



A Cross-Sectional Study on Incidence and Predictors of Self-Reported Dental Anxiety among Nigerian Public Primary Schoolchildren

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Abstract

Objective The presence of dental anxiety in Nigerian public primary schools may be one of the main obstacles preventing schoolchildren from effectively utilizing dental care services. The main objective of this cross-sectional study was to investigate the incidence and factors associated with self-reported dental anxiety among Nigerian public primary school children.

Materials and Methods A cross-sectional, observational design was employed to examine 434 primary schoolchildren (aged 6–9 years) from selected schools in Abia State, Southeastern Nigeria. Data collection was conducted using the Modified Dental Anxiety Scale, which includes 5-point Likert responses, five questions, and demonstrates good internal consistency.

Results The findings indicate that there was no statistically significant difference in the occurrence of dental anxiety between male and female schoolchildren ($p = 0.374$). In total, 1.9, 8.7, 10.1, 36.4, and 42.9% of the schoolchildren reported experiencing no dental anxiety, mild, moderate, extreme, and severe levels of dental anxiety, respectively. Furthermore, the results reveal that 2.1% of the variance in children's dental anxiety scores could be accounted for by factors such as gender, age, socioeconomic status, and parental education. However, the influence of gender ($B = 0.183$; $p = 0.060$; 95% confidence interval [CI]: -0.008 to 0.374), age ($B = -0.128$; $p = 0.187$; 95% CI: -0.318 to 0.062), socioeconomic status ($B = -0.067$; $p = 0.124$; 95% CI: -0.152 to 0.018), and parental education ($B = -0.045$; $p = 0.420$; 95% CI: -0.154 to 0.064) on schoolchildren's dental anxiety was not significant.

Male and female schoolchildren did not have significantly different dental anxiety levels. Gender, age, socioeconomic status, or parent education level did not significantly predict the dental anxiety among schoolchildren.

Conclusion School-based interventions need to be targeted to reduce dental anxiety among male and female primary schoolchildren in the study area. Clinicians should consider providing interventions to manage dental anxiety in children with moderate to severe levels of anxiety.

Keywords

- ▶ children
- ▶ dental anxiety
- ▶ dental appointment
- ▶ dental care
- ▶ Nigeria

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Introduction

The term “dental anxiety” refers to feelings of unease, fear, or stress prior to or during a dental appointment.¹ This anxiety can lead to individuals constantly postponing their dental appointments, which can then result in a cycle of oral health issues, dental pain, increased anxiety, and intricate and costly dental procedures.² Children who experience dental anxiety may find themselves caught in a cycle where they delay or avoid dental care, leading to poor oral health and worsening psychosocial consequences over time.³ The anxiety associated with dental treatment can impact a child’s physical, cognitive, emotional, and behavioral reactions. Additionally, avoiding dental care due to anxiety can worsen oral disease and increase the need for emergency dental care. When a child finally does see a dentist after delaying or avoiding care, they may require more complex treatment and miss out on opportunities to learn how to properly maintain their dental health at an early age.⁴

Managing dental anxiety is a crucial aspect of a child’s dental health care, as it has been identified as the biggest barrier to receiving dental care in children.⁵ Studies have shown that schoolchildren continue to experience dental anxiety, with prevalence rates ranging from 18.6 to 25.8%, making it a significant dental health concern.^{5,6} While dental anxiety in Nigeria has been studied primarily in hospitals among adults and community-dwelling children,^{7–9} there is a lack of research specifically examining dental anxiety in public primary school students, especially in Abia State of Nigeria. Existing dental research in Nigeria suggests that dental care services are underutilized.⁹ The presence of dental anxiety in Nigerian public primary schools may be one of the main obstacles preventing schoolchildren from effectively utilizing dental care services. Additionally, factors such as gender, age, socioeconomic status (SES), and parental education may contribute to the levels of dental anxiety among primary schoolchildren.

