



The Relationship Between Oral Health Literacy and Dental Fear and Anxiety among Public High School Students in Georgetown, Guyana

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Abstract

Background: Regular dental visits are essential in detecting, treating, and preventing problems that may arise in the oral cavity. Dental fear, anxiety, and an individual's oral health literacy can influence how often he or she seeks dental care.

Objective: This study aimed to assess the relationship between oral health knowledge and the prevalence of dental fear and anxiety among 14-year-old public high school students in Georgetown, Guyana. It also aimed to identify factors that may promote Dental Fear and Anxiety (DFA) in this population.

Method: A cross-sectional survey was conducted among 319, 14-year-old students, utilizing the Modified Dental Anxiety Scale (MDAS) and Children Fear Survey Schedule - Dental subscale (CFSS-DS) questionnaires for data collection. The data collected was tabulated and the results were statistically analyzed in Microsoft Excel.

Results: The majority; 65.5% of the study population displayed good oral health knowledge with 60.5% demonstrating low levels of anxiety and 54.9% were without dental fear. The primary dental concerns outlined were "not being numb enough", "fear of being injured by the dentist", "not being listened to or taken seriously", "receiving an injection in the gums" and "extraction of a tooth".

Conclusion: The study revealed that the sampled population possessed good oral health knowledge with low to moderate dental fear and anxiety levels.

Keywords: Oral Health Literacy; Oral Health Knowledge; Dental Anxiety; Dental Fear; Dental Phobia

Abbreviations

CFSS-DS: Child Fear Survey Schedule - Dental Subscale; DFA: Dental Fear and Anxiety; MDAS: Modified Dental Anxiety Scale; MoE: Ministry of Education; MoH: Ministry of Health; OHL: Oral Health Literacy

Introduction

Even though regular dental visits are vital for identifying, treating, and preventing oral health problems [1], dental fear and anxiety, particularly in adolescents, can lead to the avoidance of dental care [2].

"Dental fear" refers to unpleasant emotions linked to dental treatment while "dental anxiety" involves unreasonable negative emotions experienced by dental patients [3], both of which are issues posing significant challenges in dental care [4]. Dental fear can lead to poor oral hygiene and avoidance of recommended dental visits [4]. This avoidance can then result in a decline in oral health-related quality of life [2].

There are three approaches to measuring dental anxiety; behavioral assessment, psychometric assessment (e.g., Modified Dental Anxiety Scale - MDAS), and physiological response analysis [3]. Psychometric assessments are widely used in children and adolescents to measure dental fear (CFSS-DS) [1] because of its simplicity, reliability, validity, and ability to be translated into multiple languages and used across different populations [5,6]. However, it does have the disadvantage that adequate levels of comprehension and intellect are qualities needed by the child in order to accurately respond to the questions [1].

Globally, studies show that the levels of Dental fear and anxiety (DFA) experienced by patients are influenced by cultural disparities and healthcare systems [7].

Regionally, in Trinidad, gender, and age correlated with dental anxiety, with females showing higher anxiety scores as compared to their male counterparts [2], while the relationship between age and dental fear varies and is not fully understood [8].

Oral Health Literacy (OHL) significantly impacts oral health practices, with inadequate OHL levels being linked to reduced adherence to positive oral health behaviors [9] and susceptibility to oral diseases [10]. Guyana's students display adequate knowledge but may still avoid dental appointments due to fear [11] which can stem from factors like pain, injections, lack of control, and feelings of invasion [12].

The information gathered from this study is significant since understanding DFA can stimulate the identification of factors that contribute to its onset and influence further research which can help to create prevention programs to reduce the occurrence of DFA. The results of this baseline study in adolescents aim to prompt the Ministry of Health (MoH) and policymakers to consider the etiology of DFA in Guyana when tailoring oral health care protocols for its citizens and to encourage more research in this field. It will also help oral health care providers to better reach the needs of their patients as per the patient's perception.

