



An Empirical Analysis of Impact of Parent's Attitude on Preschool Children's Oral Health: A Study on Turkey

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Abstract

Early childhood oral health is strongly influenced by parental knowledge, supervision, preventive practices, and access to dental care. This study examined parental attitudes and oral-hygiene practices among preschool children attending paediatric outpatient clinics in Istanbul, Türkiye. A cross-sectional survey of 203 parents assessed demographic characteristics, toothbrushing frequency, parental supervision, fluoride toothpaste use, dental attendance, information sources, and perceived barriers. Data were analysed using descriptive statistics, Pearson's correlation, multiple linear regression, and binary logistic regression. The findings showed that 41.9% of children brushed twice daily, 45.8% were always supervised during brushing, and 61.1% used fluoride toothpaste. Nearly half of the children had never visited a dentist, while emergency visits exceeded preventive attendance. Parental supervision showed the strongest correlation with brushing frequency, while parental education was positively associated with brushing, fluoride use, and dental attendance. In multivariable analysis, parental education, supervision, and fluoride use significantly predicted brushing frequency, explaining 41% of the variance. Higher parental education also more than doubled the odds of dental attendance, while supervision and fluoride use remained significant predictors. These findings emphasise the importance of strengthening parental education, active supervision, appropriate fluoride use, and preventive dental attendance within routine paediatric healthcare.

Keywords: Oral hygiene, preschool children, parental education, supervision, fluoride use, dental visits.

1. Introduction

Oral care is an essential aspect of overall well-being and health, especially in childhood. The preschool years are an important developmental window within which basic lifestyle and health-related habits are formed, including oral hygiene habits. Dental caries, gingival diseases and other oral health problems continue to be global health issues, most notably affecting children in low- and middle-income countries. Early childhood caries (ECC) is one of the most common chronic oral diseases in early childhood and a significant public health problem. World Health Organisation diagnostic criteria show that ECC is common around the world and that prevention is a pressing need in the preschool period (Uribe et al., 2021).

If dental caries do not receive proper treatment, these symptoms may lead to dental issues that interfere with the function of the mouth, nutrition, speech development, self-esteem, quality of life, and general well-being of children. In a biological sense, dental caries is a process that takes place, consisting of dental biofilm, fermentable carbohydrates, susceptible tooth surfaces, and repeated acidic challenges. Dietary carbohydrates are metabolised by acidogenic microorganisms and produce acids that can cause enamel to demineralise; if the amount of mineral loss is greater than the remineralisation, the dental tissues will be destroyed over time. Preventing caries is thus critical in the early stages of the caries process before it becomes irreversible (Schmoeckel et al., 2020).

The preschool child can often not maintain good oral hygiene on his own, and parents have a primary role in influencing oral-health behaviours. They initiate toothbrushing, supervise toothbrushing every day, choose oral-care products, influence their own kids' eating habits, and make it easier to obtain dental care. They influence children's adoption of effective oral-hygiene practices through their knowledge, beliefs and behaviours. Results of home-based interventions suggest that enhanced parental involvement in the children's toothbrushing behaviours can help strengthen preventive behaviours and lower the risk of caries (Aliakbari et al., 2021).

Parental attitudes and practices are thus good determinants of children's oral-health outcomes. Consistently good preventive practices, such as parents brushing of teeth by the parents, increase the chance of good oral health in children, while poor preventive practices, including lack of knowledge, incorrect information and inconsistent brushing, increase the risk of poor oral health. The literature has revealed significant differences in parents' knowledge, attitudes, and practices regarding ECC; therefore, there is a need for targeted parental education (Al-Jaber et al., 2022). However, knowledge does not necessarily lead to proper preventive processes, such as the frequency of toothbrushing, use of fluoride, dietary control, dental attendance, and supervision, which rely significantly on caregiver decision-making (Nassar et al., 2022).

Fluoride is an important biological and preventive aspect of childhood dental care. It has anti-caries effects such as reducing the demineralisation of enamel and promoting the remineralisation of early carious lesions. Fluoride toothpaste thus can have both a mechanical effect in removing plaque and a chemical effect in preventing further caries, and professionally applied fluoride might offer extra protection for susceptible children. A randomised controlled trial that included parental toothbrushing training and fluoride varnish is evidence of the benefit of combining caregiver education, fluoride, and preventive measures (Jiang et al., 2014). Preventive benefits are thus maximised through the appropriate use of fluoride, if parents understand this.

Parental knowledge is not confined to fluoride. Toothbrushing frequency, supervision, attention to preventive recommendations, and when professional dental care is sought are up to the parent's decision. Studies among parents of preschool children show that there are important implications for oral-health promotion in terms of their oral-health knowledge, attitudes, and behaviours (Naidu & Nunn, 2020). Parental perspectives on the significance of the primary teeth are of particular importance as they have an

impact on mastication, speech, normal development and space maintenance for the permanent teeth. Oral health and ECC prevention education to caregivers is therefore needed on an ongoing basis (Saheb et al., 2023).

Oral health in preschoolers is still a public-health issue in Türkiye. Preventive dental services may not be being fully utilised, and there is significant variation in parental awareness and practice of the recommendations for oral hygiene. Additional barriers to oral health are potentially added through cultural influences, socioeconomic differences, the lack of health-literacy and the lack of embedding oral health education within child healthcare. Pediatric outpatient clinics offer an important setting because parents regularly visit these clinics, even if they are not regular attenders for preventive dental care. Child health care providers can remind children to brush their teeth, to use the correct amount of fluoride, to limit sugary foods, to go to the dentist early if they are concerned about oral disease, and to support the child's brushing and fluoridation practices. There is supporting evidence about the knowledge and practices of pediatricians and the need for more integration of oral-health promotion into routine pediatric care (Garrocho-Rangel et al., 2022).