It is important to recognize and manage dental anxiety among Nigerian public primary schoolchildren in a timely manner to provide them with effective dental treatment. Therefore, the main objective of this cross-sectional study was to investigate the incidence and associated factors of self-reported dental anxiety among Nigerian public primary schoolchildren aged 6 to 9 years. By identifying the prevalence of dental anxiety in this specific population, the study aims to contribute to the understanding of this dental issue within the unique cultural and socioeconomic context of Nigeria. The findings from this research will provide valuable insights for developing targeted interventions and educational programs to alleviate dental anxiety among Nigerian primary schoolchildren.

Hypotheses

- There will be no significant difference in the incidence of dental anxiety between male and female primary schoolchildren.
- Gender, SES, parental education, and age will not significantly influence primary schoolchildren’s dental anxiety.

- Gender, age, SES, and parental education will not significantly contribute to the prediction of schoolchildren’s dental anxiety.

Materials and Methods

Study Design and Ethical Procedure

A cross-sectional, observational design was used to study primary schoolchildren (aged 6–9 years) from 10 selected public primary schools in Abia State, Southeastern Nigeria. The University of Nigeria’s Faculty of Education Research Ethics Committee provided ethical clearance for this study in line with relevant research ethical guidelines.

Sample and Sampling Process

An *a priori* power analysis with G*Power version 3.1.9.4 (Heinrich-Heine-Universität Düsseldorf, Germany)¹⁰ for chi-squared test and regression analysis showed that a minimum sample size of 291 and 434, respectively, was needed to achieve 90% power to detect medium effects ($w = 0.30$; $d = 0.25$) at a significance level of 0.05. Consequently, a sample of 434 public primary schoolchildren was deemed sufficient for the study.

Criteria for Exclusion and Inclusion

Primary schoolchildren falling into the following categories were excluded from the study: (1) those with other medical illnesses, such as malaria or typhoid; (2) those with severe dental complications or bleeding, severe toothache, or severe headaches; and (3) those with physical disabilities that affect their psychological disposition. Schoolchildren within the age range of 6 and 9 years and without the aforementioned conditions were included in this study after obtaining their informed consent. The researchers included schoolchildren whose parents signed a letter of consent for their child to participate.

Data Collection

The main outcome of this study was the assessment of primary schoolchildren’s dental anxiety using the English language version of the Modified Dental Anxiety Scale (MDAS)¹ adapted by the researchers. The MDAS consists of 5-point Likert responses (ranging from 1: not anxious to 5: extremely anxious), five questions (with a total score ranging from 5 to 25), and an internal consistency of Cronbach’s alpha value of 0.89. The MDAS requires respondents to indicate their emotional responses to the prospect of a dental appointment the day before, when they are in a dentist’s waiting room, and during procedures such as drilling, scaling, and local anesthetic injection. A demographic questionnaire was used to collect individual information from the schoolchildren. Two postgraduate researchers served as research assistants to collect the required data from the schoolchildren. Data collection took place from July 15 to August 30, 2023. The MDAS showed an internal consistency reliability of 0.879 Cronbach’s alpha in the current study.

Data Analysis

Descriptive statistics were used to analyze some aspects of the data from this study. Chi-squared statistics, pie charts,

Table 1 Participants' characteristics

Variables		n (%)
Age (y)	Mean ± SD	7.52 ± 1.18
Age group	6–7 y	210 (48.4)
	8–9 y	224 (51.6)
Gender	Male	234 (53.9)
	Female	200 (46.1)
Parental education	Primary	10 (2.3)
	Secondary	36 (8.3)
Socioeconomic status	Postsecondary certificate	126 (32.0)
	University degree	208 (47.9)
	Postgraduate degree	54 (12.4)
	NGN <50,000	36 (8.3)
	NGN 50,000–100,000	49 (11.3)
	NGN 100,001–150,000	119 (27.4)
	NGN 150,001–200,000	158 (36.4)
	NGN >200,000	72 (16.6)

Abbreviation: NGN, Nigerian Naira; SD, standard deviation.

and regression analyses were used to analyze the research data. The study hypotheses were tested at a probability level of 0.05 using the Statistical Package for Social Sciences, version 29 (IBM Corp, New York, United States). Microsoft Excel was used to prepare the pie chart.

