

Principal motives for tooth-brushing in a population of South African adolescents: implications for oral health promotion

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ABSTRACT

Background: Little is known of the motives for tooth-brushing among adolescents in resource-poor settings.

Aim: To investigate the principal motive for tooth-brushing among a rural population of South African adolescents.

Methods: The participants were high school students between the ages of 12 and 19 years who provided baseline data during 2005 as part of a tobacco use prevention trial (n = 2119). Information was obtained using a self-administered survey questionnaire, including demographic data, data on the employment status of the parents, oral health practices and risk behaviors. The main outcome measure was the principal reason for brushing. Data was analyzed using chi-square statistics and multiple logistic regression analysis.

Results: Of the study participants, only 27.2% had ever visited a dentist. For 28.9%, both parents are unemployed. The principal motive for brushing among most adolescents (84.9%), including those who reported frequent sugar intake, was related to cosmetic rather than preventive dental health reasons. Motives for brushing were not associated with brushing frequency. However, the socially disadvantaged, current smokers, and those who reported a past suicide attempt were significantly less likely to brush for cosmetic reasons.

Conclusions: Motives for tooth-brushing among adolescents may reflect their psychosocial state rather than knowledge of the preventive effect of brushing.

INTRODUCTION

It is likely that tooth brushing is a complex behavior, determined by a variety of motives.¹ There is evidence to suggest that people do not only brush their teeth because of dental health-related reasons – the habit can be influenced by social factors and living conditions.^{2,3} Hodge et al.¹ give three possible reasons that could motivate a child to brush his or her teeth, namely concerns about personal hygiene, a desire for good grooming and a desire for good health.¹ Tooth brushing during adolescence has been

found to be mostly related to cleanliness and appearance, and less related to promoting dental health.¹ The single most common reason for tooth brushing given by young people, even among those at high risk for caries,⁴ appears to be to ensure clean teeth, in other words, brushing for cosmetic or aesthetic reasons.⁵ However, some studies have demonstrated that a more frequent brushing schedule among adolescents in the United Kingdom (UK)⁶ and in South Africa⁷ is associated with brushing for dental health reasons. In the UK, the more socially advantaged adolescents were found to be more inclined to brush their teeth for dental health reasons than for cosmetic reasons.⁶ More females than males give cosmetic reasons as the principal reason for tooth-brushing.⁸

Brushing frequency has also been positively associated with adolescents' self-esteem.⁸ In particular, the tooth-brushing frequency⁸ and tooth-brushing for aesthetic reasons increases with increasing self-esteem.⁵ Previous studies have also demonstrated that children who are not satisfied with their life and school seem to be more likely to display less frequent tooth brushing behavior,⁹ but it may also be that adolescents who do not brush regularly are those who have given up on achievement, social acceptance and prestige amongst peers.¹⁰ A recent study has, for example, demonstrated that hope of success in a population of young Romanian adults was positively associated with tooth-brushing frequency.¹¹ Infrequent tooth-brushing and reasons for brushing among adolescents may therefore reflect the existence of psychological problems, such as indifference, low self-esteem and a lack of self-efficacy.^{8,9,12,13}

The reasons for tooth-brushing may vary between cultures and may reflect differences in the level of oral health care prevalent in a particular society. For instance, while one previous study in South Africa showed that adolescent smokers were more likely to brush for dental health reasons,⁷ another study in the UK demonstrated that adolescent smokers were more likely to report brushing for aesthetic reasons.⁶ From a health education point of view and for the sake of the prevention of dental diseases, it is necessary to know what motivates adolescents in a particular culture to achieve optimal oral health through tooth-brushing. However,

only limited information is available on the motive(s) for tooth-brushing among South African adolescents, even among those considered at high risk for poor oral health. The aim of this study was therefore to investigate the principal motivation for tooth-brushing among a population of South African adolescents.

MATERIALS AND METHODS

Study participants and sampling procedure

This study involved a population of high school students in the most rural of the nine provinces in South Africa – the Limpopo province.⁷ The participants in this self-administered questionnaire survey were students in high schools who provided baseline data during 2005 as part of a tobacco use prevention intervention study.

