participants (31%). Lastly, level 1 (very low levels of anxiety) was seen in eight participants, accounting for 16% of the sample. Table 2 displays these results. For anxiety level 1, seven out of eight (88%) children were in the older age category. Similarly, 79% of children that displayed low levels of anxiety were in the older age category. The highest level of anxiety demonstrated by participants was level 4, or above average levels, which was solely present in three of the oldest children at eight years of age.

Weighted κ was used to evaluate the consistency of CD: H anxiety scores for each drawing and produced a κ -value of 0.98 ($p < 0.001$), which suggests near-perfect agreement between the two raters.³⁵ For the individual categories, Fleiss' κ was used and found perfect agreement between the two raters for average and above average levels of anxiety ($\kappa = 1, p < 0.001$), for low levels of anxiety ($\kappa = 0.98, p < 0.001$), and for the very low levels of anxiety ($\kappa = 0.94, p < 0.001$).

Verbal Interviews

Codes most mentioned by the participants included the child's self-image (35 times), whether the dentist is smiling or not (34 times), the dental chair (30 times), and the participant's awareness of their surroundings (29 times). The code with the most negative rating percentage was the explorer, which was frequently described as "pokey" or "pointy." Conversely, the suction had mostly positive mentions. The needle was marked as positive when the children stated they did not mind it or that it "did not hurt as much as (they) thought." However, the overall perspective into the needle was coded as "either." Finally, the dental chair and the awareness of light and surroundings appeared as the most neutral elements in the interviews.

The reliability of the identified codes between the two raters was evaluated. The weighted κ on the overall participant experience was calculated at 0.54 ($p < 0.001$), indicating moderate agreement between the raters.³⁵ For individual designations, Fleiss' κ was calculated where the raters had the highest reliability value for positive designation, (1) with a κ -value of 0.78 ($p < 0.001$), showing substantial agreement. For neutral designations, (2) the κ -value also indicated a substantial level of agreement between the raters at 0.65 ($p < 0.001$). Finally, the lowest level of agreement occurred in negative designations (3) with a κ -value of 0.56 ($p < 0.001$), representing a moderate level of agreement.

Student Performance

There were four predictor variables corresponding to the participants used for the Phi correlations and logistic regressions. Two of the variables were demographic—the sex (female; 0 = male, 1 = female) and age-group of the child participant (older; 0 = age-group 1, 1 = age-group 2). The other two variables stemmed from the interview and drawing—the child's overall experience, (positive; 0 = negative/neutral, 1 = positive), and anxiety level, (anxiety; 0 = low or very

Table 1: Distribution of participants by age and sex

Age	Sex		Total
	Male	Female	
5	4	1	5
6	5	1	6
7	8	7	15
8	8	17	25
Total	25	26	51

Table 2: Distribution of the average anxiety

Anxiety level	Frequency	Percent
1	8	15.7
2	24	47.1
3	16	31.4
4	3	5.9
Total	51	100.00



low anxiety, 1 = average or above average anxiety). Corresponding student assessment data were available for 42 of the 51 participants analyzed. No outliers were identified using Mahalanobis distance.

Correlational analysis was completed using a Phi coefficient (ϕ) for dichotomous variables. The student evaluation criteria items of EIP and TPE demonstrated a moderate positive correlation with the child variable anxiety. This indicated that the students who treated child participants with scores of average or high levels of anxiety on the CD: H were more likely to be scored higher in the EIP ($\phi = 0.36, p = 0.02$) and tolerance to procedural error ($\phi = 0.32, p = 0.04$) rubric items. Binary logistic regression was performed using each outcome variable and the set of independent variables described. Final models were achieved for skills, EIP, and TPE. The summary of these models can be found in Table 3.

The model that offered the best fit for the outcome variable skills contained the predictor variables of anxiety, positive, and older. The participant's anxiety had a significant partial effect on the model ($W = 4.57, p = 0.03$). The effect of the child participant's anxiety was greater than that of their experience on students' technical skills scores. Participants having anxiety lead to 6.1 times greater odds of a higher student score in technical skills while having a positive experience lead to 5.5 times greater odds. Univariate analysis indicated that there was no statistically significant difference between treating a child who had anxiety or not ($\chi^2_{21} = 3.23, p = 0.07$) on the student's technical skills component scores of the criteria.

