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FACTORS ASSOCIATED WITH DENTAL ANXIETY DURING PAEDIATRIC DENTAL CARE IN ACEH, INDONESIA

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Abstract

Dental anxiety is one of the most common psychological problems experienced by children during dental care and may reduce cooperation, compromise the quality of treatment, and discourage future utilisation of oral health services. This study examined the relationship between children's characteristics and their level of dental anxiety at the Dental and Oral Polyclinic of UPTD RSUD Tgk. Chik Ditiro Sigli, Pidie District, Aceh, Indonesia. A quantitative observational study with a cross-sectional design was conducted from 25 May to 8 June 2026 among 77 children aged 8–17 years recruited through total sampling. Child characteristics (sex, age, previous dental treatment experience, and parental educational level) were obtained through structured interviews and hospital information records, while anxiety was assessed by direct observation using the Facial Image Scale before, during, and after treatment. Data were analysed univariately and bivariately using the chi-square test with α = 0.05. Most respondents were boys (50.65%), aged 11–13 years (48.0%), had previous dental treatment experience (64.9%), and had parents holding a bachelor's degree (58.4%). Anxiety peaked during treatment, when 58.4% of the children were categorised as highly anxious and none were free of anxiety. Sex was not significantly associated with anxiety (p = 0.498), whereas age (p = 0.011), previous dental treatment experience (p = 0.003), and parental educational level (p = 0.042) were significantly associated with children's anxiety. Younger children, first-time attendees, and children whose parents had lower educational attainment showed the highest anxiety. Age-appropriate communication, a child-friendly clinical environment, and active parental involvement are therefore recommended to reduce dental anxiety among paediatric patients.

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INTRODUCTION

Oral health constitutes an essential component of overall health and well-being across the life course. Oral health extends beyond the absence of dental and oral diseases and encompasses the ability to eat, speak, smile, and engage in social interactions without pain, functional limitation, discomfort, or psychological distress(Delgado-Pérez et al., 2024; Foláyan et al., 2025). Among children, dental caries and periodontal diseases remain highly prevalent conditions and represent substantial public health concerns globally. Poor oral health may adversely affect children's quality of life by interfering with eating, speech, physical growth, school participation, and social interaction, while also generating psychological consequences, including discomfort, fear, and anxiety(Fisher et al., 2023; Flavin et al., 2025). Accordingly, the World Health Organization (WHO) advocates a greater emphasis on health promotion and disease prevention, particularly among paediatric populations, and recommends

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child-centred dental services that provide psychologically supportive and child-friendly environments to minimise anxiety and foster positive experiences of dental care (World Health Organization, 2017).

Despite increasing recognition of the importance of preventive oral health care, substantial disparities remain in the utilisation of dental services. Maintaining oral hygiene is an integral component of personal health and contributes to functional capacity, well-being, and productivity(Anyikwa & Ogwo, 2025; Foláyan et al., 2025). In Indonesia, however, dental and oral health problems continue to represent a significant public health challenge, partly because dental care is frequently perceived as a low priority and awareness of the consequences of inadequate oral health remains limited(Delgado-Pérez et al., 2024; Flavin et al., 2025) Data from the 2018 National Basic Health Research (Riskesdas) indicated that 57.6% of the Indonesian population experienced dental and oral health problems, yet only 10.2% received treatment at dental health facilities.