Prior studies in Türkiye have concentrated on dental-clinic populations or the dental surveys conducted in school settings, with little research available on parent behaviours outside of dental care settings. Parents visiting paediatric outpatient clinics may be more focused on overall health issues instead of dental concerns, more likely to seek advice from paediatricians instead of dentists, or may have financial, time, or awareness constraints and/or child resistance to toothbrushing. While families might seek dental care when pain or disease becomes apparent, regular check-ups for preventive care are also important for early detection of disease and professional preventive intervention. Preventive dental attendance can be significantly limited by accessibility, parental perceptions, financial constraints, and behavioural challenges (Zhou et al., 2021).

The relationships under study are investigated in the setting of the largest metropolitan city in Turkey, Istanbul, where the socio-economic and health care environment is diverse. In this study, the researchers investigated the oral-hygiene attitudes and practices of parents in relation to their preschool children who are followed in the paediatric outpatient clinic in Istanbul. This original study examines a sample of 203 parents to determine attitudes about toothbrushing, parental supervision, usage of fluoride toothpaste, dental visits, sources of information and perceived barriers. This study aims to explain why biological and preventive factors, as well as parental behaviours, are associated with oral-health practices in preschool children. It aims to evaluate parent oral hygiene practices and attitudes, dental visits, sources of oral health information, demographic factors on preventive practices, and barriers to effective oral hygiene.

2. Literature Review

ECC is one of the most common diseases affecting preschool-age children and is a disease that can rapidly develop if preventive measures are missing. Biological, behavioural, dietary and environmental factors affect the condition, such as frequent exposure to sugar, poor plaque control, low fluoride, and late attendance at the dentist. A systematic review and meta-analysis of risk predictors found that the development of ECCs is multifactorial and is heavily influenced by modifiable behavioural and household factors, which highlights the need to identify risks at an early stage and to intervene to prevent the development of ECCs (Lam et al., 2022).

The preschool years are a critical time when parents and other adults are the primary influences shaping oral-health behaviours among young children, as they are typically relied upon by young children for toothbrushing, toothbrushing products, feeding behaviours and access to professional dental care. Parental oral health literacy is associated with how well other people in the care-taking role will understand the

advice for prevention and put it into practice in their everyday lives. This can be explained by the fact that higher literacy has been linked to better oral-health behaviours and a reduction in their caries experience among preschool children, emphasising the need to increase parent/caregiver awareness of preventive oral health care (Adil et al., 2020).

More external social and environmental factors influence parental behaviour. Familial factors like education, resources, cultural habits, health care access and parental beliefs may impact children's brushing habits, dietary exposures, fluoride use, and dental attendance. From these factors, oral-health behaviours should be viewed as part of a child's socio-economic and family environment. In a systematic scoping review of the literature examining the determinants of children's oral health outcomes, including caregiver characteristics, the researchers identified that caregiver knowledge, oral-health behaviours and sociological factors were important factors and suggested that family-centred and context-specific approaches to prevention should be implemented (Andrew et al., 2021).

Another factor which is important for determining preschool oral health is socioeconomic conditions. Lower SES families may lack access to preventive dental care services, less access to professional oral-health information and more challenges in maintaining recommended preventive oral-health routines. Variations in education and/or household resources can also influence the purchase and use of appropriate oral care products. Inequalities may affect exposure to oral-health risks, and the capacity of families to consistently follow preventive recommendations. Findings from the 3–5-year age group indicate that social and economic disparities have a significant impact on the experience of ECC and must be considered when designing initiatives that aim to prevent ECC on a population level (Du et al., 2024).

Especially during preschool, parents need to supervise their children's brushing since they often do not have the dexterity or routine to properly brush their teeth. In addition to reminding children to brush their teeth, parents should ensure that they brush for the right amount of time, technique, frequency and type of oral-care products. Thus, supervision itself is a direct behavioural process that could allow the parental knowledge to be applied to effective oral hygiene practices in the home. Findings from maternal perceptions and experiences of helping preschool-aged children with toothbrushing highlight that supervision may be impacted by child resistance, parental confidence and routine within the household and practical issues; therefore, effective interventions should focus on both knowledge and real-world behaviours (Peralta et al., 2024).

Oral-health education is one of the critical approaches to enhancing preventive practices with preschool children and their families. Appropriately designed educational programs can enhance toothbrushing, fluoride use, dietary habits, and the value of preventive dental care visits. There are times when education is more useful when it offers caregivers hands-on training that can be implemented in their daily lives, instead of just being a new way to add to their list of theories. There are recent supporting studies that demonstrated the effectiveness of oral-health education in increasing awareness of hygiene among preschool children and their parents, which implied that incorporating structured oral-health education in child-health and community services could be beneficial (Liu et al., 2025).

Fluoride is still one of the most effective evidence-based dental caries preventive agents. It is of special biological relevance because it has a protective effect against mineral loss on acidic challenges and promotes remineralisation of early enamel lesions, leading to enhanced resistance to subsequent cariogenic attacks. Inappropriate use and selection of the fluoride product and its topical application may be especially important in young children, as fluoride can be provided in toothpaste, topical varnishes, gels, or other preparations. This also creates a greater link between parenting's oral-care habits and the clinically successful preventive therapy. A

systematic review with network meta-analysis showed the efficacy of topical fluoride interventions in preventing ECC and strengthened the importance of multistakeholder childhood caries prevention strategies that include these interventions (Manchanda et al., 2022).

Parental knowledge is not the only link to children's oral health. Parents can impact the success of children's outcomes by the behaviours they engage in every day, such as supervising children's brushing, choosing a fluoride toothpaste, eating habits, scheduling dental visits, and reinforcing preventive care. Together, these behaviours help to shape the real-world effectiveness of evidence-based preventative recommendations to protect against oral disease. Results of the literature search revealed evidence among preschool children (aged 3–6 years) that parental oral-health literacy and oral-health behaviour play an important role in influencing oral-health status, suggesting that interventions targeting parents can have a positive impact on preventive oral-health behaviour and preschool-child outcomes (Wu et al., 2024).