The predictive model for EIP contained all the predictor variables, except for the child participants' sex, the variable female. Only the child's anxiety had a significant partial effect on the score the students received in EIP ($W = 6.34, p = 0.01$). When holding all other variables constant, the odds ratio showed that treating a child who presented with anxiety increased the likelihood that the student would receive a higher score in the EIP rubric item by 10.3 times. Univariate analysis indicated that treating child participants who presented with anxiety made the student significantly more likely to receive a higher score than those who treated child participants with low anxiety ($\chi^2_{21} = 5.36, p = 0.02$).

The predictive model for TPE contained the predictor variables anxiety and positive. Whether the participant presented with anxiety had a significant effect on whether the student treating them received a higher score in TPE. Students who treated participants with higher anxiety received a higher score in TPE ($W = 5.58, p = 0.02$). The received score was 8.2 times higher

compared to those students who treated participants with lower anxiety. Univariate analysis showed that treating participants who had anxiety made the student significantly more likely to receive a higher score in the TPE rubric item than those who treated child participants with low anxiety ($\chi^2_{21} = 4.20, p = 0.04$).

There was no statistical significance between treating child participants who had a positive experience or not in any of the three models ($\chi^2_{21} = 0.97, p = 0.32; \chi^2_{21} = 0.97, p = 0.37; \chi^2_{21} = 1.60, p = 0.21$).

DISCUSSION

Dental anxiety and perspectives on dental experiences are considered to be major factors that affect dental treatment for pediatric patients.³⁶ Children's ability to express their feelings and expectations is limited due to their cognitive development; thus, projection of their emotions requires a method other than verbal means. Drawing is assumed to be one of these useful alternative methods, as it can provide a vast amount of information about children's feelings and thoughts.³⁷

The present study used child participants' drawings to identify their experiences of anxiety and perspectives during dental treatment and sought to find the relationship between these criteria and the clinical evaluation of dental students made by their instructors. These findings can offer precious insight into patients' perspectives of the dental experience and student performance, including the quality of student interaction.²

Anxiety and Perspective Scoring

Yon et al.³⁸ categorized assessment methods for identifying children's fear and anxiety during dental treatment. They reported that self-assessment techniques (e.g., drawing analysis) hold advantages such as enabling children to elaborate their perspectives of dental fear and anxiety, and also generate the possibility of measuring cognitive components of dental fear directly based on the child's perspective over other methods.³⁸

In our study, the mean total score of CD: H showed the pediatric patients referred to the dental clinic had a low level of anxiety. Similarly, Onur et al.²⁷ evaluated children's drawing to measure dental anxiety in pediatric dentistry. They compared CD: H scores with two objective methods of analyzing distress during treatment (Frankl and sound-eye-motor) and concluded that based on the CD: H scores, the mean anxiety value for girls and boys were 79.24 and 84.41, respectively,²⁷ which underlie the low-level category

Table 3: Summary of regression models

Outcome variable	Name	B	Standard error	Wald	Significance	Exp (B)	95% confidence of interval for EXP (B)	
							Lower	Upper
Skills	Anxiety	1.81	0.85	4.57	0.03	6.13	1.16	32.35
	Positive	1.71	0.87	3.83	0.05	5.52	1.00	30.59
	Older	-1.73	0.89	3.74	0.05	0.18	0.03	1.02
	Constant	-0.60	0.82	0.55	0.46	0.55		
EIP	Anxiety	2.33	0.93	6.34	0.01	10.30	1.68	63.31
	Positive	1.86	0.96	3.78	0.05	6.41	0.97	41.71
	Older	-1.47	0.90	2.63	0.11	0.23	0.04	1.36
	Constant	-1.34	0.91	2.19	0.14	0.26		
TPE	Anxiety	2.10	0.89	5.58	0.02	8.15	1.43	46.50
	Positive	1.66	0.87	3.64	0.06	5.28	0.96	29.18
	Constant	-2.11	0.77	7.42	0.01	0.12		

of dental anxiety. Moreover, they found that there is a significant correlation between CD: H and Frankl scores, indicating the validity of self-reporting methods such as CD: H in identifying children's anxiety.²⁷

