Artículos Originales de Investigación
https://doi.org/10.47990/nf72ba86

Assessing Dental Students' Emotions While Treating Uncooperative Children: A Pilot Study

Ida Kornerup[1], *Sharon Compton*[1], *Qi Guo*[1], *Mark Gierl*[1], *Hollis Lai*[1], *Karla Carpio Horta*[1], *Raisa Catunda*[1], *Mehdi Salehizeinabadi*[1].

Abstract: **Introduction:** Dental students often face emotional challenges when managing uncooperative pediatric patients, which may lead to reduced interest in treating children post-graduation, limiting access to pediatric dental care. **Objective:** This study aimed to examine dental students' emotional experiences while treating uncooperative children and their perceptions of the training provided on behavioral management techniques. **Materials and Methods:** This cross-sectional survey-based pilot study was conducted at an urban, university-affiliated dental clinic during the 2017-2018 academic year. The target population consisted of 41 third-year dental students in their first year of clinical rotations, from which 29 students completed the survey. Informed consent was obtained, emphasizing voluntary participation or withdrawal. Students were invited to complete an 18-question Likert-scale survey. Access was restricted to their unique university emails, ensuring participation integrity. To avoid academic pressure, a research assistant administered the survey. The survey included questions adapted from established tools such as the State-Trait Anxiety Inventory (STAI) and validated by two pediatric dentistry experts. Responses were analyzed using descriptive statistics and path analysis to explore relationships between stress, training adequacy, and behavioral management perceptions. **Results:** A majority (75.9%) of students reported stress while treating uncooperative children, with 58.6% experiencing anxiety and 69.0% frustration. Additionally, 13.8% expressed concerns about harming the child. While 51.7% were satisfied with their treatment outcomes, 65.5% indicated needing further behavioral management training. **Conclusion:** This study highlighted significant stress and anxiety among students managing uncooperative pediatric patients. Enhanced training in behavioral management and increased clinical exposure are essential to prepare students for practice confidently.

Keywords: patient care, student, oral health, children, anxiety.

Avaliação das emoções dos estudantes de Odontologia ao tratar crianças não cooperativas: Um estudo piloto

Resumo: **Introdução.** Estudantes de odontologia enfrentam desafios emocionais ao atender pacientes pediátricos não cooperativos, o que pode reduzir seu interesse futuro na odontopediatria e impactar o acesso das crianças ao atendimento odontológico. **Objetivo.** Este estudo piloto analisou as emoções dos estudantes de odontologia ao lidar com crianças não cooperativas e suas percepções sobre o treinamento recebido em técnicas de manejo comportamental. **Materiais e Métodos.** Este estudo piloto transversal, baseado em questionário, foi realizado em uma clínica odontológica universitária urbana durante o ano acadêmico de 2017-2018. Participaram 41 estudantes do terceiro ano em suas primeiras rotações clínicas; 29 completaram a pesquisa. O consentimento informado foi obtido, garantindo voluntariedade e confidencialidade. A pesquisa, com 18 perguntas em escala Likert (algumas adaptadas do Inventário de Ansiedade Traço-Estado – IDATE), foi validada por especialistas em odontopediatria. O formulário foi distribuído via Google Forms, com acesso restrito aos e-mails institucionais. A aplicação foi conduzida por um assistente de pesquisa, a fim de evitar pressões acadêmicas. Utilizaram-se estatísticas descritivas e análise de caminho para avaliar estresse, percepção sobre o treinamento e manejo comportamental. **Resultados.** Entre os respondentes, 75,9% relataram estresse, 58,6% ansiedade e 69,0% frustração. Além disso, 13,8% temiam causar danos ao paciente. Embora 51,7% estivessem satisfeitos com os resultados clínicos, 65,5% consideraram necessário mais treinamento. **Conclusão.** Foram observados altos níveis de estresse e ansiedade, ressaltando a importância de fortalecer o preparo emocional e técnico dos estudantes para o atendimento infantil.

Palavras-chave: dcuidado ao paciente, estudante, saúde bucal, crianças, ansiedade.

[1]*University of Alberta, Edmonton, Alberta, Canada.*

Evaluación de las emociones de los estudiantes de Odontología al tratar niños poco cooperativos: Un estudio piloto

Resumen: **Introducción:** Los estudiantes de odontología enfrentan desafíos emocionales al manejar pacientes pediátricos poco cooperativos, lo que puede llevar a un menor interés en tratar niños después de la graduación, limitando el acceso a la atención odontopediátrica. **Objetivo:** Este estudio tuvo como objetivo examinar las experiencias emocionales de los estudiantes de odontología al tratar niños poco cooperativos y sus percepciones sobre la formación proporcionada en técnicas de la guía del comportamiento. **Materiales y Métodos:** Este estudio piloto, basado en encuestas, se llevó a cabo en una clínica odontológica universitaria ubicada en un entorno urbano durante el año académico 2017-2018. Forma parte de un proyecto aprobado por el Comité de Ética en Investigación de la Universidad de Alberta. Participaron 41 estudiantes de tercer año en sus primeras rotaciones clínicas; 29 completaron la encuesta. Se obtuvo consentimiento informado, garantizando la confidencialidad y la participación voluntaria. La encuesta, distribuida por Google Forms con acceso restringido a correos institucionales, incluyó 18 preguntas en escala Likert, algunas adaptadas del Inventario de Ansiedad Estado-Rasgo (STAI), y fue validada por expertos en odontopediatría. Se utilizaron estadísticas descriptivas y análisis de trayectoria. **Resultados:** El 75,9 % de los estudiantes reportó estrés, 58,6 % ansiedad y 69,0 % frustración. Un 13,8 % manifestó temor de causar daño. El 65,5 % consideró insuficiente la formación en manejo conductual. **Conclusión:** Se identificaron niveles elevados de estrés y ansiedad, lo que resalta la necesidad de fortalecer el entrenamiento en manejo del comportamiento infantil.

