The association between intensive parenting attitudes and topical fluoride opposition

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Abstract

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Introduction. Despite evidence that topical fluoride is safe and effective, opposition to it is a growing clinical and public health challenge. Intensive parenting attitudes may affect a caregiver's preventive care decision-making for their children, including decisions about fluoride, but no studies exist on how intensive parenting attitudes influence topical fluoride opposition. The objective of this study is to investigate the association between intensive parenting attitudes and topical fluoride opposition.

Methods. This was a secondary analysis of data on caregivers' beliefs about fluoride for their children. An 85-item survey was administered from November 2020 to September 2021 (N=1,135). Participants were eligible if they were an English-speaking caregiver of a child under 18 years. The outcome variable was topical fluoride opposition, defined as how opposed the caregiver was to topical fluoride for their child (self-reported scale of 0-10). The explanatory variable was intensive parenting attitudes, defined as the extent of child-centered, time-intensive,

and self-sacrificing parenting, measured as a composite score from three survey items. Linear regression was used to test the study hypothesis, adjusting for confounders. All analyses were performed in SPSS.

Results. The mean±SD caregiver age was 41.7±8.8 years, with most caregivers being women (73.0%), white (55.5%), non-Hispanic (79.3%), having greater than a 4-year degree (28.5%), and having private dental insurance (45.1%). The mean±SD topical fluoride opposition score was 2.0±3.1, and the mean±SD intensive parenting attitudes score was 1.7±0.4. After adjusting for confounders, a 1-point increase in intensive parenting attitudes score was associated with a 0.3-point increase in topical fluoride opposition score (95% CI: 0.1, 0.4; $p<0.001$).

Conclusions. Intensive parenting attitudes were significantly and positively associated with topical fluoride opposition. Clinicians can utilize these findings to assess caregivers' intensive parenting attitudes, learn about concerns, and address them by tailoring communication strategies to discuss appropriate risk-based recommendations about topical fluoride.

INTRODUCTION

Topical fluoride is evidence-based, cost-effective, and safe (Ko and Chi 2022; CDC 2000; Pollick 2018). It is a gel, foam, or varnish that is professionally applied on all teeth during medical and dental visits to help prevent tooth decay, the most common chronic childhood disease (Rozier et al. 2003; Bakhurji and Cooper 2019; GBD 2017 Oral Disorders Collaborators et al. 2020; American Academy of Pediatric Dentistry 2023). It plays an important role in reducing disparities in oral health, which disproportionately burdens vulnerable populations (Chi et al. 2014). Vulnerable populations include families from low-income households, racial and ethnic minorities, and children with chronic medical conditions (Herzog et al. 2019; Colak et al. 2013). Even though there is strong evidence on topical fluoride safety and effectiveness, opposition to it has been a growing problem (Chi 2014; Chi and Basson 2018). Topical fluoride opposition is related to the concept of topical fluoride refusal. Opposition refers to how opposed a caregiver is to topical fluoride (Chi 2017). One study reported a 14.6% prevalence of topical fluoride refusal based on survey data (Chi et al. 2014). A more recent study reported 43.3% of caregivers of healthy children refused or thought of refusing topical fluoride for their child (Koh et al. 2023).

There are various reasons caregivers are opposed to topical fluoride. One potential explanation is that caregivers opposed to topical fluoride may make their decisions because of knowledge gaps. One study reported that one-half of the surveyed caregivers in Washington state had an incomplete or inaccurate understanding of topical fluoride (Chi et al. 2018). A qualitative study conducted in Appalachia found that mothers received inconsistent or conflicting information about topical fluoride from family members, health providers, and/or community members through social networks (Burgette et al. 2022). This resulted in confusion and difficulty assessing the accuracy of the information (Burgette et al. 2022). However, these explanations oversimplify the determinants of topical fluoride opposition because knowledge is a necessary but insufficient determinant of health behaviors (Klein et al. 2017).

An unexplored but potential determinant of topical fluoride opposition is intensive parenting attitudes. Intensive parenting attitudes are defined as the extent of child-centered, time-intensive, and self-sacrificing parenting. They have generally been associated with positive child outcomes (Long et al. 2021; Treyvoud et al. 2016; Yee et al. 2017). One study found that caregivers with more intensive parenting attitudes had children with improved cognitive development and fewer behavioral difficulties (Treyvoud et al. 2016). Another study revealed that more intensive parenting attitudes were associated with improved child health behaviors, like healthy dietary choices and increased physical activity (Lovan et al. 2024). However, excessively intensive parenting attitudes can lead to negative child outcomes (Bonavolonta et al. 2021; Kim 2019; Li et al. 2023). One study found that intensive parenting attitudes exceeding a threshold led to male

soccer players burning out or dropping out due to feeling pressured (Bonavolonta et al. 2021). Another study found that the odds of suicide ideation and planning in males increased after intensive parenting attitudes exceeded a threshold, indicating a potentially curvilinear association between intensive parenting attitudes and child mental health behaviors (Kim 2019). This finding is consistent with previous work, whereby intensive parenting attitudes had a positive effect on IQ and executive and behavioral functioning until attitudes reached a threshold, after which the effects of parenting on children were negative (Treyvaud et al. 2016).