Results

► **Table 1** indicates that the mean age of the children was 7.52 ± 1.18 years. Out of the 343 schoolchildren who participated in the study, 234 (53.9%) were male students, while 200 (46.1%) were female students. Additionally, the parents' educational background showed that the majority of parents (47.9%) had a bachelor's degree, while 126 (32.0%) had a post-secondary certificate. Others had a postgraduate degree (12.4%), secondary certificate (8.3%), or primary school certificate (2.3%). Finally, most participants came from a good socioeconomic background, with incomes ranging from NGN 150,001 to 200,000 (36.4%) to >200,000 (16.6%).

► **Table 2** and ► **Fig. 1** show that 1.2% of male schoolchildren and 0.7% of female schoolchildren reported having no dental

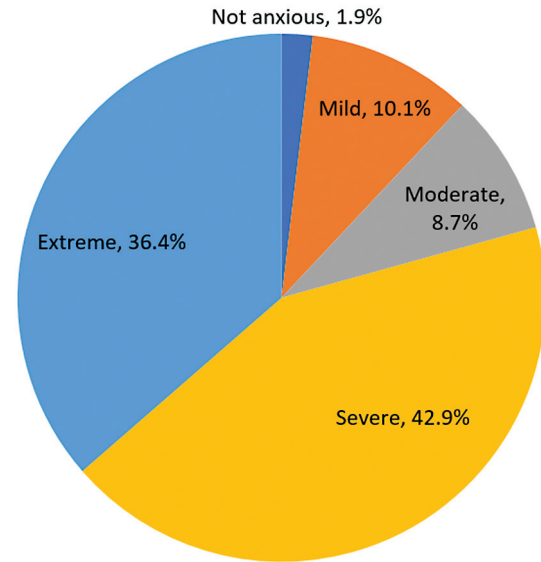


Fig. 1 Pie chart indicating the total incidence of self-reported dental anxiety among schoolchildren.

anxiety. On the other hand, 6.2% of male schoolchildren and 3.9% of female schoolchildren reported mild levels of dental anxiety. Approximately 5.5% of male schoolchildren and 3.2% of female schoolchildren reported moderate levels of dental anxiety. Furthermore, 23.3% of male schoolchildren and 19.6% of female schoolchildren reported severe levels of dental anxiety. Also, 17.7% of male schoolchildren and 18.7% of female schoolchildren reported extreme levels of dental anxiety. Overall, there was no statistically significant difference in the self-reported incidence of dental anxiety between male and female schoolchildren ($p = 0.374$).

► **Table 3** shows that gender is positively correlated with dental anxiety score in schoolchildren ($r = 0.093$; $p = 0.044$). Furthermore, age ($r = -0.076$; $p = 0.047$) and SES ($r = -0.087$; $p = 0.050$) are negatively associated with schoolchildren's dental anxiety score. Furthermore, there is a negative correlation between parental education and schoolchildren's dental anxiety scores ($r = -0.053$; $p = 0.390$).

► **Table 4** shows the stepwise regression analysis model that includes four sociodemographic variables, explaining 2.1% of the variance in children's dental anxiety score. Specifically, gender explains only 0.9% of the variance in children's dental anxiety score; gender combined with age

Table 2 Incidence of dental anxiety among schoolchildren by gender

Measure		Gender		Chi-squared statistic
		Male (%)	Female (%)	
MDAS	Not anxious	1.2	0.7	$\chi^2 = 4.244, p = 0.374$
	Mild	6.2	3.9	
	Moderate	5.5	3.2	
	Severe	23.3	19.6	
	Extreme	17.7	18.7	

Abbreviations: MDAS, Modified Dental Anxiety Scale.