Palabras clave: Atención al paciente, estudiante, salud bucal, niño, ansiedad.

Introduction

For many dental students, pediatric dentistry is often thought of as a difficult, strenuous specialty and is considered a particularly challenging component of their educational program[1-3]. The fear of possibly "causing pain to a child while performing treatment"[3,4], is often felt by students, resulting in general dentists choosing to avoid treating pediatric patients. Furthermore, the stress of harming a child may lead to a loss of motivation and engagement during the pediatric dentistry course, mostly due to the students' disconcerting thought of causing "pain" while treating children[4,5].

Stress has been identified as one of the barriers affecting a student's ability to be a lifelong learner[5-7]. Through stress, students generally experience a loss of motivation, resulting in their decision to avoid the practice that is creating feelings of stress[8-10]. This stress is found to be higher for dental students while treating preschool children[11]. Moreover, a lack of motivation may impede students' learning of appropriate behavior management techniques, resulting in the delivery of outdated and lower-quality care to pediatric patients[6-9]. In health professional programs, numerous stressors have been identified related to students and their experience when treating uncooperative patients and their sense of causing pain as factors impacting student academic performance, physical health, and psychological well-being[1,12-17]. For instance, Ellani *et al*[12]. observed psychological stress and its impact on the well-being of individual students while accounting for the multiple academic traumatic experiences that contribute to student stress. One of these major stressors was the responsibility a student has when treating children, particularly while performing complex treatments on anxious patients[2,12,13]. These concerns are frequently rooted in the student's sense of culpability. When students reflect on treating a difficult, anxious, or fearful pediatric patient, the tendency is to assume that they are the

cause of that harm[3]. These feelings also affect their confidence and motivation, which disengages them from the course[6,15]. Also, children's lack of cooperation is one of the factors that reduce students' self-confidence[18,19] and results in further struggle being presented by dental students. For instance, when conducting a clinical procedure in a pediatric dental clinic, the aforementioned fear or lack of confidence leads to compromised psychomotor skills, critical thinking, and behavior management techniques[4,20]. Combined, this spiral translates into a loss in willingness by the students to treat pediatric patients in their future dental private practice[12].

High levels of stress, in combination with the lack of confidence, place both the student and the patient at an increased risk of errors, particularly as "the student has the responsibility of performing irreversible treatments on patients"[1,13,14,16,19,21]. Batista *et al.*[5] suggest an approach that can improve student self-confidence and explore coping mechanisms students may use to perform adequately and effectively when dealing with uncooperative pediatric patients. The coping mechanisms are based on student education and their ability to adjust to difficult behaviors and apply the appropriate behavior management techniques[12,20,22]. Dental treatment for pediatric patients is considered the most needed yet neglected area of all the services provided by general dentists, partly due to their fear of treating children[23]. Therefore, reducing the level of this fear and anxiety among dentists by increasing clinical skills and self-confidence and establishing an appropriate relationship with children can lead to replacing the usual treatments with sedation and general anesthesia increasing access to care to this population[24-27]. It becomes necessary to pursue this area of research in dental education and ensure dental students are adequately prepared for managing children in general dental private practice. Thus, the objective of this study was to explore dental students' emotional responses, such as stress and anxiety, while treating uncooperative pediatric patients and assess their perceptions of behavioral management training. It sought to identify factors influencing these emotions, including clinical exposure and confidence levels, and to provide insights into how curriculum improvements can better prepare students for managing challenging pediatric cases.

Material and Methods

This cross-sectional survey-based pilot study was conducted at an urban, university-affiliated dental clinic during the 2017-2018 academic year. The target population consisted of 41 undergraduate third-year dental students at the University of Alberta, who were in their first year of clinical rotations, were recruited to participate. To ensure ethical compliance and voluntary participation, informed consent forms highlighting the option to participate or withdraw at any time were distributed to all eligible third-year dental students via Google Forms. Participation was facilitated through a structured eighteen-question Likert scale survey, which was also disseminated through Google Forms. Access to this survey was restricted to the target group using their unique university email addresses to ensure the integrity of the data collection process.

Out of the 41 students, 29 completed the survey, achieving a participation rate of 70.7%. A research assistant handled the recruitment and survey administration to eliminate any potential academic pressure from the principal investigator and maintain an unbiased and comfortable environment for the participants. The study was approved by the institution's ethics review board under approval number Pro00073662.

