

Parent's self-reported tooth brushing and use of fluoridated toothpaste: Associations with their one-year-old child's preventive oral health behaviour

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Abstract

Objective: The aim of the study was to examine the tooth brushing frequency and use of fluoridated toothpaste of the mother and father were associated with the tooth brushing frequency and use of fluoridated toothpaste for their 1-year-old child.

Methods: This cross-sectional study is part of the FinnBrain Birth Cohort Study. Questionnaire data were obtained from 1672 mothers and 867 fathers on tooth brushing and use of fluoridated toothpaste, age, education, number of siblings and parity (when the child was 1-year-old). For 763 families (mother and father), data from both parents were available. Tooth brushing was dichotomized to at least twice daily (2× day) and less than 2× day, and use of fluoridated toothpaste for child to at least once daily and less than once daily. The association between brushing of child's teeth (both parents less than 2× day) and use of fluoridated toothpaste for the child (both parents less than once daily) with parent's own tooth brushing was modelled with logistic regression analyses adjusted for family-related variables (parents' age and education, number of older siblings) using odds ratios (OR) and 95% confidence intervals (CI).

Results: Families in which both parents brushed their own teeth less than 2× day were more likely to brush their child's teeth less than 2× day than families in which both parents brushed their own teeth 2× day (OR = 9.23; 95%CI = 5.42–15.69). The likelihood of not brushing the child's teeth 2× day was less strong when at least one of the parents brushed his/her own teeth 2× day (mother 2× day: OR = 1.97; 95%CI = 1.25–3.10; father 2× day: OR = 2.85; 95%CI = 1.51–5.40).

Conclusions: Less frequent tooth brushing of both mothers and fathers was strongly associated with less frequent tooth brushing of their child. When educating parents on child oral home care, parents' own home care and inclusion of fathers also need more attention.

KEYWORDS

children, oral health behaviour, parents, tooth brushing

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1 | INTRODUCTION

Caries is one of the most common chronic diseases of childhood¹ and a significant public health burden greatly reducing quality of life for those affected.^{2,3} It is a multifactorial disease caused by the interactions between host and fermentable carbohydrates from diet which may further result in a caries lesion.⁴ Since caries process is the ubiquitous metabolism in the biofilm, disruption of the biofilm by brushing with fluoridated toothpaste effectively prevents caries.^{4,5}

Early commencement of brushing twice daily is important to reduce the development of caries in childhood.^{6,7} Tooth brushing should be introduced as soon as the first deciduous teeth erupt (0.5–1 years old).⁸ The onset of tooth brushing at a younger age is associated with children having a greater tooth brushing frequency later.⁹ The oral health behaviour children learn in early life will predict their future behaviour.^{10,11} Parental health behaviour has a major impact on what kind of behaviour the child adopts, and the impact is greater in early childhood than in older age.^{12–14} Children acquire knowledge, attitudes and habits related to oral health mostly from their parents,¹⁵ as parents are their primary unit of socialization.¹⁶

Of the social determinants of health, factors related to social position, such as education, affect health behaviours such as the tooth brushing of parents.¹⁷ Lower social position is commonly associated with unfavourable tooth brushing behaviour.^{18–20} In addition, education together with tooth brushing behaviour appears to explain inequality in dental caries in Finnish adults.²¹ Thus, these social determinants of health, including also living conditions, can also affect whether child's teeth are brushed, and caries prevented. Consequently, the family in which the child is born may determine his/her oral health and lead to inequalities in it.²² A few studies have indicated that maternal tooth brushing behaviour is a strong predictor of children's brushing behaviour,^{22–27} but few studies have examined the role of fathers.²² Thus, there is a scarcity of studies in which the impact of both the mother and the father on children's brushing behaviour and role of family-related factors has been reported.^{22,28}

The aim of the study was to examine whether the tooth brushing frequency and use of fluoridated toothpaste of the mother and father were associated with the tooth brushing frequency and use of fluoridated toothpaste for their 1-year-old child when adjusted for factors related to the family. A secondary aim was to assess if parents reported similarly the frequency of brushing their child's teeth with special intention to identify those families in greatest need of oral health-promoting intervention. The study hypothesis was that the tooth brushing and use of fluoridated toothpaste of both parents were positively associated with brushing frequency and use of fluoridated toothpaste for their child's teeth.

