

## Analysis of the Phobia of Brushing Teeth in High School Students in Palopo City, Indonesia During COVID-19

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### ABSTRACT

**Objective:** To analyze the phobia and social anxiety of brushing their teeth among high school students in Palopo City, Indonesia, during COVID-19. **Material and Methods:** Social phobia was obtained with the MINI-Spin questionnaire and anxiety with the GAD-7 questionnaire. The questionnaire consists of 15 questions with a Likert scale. Primary data type with logistic regression analysis. **Results:** The results of the logistic regression analysis showed that men are more likely to brush their teeth twice a day than women (OR=2.01; 95% CI 1.3-2.9). Subjects who reported not having social phobia were not significantly (OR = 0.9; 95% CI 0.6-1.4) more likely to brush their teeth twice a day than those who tended to have social phobia. Subjects who reported no significant anxiety (OR = 0.7; 95% CI 0.5-1.5) were more likely to brush their teeth twice a day than those who tended to have anxiety. **Conclusion:** The frequency of brushing teeth in students who do not have a relationship is more likely to brush their teeth twice a day than students who tend to have phobias and social anxiety. Regarding the relationship between brushing teeth frequency and gender criteria, there is a relationship between female students brushing their teeth twice a day more often than male students during COVID-19.

**Keywords:** Behavior and Behavior Mechanisms; Dental Anxiety; Students; Coronavirus Infections.

## Introduction

COVID-19 and lockdown measures have had a serious impact on physical and mental status and daily behavior, including oral health care behavior; in addition, routine medical activities have been severely disrupted amid the pandemic. We are concerned about the oral health of the public in the midst of this outbreak. It is very important to explore the impact of COVID-19 on oral health, namely phobias and oral hygiene, dental problems encountered, how people deal with these problems, and whether these problems exacerbate their anxiety [1-4].

Interestingly, one study showed that increased levels of anxiety, depression, and stress lead to increased levels of oral parafunctional habits during the COVID-19 pandemic, and the authors suggested that this may result in an increased prevalence of orofacial pain and temporomandibular disorders in the future [4,5]. Oral health is an important part of overall health, and oral disease is associated with chronic health conditions. General risk factors for oral health are very influential in integrating oral health into general health [6,7].

Many changes mark the transition period from childhood to adulthood. During this period, independence from parents increases, which results in behavioral changes, including those related to eating habits, smoking, and lifestyle behaviors. The development of this independent behavior can affect oral health and form lifelong behavioral patterns [8,9].

In addition, as the need for independent functioning increases in adolescence, anxiety and social phobia can affect a young person's ability to cope and can adversely affect a person's quality of life. Symptoms of anxiety and SP often appear in late childhood or adolescence. Anxiety disorders, including generalized anxiety disorder, panic disorder, agoraphobia, social phobia, and specific (simple) phobia, are more common in adults than other mental disorders. Mild to moderate anxiety is a normal emotional response to many stressful life situations [8-12].

Gender differences in tooth brushing in adolescents have been reported, with girls brushing more often than boys. Several authors have described these gender behavioral differences according to the social and psychological impact of oral health, finding that women perceive oral health as having a greater impact than men on their general quality of life [13,14].

Brushing your teeth is the most effective method of cleaning your teeth and mouth. The universally recommended frequency is brushing your teeth twice a day. Studies have shown links between stress and dental health among adults, including an association between depression and anxiety with lower tooth brushing frequency and an association between stress and depressive symptoms and poor oral health. A European study has reported that adolescents with stress brush their teeth twice a day less often than adolescents with good mental health. The relationship between periodontitis and stress dimensions has been documented in adolescents and poor maternal factors (e.g., low education and psychological stress) can have a cumulative impact on adolescents' future caries experience [6,13,14].

Based on the Indonesian Basic Health Research (Riskesdas) in 2018, dental and oral health problems in the city of Palopo were around 8.9%, with details of carious teeth at 58.42%, easy bleeding gums at 23.29%, and recurrent canker sores at 6.97%. The percentage of daily tooth brushing behavior in Palopo City residents aged 3 years and over is 95.32%. However, the percentage of those who brushed at the right time was only around 9.68%. The prevalence of Palopo City residents aged 15 years and over who experience depression is around 10.40%. This depression mainly occurs in the 15-24 years age group [15-17].