Among the students who did not participate, some were absent during the survey briefing session and therefore did not have the opportunity to respond. Specifically, four students were away at external clinical rotations where internet access was limited, and two had excused absences for other reasons. Additionally, six students opted not to participate as they had not yet encountered the experience of treating uncooperative pediatric patients, which was a critical focus of the study. This non-participation helped to ensure that the survey results accurately reflected the experiences and perceptions of students who had directly engaged with the study's subject matter.

An eighteen-item survey was developed and adapted from previously published sources to identify student experiences when treating uncooperative pediatric patients using pediatric behavioral management techniques[5]. The first survey was based on both variants of the State-Trait Anxiety Inventory (STAI) to measure student anxiety[28]. The STAI statements were slightly modified for this study to specifically capture the dental students' overall emotions: "I feel nervous" was modified to "I feel anxious," and "I feel restless" was modified to "I feel stressed."

In addition, some survey questions were derived and adapted from two other research studies to capture students' satisfaction with the treatment provided and their perception of behavioral management techniques taught in the curriculum[1,5]. Three questions were also included in the survey based on the professional experience of the first author, who had received similar concerns from students while instructing in the pediatric clinic. For example, "I feel that I am harming the child" and "I feel heartbroken while treating an anxious child." After the survey was drafted, it was reviewed by two pediatric dentists who verified the content-related validity of the questions. No major modifications to the survey were needed. The survey questions used a five-point Likert scale (1-Strongly Disagree to 5-Strongly Agree) to assess student emotions during the treatment of difficult pediatric patients and student perceptions of the curriculum taught for behavioral management techniques with uncooperative and anxious children. The variables used in the survey are shown in Table 1.

Statistical Analysis

To answer the first research question, "What are students' emotional experiences with treating uncooperative patients?' descriptive statistical analyses of the survey items were conducted. The data were grouped into positive responses (agree and strongly agree), neutral responses (neural) and negative responses (disagree and strongly disagree). The decision to switch from a five-point scale to a three-point scale was made since the main purpose of this study is to differentiate three kinds of students: the ones who agreed,

Table 1: *Dental Students' Experiences with Uncooperative Patients Survey*

Survey items	Agree	Neutral	Disagree	Mean (sd)
1. Did you feel stressed in the clinic treating your uncooperative patient?	75.9%	13.8%	10.3%	3.9(1.1)
2. Did you feel confident in the clinic treating your uncooperative patient	34.5%	44.8%	20.7%	3.1(0.9)
3. Did you feel hesitant in the clinic treating your uncooperative patient?	41.4%	20.7%	37.9%	3.1(1.0)
4. Did you feel frustrated in the clinic treating your uncooperative patient?	69.0%	13.8%	17.2%	3.7(1.2)
5. Did you feel insensitive in the clinic treating your uncooperative patient?	17.2%	17.2%	65.5%	2.5(1.0)
6. Did you feel fearful in the clinic treating your uncooperative patient?	13.8%	34.5%	51.7%	2.6(1.0)
7. Did you feel anxious in the clinic treating your uncooperative patient?	58.6%	17.2%	24.1%	3.4(1.1)
8. Did you feel heartbroken in the clinic treating your uncooperative patient?	10.3%	24.1%	65.5%	2.3(1.0)
9. Did you feel afflicted in the clinic treating your uncooperative patient?	6.9%	44.8%	48.3%	2.5(0.7)
10. Did you feel unhappy in the clinic treating your uncooperative patient?	34.5%	27.6%	37.9%	3.0(1.1)
11. Did you feel pessimistic in the clinic treating your uncooperative patient?	35.7%	28.6%	35.7%	3.0(1.0)
12. Did you feel desperate in the clinic treating your uncooperative patient?	14.3%	28.6%	57.1%	2.5(1.0)
13. Did you feel that you were harming the child during treatment?	13.8%	13.8%	72.4%	2.2(0.9)
14. Do you enjoy helping anxious patients?	51.7%	24.1%	24.1%	3.3(1.0)
15. Do the behavioral management techniques work for you?	55.2%	37.9%	6.9%	3.5(0.7)
16. Do you feel you require further training in behavior management?	65.5%	20.7%	13.8%	3.8(1.0)
17. Do you have enough time to spend with anxious patients?	27.6%	24.1%	48.3%	3.2(0.9)
18. Which is your level of satisfaction with the quality of care that you give to an uncooperative child?	51.7%	41.4%	6.9%	3.5(0.7)

the ones who maintained neutrality, and the ones who disagreed. For each item, the percentage of students who agreed, disagreed and maintained neutrality were reported.

To answer the second research question, "What are the factors that impact students' emotional experiences while using behavioral management techniques when treating anxious pediatric patients?", a correlation analysis and a path analysis were conducted. The purpose of the correlation analysis was to provide an initial screening of the relationships among the survey items. Pearson correlations among the items were conducted using IBM SPSS version 2429. The purpose of the path analysis was to identify a causal model of students' stress, satisfaction,

and perceptions of behavior treatment. Path analysis was conducted with Mplus 7, correcting for missing data and violation of multivariate normality by using full information Maximum Likelihood with Robust standard error[30,31]. To evaluate the overall fit of the path model to the data, we used all the fit indices provided by Mplus 7, including Chi-square *p*-value >0.05, Root Mean Square Error of Approximation (RMSEA) <0.0832, Standardized Root Mean Square Residual (SRMR) <0.0833, and Comparative Fit Index (CFI) >0.9034.