Materials and Methods

- **Study design:** This cross-sectional study was carried out using a self-administered questionnaire which comprised five (5) sections with twenty (20) questions to assess both oral health knowledge and dental anxiety along with two (2) dental scales to assess dental fear and dental concerns.
- **Measures:** Oral health knowledge was assessed utilizing questions from the study carried out in 2021 by Perreira, *et al.* [11], which followed a 5-point Likert scale each with an assigned value; Strongly agree (SA) = 5 and Strongly disagree (SD) = 1 to give a maximum of 30 points. From this, their knowledge was assessed using Bloom's cut-off point where knowledge was categorized as Good = >80%, Moderate = 79 - 60%, and Poor = <60% [13].

Dental anxiety was assessed using the MDAS composed of 5 questions with a 5-point likert scale where 'Not Anxious' = 1 and 'Extremely Anxious' = 5 to give a possible maximum of 25 points where; 5 - 14 = low anxiety, 15 - 18 = moderate anxiety, > 19 = high anxiety.

Dental fear assessment utilized the modified version of the CFSS-DS consisting of fifteen dental related scenarios with a 5-point likert scale ranging from 'Not Afraid' = 1 and 'Very Afraid' = 5 to give a total maximum score of 75 where; < 38 = no clinical dental fear and > 38 = having clinical dental fear.

Concerns were assessed utilizing a dental concerns scale consisting of twenty-two dental related scenarios with a four (4) point Likert scale of 1 being least concerning and 4 being most concerning. The points awarded to each concern were added and the con-

cerns were ranked from most to least concerning, the higher the total, the more concerning the scenario.

Ethics

Approval to conduct this study was requested from the Institutional Review Board of the MoH. Further approval was sought from the Ministry of Education (MoE), the headteacher of each school, and the parent(s) of each child, before any involvement of any student.

Study population

As this research not only dealt with oral health knowledge but was also carried out in the same population as the study conducted by Perreira, *et al.*, the prevalence determined from that study was used to determine the statistically accurate study population.

This information was inputted into the Epitool [14] sample size calculator at 95% confidence with a 5% margin of error and a prevalence of 40%, which gave a sample size of 212. To cater for non-response, the sample size was adjusted to 276 [15] and an additional 43 questionnaires were distributed, taking our sample size to 319 participants.

The twenty-nine public high schools in Georgetown, Guyana were grouped based on similarities of the cutoff marks from the National Grade Six Assessment to form clusters [16].

Cluster random sampling was then done to randomly select one school from the six (6) formed clusters.

Proportional probability sampling was then conducted to calculate the final number of students required for credible representation and the number of males and females sampled from each school.

Inclusion Criteria

- Participants must be 14 years old at their last birthday.
- Participants must attend a public high school in Georgetown, Guyana.

Exclusion Criteria

- Participants with unsigned parental consent forms.
- Unwilling participants with signed consent forms.

Results

A total of 319, 14 year old grade nine students were a part of this survey of which 51.4% were males and 48.6% were females. 49.9% of the students were of mixed ethnicity with 63.1% of the respondents residing in Georgetown. Demographic and descriptive statistics are presented in table 1.

Demographic Variables	n	%
Gender		
Males	164	51.4
Females	155	48.6
Ethnic Group		
African	103	32.3
Amerindian	15	4.7
Chinese	3	1
East Indian	33	10.3
European	6	1.9
Mixed	158	49.9
Residence		
East Bank Demerara	46	14.4
East Coast Demerara	57	17.9
Georgetown	201	63.1
West Bank Demerara	8	2.5
West Coast Demerara	5	1.6
School Attended		
St. Joseph's High	59	18.5
North Georgetown Secondary School	87	27.3
New Campbellville Secondary	80	25.1
South Ruimveldt Secondary	67	21
Freeburg Secondary	23	7.2
Ascension Secondary	3	1
Total	319	100

Table 1: Demographic and Descriptive Statistics.

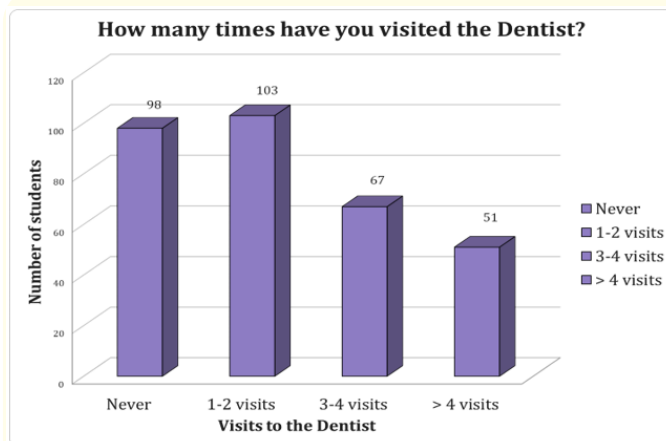


Figure 1: Frequency of Dental Visits.