2 | METHODS

This study is a secondary analysis of data obtained from the multidisciplinary FinnBrain Birth Cohort Study (www.finnbrain.fi). It studies prospectively the effects of environment and genes on child's brain

development and health.²⁹ Participants were recruited after ultrasonography appointments that were offered free of charge to every pregnant mother in Finland by municipal maternity clinics during the first trimester of their pregnancy (gestational week (gwk) 12) in the South-Western Hospital District and the Åland Islands in Finland in 2011–2015. The coverage of women and fathers of the children or partners of the mothers in this cohort population was close to 100% of the population attending the ultrasounds at gwk 12.^{29,30} The Ethics Committee of the Hospital District of Southwest Finland has approved the study protocol (14.6.2011 ETMK:57/180/2011 § 168). Of those informed about the study ($N = 5790$), a total of 3808 (66%) mothers and 2623 fathers or other partners of the mother who were expecting 3837 children (twins included) decided to participate. Of those who agreed to participate, 3095 (81.3%) mothers and 2011 (76.7%) fathers returned the baseline questionnaire and started the study.²⁹ The parents gave written informed consent on their own and on their child's behalf.

This study is based on the data collected when the children were 1-year-old, when tooth brushing and use of fluoridated toothpaste were asked for the first time. At this data collection point, 1677 mothers and 871 fathers returned the questionnaire. Those who had filled in the questionnaire, but not answered any of the questions relating to tooth brushing or use of fluoridated toothpaste, were excluded. We ended up with 1672 (54.0% of those who returned the baseline questionnaire and started the study) mothers with 1682 children, and 867 (43.1%) fathers with 872 children. Furthermore, we also conducted family-level analyses, and for those, the population was restricted to 763 (45.6%, 88.0%, respectively) mother–father pairs (with 763 children) in which both parents had filled in the questionnaire and answered any of the questions relating to tooth brushing and use of fluoridated toothpaste. Since we did not require all items having answers, in the analysis, numbers of parents varied between 751 and 763. Attrition analysis has been published before regarding overall loss in the FinnBrain Cohort study³¹; those who have dropped out of the study, had statistically significantly lower age and education and were more often male. Also, the mothers who participated in the study alone had lower education, higher age, and were less frequently married or in a relationship, than did the mothers whose child's father also participated in the study. To form a pairwise data, 914 mothers and 109 fathers whose partners did not participate, were excluded. Attrition analyses revealed that compared to participating pairs, mothers who participated without the father, had more children and lower education, but fathers who participated without the mother had higher education. No differences in age or tooth brushing and use of fluoridated toothpaste were observed.

Questions on the frequency of tooth brushing and the use of fluoridated toothpaste were asked with 7 response alternatives: 3–4 times per day, twice daily, once daily, 2–3 times per week, once a week, twice a month and seldom or never. All tooth brushing frequencies and parents' own use of fluoridated toothpaste were dichotomized as good (twice daily or more often) and poor (less than twice daily). Use of fluoridated toothpaste for the child was dichotomized as good (at least once daily) and poor (less than once daily).

TABLE 1 Distribution (%) of 763 mother–father pairs of 1-year-olds according to family-related and oral homecare variables in the FinnBrain Birth Cohort

Variable	Categories	Mothers	Fathers
Parity	Nullipara	59.6	-
Number of older siblings living in the household ^a	0	64.9	69.9
	1	25.1	21.1
	≥2	10.0	9.0
Education	Low	26.9	40.5
	Medium	30.4	28.9
	High	42.7	30.6
Age	<27	16.2	10.0
	27–34	63.6	56.1
	>34	20.2	33.9
Child's gender	Girl	48.2	48.2
Tooth brushing (child)	At least twice daily	59.8	57.2
Toothpaste (child)	At least daily	73.1	72.1
Tooth brushing (own)	At least twice daily	79.5	69.1
Toothpaste (own)	At least twice daily	79.1	68.8

^aReported by mother.

Dichotomizations were done according to Finnish Current Care Guidelines.⁸

For family's tooth brushing behaviour combined variables were created. The tooth brushing frequency of the mother and the father were trichotomized as follows: both good (both brush twice daily or more often), mixed responses (one parent brushes at least twice daily, other brushes less often), and both poor (both brush less than twice daily). Mother's and father's responses on the tooth brushing frequencies of the child were combined and categorized similarly: both good (both report child's tooth brushing at least twice daily), mixed responses (one parent reports child's tooth brushing at least twice daily, other less often), and both poor (both report child's tooth brushing less than twice daily).