In Aceh Province, 55.3% of the population reported dental and oral health problems, whereas only 13.9% sought professional treatment and 86.1% did not receive clinical management. In Banda Aceh, the reported prevalence of dental and oral health problems was 47.3%, while only 19.9% of affected individuals received professional dental care (Kementerian Kesehatan Republik Indonesia, 2019). These findings demonstrate a persistent gap between the burden of oral health problems and the utilisation of professional dental services, underscoring the need to address barriers that may discourage children and their families from accessing and completing dental treatment. Children represent a particularly vulnerable population in dental care because they are undergoing rapid physical, cognitive, emotional, and social development. Their capacity to understand unfamiliar procedures, regulate emotions, and adapt to novel environments remains relatively limited compared with that of adults. Consequently, unfamiliar health-care environments may readily evoke fear, apprehension, and anxiety(da Silva et al., 2023; Fisher et al., 2023). Dental clinics may be perceived as threatening settings because they expose children to unfamiliar surroundings, dental instruments, clinical procedures, and the anticipation of pain or discomfort. In addition, children's developing emotional regulation and self-control may contribute to behavioural responses such as crying, withdrawal, resistance, or refusal to cooperate, particularly when they have had limited or negative previous experiences of dental care(Cunha et al., 2025; Ryu et al., 2024)

Dental anxiety in children is a multidimensional psychological response shaped by the interaction of individual characteristics, previous dental experiences, parental influences, and contextual features of the treatment environment. Anxiety may arise before or during dental treatment and can manifest as fear, emotional distress, physiological arousal, avoidance, and uncooperative behaviour. Previous negative or painful dental experiences are among the important determinants of subsequent anxiety, as experiences perceived as threatening may establish negative expectations and reinforce fear during subsequent dental visits(Mendoza-Mendoza et al., 2015; Rajeev et al., 2020). Age and cognitive maturity may also influence children's responses to dental procedures; younger children generally have more limited cognitive capacity to understand the purpose and sequence of treatment and may therefore be more susceptible to fear and anxiety. Furthermore, parental attitudes and anxiety, the clinical environment, and the quality of communication between dental professionals and

children may shape children's perceptions of dental treatment and influence their behavioural and emotional responses(Alenezi & Aldokhayel, 2022; Schemel-Suarez et al., 2025; Winkler et al., 2023)

Although paediatric dental anxiety has been extensively investigated, its prevalence and associated factors vary across populations and health-care settings. Such variation may reflect differences in children's demographic characteristics, previous exposure to dental treatment, parental backgrounds, health-seeking behaviour, and sociocultural context. Consequently, locally specific evidence is necessary to identify the characteristics associated with dental anxiety within particular clinical populations. This issue is especially relevant at the Dental and Oral Polyclinic of UPTD RSUD Tgk. Chik Ditiro Sigli, a referral health facility in Pidie District that provides dental services to paediatric patients from diverse social and demographic backgrounds. Preliminary observations conducted in December 2025 among 66 children aged 0–17 years attending the polyclinic indicated that only 30% were willing to undergo dental treatment, whereas 70% demonstrated observable signs of anxiety when dental examination or treatment was initiated. These responses included restlessness, crying, reluctance to cooperate, and resistance to clinical procedures. This preliminary finding suggests that dental anxiety may constitute an important barrier to effective paediatric dental service delivery in this setting.

Despite the clinical relevance of this problem, evidence regarding factors associated with dental anxiety among children attending the Dental and Oral Polyclinic of UPTD RSUD Tgk. Chik Ditiro Sigli remains limited. In particular, the extent to which children's sex, age, previous dental treatment experience, and parental educational level are associated with anxiety during dental care has not been specifically established in this population. Identifying these characteristics is important because a better understanding of patient-level and family-level factors associated with dental anxiety can support the development of more responsive, child-friendly, and psychologically informed dental care strategies. Therefore, this study aimed to determine the association between children's characteristics—including sex, age, previous dental treatment experience, and parental educational level—and the level of dental anxiety among paediatric patients receiving care at the Dental and Oral Polyclinic of UPTD RSUD Tgk. Chik Ditiro Sigli, Pidie District, Aceh, Indonesia

RESEARCH METHODS

Study Design and Setting

This study employed a quantitative observational approach using a cross-sectional design to examine the association between selected child and parental characteristics and dental anxiety among paediatric patients. In a cross-sectional framework, the independent and dependent variables were assessed within the same study period, enabling the identification of associations between participant characteristics and the level of dental anxiety at the time of dental care. The study was conducted at the Dental and Oral Polyclinic of UPTD RSUD Tgk. Chik Ditiro Sigli, Pidie District, Aceh Province, Indonesia, from May to June 2026, with data collection undertaken from 25 May to 8 June 2026.