30.7% of the respondents reported never visiting the dentist. Over 50% of the student participants had at least one dental visit of which 32.3% had at least 1-2 dental visits and 21% had 3-4 dental visits. Only 16% of the students indicated having more than 4 dental visits (Figure 1).

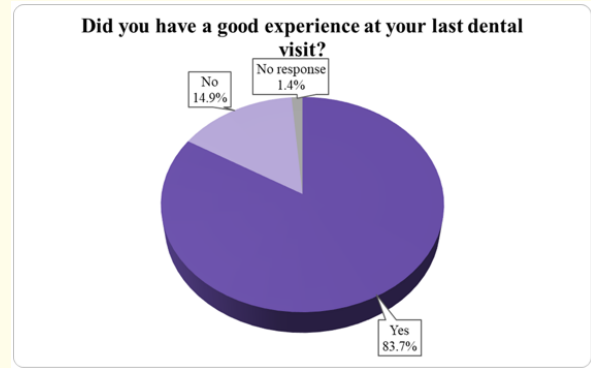


Figure 2: Dental Experiences of the Student.

Of the 221 students who had previous dental experiences, 185 (84%) indicated having a good experience at their last visit, while 33 (15%) had a bad experience. The remaining 1% of respondents did not select either option (Figure 2).

Variable	Oral Health Knowledge			
	Good n %	Moderate n %	Poor n %	Total n %
Dental Anxiety				
Low	130 (62.2)	78 (75.7)	5 (71.4)	213 (66.8)
Moderate	52 (24.9)	17 (16.5)	1 (14.3)	70 (21.9)
Severe	27 (12.9)	8 (7.8)	1 (14.3)	36 (11.3)
Total	209 (100)	103 (100)	7 (100)	319 (100)
Dental Fear				
Without Dental Fear	111 (53.1)	60 (58.3)	4 (57.1)	175 (54.8)
With Dental Fear	98 (46.9)	43 (41.7)	3 (42.9)	144 (45.2)
Total	209 (100)	103 (100)	7 (100)	319 (100)

Table 2: Relationship between the level of oral health knowledge and dental anxiety and fear.

It was discovered that 209 participants (65.5%) had good oral health knowledge, 103 participants (32.3%) had moderate knowledge and 7 participants (2.2%) had poor knowledge of oral health. Analysis of the questions about the student's level of dental anxiety showed that the majority of students, 130 (62.2%), with good oral health knowledge demonstrated low levels of dental anxiety while 12.9% showed severe levels of dental anxiety. 78 (75.7%), 17 (16.5%) and 8 (7.8%) of the students with moderate oral health knowledge displayed low, moderate, and severe levels of anxiety, respectively. While the majority of students with poor oral health knowledge (71.4%) had low levels of anxiety. Of the 209 respondents with good oral health knowledge, 111 (53.1%) were without dental fear while 98 (46.9%) were with dental fear (Table 2).

Table 3 compares oral health knowledge and dental fear and anxiety. Overall, females were found to have higher levels of anxiety when compared to males. Of the 213 respondents experiencing

Variable	Gender		
	Male n %	Female n %	Total n %
Dental Anxiety			
Low	116 (70.7)	97 (62.6)	213 (66.8)
Moderate	30 (18.3)	40 (25.8)	70 (21.9)
Severe	18 (11)	18 (11.6)	36 (11.3)
Total	164 (100)	155 (100)	319 (100)
Dental Fear			
Without Dental Fear	104 (63.4)	71 (45.8)	175 (54.8)
With Dental Fear	60 (36.6)	84 (54.2)	144 (45.2)
Total	164 (100)	155 (100)	319 (100)

Table 3: Relationship between gender and dental anxiety and fear.

low levels of anxiety, 97 were represented by females. Of the 70 experiencing moderate levels of anxiety, 30 were represented by males. 84 (54.2%) of the 155 female respondents had dental fear while 60 (36.6%) of the 164 male respondents had dental fear.