The literature reviewed overall indicates that the interaction between parental knowledge and supervision, socio-economic condition, oral health education, preventive behaviours, and fluoride exposure are all factors that influence preschool oral health. Overall, the evidence suggests there is a need to consider, as well as the biologically and clinically effective preventive strategies, the behavioural determinants in designing the interventions for ECC. The results of these findings back up an overall approach of merging caregiver education with the clinically effective preventive approach. They also believe that it is not too early to explore parental behaviours in paediatric outpatient care, where families may be provided with preventive counselling, fluoride advice and early referral before the onset of more advanced oral disease.

3. Research Methodology

3.1 Research Design

The study used a cross-sectional quantitative survey design to examine the attitudes, knowledge and practices of parents towards the oral health of preschool children in Türkiye. The design allowed for the evaluation of descriptive and preventive oral hygiene behaviours, fluoride use, dental care utilisation, sources of information, and perceived barriers to oral health care both at the same time and at the same place. The research focused on finding out if there was a relationship between parental education, supervision and use of fluoride and the frequency that the child brushed their teeth, and if the child used dental services. The cross-sectional method was suitable for determining the relationship between oral-health promoting behaviours and factors among preschool children in outpatient care.

3.2 Study Setting and Population

The study population included parents/primary caregivers of preschool children aged 2-6 years who attended at paediatric outpatient clinics in Istanbul, Türkiye. Paediatric outpatient clinics were chosen because they offer a way to access families that might use general health care services on a regular basis but may not regularly attend a dental clinic for preventive dentistry. This setting thus allowed the exploration of oral-health behaviour in a wider paediatric care setting.

Parents were recruited during regular clinic visits; a convenience sampling method was used. To be eligible, participants had to be the primary caregiver of a preschool-aged child and must provide informed consent. Children with chronic illnesses that may significantly affect their normal oral care were excluded. 203 parents participated in the final sample.

3.3 Data Collection Instrument

Data were gathered by a structured questionnaire based on previous literature <http://eijbps.com/index.php/bps>

emerging from the oral-health field and previously identified survey domains. The instrument aimed to collect behavioural, preventive, health services utilisation, and parental factors related to preschool oral health. It consisted of four main components. The first part obtained demographic data such as parental age, parental gender, level of education, parental employment status, child age, child gender and birth order. The second area measured oral hygiene habits, such as how often participants brushed their teeth, if their parents supervised their toothbrushing and flossing habits, whether they used fluoride toothpaste or not, whether they flossed or not, and whether they used mouthwash or not. The third was dental-care utilisation (previously seen at dentists, had never been to a dentist, and whether the visits were for prevention or pain or caries). The fourth reviewed parents' knowledge and attitudes to oral health and major sources of information about oral health, and what makes oral health difficult for parents to maintain.

The study included a specific preventive exposure - the use of fluoride toothpaste - instead of a general hygiene exposure. Dental attendance was also reframed as preventive versus problem-oriented use and a measure of whether there was a relationship between parental practices and proactive oral health care.

3.4 Operationalisation of Study Variables

Child brushing frequency was the main outcome variable in the first analytical model, which was measured on an ordinal scale from 0 (no brushing) to >2 (more than twice daily). Brushing frequency was handled in number for regression analysis to compare the differences in brushing frequency correlated to the parent and preventive characteristics. Dental attendance was the second principal dependent variable, which was dichotomized: ever attended a dentist and never attended a dentist.

Parental age, child age, parental education, parental supervision, and fluoride toothpaste use were considered as the main independent variables. Parental education separated parents who had a primary/secondary level education from those who had university level or more. Supervision was defined as always, sometimes or never the parent was present while the child brushed its teeth and was reported as a level of parental involvement. Fluoride exposure was defined as using fluoride-containing versus non-fluoride toothpaste.

Other descriptive variables were child gender, reason for dental attendance, perceived importance of oral hygiene, sources of information, and reported barriers to using the product including child resistance, lack of time, cost, and lack of awareness.

Due to the lack of direct clinical data (dmft/dmfs, plaque scores, salivary markers, microbiological measurements), this study did not make a claim of the direct measurement of caries severity or biological disease activity. Rather, preventive behaviors and dental-care utilization were evaluated as clinically relevant indicators that were associated with early childhood oral-health management.

3.5 Data Collection Procedure

During the usual check-up visits of participating pediatric outpatient clinics, parents were recruited. Following eligibility criteria and informed consent, the questionnaire was completed with face-to-face interviews conducted by trained research assistants. The literature indicated that this could be used in the context of minimizing literacy related problems, ensuring that the questions are interpreted in the same way, and maximising the completeness of the responses. The interviews took about 15-20 minutes each.

The most important modifiable behaviours examined in the study were given particular attention, such as toothbrushing frequency, supervision of toothbrushing, use of fluoride toothpaste, attendance at preventive dental appointments and barriers to seeking dental care.

3.6 Preventive and Clinical Oral-Health Assessment

Preventive oral-health practices were assessed by the self-reported use of toothbrushing, parental supervision, fluoride toothpaste, flossing, using mouthwash, and attendance at the dentist. Fluoride use was added as a separate preventive factor, due to its proven importance in caries prevention. Attendance for dental services was further classified based on the purpose of visiting the dentist (preventive or emergency), including pain or dental caries.

The analytical framework thus identified three dimensions that are related to: the influence of parents, home-based preventive behaviour, and the use of professional care for dental problems. This allowed us to examine the association of parental education and supervision not only with daily hygiene behaviours, but also with fluoride-based prevention and utilisation of professional dental services.