Table 3 Correlations of children’s sociodemographic variables with dental anxiety

Variables	Dental anxiety	
	R	p
Gender	0.093	0.044
Age	-0.064	0.047
SES	-0.087	0.050
PE	-0.053	0.390

Abbreviations: PE, parental education; SES, socioeconomic status.

Table 4 Stepwise regression of children’s sociodemographic variables with dental anxiety

Model	Stepwise R	R ²	R ² change
Gender	0.093	0.009	0.009
Gender*Age	0.112	0.013	0.004
Gender*Age*SES	0.140	0.020	0.007
Gender*Age*SES*PE	0.145	0.021	0.001

Abbreviations: PE, parental education; SES, socioeconomic status.

explains 1.3% of the variance in children’s dental anxiety scores; and gender, age, and SES together explain 2.0% of the variance in children’s dental anxiety score. In other words, the dental anxiety score reported by schoolchildren is slightly influenced by a combination of gender, age, SES, and parental education factors.

► **Table 5** presents the contributions of sociodemographic variables to the prediction of dental anxiety in schoolchildren. The impact of gender ($B = 0.183$; $p = 0.060$; 95% confidence interval [CI]: -0.008 to 0.374), age ($B = -0.128$; $p = 0.187$; 95% CI: -0.318 to 0.062), SES ($B = -0.067$; $p = 0.124$; 95% CI: -0.152 to 0.018), and parental education ($B = -0.045$; $p = 0.420$; 95% CI: -0.154 to 0.064) on dental anxiety in schoolchildren was not statistically significant. Therefore, gender, age, SES, and parental education did not significantly contribute to the prediction of dental anxiety in schoolchildren.

Discussion

The primary purpose of this cross-sectional study was to investigate the incidence and associated factors of self-reported dental anxiety among Nigerian public primary

schoolchildren. The study found that the difference in the incidence of dental anxiety among male and female schoolchildren was not statistically significant. This implies that there is a similarity in self-reported dental anxiety between male and female schoolchildren in the study area. Overall, 1.9, 8.7, 10.1, 36.4, and 42.9% of the schoolchildren self-reported having no dental anxiety, having moderate, mild, extreme, and severe levels of dental anxiety, respectively. The incidence of dental anxiety in the current study is comparable to that found in previous studies, which ranged from 7.43 to 62.8%.^{7,11-19} One study discovered that 47.3% of respondents had low dental anxiety, while 52.7% had high dental anxiety.²⁰ In another study on dental anxiety, 36.2% of respondents reported being mildly anxious, 57.8% reported being moderately anxious, and 6.0% reported being highly anxious.²¹ The present findings also align with previous studies that reported that the incidence of dental anxiety is not gender related.^{22,23} Also, Folayan et al²² reported that gender alone could not substantially determine dental anxiety, but it may contribute when combined with other factors. However, these results contradict some research that suggested that female children experience dental treatment anxiety more frequently than male children; 54% were anxious and rejected radiographic examination and showed significant anxiety levels.¹³ Males demonstrated a lesser level of dental anxiety than female respondents in Akhigbe and Koleoso’s study.⁸

The present study further found that gender, age, SES, and parental education did not make significant contributions to the prediction of schoolchildren’s dental anxiety, thereby supporting our initial hypothesis. These sociodemographic factors only explained a slight proportion of the variance (2.1%) in dental anxiety reported by the schoolchildren. The findings also supported the hypothesis that the influence of gender, age, SES, and parental education on schoolchildren’s dental anxiety is not statistically significant. Although some studies indicated that gender predicts dental anxiety following their report that dental anxiety was higher in adult females than males,^{7,12,14-17,21} one study showed that no gender disparity exists in dental anxiety levels among children.²² In contrast to some research that found that participants’ age was a contributing factor to differences in dental anxiety scores,^{7,11,12,15} other studies found the opposite,^{8,24} which is consistent with our current findings regarding the relationship between age and dental anxiety in schoolchildren. Our findings aligned with other previous studies,^{25,26} indicating that anxiety had no relation to SES, but it contrasted with the