A two-stage cluster sampling strategy was used to produce a provincially representative sample of Grade 8 students ($n = 2,119$). The first stage of the sampling consisted of a random selection of 22 of the 31 school districts in the Limpopo Province. School districts were selected with a probability of inclusion proportional to the number of schools in the district. The second stage consisted of a random selection of one school from the cluster of high schools in each school district that had been selected. Based on the original intervention study, only 20 schools were needed to provide adequate statistical power, but 22 schools were selected for the study. One of the schools refused to participate and thus only 21 schools were included in the final analysis. Participation in this study required the informed consent of both the participants and their parents. All the Grade 8 students ($n = 2,337$) in the selected schools were eligible to participate in the study. This resulted in a final sample of 2,119 students whose parents gave informed consent prior to the student's participation (thus student response rate was 90.7%). This study was reviewed and approved by the human subject research ethics committee of the faculty of Health Sciences of the University of Pretoria.

MEASURES

Demographic features

Demographic information was elicited via a self-administered survey questionnaire that the participants had to complete. The demographic information that was gathered included participants' age, biological sex, race or ethnic self-identification (broadly categorized as Black or non-Black), the employment status of their parents and the type of dwelling in which they live (formal housing – brick house/flat; or informal housing – huts/tents or non-brick building). Parental employment status and type of dwelling served as a proxy measure of the socio-economic status of the adolescents.¹⁴ The respondents were also asked about their educational aspirations in that they were asked what level of education they expected to complete, namely less than high school, high school or more than high school.

Motivation for tooth-brushing

As in a previous study,^{7,9} respondents were asked what their main reason was for brushing their teeth. Response options were "Because I like fresh breath", "Makes my mouth feel clean", "So that my teeth look nice", "So as to avoid toothache", and "So as to avoid false teeth". Respondents who brush in order to avoid toothache or false teeth were classified as being motivated to brush for preventive reasons, while the others were classified as motivated by cosmetic or social reasons.

Oral health behavior

The oral health behavior that was recorded included a history of past dental visits, the frequency of daily tooth-brushing and the respondents' estimated daily frequency of consumption of sugary snacks/drinks.¹⁵ The frequency of sugar intake was assessed by the question: "How often do you take sugar or sweets in a day? For example sugar in tea, chocolates, fizzy drinks, etc." The response options included the following:

- (i) "I rarely take sweets,"
- (ii) "1-3 times a day,"
- (iii) "Four or more times daily."

A sugar intake frequency of less than four times per day was used as a reference point. A daily frequency of four times has been estimated to be equivalent to consuming ~40g per day and represents the suggested point from which dental caries risk could significantly increase.¹⁶

Dental visit patterns

The reason for dental attendance was assessed with the following questions: "In the past, what is the most usual reason why you have visited a dentist?" The response options were:

- (i) "I have never visited a dentist,"
- (ii) "I have visited dentists only when I have pain,"
- (iii) "I have visited dentists mostly for check-ups or cleaning only."

Self-reported gingival bleeding

Respondents were asked how frequently they had experienced "bleeding gums" while brushing in the three months prior to the survey dates. Those who indicated that their gums "always" or "often" bled were categorized as having frequent gingival bleeding or gingivitis; and those who reported that their gums "never" bled or "seldom" bled were categorized as not having gingivitis.⁷

Smoking and binge-drinking

Using items previously used in national and international youth tobacco surveys,¹⁶ respondents were categorized as current smokers if they indicated having smoked a cigarette within the last 30 days preceding the date of the survey.

Past-month binge-drinking was assessed using respondents' responses to the question: "In the past 30 days, on how many days have you had 5 or more drinks of alcohol at one occasion?" The response options included:

- (i) "0 days,"
- (ii) "1 day,"
- (iii) "2 days,"
- (iv) "3 days,"
- (v) "3 – 5 days,"
- (vi) "6 – 9 days,"
- (vii) "10 – 19 days,"
- (viii) "20 days or more".

Anyone who indicated a response option other than "0 days" was categorized as a past-month binge-drinker.