Information about family-related variables was collected at the baseline (gwk 12). Family-related variables were based on the literature and availability in this study and included age and education level of the mother and father, the number of children in the household and information about whether the mother was a nullipara or not. Based on the percentage distribution, the parents' age was classified into three equal-sized categories: under 27 years old, 27–34 years old and over 34 years old. Education was chosen from different socio-economic variables due to its best predictive ability in this population.³² Education was categorized into three levels: 1 = low (high school/vocational ≤12 years), 2 = medium (polytechnics) and 3 = high (university degree or comparable). The categorization is based on both the number of years and the orientation of education according to the Finnish system, which has compulsory level (9 years), secondary level with vocational or general/academic (11–12 years) orientation, and further level with vocational (polytechnics) or academic (university degree or comparable) orientation.

Two logistic regression analyses were conducted for the brushing frequency of the child's teeth (both parents less than twice daily = 1) and use of fluoridated toothpaste for the child (both parents less

than once daily = 1) adjusting for the family's sociodemographic variables and the gender of the child. The dependent variables were brushing frequency of the child's teeth and use of fluoridated toothpaste for the child, and independent variable was combined tooth brushing of the parents. Independent variable was categorized into four groups (both good, mother good and father poor, father good and mother poor, both poor). Of the dependent variables, age was categorized into <27, 27–34, >34 years, number of other children as 0, 1, 2+ and parents' education as both low, one high/other low, both high (high >12 years of education, low ≤12 years of education). Information about the parity and parent's own use of fluoridated toothpaste was not included due to multicollinearity with number of children and parents' tooth brushing. Regression analyses were informed by Directed acyclic graphs, which are provided as Figure S1.

The statistical analyses were conducted using IBM SPSS Statistics for Windows, version 24.0. Bivariate associations between frequencies of tooth brushing and use of fluoridated toothpaste for the parent's own and their child's teeth and the family-related factors, also for combined tooth brushing variables, were evaluated using cross-tabulations and Pearson chi-squared tests. The Wilcoxon signed-rank test was used when studying whether mothers reported the frequency of brushing their child's teeth differently than fathers.

Results of logistic regression analyses were expressed as odds ratios (OR) and their 95% confidence intervals (95% CI).

3 | RESULTS

The sociodemographic characteristics of the parents of 1-year-olds are shown in Table 1. The average age of the mothers was 30.8 years (SD: 4.3) and fathers 32.8 years (SD: 5.2). They had altogether 763 1-year-olds. Of the parent's, less than 60% reported brushing their children's teeth as recommended.

Table 2 shows the frequencies of tooth brushing for the parent's own and their child's teeth according to the use of fluoridated toothpaste, brushing of child's teeth and family-related variables. Parents who brushed their own teeth twice daily were more likely to brush their child's teeth twice daily. In addition, younger mothers and mothers with fewer children brushed their 1-year-old child's teeth more often than older mothers with more children. In contrast to the parent's own tooth brushing frequency, the parent's education was not statistically significantly associated with child's tooth brushing frequency.

Table 3 presents results on those families in which both mother and father participated to the study. It shows the association between combined tooth brushing frequencies of the parents' own teeth and that of the teeth of their 1-year-old child. In the families in which both parents brushed their own teeth twice daily still almost a quarter of the children's teeth were not brushed as recommended. More than two-thirds of parents, who brushed their own teeth less often than twice daily, did not brush their child's teeth as recommended.

According to logistic regression analyses (Table 4), families in which both parents brushed their own teeth less than twice daily were more likely to brush their child's teeth less than twice daily, than families in which both parents brushed their own teeth twice

daily. Although both mothers' and fathers' less frequent tooth brushing were associated with less frequent tooth brushing for the child, there was a stronger effect for mothers. Families in which both parents brushed their own teeth less than twice daily were more likely to use fluoridated toothpaste for their child's teeth less than once daily, than families in which both parents brushed their own teeth twice daily. However, the confidence intervals for this association included 1.