Results

Descriptive Statistics

For each survey item, the mean, standard deviation, and percentage of students who selected agree, neutral and disagree were reported in Table 1. For the analysis, the categories of strongly agree/agree and strongly disagree/disagree were combined, thus resulting in three ratings (agree, neutral, and disagree). The results showed that 75.6% of students agreed they felt stressed when treating an anxious child patient. The survey also revealed that 68.9% of students felt frustrated; however, 65.5% of students disagreed that they felt insensitive. A total of 13.8% of students felt they may be harming the child during the treatment, and 55.2% of students strongly agreed that behavioral management techniques they used were effective for management. Lastly, 65.5% of students agreed that they require further training in behavioral management techniques, and 51.7% of students felt very satisfied with the dental treatment provided.

Correlational Analysis

The survey items' Pearson correlations are reported in Table 2. Feelings of harming the child during the treatment were strongly and positively correlated with feelings of affliction (r=0.407*). Anxious feelings were strongly and positively correlated

Table 2: *Survey Items Correlations.*

	i1	i2	i3	i4	i5	i6	i7	i8	i9	i10	i11	i12	i13	i14	i15	i16	i17	i18
i1	1	-.577**	.627**	.581**	.418*	.650**	.579**	0.143	0.269	.568**	.422*	0.328	0.203	-0.270	-0.139	.497**	-0.001	-.573**
i2	-.577**	1	-.541**	-0.271	-.402*	-.562**	-.452*	-0.095	-0.225	-.597**	-0.173	-0.357	-0.166	0.259	0.352	-0.332	0.136	.439*
i3	.627**	-.541**	1	.511**	0.154	.726**	.629**	-0.070	0.021	0.329	.378*	0.345	0.052	-0.102	-0.234	0.276	-0.028	-0.313
i4	.581**	-0.271	.511**	1	.438*	0.299	.428*	0.025	0.110	.386*	0.371	0.318	-0.200	-0.114	-0.282	0.118	-0.061	-.470*
i5	.418*	-.402*	0.154	.438*	1	.382*	0.192	0.301	0.154	.532**	0.051	0.359	-0.190	0.028	-0.191	0.305	-0.292	-.415*
i6	.650**	-.562**	.726**	0.299	.382*	1	.712**	0.016	0.281	.559**	.447*	0.361	0.205	-0.077	-0.176	0.308	-0.094	-0.312
i7	.579**	-.452*	.629**	.428*	0.192	.712**	1	0.080	0.174	0.326	0.322	0.274	0.055	-0.264	0.088	0.271	0.264	-0.285
i8	0.143	-0.095	-0.070	0.025	0.301	0.016	0.080	1	.368*	0.147	-0.157	0.182	0.045	-0.180	0.019	0.305	-0.047	-0.033
i9	0.269	-0.225	0.021	0.110	0.154	0.281	0.174	.368*	1	0.291	0.166	-0.048	.407*	0.085	-0.053	0.325	-0.033	0.081
i10	.568**	-.597**	0.329	.386*	.532**	.559**	0.326	0.147	0.291	1	.397*	.509**	0.077	-0.178	-0.358	0.192	-.424*	-.378*
i11	.422*	-0.173	.378*	0.371	0.051	.447*	0.322	-0.157	0.166	.397*	1	.449*	0.141	-0.326	-0.337	-0.027	-0.164	-0.122
i12	0.328	-0.357	0.345	0.318	0.359	0.361	0.274	0.182	-0.048	.509**	.449*	1	0.202	-0.148	-0.159	-0.138	-0.210	-0.197
i13	0.203	-0.166	0.052	-0.200	-0.190	0.205	0.055	0.045	.407*	0.077	0.141	0.202	1	0.143	-0.116	-0.060	-0.019	0.252
i14	-0.270	0.259	-0.102	-0.114	0.028	-0.077	-0.264	-0.180	0.085	-0.178	-0.326	-0.148	0.143	1	0.190	-0.124	-0.016	0.224
i15	-0.139	0.352	-0.234	-0.282	-0.191	-0.176	0.088	0.019	-0.053	-0.358	-0.337	-0.159	-0.116	0.190	1	-0.178	.420*	0.087
i16	.497**	-0.332	0.276	0.118	0.305	0.308	0.271	0.305	0.325	0.192	-0.027	-0.138	-0.060	-0.124	-0.178	1	-0.131	-0.362
i17	-0.001	0.136	-0.028	-0.061	-0.292	-0.094	0.264	-0.047	-0.033	-.424*	-0.164	-0.210	-0.019	-0.016	.420*	-0.131	1	.391*
i18	-.573**	.439*	-0.313	-.470*	-.415*	-0.312	-0.285	-0.033	0.081	-.378*	-0.122	-0.197	0.252	0.224	0.087	-0.362	.391*	1

** Correlation is significant at the 0.01 level. * Correlation is significant at the .05 level.

with feelings of stress (r=0.579**), feelings of hesitancy (r=0.629**), frustration (r=0.428*), and fearfulness (r=0.712**). The level of satisfaction with delivered dental care was strongly and negatively correlated to feelings of stress during treatment (r=-0.573**). Finally, stress was also strongly and positively correlated to students feeling that they require further training in behavioral management techniques (r=0.497**).