Psychological health status

Given the reported association between reasons for brushing and self-esteem on one hand, and the association between suicide attempts and adolescents' self-esteem^{17,18} on the other hand, we were also interested in exploring the association between the main reason for brushing and past suicide attempts. The respondents were asked to respond to the following ques-

tions relating to suicide attempts: "During the past 12 months, how many times did you actually attempt suicide?" The response options were

- "Never,"
- "Once,"
- "2 to 3 times,"
- "4 to 5 times,"
- "6 or more times."

The responses were then dichotomised into two categories, namely, those who indicated they had attempted suicide at least once in the last 12 months (coded 1) and those who had not attempted suicide in the last 12 months (coded 0).

Participation in extramural activities

Participants' extent of participation in extramural activities, such as attendance at religious activities, was measured on the basis of responses to the following question: "How often do you attend religious services or activity in your community?" The response options were

- "Never,"
- "Rarely,"
- "1-2 times a month,"
- "Once a week or more."

Participants' responses were then dichotomised into two groups, namely those who indicated attending religious services or activities at least once a week (regular attendees) and others (irregular attendees).

Data analysis

Statistical analyses were performed using the STATA Version 10 (Stata Corporation, College Station, Texas, USA) statistical package. The option "robust cluster" for the procedure "logit" in Stata was used to take into account the complex sample design used in this study, particularly the fact that participants were nested in schools, which were the Primary sampling units. For categorical variables, cross-tabulations were used to determine associations between potential predictor variables and the outcome variable – the main reason for tooth-brushing. Group differences were tested using chi-square statistics. All statistical analyses were two-tailed and the level of statistical significance was set at 5%. A sequential multiple logistic regression analysis was carried out, using a backward deletion approach to determine the independent factors associated with reporting brushing mainly for social or cosmetic reasons. All subjects with missing data on variables of interest were excluded from the final analysis (using the listwise deletion method).

RESULTS

The participants were aged between 12 and 19 years, with a mean (\pm SD) age of 14.6 (\pm 1.6) years. Of the participants, 50% were females, 28.8% indicated that both parents were unemployed and only 27.2% had ever visited a dentist (55% of whom only had only visited a dentist when they were in pain). Of the study participants, 21.7% ($n = 457$) indicated they take sugary snacks or drinks at least four or more time a day and 14.0% ($n = 294$) are currently smoking. Furthermore, 17.7% ($n = 373$) indicated that they do not always brush daily, while only 28.6% ($n=603$) indicated that they always brush at least twice daily.

Table 1: Behavioral and socio-demographic correlates of brushing for social or cosmetic reasons

Characteristic	% brushing for cosmetic reasons	95% confidence interval	p-value
Brush twice daily			0.35
No	84.33 ($n = 1265$)	79.85 - 87.97	
Yes	86.31 ($n = 517$)	81.64 - 89.94	
Sugar frequency (≥ 4 times per day)			0.06
No	84.02 ($n = 1378$)	79.44 - 87.75	
Yes	88.11 ($n = 400$)	85.02 - 90.63	
Reason for dental visit			0.12
Never visited	86.45 ($n = 1251$)	82.12 - 89.87	
Visits mostly as a result of pain	81.61 ($n = 244$)	75.85 - 86.24	
Visits mainly for check-ups	84.71 ($n = 205$)	79.68 - 88.67	
Bleeding gum in the last 3 months			0.12
Rarely/Never	85.91 ($n = 1177$)	82.22 - 88.94	
Frequent/always	83.13 ($n = 601$)	77.71 - 87.44	
Binge-drinking			0.02
No	85.65 ($n = 1593$)	81.64 - 88.90	
Yes	79.95 ($n = 189$)	74.07 - 84.44	
Smoked cigarette in the last 30 days			0.01
No	86.36 ($n = 1545$)	82.39 - 89.55	
Yes	76.79 ($n = 225$)	68.55 - 83.40	
Suicide attempt			0.01
No	85.95 ($n = 1634$)	81.81 - 89.28	
Yes	75.00 ($n = 150$)	67.33 - 81.37	
Attendance of religious activities			0.06
Irregular	83.42 ($n = 916$)	79.07 - 87.02	
Regular (≥ 1 /week)	86.68 ($n = 846$)	82.65 - 89.89	
Type of dwelling			0.00
Informal	78.72 ($n = 233$)	72.37-83.93	
Formal	85.86 ($n = 1542$)	81.94-89.04	
Ethnicity/race			0.07
Non-Black	79.00 ($n = 173$)	69.45 - 86.15	
Black	85.65 ($n = 1600$)	81.80 - 88.80	
Gender			0.05
Male	83.1 ($n = 875$)	78.4 - 86.9	
Female	86.6 ($n = 908$)	82.6 - 89.9	
Highest level of education expected to complete			0.01
Less than high school	79.05 ($n = 249$)	68.99 - 86.48	
High school	78.75 ($n = 215$)	71.84 - 84.34	
More than High school	87.40 ($n = 1311$)	83.68 - 90.37	