Journals that discuss the effect of stress on dental and oral health behavior among adolescents are still rare. Therefore, the authors wanted to conduct this study to know the relationship between toothbrushing frequency, stress, and related factors (gender, parental education, family structure, smoking habit, and perceived general health perception) among high school youth in Palopo. The authors hypothesized that those with more psychological stress would brush their teeth twice a day less frequently than those with less psychological stress [6,13,14].

The purpose of this study was to determine the relationship between toothbrushing frequency, stress, and related factors (gender, parental education, family structure, smoking habits, and perceived general health perception) among youth at public high schools in Palopo City, South Sulawesi Province, Indonesia.

## Material and Methods

### Study Design and Ethical Clearance

This type of research is analytic observational with a cross-sectional design. This research was conducted in November-December 2021 online. Recommendations for ethical approval issued by the Health Research Ethics Committee Number: 0161/PL.09/KEPK FKG-RSGM UNHAS/2021.

### Participants and Data Collection

This research was conducted in six public high schools in Palopo City, South Sulawesi Province, Indonesia, which returned a questionnaire in the form of a Google form totaling 661 students using the snowball sampling method. The research instrument consisted of an adapted questionnaire [6]. The questionnaire also included the reliable and validated GAD-7 questionnaire [18,19].

The questionnaire consists of 15 questions in three parts. The first part is related to the subject's social demography (toothbrushing habits, parental education, family structure, smoking habits, general health perception). The second part (Mini Spin Questionnaire) is questions to detect the subject's social phobia, and the third part (GAD-7 questionnaire) is questions to detect subject anxiety.

The assessment criteria for the questionnaire consist of 15 questions, with a Likert scale in the second part: 0 (Not at all), 1 (Slightly), 2 (Enough), 3 (Many), and 4 (Very Much). The third part is 0 (Not the same—once every 2 weeks), 1 (Multiple days in 2 weeks), 2 (More than half the time in 2 weeks), and 3 (Almost every day in 2 weeks).

The level of influence of social phobia and anxiety on the frequency of brushing the subject's teeth was measured by the total score of the answer choices on the questionnaire, which was divided into two groups in the second and third parts. The second part is 0–5 points (no SP), 6–12 points (possibly SP). The third part is 0–9 points (no, mild or mild anxiety), 10–21 points.

### Data Analysis

Descriptive statistics, including frequencies and percentages, were used to analyze the data. Logistic regression analysis was performed for confirmatory analysis and estimation of confidence intervals (CIs). SPSS version 25 for Windows (IBM Corp., Armonk, NY, USA) was used to analyze the data at a 5% significance level.

## Results

A total of 661 individuals were included, of which 31.3% were female. Based on age, subjects aged 14 years were 17 subjects (2.6%), 15 years were 178 subjects (26.9%), 16 years were 264 subjects (36.9%), 17 years were 180 subjects (27.2%), and 18 years were 22 subjects (3.3%). Based on school origin, subjects from Public Senior High School (PHS) 1 as many as 285 subjects (43.1%), from PHS 2 as many as 25 subjects (3.8%), from PHS 3 as many as 209 subjects (31.6%), from PHS 4 as many as 30 subjects (4.5%), from PHS 5 as many as 43 subjects (6.5%), and those from PHS 6 as many as 69 subjects (10.4%).

Table 1 shows the results of the MINI-SPIN questionnaire items and the responses received in the form of a percent. The question for this questionnaire is “How much has the following problem bothered you over the past week?” with three responses. For the response “Afraid of being embarrassed causes me to avoid doing something or talking to people”, the subject answered not at all 20.4%, answered slightly 49.0%, answered moderately 19.7%, answered a lot 7.9%, and answered very much 3.0%. Responses “I avoid activities where I am the center of attention” subjects, answered not at all 21.5%, answered slightly 36.9%, answered moderately 21.6%, answered a lot 14.4%, and answered very much 5.6%. Responses “Being embarrassed or looking stupid is one of my worst fears” subjects answered no at all 21.5%, answered slightly 28.3%, answered moderately 18.2%, answered a lot 18.5%, and answered very much 13.6%.