Participants and Sampling

The study population comprised all children receiving dental services at the Dental and Oral Polyclinic during the designated data-collection period. A total sampling

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technique was employed, whereby all eligible children presenting to the polyclinic during the study period were invited to participate. The final sample consisted of 77 children aged 8–17 years whose parents or legal guardians provided written informed consent. The independent variables comprised age, sex, previous dental treatment experience, and parental educational level, while the dependent variable was the child's level of dental anxiety.

Data Collection Instruments and Procedures

Data were collected using a structured questionnaire and an observational instrument. The structured questionnaire was used to obtain information regarding participants' demographic characteristics, including age and sex, as well as parental educational level and previous dental treatment experience. Previous dental treatment experience was determined based on whether the child had undergone dental treatment before the current visit. Dental anxiety was assessed using the Facial Image Scale (FIS), a visual assessment instrument consisting of five facial expressions representing progressively increasing levels of anxiety, ranging from a very happy or relaxed facial expression to a highly distressed facial expression. The child's facial response was assessed and documented by the researcher using a standardised observation sheet at three stages of dental care: before, during, and after the dental procedure. The FIS category corresponding to the child's observed facial expression was subsequently recorded for analysis. Primary data were obtained directly through structured interviews and systematic observation, whereas secondary data concerning participant identification and relevant clinical information were obtained from the polyclinic's hospital information system.

Two enumerators assisted with data collection. Prior to field implementation, the enumerators participated in a preparatory session designed to standardise their understanding of the study protocol, observational procedures, and criteria for recording participants' responses. This preparatory process was undertaken to minimise inter-observer variation and enhance the consistency of data collection. Before enrolment, the study objectives, procedures, potential implications, and confidentiality arrangements were explained to the parents or legal guardians. Participation was voluntary, and parents were informed that refusal to participate or withdrawal from the study would not affect the child's access to or quality of dental care. Written informed consent was obtained from the parents or legal guardians before data collection. Participant information was treated confidentially and was used solely for research purposes.

Data Management and Statistical Analysis

Data management consisted of several sequential stages, including editing, coding, data entry, tabulation, and computer-assisted statistical processing, following established procedures for health research data management (Masturoh & Anggita, 2018). Descriptive analysis was initially performed to summarise the distribution of each study variable. Categorical variables were presented as frequencies and percentages, calculated using the formula $P = (f/n) \times 100\%$, where P represents the percentage, f the observed frequency, and n the total number of observations. Bivariate analysis was subsequently conducted to examine the association between each independent variable—age, sex, previous dental treatment experience, and parental educational level—and the level of dental anxiety. The Pearson chi-square (χ^2) test was

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used for categorical variables when the assumptions of the test were satisfied. Statistical significance was determined at an alpha level of 0.05, with $p \leq 0.05$ interpreted as evidence of a statistically significant association and $p > 0.05$ interpreted as indicating insufficient evidence of a statistically significant association.

RESULTS AND DISCUSSION

A total of 77 children aged 8–17 years who attended the Dental and Oral Polyclinic of UPTD RSUD Tgk. Chik Ditiro Sigli between 25 May and 8 June 2026 were included in the analysis. The results are presented in three sections: the characteristics of the respondents, the distribution of anxiety across the phases of dental treatment, and the relationship between child characteristics and the level of anxiety.

Respondent Characteristics

Table 1 summarises the characteristics of the participating children. Boys and girls were represented in almost equal proportions, with boys slightly predominant (39/77, 50.65%). Children aged 11–13 years formed the largest age group (37/77, 48.0%), followed by those aged 14–17 years (30/77, 39.0%), while children aged 8–10 years were the smallest group (10/77, 13.0%). Most children had already undergone dental treatment before the study visit (50/77, 64.9%), whereas 27 children (35.1%) were attending for the first time. With respect to parental educational level, most children had parents holding a bachelor's degree (45/77, 58.4%), followed by a master's degree (22/77, 28.6%) and senior high school (10/77, 13.0%).