For most of the adolescents, the main reason for brushing their teeth can be categorized as social or cosmetic (84.9%). Specifically, 36.6% brush principally so that their teeth will look nice, 28.9% brush because they like to have fresh breath and 19.3% brush because it makes their mouth feel clean. In a bivariate analysis, those who self-identified themselves as Black as compared to non-Black tended to be more likely to brush for cosmetic reasons (85.7% vs. 79%; $p=0.07$). Similarly, females tended to be more likely than males to brush for cosmetic reasons, rather than for preventive dental health reasons (86.6 vs.

Table 2: Multivariate model of factors associated with brushing for social or cosmetic reasons (n = 2059)

Characteristic	Odds ratio	95% CI	p-value
Sugar frequency (≥4 times per day)			
No	1.0		
Yes	1.48	1.03 - 2.14	0.04
Past suicide attempt			
No	1.0		
Yes	0.53	0.34 - 0.81	0.01
Type of dwelling			
Informal	1.0		
Formal	1.54	1.15 - 2.06	0.01
Past-month smoking			
No	1.0		
Yes	0.58	0.37 - 0.91	0.02

CI = Confidence interval

83.1; $p=0.05$). No significant association was found between adolescents' principal motive or reason for brushing their teeth and their parents' employment status. However, those who live in informal dwellings, current smokers, and those who reported past suicide attempts were less likely to brush for cosmetic reasons (Table 1). Those with high educational aspirations and those who take sugar frequently were more likely to be brushing mainly for social or cosmetic reasons.

Even after controlling for potential confounders in a multiple logistic regression model, being a current smoker and having attempted suicide remained independently associated with lower odds of brushing principally for cosmetic reasons. Living in a formal housing/dwelling (OR=1.54; 95% CI = 1.03 – 2.14) as opposed to an informal dwelling was associated with higher odds of brushing mainly for cosmetic reasons, as was reporting frequent daily sugar intake (OR=1.48; 1.03-2.14), as opposed to less frequent sugar intake (Table 2).

DISCUSSION

This study has demonstrated that social or cosmetic reasons are the principal motives for tooth-brushing in this rural population of South African adolescents and that psychosocial factors such as social disadvantage and past suicide attempts were significantly associated with lower odds of brushing for social reasons.

Unlike in previous studies,^{6,7} the principal motive for brushing was not significantly associated with brushing frequency in the current study population. The difference in findings may be related to the differences in the study cohort and/or differences in the methodological approaches used. For instance, a previous study in South Africa⁷ used a longitudinal approach, focusing on those who had not been brushing twice daily, while a UK study⁶ which also used a cross-sectional study design similar to the current study looked at a group of adolescents who, unlike the current cohort, mostly already brush twice daily. It is not surprising that the differences in the adolescents' outcome expectations or motivations did not translate to differences in brushing frequency in this resource-poor setting, as the ability to perform a behavior such as frequent tooth-brushing may conceivably be constrained by other factors, such as living conditions, which may actually

limit the adolescents' control over performing that behavior.¹⁹ Furthermore, the lack of association between the principal motives for brushing and brushing frequency may also be related to a generally low caries risk perception. This view is supported by the fact that the prevalence of dental caries among 12-year-olds and 15-year-olds has been reported to be lowest in this province (14.1 % and 28.4% respectively) as compared to the average for South Africa (36.9% and 51% respectively)²⁰. Nevertheless, a more controlled study would be needed to elucidate the relationship between brushing motives and brushing frequency among these adolescents further.