3.7 Statistical Analysis

Descriptive and inferential statistical procedures were used to analyse the data. Means, standard deviations and ranges were used for continuous variables and frequencies and percentages were used for categorical variables. Descriptive analysis was employed to describe the sample and to reveal the main trends in oral-hygiene behaviour, usage of fluoride toothpaste, supervision, dental attendance, information sources and perceived barriers.

Pearson's correlation analysis was performed to assess correlations between parental age, child age, frequency of oral hygiene, parental education, dental visits, fluoride use and parental supervision. The correlation coefficients were interpreted based on the direction and magnitude of the coefficient and the statistical significance was determined at the traditional $p < 0.05$ level. The highest correlation found was between parental supervision and brushing frequency.

A multiple linear regression model was used to determine which factors predicted brushing frequency. Parental age, child age, parental education, parental supervision and fluoride toothpaste use were the independent variables included in the model. The coefficient of determination (R^2), adjusted R^2 , F statistic, regression coefficients, standard errors, t values, and associated p values were used for evaluating the model performance.

A binary logistic regression model was used to determine factors associated with whether the child had ever attended a dentist. The same major predictors (parental age, child age, parental education, supervision, and fluoride use) were used in the model. Odds ratios with 95% confidence intervals and p-values were used to present the results. The overall model significance was assessed by the likelihood-ratio chi-square statistic and reported model-fit measure.

These complementary models enabled the researcher to differentiate between determinants of routine home oral-hygiene behaviour and determinants of professional dental-care utilisation, and to assess the independent contribution of the three-parent oral-hygiene determinants after adjusting for the age of the parent and child.

3.8 Research Objectives and Analytical Alignment

The methodological framework was established to test the oral-hygiene practices of parents, dental-visit patterns, sources of oral-health information, parental attitudes, the link of the parental characteristics to the children's oral-health practices, and the barriers to effective preventive care.

The regression analyses specifically focused on whether parental education, supervision and fluoride use accounted for any variance in brushing frequency and dental attendance. This analytical approach enhanced the study's emphasis on the modifiable preventive determinants that might be targeted through parental counselling, pediatric health care interventions and community oral-health

interventions.

3.9 Ethical Considerations

Institutional review board approval was given before data collection. Subjects were free to participate, and informed consent was obtained from all parents/carers who participated. The participants were told that their answers would be kept confidential and would be kept for research purposes only. The analytical data included no personally identifying information, and participants could refuse to participate without it impacting the health care services they or their child received.

4. Results

The results are presented using descriptive statistics, correlation analysis, multiple linear regression, and binary logistic regression. The original manuscript contains five numerical tables but no embedded figure files; therefore, the four figures below were generated directly from the reported values without changing the underlying results.

4.1 Descriptive Characteristics and Oral-Health Practices

A total of 203 parents participated in the study. The mean parental age was 34.1 ± 6.2 years, and most respondents were mothers (77.8%). Nearly three-quarters of parents (74.9%) had university-level education or higher, while 60.1% were employed. The mean age of children was 4.2 ± 1.1 years, with a nearly balanced gender distribution. More than half of the children (58.1%) were first-born.

Table 1. Descriptive characteristics, oral-hygiene practices, dental-care utilisation, and parental attitudes

Variable	Category/Range	n (%) or Mean $\pm$ SD
Parent age (years)	Continuous	34.1 ± 6.2
Parent gender	Mother	158 (77.8%)
	Father	45 (22.2%)
Parental education	Primary/Secondary	51 (25.1%)
	University or higher	152 (74.9%)
Employment status	Employed	122 (60.1%)
	Homemaker/Unemployed	81 (39.9%)
Child age (years)	Continuous	4.2 ± 1.1
Child gender	Male	106 (52.2%)
	Female	97 (47.8%)
Birth order	First child	118 (58.1%)
	Later born	85 (41.9%)
Brushing frequency	Never	24 (11.8%)
	Once daily	77 (37.9%)
	Twice daily	85 (41.9%)
	> Twice daily	17 (8.4%)
Parental	Always	93 (45.8%)

supervision	Sometimes	75 (36.9%)
	Never	35 (17.3%)
Toothpaste type	Fluoride	124 (61.1%)
	Non-fluoride	79 (38.9%)
Flossing	Yes	19 (9.4%)
	No	184 (90.6%)
Mouthwash use	Yes	30 (14.8%)
	No	173 (85.2%)
Dental visits	Ever visited	110 (54.2%)
	Never visited	93 (45.8%)
Reason for visit	Preventive	45 (22.2%)
	Emergency (pain/caries)	65 (32.0%)
Source of information	Dentist	83 (40.9%)
	Pediatrician	57 (28.1%)
	Internet/Social media	39 (19.2%)
	Family/Friends	24 (11.8%)
Importance of oral hygiene	Very important	136 (67.0%)
	Moderately important	51 (25.1%)
	Not important	16 (7.9%)
Reported barriers	Child resistance	69 (34.0%)
	Lack of time	57 (28.1%)
	Cost concerns	37 (18.2%)
	Lack of awareness	40 (19.7%)

Brushing frequency averaged approximately 1.5 times per day; 41.9% of children brushed twice daily, whereas 11.8% never brushed. Parental supervision was reported as “always” by 45.8% of parents, while 17.3% reported never supervising. Fluoride toothpaste was used by 61.1% of families, whereas flossing (9.4%) and mouthwash use (14.8%) were uncommon. Figure 1 illustrates the predominance of twice-daily and once-daily brushing compared with the smaller proportions of children who never brushed or brushed more than twice daily.