Table 5 Sociodemographic variables predicting children’s dental anxiety

Model	B	SE (B)	B	T	p	95% CI for B
Constant	4.335	0.307		14.111	0.000	3.731-4.939
Gender	0.183	0.097	0.090	1.885	0.060	-0.008 to 0.374
Age	-0.128	0.097	-0.063	-1.321	0.187	-0.318 to 0.062
SES	-0.067	0.043	-0.075	-1.542	0.124	-0.152 to 0.018
PE	-0.045	0.056	-0.039	-0.807	0.420	-0.154 to 0.064

Abbreviations: CI, confidence interval; PE, parental education; SES, socioeconomic status.

finding of a study that revealed that there was a positive correlation between SES and the behavior of children in dental clinics.²⁷ Tuuti²⁸ reported that children of parents with high levels of education showed better and more harmonious behavior during dental procedures. Stabholz and Peretz²⁹ also reported that those with high levels of education are better equipped to cope with nervousness related to dental treatment. The results of our study therefore have implications for children and their families, as well as financial implications for providing dental treatment to dentally anxious children. Children with high dental anxiety may likely avoid dental encounters, resulting in neglected dental care and increased unmet need. Pediatricians should pay attention to children during early diagnostic tests and clinical risk assessment, periodic dental checkups, and oral hygiene instruction to prevent painful dental experiences and reduce the need for extensive dental procedures during childhood. It can be inferred from our results that the care for children with dental anxiety can have an impact on dentists regardless of the children's SES, gender, age, and parental education.

Even though reliable empirical methods were used, this study has some limitations. Only public school students were included in the study, while private schoolchildren were excluded. Therefore, it is crucial to be cautious when extrapolating the findings of this study to other populations experiencing dental anxiety. Ideally, future research should include a multigroup study to evaluate the prevalence of dental anxiety and its associated characteristics in children from public and private schools. This will enable us to compare dental anxiety effects and incidence among children in both contexts. Additionally, the cross-sectional design used in this study presents a challenge for making causal inferences. To address these issues, future studies should adopt a time-lag approach to data collection by using experimental or longitudinal methods. Although the data collection scale was validated before testing the hypotheses, future studies may consider running the data through a confirmatory factor analysis before utilizing it. Moreover, the study acknowledges the possibility of an order effect,³⁰ since the participants responded to all items in the same order. As a result of this order effect, the intended validity of the measurement scale may have been compromised, as respondents may have paid more attention to earlier statements than later statements. A counterbalanced or random order should be used in future research when presenting the measurement scale for dental anxiety in schoolchildren. This study has significantly contributed to our understanding of the incidence and factors associated with dental anxiety among Nigerian public primary school students, despite the limitations stated.

Conclusion

The main focus of this study was to investigate the incidence and associated factors of dental anxiety among Nigerian public primary schoolchildren, providing empirical data that can be used in future comparative studies. It was shown that there is no statistically significant difference in the incidence of dental

anxiety between male and female schoolchildren. Gender, age, SES, and parental education did not make significant contributions to the prediction of schoolchildren's dental anxiety in the study area. Researchers are urged to implement school-based interventions aimed at minimizing dental anxiety in both male and female primary schoolchildren in the study area. When preparing and implementing intervention plans to manage children's dental anxiety, clinicians should consider children with moderate to severe levels of dental anxiety.

Author Contributions

C.E. and E.R.S. initiated the study, carried out the study, analyzed and interpreted the data, and wrote the manuscript. Both authors approved the submitted version of this manuscript.

Data Availability

The data related to this research can be obtained from the authors on reasonable request.

Ethical Responsibilities of Authors

The manuscript has not been submitted to more than one journal for consideration. The manuscript has not been published previously (partly or in full) unless the new work concerns an expansion of previous work; there is no transparency on the reuse of material to avoid the hint of text-recycling ("self-plagiarism").

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Conflict of Interest

None declared.

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