Path Analysis

Based on the results of the correlation analysis, a path analysis was conducted to identify the factors that influenced students' stress, satisfaction, and perception of behavioral management. Since stress tended to be highly correlated with other survey items that measured students' affective responses to uncooperative patients, those items about emotions were eliminated from the analysis. The final path analysis model is presented in Figure 1. The model offered a good fit to the data: Chi-Square = 15.409, df = 15, p=0.4224, RMSEA=0.031, CFI = 0.988, and SRMR=0.084. All the indices passed their corresponding criteria except SRMR, which may be related to the small sample size of this study. All the path coefficients in the model were statistically significant at the 0.05 level. The model revealed three factors that influenced student outcomes. First, whether students have enough time to work with uncooperative patients can positively influence students' perception of the effectiveness of behavioral

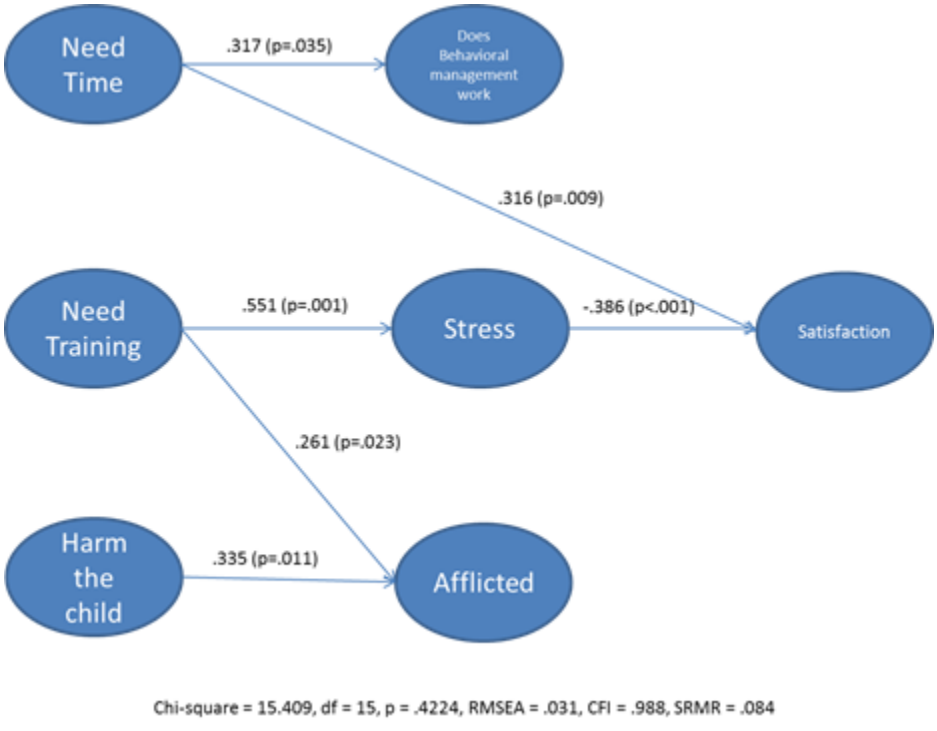

Figure 1: *Path analysis of factors influencing students' stress, satisfaction, and attitudes toward behavioral management. In the Figure, need time = i17 in Table 1; need training = i16; harm the child = i13; behavioral management work = i15; stress = i1; afflicted = i9; satisfaction = i18.*

management (b=0.317) and students' satisfaction with the treatment provided (b=0.316). Second, if students felt they did not have enough training, they tended to experience more stress (b=0.551), which resulted in their decreased satisfaction with the treatment they provided (b=-0.386). Additionally, lack of training may also lead to feeling afflicted (b=0.261). Feeling afflicted was a different type of emotion than stress, as these two variables were not significantly correlated (r=0.269 (p>0.05)). Third, if students felt they were harming the child during the treatment, they were more likely to feel afflicted when treating uncooperative pediatric patients (b=0.355). Overall, the model explained a 24.7% variance in students' stress, a 30.0% variance of students' afflicted feelings, a 17.6% variance in students' perception of the effectiveness of behavioural management, and a 48.0% variance in students' satisfaction.