Figure 3 depicts the dental concerns of the respondents from most concerning to least concerning. The main dental concerns are “not being numb enough”, “fear of being injured by the dentist”, “not being listened to or taken seriously”, “receiving an injection in the gums” and “extraction of a tooth”. The least concerning dental experiences were “scents in the dental office”, “dislike of the numb feeling”, “I don’t always understand why I need the procedure”, “air/ water on the teeth” and “taking dental X-rays”.

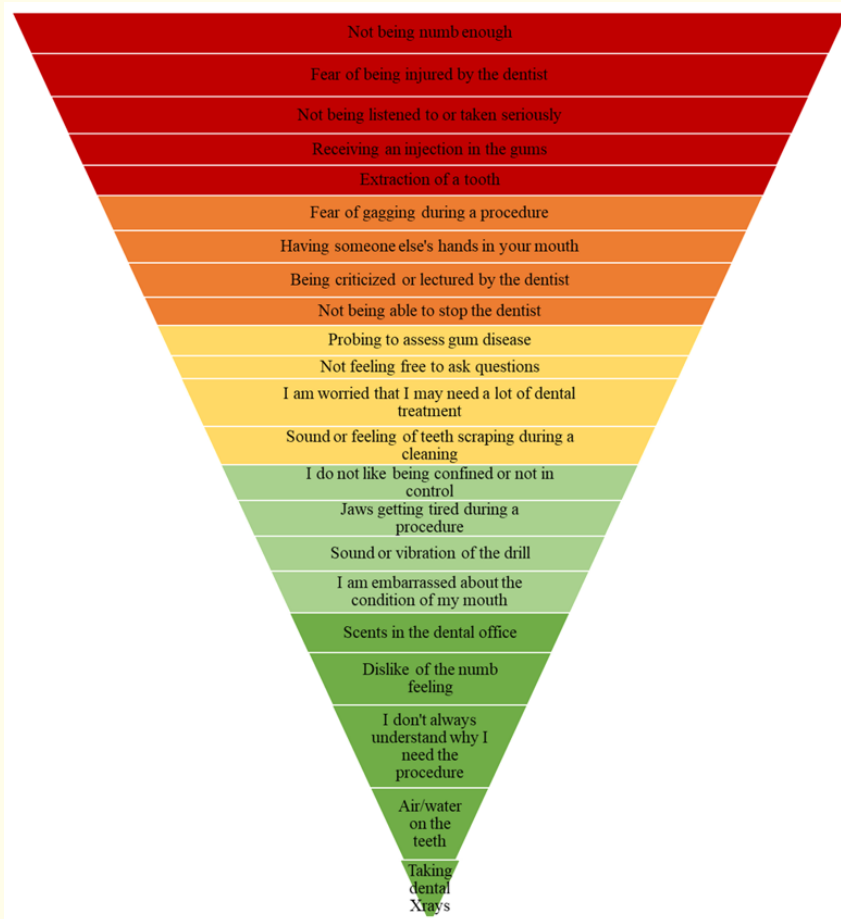


Figure 3: Dental Concerns of the Students.

Discussion

The sample used in this study is not representative of the entire population of Guyana, however, it is among the first to be conducted in the English-speaking Caribbean [7]. Considering 319 respondents across 6 public high schools in the capital city of Georgetown, 221 (69.3%) students had previous dental encounters, whereas 98 (30.7%) students had never visited a dental office. Another study found that approximately 61% of the population in 2009 were regular visitors of the dentist suggesting a similar percentage of dental avoidance [17]. Expanding on the 221 respondents, 103 had visited 1-2 times, 67 had 3-4 visits and 50 students visited more

than 4 times. We further asked about their experiences at the dentist and of the 221 students who had previous dental experiences, 185 (84%) indicated that they had a good experience at their last visit, however, 33 (15%) had a bad experience. The additional 1% of respondents did not select either option.

The 15% of respondents considered their dental experience to be unpleasant mainly because “the injection was painful”, “it was shocking when they drilled my teeth”, “dentist was too rough”, “could not afford the treatment”, “did not get numb enough”,

“Scared of the injection/needle” and “the dentist was rude”. In this study, common themes associated with DFA in children included bad experiences with pain, financial constraints preventing necessary procedures, and rough treatment by dental operators [18]. The attitude and behavior of the dental operator towards children were identified as crucial modifiers of DFA in children [18].