Adolescents who had attempted suicide were less likely to brush for cosmetic reasons. Brushing motivation may therefore be a reflection of the adolescents' perception of their self-image, as opposed to a reflection of their knowledge of the preventive effect of brushing and its benefits for oral health. Indeed, such a reflection of self-image and a need for immediate gratification, as opposed to long-term rewards (preventive dental health), are more salient to adolescents of this age. Those from lower social class were less likely to brush for social or cosmetic reasons. It is conceivable that some of those who are of low social class may be suffering lower self-esteem and therefore has negative perception of their self-image.

It is also conceivable that adolescent smokers would rather avoid dental health effect such as frequent bleeding gums, which is preventable by brushing, and not worry so much about the negative aesthetic effect (tooth discoloration), which they might have accepted as an inevitable consequence of cigarette smoking. Therefore they may report that they brush for dental health reasons rather than brush for cosmetic reasons. However, it is pertinent to note that, unlike in the current study, a similar study in the UK⁶ found that smokers were more likely to be brushing for cosmetic reasons. The differences in findings may be a reflection of the baseline levels of oral care in the different environments. Given the relatively high levels of oral care in the UK, adolescent smokers in the UK, unlike those in this rural setting, may well not have experienced frequent bleeding gums that would have been a cue to action, and thus would prioritize preventing the negative cosmetic effects of smoking through brushing in the UK over preventing the adverse dental health effects of smoking.

Consistent with the findings from Sweden,⁴ aesthetic or cosmetic reasons are the principal inducement for brushing even among those considered at high-risk for dental caries in the current study, namely those who take sugar four or more times daily. This may reflect the greater emphasis placed on the effect of brushing with toothpaste on the cosmetic appearance of teeth in several toothpaste advertisements than on the preventive dental health effect of the toothpaste used with toothbrushes. This may also partly explain why those who brush for cosmetic reasons are no more likely to brush more frequently than those who brush for preventive dental health reasons. Adolescents' cognitions or attitudes are indeed derived from social interactions and communication processes. Therefore toothpaste manufacturers who market these home care products to adolescents may need to pay more attention to including a message in their marketing campaigns that emphasizes the need for adolescents to reduce the daily frequency of sugar intake while brushing their teeth frequently.

The findings of this study should be interpreted within the limitations of the study. Firstly, as previously indicated, this is a cross-sectional study. Thus the order of events is unknown and the inferences that can be made on causality are limited. Secondly, although we used items from a previously validated questionnaire, the adolescents were provided only with closed-ended options from which to choose a reason for brushing. There may well be other reasons for which these adolescents brush that were not contained in the response options, and the options provided may not necessarily be mutually exclusive, i.e. adolescents may brush for all the reasons listed in the response options. Nevertheless, considering that our aim was to investigate the principal motive for brushing, we believe the selection of only one option is justified. Lastly, this study relied on self-reports and thus it is prone to reporting bias. In particular, adolescents may be more inclined to provide a socially desirable response. However, we do not believe this will significantly affect the conclusions reached in the current study. Moreover, we have used measures previously used in other studies, thus our findings are comparable with those of other studies. Despite these limitations, this study has provided useful information that can be used in designing future oral health education messages and to inform further studies.

CONCLUSIONS

The current study has demonstrated that the principal motive for tooth-brushing in the adolescent population that was studied in the rural, resource-poor Limpopo province in South Africa is cosmetic or social reasons rather than dental health reasons, even among those who are considered at high risk for dental caries. It therefore highlights the need to place more emphasis on messages to reduce frequent sugar intake in all marketing campaigns or educational messages aimed at promoting tooth-brushing among adolescents.

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