Discussion

Behavioral management techniques are an educational competency essential for dental students as specified in the educational framework developed by the Association of Canadian Faculties of Dentistry[35,36]. Behavioral management techniques can alleviate the challenging situations students encounter with the delivery of treatment for pediatric patients. To extend the insights provided by the survey results, a second phase of the study is in the planning stage. The purpose of this future research will be to further investigate what events cause stress amongst students and to expand our understanding of the student experience with behavioral management techniques. A combination of qualitative and quantitative methods will be used to gather this data. To consider introducing new innovative teaching practices in the pediatric dentistry curriculum, it is necessary to fully understand which behavioral techniques students find favorable and which techniques are more challenging or perhaps uncomfortable for them to practice. Moreover, the correlation between stress and further training in behavioral management techniques (r=0.497) may offer some insight into addressing and revising how these techniques are taught and suggests that increasing the time allocated to teaching and practicing these techniques may reduce the stress experienced by students. Further research on student experiences and the stressors affecting dental students when treating an anxious patient, particularly children, is warranted. The consequence of this experience in the student could be translated into decreased self-confidence when treating pediatric patients and poor-quality treatments due to increased fear of causing pain resulting in avoiding treating children in their dental practice[2].

To treat children, dentists are required to develop their skills in behavior guidance and apply them to successfully treat the oral needs of children[37]. Treating children in dentistry requires multiple skills and abilities as students frequently encounter situations in which there are behavioral problems, high expectations held by patient caregivers, and different parental styles[1], which translate into complex and stressful learning situations for dental students. These multifaceted conditions have been identified as barriers that decrease the quality of treatment patients receive and impact student learning experiences when

treating children[2,15]. In this study, students' feelings were assessed during the treatment of non-cooperative and complex pediatric patients. Moreover, the student's understanding of training programs for behavioral management techniques with non-cooperative and anxious children was assessed. The results showed that most students felt stressed and anxious (75.9% and 58.6%, respectively) while treating difficult children, and some students felt that they might harm the child during treatment (13.8%). In addition, most students expressed frustration and anxiety about the treatment of these children, and many of the students (65.5%) stated that they needed more training to control children's behavior.

These results are like those in a study by Batista where an increase in the levels of stress dental students feel when treating anxious pediatric patients was found. The students' feedback highlighted a need for more time dedicated to the curriculum to train them in behavioral management techniques and different mechanisms to cope[5].

In a study conducted by Gerreth *et al*., a two-part questionnaire concerning anxiety as a state and as a trait was used to measure the anxiety of dental students for the treatment of children. Like our findings, they concluded that the level of anxiety among dental students was relatively high while delivering dental treatment for children and suggested that further training before starting the practical clinical courses can reduce their anxiety and improve future professional careers[10]. Also, Blumer *et al*. showed that the level of anxiety among dental students peaks just before the first time of providing treatment to pediatric patients. Teaching the necessary techniques to manage this anxiety can help control and reduce their fear[38]. Using correlation and path analysis, three important factors were identified that influenced student outcomes: whether students had enough time with uncooperative patients, whether students needed further training in behavioral management, and whether they felt they were harming the child. Although correlation does not necessarily suggest causation, the findings of the path analysis were consistent with our expectations. The model-data fit and the significant path coefficients suggested that these factors may indeed be important for influencing students' stress, satisfaction, and perception of behavioral management. Future confirmatory studies are needed to validate these hypotheses.

Batista suggests that treating pediatric patients presents challenges for dental professionals, as this patient population is more likely to be uncooperative and therefore tends to instill a sense of fear in students. This mostly stems from the belief that they are harming their patients[3,5]. Our study results reflect this further, showing that an overwhelming number of students (75.9%) felt stressed when providing dental care to pediatric patients. In the study, students reported feelings of anxiety (58.6%), pessimism (34.5%), fear (13.8%), and frustration (68.9%). For some students (13.8 %), these feelings were extended with the belief that the patient's behavior may be evidence of harm caused during treatment. Given these outcomes, student reluctance to treat pediatric patients in the future may occur.

Consistently, Gerreth *et al.*, reported that in the students' opinion, making a direct relationship with a patient resulted in additional difficulties compared to the preceding simulation classes as both the theoretical knowledge as well as expression of emotions needed to be verified practically. These requirements are of higher demand during clinical classes in pediatric dentistry in which prophylactic and therapeutic actions are undertaken on developing patients[10].

Le Blanc and Jafarzade attributed students' lack of confidence when treating anxious patients to compromised psychomotor or hand skills, critical thinking, and behavior management techniques[6,18]. Furthermore, studies conducted by Rada *et al.* and Davidovich *et al*. found that dentists who are not comfortable treating anxious pediatric patients tend to refer them to a specialist[15,22]. Unfortunately, this may lead to reduced access to care for this population, as they are often referred to pediatric dental specialists with less availability and higher costs[6,18]. To interrupt this cycle, the dental education curriculum should begin to address the negative feelings of students and so, facilitate a better learning experience for students. These feelings also affect their confidence and motivation, which disengages them from the course and results in further struggle being presented by dental students [5,39].

Ronneberg *et al* and Davidovich *et al*., describe several factors that increase student levels of stress while delivering treatment thus decreasing the quality of the dental procedures, they perform[12,15]. Stressors included patient anxiety and behavioral management problems. Many studies also indicate the need for extra time in the curriculum for increased in-class training and clinical exposure to behavior management techniques[5,6,8,15,40]. Developing new strategies in the curriculum will aid students in controlling their own experience and sense of causing harm, while also mastering appropriate behavior management techniques to control the patient anxiety[41]. This, ultimately, makes students able to perform procedures adequately and to remain motivated and engaged in their pediatric dentistry practice[6,8].