Table 1. Characteristics of the children attending the Dental and Oral Polyclinic (n = 77)

Characteristic	Frequency (f)	Percentage (%)
Sex		
Boys	39	50.65
Girls	38	49.35
Age (years)		
8–10	10	13.0
11–13	37	48.0
14–17	30	39.0
Previous dental treatment experience		
Never	27	35.1
Ever	50	64.9
Parental educational level		
Senior high school	10	13.0
Bachelor's degree (S1)	45	58.4
Master's degree (S2)	22	28.6
Total	77	100

Anxiety Levels Across the Phases of Dental Treatment

The distribution of anxiety before, during, and after treatment is presented in Table 2. Before treatment, most children were classified as anxious (32/77, 41.6%) or highly anxious (30/77, 39.0%), and only three children (3.9%) were free of anxiety. Anxiety reached its peak during treatment: the highly anxious category rose sharply to 45 children (58.4%) and no child was classified as not anxious. After treatment, anxiety began to subside, with moderately anxious becoming the most common category

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(20/77, 26.0%) and the number of children free of anxiety rising to ten (13.0%). Residual fear nevertheless remained substantial, since 29 children (37.7%) were still classified as highly anxious once the procedure had ended.

Table 2. Distribution of children's anxiety levels across the phases of dental treatment (n = 77)

Anxiety level	Before treatment f (%)	During treatment f (%)	After treatment f (%)
Not anxious	3 (3.9)	0 (0.0)	10 (13.0)
Slightly anxious	2 (2.6)	2 (2.6)	5 (6.5)
Moderately anxious	10 (13.0)	5 (6.5)	20 (26.0)
Anxious	32 (41.6)	25 (32.5)	13 (16.9)
Highly anxious	30 (39.0)	45 (58.4)	29 (37.7)
Total	77 (100)	77 (100)	77 (100)

Bivariate Analyses

Bivariate analysis was performed with the chi-square test to determine whether the children's characteristics were associated with their level of anxiety, with the null hypothesis rejected at $p \leq 0.05$. For this analysis the five Facial Image Scale categories were collapsed into two groups, anxious and not anxious. Overall, 52 of the 77 children (67.5%) were classified as anxious. The results are presented in Table 3.

Table 3. Relationship between children's characteristics and level of dental anxiety (chi-square test)

Characteristic	Anxious f (%)	Not anxious f (%)	Total (N)	*p*
Sex				
Boys	25 (64.1)	14 (35.9)	39	0.498
Girls	27 (71.1)	11 (28.9)	38	
Age (years)				
8–10	9 (90.0)	1 (10.0)	10	0.011*
11–13	27 (73.0)	10 (27.0)	37	
14–17	16 (53.3)	14 (46.7)	30	
Previous dental treatment experience				
Never	24 (88.9)	3 (11.1)	27	0.003*
Ever	28 (56.0)	22 (44.0)	50	
Parental educational level				
Senior high school	9 (90.0)	1 (10.0)	10	0.042*
Bachelor's degree (S1)	31 (68.9)	14 (31.1)	45	
Master's degree (S2)	12 (54.5)	10 (45.5)	22	
Total	52 (67.5)	25 (32.5)	77	

** Statistically significant at α = 0.05 (chi-square test). Percentages are calculated within each characteristic category.*

The proportion of anxious children was slightly higher among girls (71.1%) than among boys (64.1%), but the difference was not statistically significant ($p = 0.498$), indicating that anxiety was distributed evenly across both sexes. Age, by contrast, was significantly associated with anxiety ($p = 0.011$): the proportion of anxious children fell progressively from 90.0% among those aged 8–10 years to 73.0% among those aged 11–13 years and 53.3% among those aged 14–17 years. Previous dental treatment experience showed the strongest association ($p = 0.003$); children attending for the first time were far more likely to be anxious (88.9%) than those who had been treated

before (56.0%). Parental educational level was likewise significantly associated with anxiety (p = 0.042), the proportion of anxious children declining from 90.0% among children of senior high school graduates to 68.9% among children of bachelor's degree holders and 54.5% among children of master's degree holders.