**Table 1. Items MINI-SPIN Questionnaire and subject responses.**

Question: How much has the following problem bothered you over the past week?'	Not at all	A Little	Currently	Many	A huge amount
	%	%	%	%	
Fear of embarrassment causes me to avoid doing things or talking to people.	20.4	49.0	19.7	7.9	3.0
I avoid activities where I am the center of attention.	21.5	36.9	21.6	14.4	5.6
Being shy or looking stupid is one of my worst fears.	21.5	28.3	18.2	18.5	13.6

Table 2 shows the results of the GAD-7 questionnaire items and the responses received in percent. The question for this questionnaire is, "Over the past two weeks, how often have the following problems bothered you?" with 6 responses. For responses "Feeling nervous, anxious or restless," subjects answered not at all in 2 weeks (31.3%), several days (48.0%), More than half the time (13.6%), and almost every day (7.1%).

**Table 2. GAD-7 Questionnaire items and responses of subjects.**

Question: 'Over the past two weeks, how often have the following problems bothered you?'	Response			
	Not at all in 2 weeks	Few days in 2 weeks	More than half the time in 2 weeks	Most days in 2 weeks
	%	%	%	%
Feeling nervous, anxious, or restless	31.3	48.0	13.6	7.1
Inability to stop or control worry.	45.3	39.0	10.1	5.6
Worrying too much about different things.	33.9	42.2	14.2	9.7
It's hard to relax.	43.7	35.2	11.3	9.7
Becomes so restless that it's hard to sit still.	61.6	26.8	5.4	6.2
Feeling scared, as if something bad was going to happen.	39.9	39.2	13.0	7.9

Regarding “Inability to stop or control worry”, 45.2% of the participants answered not at all in 2 weeks and 39.0% reported few days in 2 weeks. Concerning “Too worried about different things”, 33.9% of the participants answered not at all in 2 weeks and 42.2% reported few days in 2 weeks.

Regarding “Difficult to relax”, 43.7% of participants reported not at all in 2 weeks and 35.2% reported few days in 2 weeks. Regarding the answer “Become so restless that it is difficult to sit still”, 61.6% answered not at all in 2 weeks and 26.8% reported few days in 2 weeks. Finally, regarding the question “Feeling afraid, as if something bad will happen”, 39.9% answered not at all in 2 weeks and 39.2% reported few days in 2 weeks.

Table 3 shows that female subjects who brush their teeth twice a day represent 78.0%, while for men, this percentage corresponds to 65.7%. For the characteristics of parental education, subjects with basic parental education or less who brush their teeth twice a day represented 67.0%, subjects with secondary parental education who brush their teeth twice a day represented 76.0%, and subjects with high parental education brushing their teeth twice a day represented 75.0%.

For the characteristics of family structure, 76.0% who live with both parents brush their teeth twice a day and 70.0% who do not live with their parents. For the characteristics of smoking habits, participants who have a smoking habit brush their teeth twice a day represented 60.0%, and subjects who do not have a smoking habit brush their teeth twice a day represented 75.0%. For the characteristics of general health perception, 79.0% of the participants with very good general health brushing their teeth twice a day, while subjects with good general health brushing their teeth twice a day represented 74.0%, and subjects with good general health brushing their teeth twice a day represented 74.0%. Thirty-nine participants with poor general health brush their teeth twice a day (60.0%).

**Table 3. Frequency of brushing teeth.**

Variables	Brushing Teeth		Total N (%)
	≤1 Time a Day N (%)	≥ 2 Times a Day N (%)	
<b>Gender</b>			
Male	71 (34.3)	136 (65.7)	207 (100.0)
Female	100 (22.0)	354 (78.0)	454 (100.0)
<b>Parental Education</b>			
Basic Education	39 (33.0)	79 (67.0)	118 (100.0)
Middle Education	81 (24.0)	257 (76.0)	338 (100.0)
Higher Education	51 (25.0)	154 (75.0)	205 (100.0)
<b>Family Structure</b>			
With Both Parents	102 (24.0)	332 (76.0)	434 (100.0)
Other	69 (30.0)	158 (70.0)	227 (100.0)
<b>Smoking Habit</b>			
Smoker	08 (40.0)	12 (60.0)	20 (100.0)
Do not smoke	163 (25.0)	478 (75.0)	641 (100.0)
<b>General Perceived Health</b>			
Very Good	39 (21.0)	148 (79.0)	187 (100.0)
Pretty Good	106 (26.0)	303 (74.0)	409 (100.0)
Bad	26 (40.0)	39 (60.0)	65 (100.0)

The total scores of the Mini-SPIN and GAD-7 questionnaires among State High School students in Palopo City are presented, with the number of Mini-SPIN 6 or more indicating the possibility of social phobia in as many as 232 people (35.1%). The total score of GAD-7, which has a total score of 10 or more, indicates the possibility of anxiety in as many as 138 people (20.5%).