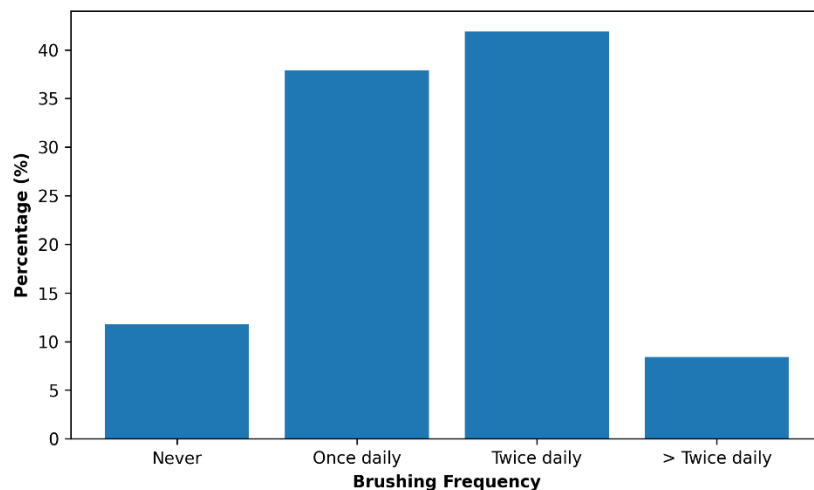


Figure 1. Distribution of brushing frequency among preschool children

Parental supervision was also a prominent component of children's oral hygiene routines, with 45.8% of respondents reporting that they always supervised brushing. Figure 2 shows the distribution of parental supervision, with “always” supervision representing the largest category.

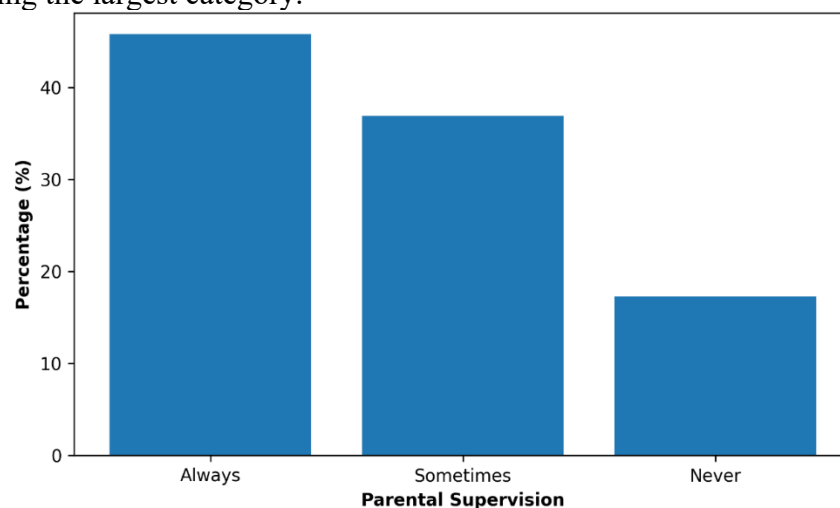


Figure 2. Distribution of parental supervision during toothbrushing

4.2 Range and Distribution of Study Variables

Table 2 summarizes the observed ranges and categorical distributions of the principal study variables. Parent age ranged from 22 to 52 years, whereas child age ranged from 2 to 6 years. Brushing frequency was coded from 0 to 3+, and perceived importance of oral hygiene was assessed on a three-point scale.

Table 2. Distribution and observed ranges of study variables

Variable	Category/Range	Min	Max	n (%)
Parent age (years)	Continuous	22	52	—
Parent gender	Mother	—	—	158 (77.8%)
	Father	—	—	45 (22.2%)
Parental education	Primary/Secondary	—	—	51 (25.1%)
	University or higher	—	—	152 (74.9%)

Employment status	Employed	–	–	122 (60.1%)
	Homemaker/Unemployed	–	–	81 (39.9%)
Child age (years)	Continuous	2	6	–
Child gender	Male	–	–	106 (52.2%)
	Female	–	–	97 (47.8%)
Birth order	First child	–	–	118 (58.1%)
	Later-born	–	–	85 (41.9%)
Brushing frequency	Ordinal (0–3+)	0	3	–
Parental supervision	Always	–	–	93 (45.8%)
	Sometimes	–	–	75 (36.9%)
	Never	–	–	35 (17.3%)
Toothpaste type	Fluoride	–	–	124 (61.1%)
	Non-fluoride	–	–	79 (38.9%)
Flossing	Yes	–	–	19 (9.4%)
	No	–	–	184 (90.6%)
Mouthwash use	Yes	–	–	30 (14.8%)
	No	–	–	173 (85.2%)
Dental visits	Ever visited	–	–	110 (54.2%)
	Never visited	–	–	93 (45.8%)
Reason for visit	Preventive	–	–	45 (22.2%)
	Emergency (pain/caries)	–	–	65 (32.0%)
Importance of oral hygiene	Likert (1–3)	1	3	–

Just over half of the children (54.2%) had ever visited a dentist, whereas 45.8% had never attended. Emergency visits due to pain or caries (32.0%) exceeded preventive visits (22.2%), indicating comparatively limited use of preventive dental services. Figure 3 summarises dental-care utilisation and demonstrates the lower proportion of preventive visits relative to emergency attendance.