Yadav et al.³⁹ conducted a cross-sectional study of a total of 100 children between the ages of 4 and 6 years. The children were asked to draw on their experience of dental surgery. The drawings were recorded using CD: H (projection scale) and the results were compared with pulse oximeter readings (physiological parameter) and a Venham image test score. They found that CD: H scoring had a positive correlation with pulse oximeter reading and a negative correlation with the Venham image test, which represents that drawing analysis using CD: H scoring can be a statistically important tool for assessing child anxiety in the dental setting.³⁹

We found that the lowest level of anxiety according to the age of the participants was related to children in the older age-group (7–8 years old). Alshoraim et al.⁴⁰ showed the effects of child characteristics on their dental fear in a cross-sectional study. A total of 1522 children participated and their fear was analyzed using the children's fear survey schedule-dental subscale. They also examined children's behavior during dental examinations using the Frankl behavior rating scale. They reported that dental fear decreases with age during dental examinations.⁴⁰ Some literature indicates that the decrease in dental fear over time can be explained by the increase in general competence and maturation of cognitive and impulse controls that occur as children grow up.^{41–43} However, the relationship between dental fear and age should not be considered stable as it can be affected by oral health status and exposure to various social and cultural events.^{44–46}

The current study explored the children's perspective and the related codes which were assigned a mostly positive rating including the child participants' representations of themselves, the prizes, emotions, and familiarity with the dentist (e.g., mentions of joking between them or even knowing their name). Similarly, Weinstein⁴⁷ advocated that making the child the center of attention has important consequences that improve patient experience and avoid the development of negative perceptions of the child.

In our study, codes that were mostly negative included the child participant having an open mouth in the drawing, the other dental personnel (i.e., the instructor and the dental assistant), down emotions, and the notion of having to wait or spend time waiting. The code with the most negative rating percentage was the explorer, which was frequently described as "pokey" or "pointy." Comparably, in their study on the environmental factors affecting anxiety, Shindova and Belcheva⁴⁸ concluded that painful treatments and the use of sharp objects (such as needles) are the most important causes of anxiety in children receiving dental services. However, since the term needle was coded as "either" in our study, it is important to note that context could have a positive or a negative influence on the child's experience. For example, the needle was marked as positive when the children stated they did not mind it or that it did not hurt as much as the child participant thought. The code with the most positive rating percentage was the suction, which may be explained by the behavior guidance technique of allowing children to hold the suction to help the child patient feel like they have control in the situation.⁴⁹

Aminabadi et al.²⁸ stated that positive perceptions of the dentist in children's drawings were demonstrated by happy facial expressions and friend-like depictions, as well as representations of trust and safety. In our study, a few children alluded to a prank or

a joke between them and the dental student, which are examples of friend-like relationships. These findings reveal that rapport is important in establishing a positive perspective of the dental setting and the dental professional within a child and that children pay attention to the detailed appearance of the dentist, especially if the dentist was successful in developing a certain level of familiarity with the patient.

An important finding from the direct questionnaire used in this study was that the majority of participants had a positive perception of the dental treatment situation. This finding corroborates those of Oppenheim and Frankl.⁵⁰ In contrast, Klein⁵¹ reported a much higher negative experience percentage in his sample of children aged 3–6 years. However, these results could be due to the younger age ranges used in their study.