Table 4 shows the frequency of brushing teeth with social phobia and anxiety in Palopo State High School students. Social phobia was detected using the MINI-Spin questionnaire, while anxiety was identified using the GAD-7 questionnaire. Ninety-seven male subjects (67.0%) who did not have social phobia (MINI-Spin

score 6) brushed their teeth twice a day. For women whose social phobia was not detected, 79% brushed their teeth twice a day, while for those with social phobia, this percentage was 76%. Ninety-four male subjects (72.0%) who did not have anxiety (GAD7 score 10) brushed their teeth twice a day. Women who were not detected as having social phobia accounted for 79.0% and those who were detected as having anxiety accounted for 77.0%.

**Table 4. Tooth brushing among males and females according to the Mini-SPIN and GAD-7 classifications.**

Variables	Tooth Brushing		Total N (%)
	≤Once Daily	≥Twice Daily N (%)	
<b>Male</b>			
Mini-SPIN Classification			
0–5 points (No SP)	48 (33.0)	97 (67.0)	145 (100.0)
6–12 points (Possible SP)	23 (37.0)	39 (63.0)	62 (100.0)
Category GAD-7.2			
0–9 points (None, Little, or Mild Anxiety)	36 (28.0)	94 (72.0)	130 (100.0)
10–21 points (Moderate to Severe Anxiety)	35 (45.0)	42 (55.0)	77 (100.0)
<b>Female</b>			
Mini-SPIN Classification			
0–5 points (No SP)	59 (21.0)	225 (79.0)	284 (100.0)
6–12 points (Possible SP)	41 (24.0)	129 (76.0)	170 (100.0)
Category GAD-7.2			
0–9 points (None, Little, or Mild Anxiety)	45 (21.0)	165 (79.0)	210 (100.0)
10–21 points (Moderate to Severe Anxiety)	55 (23.0)	189 (77.0)	244 (100.0)

p<0.001 for all associations; chi-square test.

Logistic regression analysis (Table 5) showed that male subjects were more likely than female students (OR=2.01; 95% CI 1.3–2.9) not to brush their teeth twice a day. Student subjects whose parents only had primary education were not significantly (OR=1.02; 95% CI 0.6–1.5) more likely not to brush their teeth twice a day than students whose parents had secondary education or above. Participants who lived with both parents were not significantly more likely to brush their teeth twice a day compared to students who did not live with both parents (OR=0.7; 95% CI 0.5–1.1). Students who had a smoking habit were not significantly more likely to not brush their teeth twice a day than students who did not smoke (OR=1.8; 95% CI 0.6–4.9). Students with a good perception of health were not significantly more likely to brush their teeth twice a day compared to those with a poor health perception (OR=0.5; 95% CI 0.2–0.8). Students who reported not having social phobia were not significantly more likely to brush their teeth twice a day than students who were likely to have social phobia (OR=0.9; 95% CI 0.6–1.4). Students who reported not having anxiety were not significantly more likely to brush their teeth twice a day than students who were likely to have anxiety (OR=0.7; 95% CI 0.5–1.5) (Table 5).

**Table 5. Results of the logistic regression analysis of brushing teeth.**

Variables	OR	95% CI
<b>Gender</b>		
Male	2.01*	1.3–2.9
Female	1.0	
<b>Parental Education</b>		
Basic Education	1.02	0.6–1.5
Secondary & Higher Education	1.0	
<b>Family Structure</b>		
With both Parents	0.7	0.5–1.1
Other	1.0	
<b>Smoke</b>		

Smoker	1.8	0.6–4.9
Do not Smoke	1.0	
General Health Perception		
Good	0.5	0.2–0.8
Bad	1.0	
Mini-SPIN		
0–5 points (No Social Phobia)	0.9	
6–12 points (Probable Social Phobia)	1.0	0.6–1.4
GAD-7		
0–9 points (No Anxiety)	0.7	0.5–1.5
10–17 points (Probability of Anxiety)	1.0	

Once a day or less often=1; \*p<0.001.

## Discussion

Stress is related to brushing your teeth. Those who probably had social phobia or moderate to severe anxiety were less likely to brush their teeth twice a day than those who had no possible problems with social phobia or reported low or no anxiety. The results support previous studies on adolescents in Asia, Africa, the Caribbean, and South America. Problems that cause stress can dominate so much of a teenager's attention that they cannot follow recommended oral health behaviors [15,19,20]. According to a survey by Keles and Sancakli [21], 25.6% of these people visited the dentist, while 74.4% did not.