According to the Wilcoxon signed-rank test, parents' reports about how often the teeth of their child are brushed differed statistically significantly from each other ($p = .001$). Most of the parents (76.1%) reported the tooth brushing frequency for their child similarly. However, 13.5% of fathers reported brushing of their child's teeth more frequently than the mothers, while 9.1% of the mothers reported more frequent brushing of child's teeth than the fathers.

4 | DISCUSSION

Less frequent tooth brushing of both mothers and fathers was strongly associated with less frequent tooth brushing of their 1-year-olds when taking into account family characteristics. In families where only one of the parents brushed less frequently, mother's

TABLE 2 Percentages (%) of tooth brushing frequencies of their own and their child's teeth among 763 mothers and 763 fathers of 763 one-year-olds according to sociodemographic variables and tooth brushing behaviour in the FinnBrain Birth Cohort

Variable	Categories	Brushing own teeth at least twice daily		Brushing child's teeth at least twice daily	
		Mothers	Fathers	Mothers	Fathers
Parity	Nullipara	79.7		64.8*	
	Multipara	79.3		54.2	
Number of older siblings living in the household ^a	0	79.7	66.9	64.8*	59.8*
	1	79.3	71.0	60.7	57.7
	≥2	75.8	73.0	40.3	42.2
Education	Low	71.4*	60.3*	59.4	57.6
	Medium	79.2	69.4	61.4	57.5
	High	84.9	78.6	60.7	58.2
Age	<27	65.6*	57.3	66.9*	62.7*
	27–34	82.1	70.0	60.8	60.8
	>34	82.9	71.0	52.3	49.6
Child's gender	Girl	79.0	65.1*	58.6	55.7
	Boy	79.9	72.8	60.8	58.5
Frequency of brushing the child's teeth	At least twice daily	88.7*	79.7*		
	Less often	65.7	54.6		
Use of fluoridated toothpaste for the child	At least daily	81.5*	72.3*	69.4*	69.2*
	Less often	75.6	60.2	33.2	26.1
Use of fluoridated toothpaste by a parent	At least twice daily	99.7*	99.8*	66.9*	66.8*
	Less often	2.5	1.3	32.7	36.9

Note: p -values for chi-squared tests within the groups of mothers and fathers: * $p < .05$.

^aReported by mother.

TABLE 3 Percentages (%) of parents' combined frequencies on brushing the teeth of their 1-year-old child according to their own tooth brushing behaviour in the FinnBrain Birth Cohort Study (chi-squared test $p < .001$)

Frequency of brushing their own teeth	n	Frequency of brushing the child's teeth by both parents		
		Both at least twice daily	Only one at least twice daily	Neither twice daily
N		379	127	245
Both at least twice daily	464	60.6	16.0	23.5
Only one at least twice daily	189	43.4	20.1	36.5
Neither twice daily	98	16.3	15.3	68.4
All	751	50.5	16.9	32.6

TABLE 4 Logistic regression analyses for the brushing frequency of the child's teeth (both parents less than twice daily = 1) and use of fluoridated toothpaste (both parents less than once daily = 1) adjusting for the family's sociodemographic variables and the gender of the child ($n = 763$ children)

Categories	Tooth brushing			Use of fluoridated toothpaste		
	Model 1 ($R^2 = 0.181$)			Model 2 ($R^2 = 0.085$)		
	p	OR	95% CI	p	OR	95% CI
Gender						
Boy	0.794	1.05	0.74–1.49	0.795	0.95	0.66–1.37
Number of other children (ref. 0)						
1	0.910	1.02	0.68–1.54	0.248	0.77	0.50–1.20
2+	0.016	1.98	1.14–3.45	0.674	1.13	0.64–2.02
Mother's age (ref. <27)						
27–34	0.118	1.65	0.88–3.11	0.485	0.80	0.43–1.49
>34	0.038	2.24	1.05–4.80	0.733	1.14	0.54–2.43
Father's age (ref. <27)						
27–34	0.831	0.92	0.45–1.91	0.356	1.44	0.67–3.12
>34	0.753	1.14	0.52–2.50	0.048	2.34	1.01–5.43
Parents' education (ref. Both low)						
One high /other low	0.331	1.31	0.76–2.24	0.603	0.86	0.50–1.50
Both high	0.694	1.11	0.66–1.87	0.288	0.75	0.44–1.27
Parents' tooth brushing (ref. Both good)						
Father poor, mother good	0.003	1.97	1.25–3.10	0.169	1.40	0.87–2.25
Mother poor, father good	0.001	2.85	1.51–5.40	0.233	1.53	0.76–3.08
Both poor	<0.001	9.23	5.42–15.69	0.113	1.54	0.90–2.63

Note: Good = Brushing at least twice daily, Poor = Brushing less than twice daily.