Student Performance Evaluation

The child participant's anxiety had the largest effect on the student's grades and showed a statistically significant positive correlation with TPE, EIP, and skills. This finding can be explained by the fact that treating a child with higher levels of anxiety was more likely to lead to higher grades for the students in these three criteria items. Whether the child had a positive experience or not and the age-group the child belonged to did not have an effect on these items. Lastly, the child's sex was not related to student grades in any of the criteria items. These results could suggest that students are utilizing higher levels of skills and evidence in their practice when faced with the difficulties that accompany increased anxiety in patients. Instructors could also provide higher scores to students who treated more anxious and/or younger children and were able to maintain a certain level of technical skills and support their decisions with evidence.

According to Jones et al.,⁵² the feedback that patients and their families provide regarding their experiences can be a powerful trigger in promoting student reflection. This feedback tends to focus on the interpersonal and communication skills of the student, allowing for insight into how the students' own behaviors affected patients as well as into how to modify these behaviors in the future.⁵³ A major thrust of the patient-centered principle in health professions education is to emphasize communication and interpersonal skills, as developing these skills enables future health professionals to provide quality care and promote better health outcomes for patients.⁵⁴

Schmid et al.⁵⁵ involved patients' feedback and scoring of student optometrists' interpersonal skills. They reported that patients were satisfied with the interpersonal skills of students who received high patient scores related to warmth of greeting, respect shown, and time given. Students' grades related to reassurance and confidence were the lowest. They concluded that patients' feedback on the student's interpersonal skills can further improve students' skill and makes patients feel valued within the teaching clinic environment.

In a study by Gharib et al.⁵⁶ at Newcastle University, School of Dentistry, patient feedback cards were incorporated into an undergraduate course evaluation. They asked patients to answer two questions about their experience and to identify the "just one thing" (JOT) that the student can do to improve it. Around >90% of JOT, cards gave students an "excellent" grade, and the rest gave the student a "good" grade or did not respond. The authors concluded that such open-source comments are valuable tools for students' improvement in self-confidence and identifying required skills. However, they stated that due to many positive responses, this

model may not be effective in distinguishing students with different levels of interpersonal and/or communication skills.

Certain observations from the current study bring forth important considerations that can help improve patient experience in clinical teaching and practice. These observations are closely related to the way behavior guidance techniques (BGT) are applied by dentists and dental students. The American Academy of Pediatric Dentistry⁸ defines BGT through its goals—"... to establish communication, alleviate fear and anxiety, deliver quality dental care, build a trusting relationship between dentist and child, and promote the child's positive attitude toward oral/dental health, and oral healthcare." Examples of these techniques include "verbal and nonverbal communication, tell-show-do, modeling, distraction, positive reinforcement, flexibility, foreshadowing, visualization, relaxation, and the presence of parents."⁵⁷

Although our study identified relations between the child indicators and the current clinical grading criteria for upper-year undergraduate dental students at the University of Alberta, in general, there is room for improvement in the criteria's consideration of the patient's experience. The study's analysis showed that some child participant variables were related to the grades students received in the criteria items that evaluated their technical skills, use of EIP, and TPE. A key limitation of the study was an overrepresentation of positive experiences. Frauches et al.³⁰ also found that children tended to have a positive view of both the dentist and dental treatment. They noted, however, that children who had positive views of the dentist did not necessarily have a positive view of dental treatment. Another limitation is that some participant interviews/drawings were conducted individually, while some were completed in group settings. Future studies may need to sustain a longer collection period to gather a larger set of negative experiences. Moreover, future studies should explore pediatric drawings in contrast to the instructors' verbal feedback to corroborate and provide a holistic picture of a student's clinical grading practices. It is also suggested that future studies incorporate new methods of drawing analysis such as artificial intelligence and utilization of computerized systems to reduce the risk of human errors.

CONCLUSION

Our study proposes a novel framework for how pediatric patient drawings can be analyzed and integrated with student assessment for pediatric dentistry patients. Incorporating patients' opinions can offer invaluable and meaningful insight into their perspective of the dental experience, student performance, and an assessment method of students' communication skills.²⁻⁴

Clinical Significance

This study will enable students to meet the needs of patients which consequently increases treatment motivation and adherence to dental services as well as reduces the likelihood of patient anxiety, and improves patient self-care skills over time.^{1,5}

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