Despite its comprehensive analysis, this study has some limitations. First, a convenient sample of University of Alberta dental students was used, and although the findings of this study may apply to other dental schools, the small sample size reduces the generalizability of the current results. Second, the data provided was collected from a survey of self-reported responses; as such, there may be a possibility of students having misinterpreted the survey questions.

Furthermore, the study did not gather data regarding participants' sex, and it is recognized that there could be differences between male and female emotions when treating uncooperative children[42]. However, a study conducted by Alazmah *et al*. in Saudi Arabia showed that the level of stress among dental students did not differ between males and females while treating children [11]. Moreover, we modified the existing STAI instrument to better align with our specific study design. However, due to the limited sample size, we were unable to perform a comprehensive

verification of the modified instrument. This presents a limitation of our study, as the reliability and validity of the adapted instrument were not fully confirmed. Future studies with larger sample sizes can address this limitation by thoroughly confirming the modified instrument.

Conclusion

This study demonstrated that students treating uncooperative pediatric patients experienced emotions of stress, frustration, and anxiety about the possibility of harming the child. A path analysis identified factors that influenced students' experiences while treating anxious patients. In particular, the amount of time students have to work with anxious patients can positively influence their perception of behavioral management techniques and their satisfaction of the treatment provided. Furthermore, the amount of training students receive inversely affects the amount of stress and/or satisfaction they feel regarding their treatment. Need for enhanced education in behavior management and increased clinical exposure with pediatric patients are required to better prepare students for graduation and the subsequent entry-to-practice. With increased clinical training, new graduates may be more confident in managing dental treatment for uncooperative young patients.

Conflicts of Interest

The authors declare no conflict of interest.

Funding: None.

References

1. Hill KB, Hainsworth JM, Burke FJ ,*et al*. Evaluation of dentists' perceived needs regarding treatment of the anxious patient. Br Dent J. 2008; 204(8):E13; discussion 442-3.
2. Rønneberg A, Strøm K, Skaare AB, *et al*. Dentists' self-perceived stress and difficulties when performing restorative treatment in children. Eur Arch Paediatr Dent. 2015; 16(4):341-7
3. Rasmussen JK, Frederiksen JA, Hallonsten AL, *et al*. Danish dentists' knowledge, attitudes and management of procedural dental pain in children: association with demographic characteristics, structural factors, perceived stress during the administration of local analgesia and their tolerance towards pain. Int J Paediatr Dent. 2005; 15(3):159-68.
4. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. Am Psychol. 2000; 55(1):68-78.
5. Batista CG, Nascimento CL, Rolim GS ,*et al* Student self-confidence in coping with uncooperative behaviors in pediatric dentistry. Eur J Dent Educ. 2011;15(4):199-204..
6. LeBlanc V. The effects of acute stress on performance: Implications for health professions education. Acad Med 2009; 84(10):S25-S33
7. Pascoe M, Hetrick S, Parker A The impact of stress on students in secondary school and higher education. International Journal of Adolescence and Youth 2020; 25(1): 104-112.
8. Zepke N, Leach L. Improving student engagement: Ten proposals for action. Active Learning in Higher Education. 2010; 11(3):167-177.
9. Orsini C, Binnie V, Wilson S, *et al*. Learning climate and feedback as predictors of dental students' self-determined motivation: The mediating role of basic psychological needs satisfaction. Eur J Dent Educ. 2018; 22(2):e228-e236.