The research suggested that improper dental management during previous visits could strongly correlate with DFA in children and adolescents, consistent with findings from other studies [19,20]. Negative dental experiences were recognized as a significant barrier to receiving treatment and could lead to poor dental attendance or avoidance [20].

Despite generally having good oral health education, 41% of respondents agreed that preventing gum disease through brushing, flossing, and avoiding sugar was impossible, likely due to the wording of the question [18]. Bloom’s oral knowledge cutoff points revealed that the majority of participants had good oral health knowledge (65.5%), followed by moderate (32.3%) and poor knowledge (2.2%) groups [18]. This was consistent with findings from Pereira, *et al.* in 2021, indicating that public secondary school students in Guyana generally had adequate dental knowledge [11].

The study used the MDAS to assess dental anxiety levels among participants [7]. Results showed that the majority had low levels of dental anxiety (60.5%), with a smaller percentage experiencing severe anxiety (12.5%) [18]. Similar findings were reported in a study from Trinidad [7].

The study found a positive correlation between higher levels of dental anxiety and insufficient OHL [9]. Individuals with better OHL tended to have lower dental anxiety levels, but some individuals with good OHL still exhibited moderate to severe dental anxiety, indicating other contributing factors [9] such as cultural beliefs [21] and indirect negative experiences of others [10].

Gender differences in dental anxiety were observed, with females generally exhibiting higher levels of dental anxiety than males [2,7]. This gender difference may be attributed to the possibility that boys are less forthcoming with information regarding their emotions since it makes them feel weak to admit to being fearful/anxious [22]. Females also tend to rate their oral health lower than males, which could contribute to their anxiety [2].

Dental anxiety is oftentimes presented alongside dental fear. An assessment of dental fear in the study population yielded interesting results which suggest that of the 319 participants assessed 54.8% of the participants reported dental fear [18]. Contrary to our findings, other studies found high rates of dental fear among their study population [23]. On the other hand, Stuart in 2021 stated that for any group of patients, approximately 40% will have dental fear [24], further supported by Hill stating that DFA is estimated to af-

fect 36% of the population [17]. Gender differences were observed, with females (54.2%) more likely to experience dental fear than males, corroborated by other studies [8,25,26]. Dental fear can lead to dental avoidance and poorer oral health [11,20,27], thus, an alarming concern given the statistics found by this research.

This study also identified specific concerns that intensified dental fear and anxiety, including concerns about not being adequately numbed during procedures, fear of injury by the dentist, perceived lack of communication and listening, receiving injections, and the prospect of tooth extraction [12,28]. Feelings of helplessness, loss of control, embarrassment, and invasion of personal space were also identified as significant factors amplifying dental anxiety [12].

In contrast, factors like scents in the dental office, dislike of numbness, lack of understanding about the necessity of a procedure, the use of air/water on the tooth, and dental X-rays were found to have less impact on dental fear and anxiety [18]. These findings highlight the importance of addressing specific concerns to alleviate adolescent’s fear and anxiety in dental practice regionally and internationally.

Conclusion

This study has determined that the majority of 14-year-old public secondary school students in Georgetown, Guyana have good oral health knowledge. Analysis of dental anxiety revealed that the sample population had an anxiety level of low to moderate. The majority of respondents from this survey, having good oral health knowledge also presented with low levels of dental anxiety while those with poor oral health knowledge presented primarily with moderate dental Anxiety. Overall, females were found to have higher levels of dental anxiety as compared to their male counterparts.

The dental fear survey found that 45.1% of the study population would experience fear when placed in a dental setting. When comparing the level of oral health knowledge to the level of dental fear experienced, the majority of respondents, regardless of whether they were classified as having good, moderate, or poor oral health knowledge, were found to be without dental fear. When comparing the level of fear experienced by males versus females, the females have a higher incidence of dental fear.

The top 5 concerns of respondents with DFA included “not being numb enough”, “fear of being injured by the dentist”, “not being listened to or taken seriously”, “receiving an injection in the gums” and “extraction of a tooth”.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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