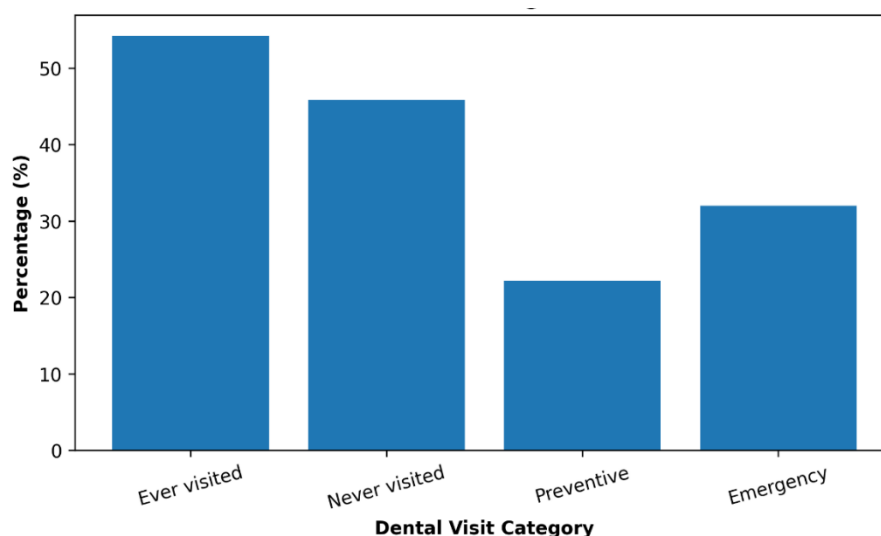


Figure 3. Dental visit patterns among preschool children

Dentists were the most frequently reported source of oral-health information (40.9%), followed by paediatricians (28.1%), internet/social media (19.2%), and family or friends (11.8%). Most parents considered oral hygiene very important (67.0%). Child resistance was the most frequently reported barrier (34.0%), followed by lack of time (28.1%), lack of awareness (19.7%), and cost concerns (18.2%).

4.3 Correlation Analysis

Correlation analysis indicated that parental behaviours and education were more strongly associated with preventive oral-health practices than parent or child age.

Table 3. Correlation matrix of study variables

Variable	Parent Age	Child Age	Brushing Frequency	Parental Education	Dental Visits	Fluoride Use	Supervision
Parent Age	1	0.18*	-0.07	-0.12	-0.05	-0.09	-0.11
Child Age	0.18*	1	0.12	-0.05	0.08	-0.02	-0.10
Brushing Frequency	-0.07	0.12	1	0.42**	0.36**	0.31**	0.55**
Parental Education	-0.12	-0.05	0.42**	1	0.48**	0.39**	0.33**
Dental Visits	-0.05	0.08	0.36**	0.48**	1	0.27**	0.29**
Fluoride Use	-0.09	-0.02	0.31**	0.39**	0.27**	1	0.22*
Supervision	-0.11	-0.10	0.55**	0.33**	0.29**	0.22*	1

Note. * $p < 0.05$; * $p < 0.01$.

The strongest correlation was observed between parental supervision and brushing frequency ($r = 0.55$, $p < 0.01$). Parental education was positively related to brushing frequency ($r = 0.42$), dental visits ($r = 0.48$), and fluoride use ($r = 0.39$). Dental visits were also positively correlated with brushing frequency ($r = 0.36$) and fluoride use ($r = 0.27$). In contrast, child age had only weak relationships with brushing frequency ($r = 0.12$) and dental visits ($r = 0.08$).

4.4 Multiple Linear Regression for Brushing Frequency

The first multivariable model examined brushing frequency as the dependent variable,

with parent age, child age, parental education, supervision, and fluoride use entered as predictors.

Table 4. Multiple linear regression predicting brushing frequency

Predictor	β Coefficient	Std. Error	t-value	p-value
Parent age	-0.04	0.02	-1.8	0.07
Child age	0.05	0.03	1.6	0.11
Parental education	0.28	0.07	4.0	<0.001**
Supervision	0.45	0.08	5.6	<0.001**
Fluoride use	0.21	0.09	2.3	0.02*

Model fit: $R^2 = 0.41$; Adjusted $R^2 = 0.39$; $F(5,197) = 27.4$; $p < 0.001$

Parental education ($\beta = 0.28$, $p < 0.001$), supervision ($\beta = 0.45$, $p < 0.001$), and fluoride use ($\beta = 0.21$, $p = 0.02$) were significant positive predictors of brushing frequency. Parent age and child age were not statistically significant. The model explained 41% of the variance in brushing frequency. Figure 4 visually compares the significant regression coefficients and shows parental supervision as the strongest predictor of brushing frequency.

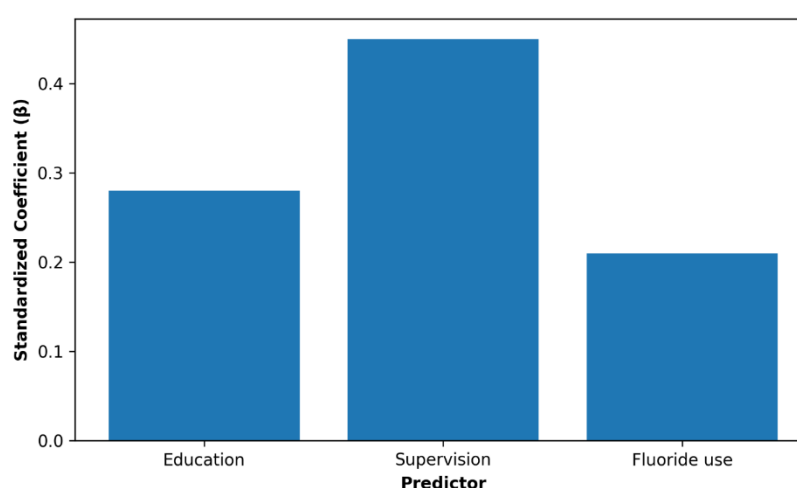


Figure 4. Significant predictors of brushing frequency in the multiple linear regression model

4.5 Logistic Regression for Dental Visits

The second multivariable model examined whether a child had ever visited a dentist. Parent age, child age, parental education, supervision, and fluoride use were entered as predictors.