10. Gerreth K, Chlapowska J, Lewicka-Panczak K, *et al*. Self-Evaluation of Anxiety in Dental Students. Biomed Res Int. 2019; 2019: 6436750.
11. Alazmah A, Almotiry K, Alolaywi A, *et al*.Level of Stress among Final Year Dental Students while Performing Paediatric Dentistry Procedures in Riyadh CityA Cross-sectional Study,Journal of Clinical and Diagnostic Research 2020;14(11): ZC24-ZC28.
12. Elani HW, Allison PJ, Kumar RA, *et al*. A systematic review of stress in dental students. J Dent Educ. 2014; 78(2):226-42.
13. Alzahem AM, van der Molen HT, Alaujan AH, *et al*. Stress amongst dental students: a systematic review. Eur J Dent Educ. 2011; 15(1):8-18.
14. Hakeberg M, Klingberg G, Noren JG,Berggren U. Swedish dentists' perceptions of their patients. Acta Odontol Scand. 1992; 50(4):245-52.
15. Davidovich E. Pessov Y. Baniel A,Ram D. Level of stress among general practitioners, students and specialists in pediatric dentistry during dental treatment. J Clin Pediatr Dent. 2015; 39(5):419-422.
16. Moore R, Brødsgaard I. Dentists' perceived stress and its relation to perceptions about anxious patients. Community Dent Oral Epidemiol. 2001; 29(1):73-80.
17. Melaku L, Bulcha G. Evaluation and Comparison of Medical Students Stressors and Coping Strategies among Undergraduate Preclinical and Clinical Year Students Enrolled in Medical School of Arsi University, Southeast Ethiopia. Education Research International. 2021, 1-12. 10.1155/2021/9202156
18. Jafarzade M, Tahririan D, Bonyadian AH, *et al*. A Comparative Study of Shahid Beheshti and Isfahan Universities Dental Students' Self Confidence in Managing Uncooperative Pediatric Dental Patients (A Cross-sectional Study). Asian Journal of Dental Sciences 2018; 1(1): 1-8.
19. Moore R, Molsing S, Meyer N, Schepler M. Early Clinical Experience and Mentoring of Young Dental Students-A Qualitative Study. Dent J (Basel). 2021 Aug 6;9(8):91. doi: 10.3390/dj9080091.
20. Farag A, Hashem D. Impact of the Haptic Virtual Reality Simulator on Dental Students' Psychomotor Skills in Preclinical Operative Dentistry. Clin Pract. 2021 Dec 28;12(1):17-26.
21. Jowkar Z, Masoumi M, Mahmoodian H.Psychological Stress and Stressors Among Clinical Dental Students at ShirazSchool of Dentistry, Iran. Adv Med Educ Pract 2020; 11: 113-120
22. Rada RE, Johnson-Leong C. Stress, burnout, anxiety and depression among dentists. J Am Dent Assoc. 2004; 135(6):788-94.
23. Bimstein E, Azari AF, Riley JL 3rd.Predoctoral and postdoctoral students' perspectives about pediatric dental behavior guidance. J Dent Educ 2011; 75:616-25
24. Adair SM, Rockman RA, Schafer TE, *et al*. Survey of behavior management teaching in pediatric dentistry advanced education programs. Pediatr Dent 2004; 26:151-8.
25. Lolo PS, Arevalo O, Saman DM. Enhancing the pediatric dentistry skills and knowledge of general dentists. Gen Dent 2021; 69(1):26-29.
26. Rani TS, Reddy E R, Merum K, *et al*. General dentists' knowledge, attitude, and practice guidelines toward pediatric dentistry. CHRISMED J Health Res 2020; 7:24-9
27. Amin M, ElSalhy M. Factors affecting dental attendance of children among newcomers/immigrants: a cross-sectional study. J Immig Min Health. 2017; 19(6):1351-1361
28. Spielberger C., Gorsuch, R., Lushene, R.STAI manual: For the State-Trait Anxiety Inventory ("self-evaluation questionnaire"). Palo Alto: Consulting Psychologists Press, 1970.
29. IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.
30. Muthén, B., Asparouhov, T. Using Mplus Monte Carlo simulations in practice: A note on non-normal missing data in latent variable models. Mplus Web Notes: No. 2. Version 2 2002 Retrieved From: https://www.statmodel.com/download/webnotes/mc2. pdf. Accessed July 4 2019
31. Geiser, C. Data analysis with Mplus. New York: The Guildford Press, 2010.
32. Browne, MW., Cudeck, R. Alternative ways of testing model fit. In K. A. Bollen & J. S. Long (eds.). Testing Structural Equation Models (pp. 445-455). Newbury Park, CA: Sage, 1993.
33. Hu, L., Bentler, P. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Struct Eq Model 1999; 10: 333-351.

34. Bentler PM. Comparative fit indexes in structural models. Psychol Bull1990; 107(2): 238-46.
35. Barros Padilha DX, Veiga NJ, Mello-Moura ACV, Nunes Correia P. Virtual reality and behaviour management in paediatric dentistry: a systematic review. BMC Oral Health. 2023 Dec 12;23(1):995.
36. ACDF. ACDF Educational framework for the development of competency in dental program. Assoc of Can Fac Dent 2016 ISBN 978-0-9952789-0-5
37. American Academy of Pediatric Dentistry. Behavior guidance for the pediatric dental patient. The Reference Manual of Pediatric Dentistry. Chicago, Ill.: American Academy of Pediatric Dentistry; 2023:359-77.
38. Blumer S, Peretz B, Yukler N, *et al*. Dental Anxiety, Fear and Anxiety of Performing Dental Treatments among Dental Students during Clinical Studies. J Clin Pediatr Dent 2020; 44(6):407-411.
39. Colley JM, Harris M, Hellyer P, Radford DR.Teaching stress management in undergraduate dental education: are we doing enough? Br Dent J 2018; 224(6):405-407.
40. Gyllensvard, K., Qvarnstrom, M., Wolf, E. The dentist's care-taking perspective of dental fear patients- a continuous challenge. J Oral Rehab 2016; 43: 598-607.
41. MacNeil RLM, Hilario H. Input From Practice: Reshaping Dental Education for Integrated Patient Care. Front Oral Health 2021; 2:659030.
42. Pau, A., Croucher, R. Emotional intelligence and perceived stress in dental undergraduates. J Dent Educ 2003;67(9):1023-1028

Recibido 30/05/2024
Aceptado 19/04/2025
Correspondencia: Mehdi Salehizeinabadi, correo: zeinabad@ualberta.ca