Problems in adolescents that cause psychological stress can dominate, so that they cannot follow the oral health behavior that is conveyed. The main motivating factor for brushing teeth is social benefits. The positive impact on clean teeth looks attractive, creates a fresh feeling and strengthens self-confidence [14]. The study's results by Girão Júnior et al. [22] showed no difference between the fluoride concentrations analyzed one hour after brushing with different toothpastes.

The main motivating factor for brushing teeth is the social benefits: clean teeth look attractive, create a fresh feeling, and strengthen one's self-confidence. Fewer social problems can make teenagers more aware of the social benefits of brushing their teeth, increasing their motivation to brush their teeth regularly. Possible social phobia problems indicate a higher risk for oral health problems among adolescents [15,17].

In this study, male students brushed their teeth twice a day less often than female students. These findings are in line with Maes et al. [15] that reported aged 15 years brushing teeth according to the recommendation twice a day or more by 45% in 2001–2002, the appropriate figure in this study is 53%. They are also in agreement with Yang et al. [23], whose findings showed that 46.9% of students experienced bleeding while brushing their teeth, while only 11.8% reported professional teeth cleaning.

In this study, there was no relationship between the frequency of brushing teeth and parents' level of education. This is not in line with previous research, which found that higher levels of education and socioeconomic status of parents were associated with more frequent brushing of teeth in adolescents, in this case, State High School students. Higher parental education levels are positively associated with children's psychological health and reduced health complaints, which can also stem from a favorable socioeconomic situation. In addition, higher educational expectations from families are associated with better health behaviors, including brushing teeth [24–27].

The results of this study did not show a relationship between the frequency of brushing teeth and the students' family structure. Previous studies on the relationship between family structure and children's brushing habits have shown varying results in different countries. Parents greatly influence the brushing habits of their children, regular family routines and practices that promote good oral health from an early age are important to

promote children's oral health. A regular family routine can be more easily achieved in a family with two parents than in a family where the father and mother are separated [25,28].

The results of this study did not show a relationship between the frequency of brushing teeth and the smoking habits of adolescent high school students. This result is not based on previous studies that showed a relationship between smoking and poor tooth brushing. In general, smokers tend to have poorer oral health than nonsmokers. Smoking affects a person's sense of smell and taste, smokers may not feel the clean and fresh feeling that brushing their teeth provides in the same positive way as nonsmokers do; they may also perceive oral health as less important than nonsmokers [26,29].

The results of this study also did not show a relationship between perceptions of good or very good health and the frequency of brushing the teeth of State Senior High School adolescents. This is not by previous research. Brushing teeth is related to oral health, which is related to general health. Several studies have examined the relationship between tooth brushing and general health. One recent study found that a higher daily brushing frequency reduced the development of malignancies. In addition, because poor health behaviors tend to cluster, infrequent brushing of teeth, along with other poor health habits and other aspects of life, can contribute to perceptions of poor health [27,30].






The results in this study also did not show a relationship between the frequency of brushing teeth and the social phobia or anxiety of state high school students. This is not by previous research. Students who do not have social phobia or anxiety are more likely to brush their teeth twice a day than those who are likely to have social phobia or anxiety [16]. More frequent problems with social phobia among girls can lead to negative oral health effects due to psychological stress [18]. However, girls also reported brushing their teeth twice a day more often than boys, thus providing girls with greater protection from oral health problems [20,29,31].

This study has some limitations that should be addressed. First, because this is an online cross-sectional survey, there is a possibility of recall bias in the information, as well as the possibility that students have searched for answers to some of the questions before answering. Second, fewer subjects filled out online questionnaires than the total population. Lastly, as this is an internet-based online survey, responses from areas without internet access may not be captured, which could lead to demographic selection bias.

## Conclusion

The frequency of brushing teeth in students who have no relationship are more likely to brush their teeth twice a day than students who tend to have phobias and social anxiety. The criteria for parental education, family structure, smoking habits, and general health perceptions also did not show a relationship. For the relationship between the frequency of brushing their teeth and gender criteria, there is a relationship that female students are more likely to brush their teeth twice a day than male students.

## Authors' Contributions

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None.

## Conflict of Interest

The authors declare no conflicts of interest.

## Data Availability

The data used to support the findings of this study can be made available upon request to the corresponding author.

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