Table 5. Binary logistic regression predicting dental attendance

Predictor	Odds Ratio (OR)	95% CI	p-value
Parent age	0.97	0.93–1.01	0.12
Child age	1.08	0.95–1.23	0.21
Parental education	2.15	1.42–3.26	<0.001**
Supervision	1.62	1.10–2.39	0.01*
Fluoride use	1.48	1.02–2.15	0.04*

Model fit: $R^2 = 0.32$; $\chi^2(5) = 45.7$; $p < 0.001$

Parental education was the strongest predictor of dental attendance, with parents in the higher education category having approximately 2.15 times greater odds of reporting a

dental visit. Supervision (OR = 1.62, $p = 0.01$) and fluoride use (OR = 1.48, $p = 0.04$) were also significant positive predictors. Parent and child age remained non-significant. Overall, the logistic model explained approximately 32% of the variation in dental attendance.

4.6 Overall Findings

The results consistently showed that parental education and parental supervision played the most significant role in oral hygiene practice among preschool children, and fluoride use played another preventive role. More frequent brushing was associated with active watching of brushing by parents and higher parental educational level, whereas use of fluoride and attendance at the dental office were not associated with any parent behaviours. Comparative impacts of age-related demographic variables were relatively weak.

The descriptive results also indicate deficiencies in preventive actions. 61.1% of the families indicated that they use fluoride toothpaste, while almost 39% use non-fluoride toothpaste. Nearly half of the children had never been to the dentist, while emergency attendance was greater than preventive attendance. Limited awareness, lack of time, cost concerns and child resistance continued to be significant challenges. These findings suggest that enhancing the knowledge of parents, active supervision, fluoride use, and preventive dental attendance could be significant factors in improving oral-health practices among preschool children.

5. Discussion

This study showed that the most important factors affecting the oral-hygiene behaviors and dental-care utilization of preschool children in Türkiye are parental education, supervision and fluoride use. The descriptive results indicated that 41.9% of children brushed twice a day, 11.8% did not brush their teeth at all and 45.8% of the parents reported that they always supervised child's toothbrushing. 61.1% of families used fluoride toothpaste and almost half of children had never been to a dentist. The results showed that overall the level of awareness regarding oral hygiene was good, but there were insights that must be further highlighted on the consistency of preventive actions that should be carried out by parents. Alkaabi et al. (2026) also found that in the UAE, maternal knowledge, attitudes, and practices significantly correlate with dental caries in preschool children, which further emphasizes the role of caregiver-related factors in shaping early oral-health outcomes.

The comparatively low attendance in the study for preventive dental care is significant. Twenty-two point two percent of children attended for a preventive reason, while 32.0% attended for pain or for a caries diagnosis made. Such a trend indicates that people often wait for symptoms to first present before seeking dental care, and not because of preventive care. While data on prevalence levels is available in different geographical areas, the available evidence is systemic and suggests that despite the variations in prevalence, ECC still represents a significant public-health challenge among the preschool-aged population and needs more effective preventive measures implemented at the family and community levels (Devan et al., 2022). Raising parents' awareness of the significance of early visits to the dentist may, therefore, contribute to changing the approach to oral health care from a reactive to a preventive one.

The strongest predictor of both brushing frequency and dental attendance was parental education. Parental education was significant in the multiple linear regression model when predicting the brushing frequency, and in the logistic regression model when predicting parental taking their children for a dental visit, with the parents with higher education having more than twice the odds. The results indicate that education could help caregivers to grasp and understand the recommendations for prevention, choose the right oral care products, and understand the importance of early care. Previous

cross-sectional studies have also reported a relationship between parent awareness and positive oral-health behaviors with the implementation of ECC preventive practices (Goel et al., 2026).

Parental supervision was most strongly associated to brushing frequency, $r = 0.55$ and standardized regression coefficient, $\beta = 0.45$. This finding underscores the need for direct involvement of caregivers to ensure consistent and proper oral hygiene practices among preschool children, who do not have adequate dexterity or behavioral consistency to maintain their oral hygiene without help. Additionally, the multifactorial nature of ECC has been highlighted in systematic evidence that shows that all four contributing factors for ECC (behavioural, dietary, socioeconomic and oral hygiene) add up to increase risk of disease in the early preschool years (Khan et al., 2022). As a result, interventions need not only be targeted at providing information, but also to promote parental supervision and involvement in their children's daily brushing routines.

Another important determinant of prevention was fluoride use. Children who used fluoride toothpaste had an increased number of times they brushed their teeth and the use of fluoride toothpaste was a separate factor in predicting dental attendance. These results highlight the need for fluoride-based prevention and education of parents and supervision. The use of fluoride varnish combined with oral-health education has demonstrated improved prevention of ECC compared to oral-health education alone (Memarpour et al., 2016), and thus, a combination of both types of preventive strategies is valuable. When considering fluoride use for preschool children, then, information about appropriate fluoride use should be included in the routine counseling that is given to children by their dental and pediatric health care providers. Child resistance, lack of time, cost concerns and lack of awareness were also found to be significant challenges for the maintenance of good oral hygiene. The results of the present study suggest that preventive behavior is not only related to knowledge, but also social support, family routines, competing responsibilities and perceived feasibility. Research in the general health-behavior literature suggests that social influences, such as one's perceived norms (Molina et al., 2015) and social support, can affect preventive intentions through recommendations from family members and friends, indicating the role that interpersonal influences can play in health related decision making. This evidence is outside of the oral-health prevention realm, but the principle is the same: family networks and social norms can influence parenting behavior regarding oral-health behaviors.

The fact that parents reported that the dentist was their first source of oral-health information and that the pediatrician was the next source of information also emphasizes the importance of structured oral-health education. Pediatric outpatient clinics have the potential to provide a short-term prevention counseling opportunity due to the nature of their visits, which are often by families who do not routinely visit the dentist. Repeated and accessible education can increase parents' oral-health knowledge, with school- and family-based educational interventions demonstrated to increase preventive behaviour outside the dental clinic (Shan et al., 2023). A potentially beneficial outcome of embedding oral-health messages within the context of the child's health visit may therefore be to enhance awareness of the use of fluoride, encouragement of toothbrushing supervision and the value of preventive dental attendance.