DISCUSSION

This study found that age, previous dental treatment experience, and parental educational level were significantly associated with the level of dental anxiety among children attending the Dental and Oral Polyclinic of UPTD RSUD Tgk. Chik Ditiro Sigli, whereas sex was not. Anxiety was highly prevalent overall, affecting 67.5% of the children, and fluctuated across the treatment episode, peaking during the procedure itself. The absence of a significant association between sex and anxiety (p = 0.498) indicates that boys and girls were equally likely to experience anxiety during dental care. Although sex differences in sex hormones and in the neural circuits governing emotional regulation may contribute to the anxiety response, that contribution is modulated by developmental stage, experience, and environment and does not necessarily produce a measurable difference in the clinical setting(Northridge et al., 2020; Shukla et al., 2025). The present finding is consistent with studies of dental anxiety in children and adolescents reporting no statistically significant difference between male and female patients, in which emotional responses such as restlessness and refusal were attributed to the invasive nature of the procedure rather than to the patient's sex(Heft et al., 2007; Šimunović et al., 2022). Fear of pain and the sight of dental instruments appear to act as universal triggers affecting children irrespective of sex, so anxiety in this setting is more plausibly explained by previous experience, the clinical environment, and the manner in which staff interact with the child.

Age was significantly associated with anxiety (p = 0.011), with the proportion of anxious children decreasing steadily as age increased. Younger children have a more limited understanding of dental procedures and are therefore more readily frightened by an unfamiliar environment, the sound of dental instruments, and the treatment itself; they also find it harder to regulate fear when a situation is perceived as threatening. Older children reason more effectively, understand explanations more fully, and have usually accumulated more experience of dental visits, which supports adaptation and reduces anxiety. This pattern accords with the developmental transition from concrete to formal operational thinking and with evidence that comprehension of medical procedures improves with cognitive maturity(Al Homoud et al., 2023; Bayón et al., 2025). It is also consistent with systematic review evidence that younger children display higher dental anxiety because cognitive and emotional capacities are not yet fully developed (Cianetti et al., 2020), and with local findings that primary school children experience considerably higher dental anxiety than adolescents when receiving invasive treatment in hospital(Peric & Tadin, 2024; Shim et al., 2015)

Previous dental treatment experience showed the strongest association with anxiety in this study (p = 0.003). Children who had never been treated before were markedly more likely to be anxious (88.9%) than those with previous experience (56.0%). Earlier experience is retained in memory and shapes the child's perception of dental care: unpleasant experiences involving pain, frightening instrument noise, or discomfort generate the expectation that the next visit will be similarly painful and thereby raise anxiety, whereas positive experiences accompanied by clear explanation

and friendly, comfortable service build confidence and reduce fear(Agarwalla et al., 2024; Peric & Tadin, 2024) The finding corresponds with meta-analytic evidence that the history of dental attendance is significantly related to dental fear and anxiety, and that children without prior treatment carry a higher risk than those whose earlier experience was positive. (Assunção et al., 2013; Mendoza-Mendoza et al., 2015)It follows that dentists and dental therapists should work deliberately to make the first visit a positive one, through clear communication, a friendly approach, and gentle technique.