Model 1: Dependent variable 'Both parents report brushing child's teeth less than twice daily' = 1.

Model 2: Dependent variable: 'Both parents report use of fluoridated toothpaste for the child less than once daily' = 1.

less frequent tooth brushing tended to be more strongly associated with the likelihood of not brushing the child's teeth twice daily than father's less frequent tooth brushing.

One strength of this study was the large sample. Hence, the findings can be generalized for families of small children in Finland. The study population also included fathers, whose effect on the oral home care of children has been rarely studied. Moreover, there are very few representative studies on as young children as in this

study. This study also had limitations. Highly educated parents were to some extent overrepresented compared to the Finnish population.³³ This could lead to better outcomes of tooth brushing frequencies of parents and their children. On the other hand, in this study more than three quarters of mothers and around two-third of fathers brushed their teeth at least twice daily. The findings are similar among women but slightly better among men than in a national study among women and men of a similar age in Finland.³⁴ Another

limitation was that the data were collected using self-reported questionnaires which could lead to socially acceptable answers. The number of fathers was lower than the number of mothers, possibly due to the recruitment during ultrasonography visits. As we do not have information if the mothers participated these visits alone or with the father/partner, the percentage of the fathers agreeing to participate cannot be calculated. Of the mothers 97.3% reported in the baseline questionnaire that they live with the child's father or other male partner. There was only one two-female couple in the data, and the findings are therefore limited to heterosexual couples. Thus, the results cannot be generalized to other populations where family compositions may be different. Finally, we cannot draw causal conclusions due to the cross-sectional nature of the study. The topic requires further research and especially longitudinal studies.

Tooth brushing behaviours were not identical within the family. One quarter of the parents had a different tooth brushing frequency from each other and one sixth of the parents gave a different report on the tooth brushing frequency of their child. Fathers reported a higher tooth brushing frequency of the child's teeth than the mothers did. Often mothers are the main caregivers of a 1-year-old and some fathers may have not known the exact tooth brushing frequency for their child. If this is the case, it could have reduced the strength of the association between the parents' own and child's tooth brushing. Probably for the same reason, the tooth brushing behaviour of the mother was more strongly associated with the oral homecare of their one-year-old child than that of the father's behaviour.

For the use of fluoridated toothpaste, similar associations were not observed. This may be due to different cut-off points for good and poor behaviour as the recommendations are different. In logistic regression when outcomes are quite prevalent, OR's are greater than RR's, which should be kept in mind when interpreting the results. Unfortunately, we could not identify studies in which the impact of both parent's role on young children's tooth brushing had been considered. Instead, the role of the mother alone has been extensively studied and shown to be significant for brushing the teeth of a small child.^{23-25,27,35-37}

Parents' tooth brushing behaviour and age together with parity had a bivariate association with oral homecare of the 1-year-olds. However, the parents' education and the gender of the child was not shown to have an impact on oral homecare of the 1-year-olds. The bivariate associations between tooth brushing behaviour and the homecare of 1-year-olds, as well as the lack of association between parents' education and oral homecare of one-year-olds found in this study, are consistent with findings of previous studies.^{35,38} Contradictory findings to our study have been reported for parity, gender of the child and the tooth brushing behaviour of children.^{26,38-40} However, when considering these family-related issues parents' own tooth brushing had the strongest association with the oral homecare of the children.

5 | CONCLUSION

Less frequent tooth brushing of both mothers and fathers was strongly associated with less frequent tooth brushing of their

child. The important role of fathers in brushing their child's teeth is a novel finding. When educating parents on child oral home care, parents' own home care and inclusion of fathers also need more attention.

CONFLICT OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses or interpretation of data; in the writing of the manuscript or in the decision to publish the results.

INFORMED CONSENT

Informed consent was obtained from all participants involved in the study.

DATA AVAILABILITY STATEMENT

Data are not available due to restrictions related to privacy and ethical issues.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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