The context of the present study is also important for the Turkish context. The sample included parents visiting the paediatric outpatient clinics of Istanbul, enabling research to be conducted on oral-health practices in non-dental environments. The underlying data set specifically focuses on parental attitudes, oral hygiene practices, fluoride use, attendance at the dentist, information sources and impediments among preschool children in the city of Istanbul and, therefore, is especially appropriate to assess family-level preventive behaviours in this population (Unsal-Caliskaner, 2026).

The results thus offer locally applicable evidence that parental behaviour can have a greater influence than the demographic factor of age on preventive oral health practices.

On a general level, the findings suggest that an integrated approach to improving preschool oral health is needed that addresses the components related to parental knowledge, supervision of active toothbrushing, fluoride use and utilisation of preventive dental services. Additionally, the lack of a significant relationship between parent and child age indicates that caregiver behaviours that can be modified could be better intervention targets than solely demographic characteristics. Therefore, the paediatric health-care environment can be an important opportunity to detect families at risk, to discuss oral-health prevention and counselling, to ensure reinforcement of fluoride-based prevention, and to facilitate timely dental referral. Longitudinal and intervention studies need to be conducted to determine if these integrated approaches lead to lasting changes in oral-hygiene behaviour and clinically assessed caries outcomes.

6. Recommendations and Practical Implications

The results suggest that parental education needs to be emphasised as a key component of the preschool oral-health promotion initiative. Twice daily toothbrushing, use of an appropriate fluoride toothpaste, preventive dental visits and the importance of the primary dentition can be addressed within structured educational programmes in paediatric outpatient clinics, community health centres and preschools to enhance parents' knowledge. Consideration should be paid to translating knowledge into more practical and daily use, not just to the delivery of information.

Increased attention should also be given to active parental supervision. As the most important association was between supervision and frequency of brushing, parents should be encouraged to directly supervise or encourage toothbrushing during the preschool years. Some practical ways to overcome child resistance can be age-appropriate brushing techniques, positive reinforcement and parental involvement. The study also endorses the importance of reinforcing fluoride use in the appropriate way, as fluoride toothpaste was positively associated with brushing frequency and dental attendance. Paediatric and dental health workers should thus give very clear advice on appropriate products and on their appropriate use when these products contain fluoride.

Emphasis should be placed on increasing the use of preventive dental care, as more children attended for emergency services than for preventive services, and nearly half of children had no dental attendance. Paediatric outpatient clinics can be a good place for oral health counselling and referral, especially among families that do not use dental services regularly. It has been revealed that dentists and paediatricians have a strong position as a source of information, which indicates that the cooperation of the two medical professions may contribute to the strengthening of preventive behaviour. Practical issues of cost, time constraints, awareness and child resistance should also be included in the oral health promotion programs. All these suggestions are directly supported by the patterns of supervision, fluoride use, dental attendance, information sources, and barriers reported in the study.

7. Limitations and Future Research

There are several limitations to be noted in the findings. The cross-sectional design enables the determination of relationships, but not the temporal or causal relationships between parental education and supervision, fluoride use and brushing frequency and dental attendance. Second, convenience sampling in paediatric outpatient clinics in Istanbul could be a limitation in generalizability to children and families in other parts of Türkiye or to children who do not routinely use paediatric health care services.

Third, the study was mainly parent-reported, which could lead to recall errors or socially desirable reporting.

Another limitation was that the data available did not include direct clinical oral-health measures, including dmft/dmfs scores, plaque indices, gingival assessments, characteristics of saliva, or microbiological measures. The analysis therefore analysed preventive practices and dental care utilisation and not severity of caries or biological activity of dental diseases. This limitation must be made clear to avoid the erroneous interpretation of the conclusions as proof of direct clinical effectiveness.

Longitudinal and intervention-based designs should be used in future research to evaluate the effects of the intervention (improvement in oral health-related practices, parental education and supervision) on improved oral health behaviour and measurable reduction in ECC. Ideally, studies should include a questionnaire for the carers as well as clinical examination of the dental caries and standardised indices of caries and/or plaque. External validity would also be enhanced if research were conducted in various socio-economic and geographical regions of Türkiye. Future studies also might consider school-based education, paediatric-clinic counselling, digital oral-health interventions, and microbiological/salivary indicators to develop a more thorough understanding of behavioural and biological determinants of preschool oral health.

8. Conclusion

This study demonstrates that parental education, supervision, fluoride use, and dental-care utilisation are key determinants of preschool children's oral-hygiene practices in Türkiye. The findings showed that parental supervision had the strongest association with brushing frequency, while higher parental education significantly improved both brushing behaviour and the likelihood of dental attendance. Fluoride toothpaste use also contributed positively to preventive oral-health practices, reinforcing its importance within early childhood caries prevention. Despite generally favourable parental attitudes toward oral hygiene, substantial gaps remained in daily preventive behaviour. Nearly half of the children had never visited a dentist, emergency visits exceeded preventive attendance, and advanced hygiene practices such as flossing and mouthwash use were uncommon. Child resistance, lack of time, cost concerns, and insufficient awareness further limited the consistency of preventive routines. These findings indicate that awareness alone is insufficient unless it is translated into sustained caregiver involvement and access to preventive care. The study therefore supports an integrated approach that combines parental education, active supervision, appropriate fluoride use, and early dental attendance. Paediatric outpatient settings can provide valuable opportunities for reinforcing oral-health messages, identifying families requiring additional support, and facilitating timely dental referral. Future studies should incorporate longitudinal designs and direct clinical indicators, such as caries indices and plaque assessment, to clarify how parental behaviours influence measurable oral-health outcomes over time.

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