Parental educational level was also significantly associated with children's anxiety (p = 0.042), the proportion of anxious children falling as parental education rose. Parents with higher educational attainment generally have better knowledge of oral health and of the value of routine dental examination, and are better placed to give their children accurate explanations of what treatment involves, so that the child arrives better prepared and calmer(Dahal et al., 2020; Lalić et al., 2015). Parents with lower educational attainment may have more limited access to or understanding of oral health information, with the result that the child receives inaccurate information or none at all and fears a procedure whose nature is unknown(Rahayu et al., 2026; Reca et al., 2026). Educational level further influences parenting style and the manner of accompanying the child during treatment: better informed parents tend to provide emotional support, calm the child, and avoid stories or threats involving the dentist that generate fear(El-Housseiny et al., 2014; Popescu et al., 2014). The present result is in line with evidence that parental educational level correlates positively with the child's psychological readiness for dental treatment(El-Housseiny et al., 2014; Peng et al., 2024)

The phase-specific findings add a further clinically useful observation. Anxiety fluctuated across the treatment episode and culminated during the procedure, when the highly anxious category rose to 58.4% and not one child was free of anxiety; it then eased once treatment had finished, with the moderately anxious category becoming dominant. This indicates that the period of active treatment is the point at which behavioural management techniques and reassurance are most needed. The residual anxiety observed after treatment in 37.7% of the children also suggests that the experience may continue to shape expectations of future visits, which reinforces the importance of concluding each appointment positively.

Several limitations should be considered when interpreting these findings. The cross-sectional design measured exposure and outcome simultaneously and therefore cannot establish causality. The study was conducted in a single hospital polyclinic over a two-week period with a relatively small sample obtained by total sampling, which limits generalisability. Anxiety was assessed by observer rating of facial expression, which is open to observer bias despite the standardisation meeting held with the enumerators, and potentially influential variables such as the type and invasiveness of the procedure performed, parental anxiety, family income, and the child's temperament were not measured or adjusted for. Future studies should employ larger multi-centre samples, longitudinal designs, and additional explanatory variables to clarify these relationships.

CONCLUSION

Dental anxiety remains an important consideration in the provision of paediatric dental care, particularly during the treatment procedure itself. Among children aged 8–17 years attending the Dental and Oral Polyclinic of UPTD RSUD Tgk. Chik Ditiro Sigli,

age, previous dental treatment experience, and parental educational level were significantly associated with dental anxiety, whereas sex was not. Anxiety was more pronounced among younger children and those without previous dental treatment experience, highlighting the importance of developmental maturity and prior exposure to dental care in shaping children's responses to clinical procedures. Higher parental educational attainment was also associated with lower levels of child dental anxiety, suggesting that parental capacity to provide appropriate information and psychological preparation may contribute to children's readiness for dental treatment. Notably, anxiety was not static throughout the treatment episode but increased substantially during the dental procedure, when 58.4% of children exhibited high anxiety and none were classified as anxiety-free. These findings underscore that paediatric dental anxiety should be addressed as an integral component of clinical care rather than regarded solely as a behavioural response. From a clinical perspective, dental services should incorporate developmentally appropriate communication, anticipatory guidance, positive behavioural support, and psychologically supportive care into routine paediatric dental practice. Particular attention should be directed towards younger children and first-time patients, who may benefit from additional explanation, gradual familiarisation, and supportive interaction before and during treatment. Parents should likewise be engaged as partners in anxiety management by providing them with evidence-based oral health information and guidance on how to prepare children positively for dental visits. At the institutional level, creating a welcoming, comfortable, and child-oriented clinical environment may further strengthen children's sense of safety and facilitate cooperation during treatment.

Statement on the Use of Artificial Intelligence

Artificial intelligence (AI) tools were used solely to assist in the preparation of this manuscript, particularly for language editing, grammar checking, and improving clarity, coherence, and readability. The authors retain full responsibility for the accuracy, originality, integrity, interpretation of the findings, and academic content of the manuscript. All AI-assisted text was critically reviewed, revised where necessary, and verified by the authors prior to submission.

Conflicts of Interest

The authors declare that they have no conflicts of interest related to this study, its authorship, or publication.

Author Contributions

Reca Reca: conceptualization, study design, data collection, data validation, formal analysis, and writing—original draft preparation. Mena Suciati: conceptualization, methodology, data validation, writing—review and editing, and supervision. Both authors contributed to the interpretation of the findings, critically reviewed the manuscript, and approved the final version for submission and publication.

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