There are few studies from medicine that investigate how intensive parenting attitudes influence a parent's preventive care decision-making. In one study on HPV vaccine decision-making, mothers who supervised their daughters more or were more involved in their daughter's life were more likely to accept the HPV vaccine for their child (Rosenthal et al. 2008). Another study found that intensive parenting attitudes were not associated with topical fluoride opposition, but the parenting variable was modeled as a confounder rather than a main effects variable (Saini et al. 2022). The purpose of this study is to address a critical gap in the scientific literature on preventive care decision making by testing the hypothesis that intensive parenting attitudes are associated with topical fluoride opposition.

METHODS

Study Design and Population

This was a secondary analysis of data collected through an 85-item online survey administered to caregivers recruited from multiple sites throughout the United States, including at the University of Washington School of Dentistry and Center for Pediatric Dentistry, Boston Children's Hospital, University of California at Los Angeles, the University of Iowa, and social media (e.g., Facebook, Twitter). The Research Electronic Data Capture (REDCap) survey was administered electronically from November 2020 to September 2021. It included questions on caregiver oral health knowledge, beliefs and reasons for topical fluoride opposition, and demographic items. Participants were eligible if they were an English-speaking caregiver of a child under 18 years of age (N=1,135). Of these caregivers, we excluded 93 caregivers from the current analyses who declined topical fluoride exclusively for financial reasons, resulting in a final sample of 1,042 caregivers. Participating caregivers were entered into a raffle for Amazon or Target gift cards, an Apple iPad, or a pair of Philips Sonicare toothbrushes. This study was approved by the institution's Institutional Review Board.

Variables

Independent variable

The independent variable was intensive parenting attitudes. Intensive parenting attitudes were measured using three items drawn from an existing questionnaire: 1) caregivers should adjust their parenting style to the individual needs of their children; 2) finding the best educational opportunities for children is important as early as preschool; and 3) if caregivers have the adequate time, resources, and knowledge, they can ensure their child's success. Each item was scored on a 4-point scale (from 1="Strongly agree" to 4="Strongly disagree") (Liss et al. 2013). We created a composite as described previously (Carle et al. 2024).

Dependent variable

The dependent variable was topical fluoride opposition. Caregivers were asked, "On a scale of 0 to 10 with '0' being 'not at all opposed' and '10' being 'totally opposed,' how opposed are you to topical fluoride for your children?" Responses were recorded as ordinal values, but treated as a continuous variable.

Confounders

This study considered the following potential confounders based on previous literature: caregiver age, gender, race, ethnicity, education level, annual household income, and child dental insurance type (Saini et al. 2022, Carle et al. 2024). Categories for each potential confounder are described in Table 1.

Statistical Analysis

First, descriptive statistics for the study sample were computed. Second, unadjusted and confounder-adjusted linear regression was performed to determine the association between intensive parenting attitudes and topical fluoride opposition. Confounders were identified through bivariate analyses (e.g., Pearson correlation test for continuous variables and one-way analysis of means for categorical variables) with those significantly associated with both the independent and dependent variables included in the final confounder-adjusted linear regression model (α=0.05). All analyses were conducted using IBM SPSS Statistics 28.0 (Chicago, IL).

RESULTS

Descriptive Statistics

A total of 1,042 participants were part of the analyses. The mean caregiver age was 41.7 (SD = 8.8) years, with most parents women (73.0%), white (55.5%), non-Hispanic (79.3%), having greater than a 4-year degree (28.5%), and with private dental insurance (45.1%) (Table 1). The

mean topical fluoride opposition score was 2.0 (SD = 3.1), with a mean intensive parenting attitudes score of 4.9 (SD = 1.6 (Table 1).

Confounders

The bivariate analyses indicated three confounders significantly associated with both the predictor and outcome variables: caregiver age and caregiver education level (Table 2).

Linear Regression

After adjusting for confounders, a 1-point increase in mean intensive parenting attitudes score was significantly associated with a 0.26-point increase in topical fluoride opposition score (95% CI: [0.138, 0.385]; p-value<0.001) (Table 3).

DISCUSSION

In this study, we evaluated the association between intensive parenting attitudes and topical fluoride opposition. The main finding was that intensive parenting attitudes were significantly associated with topical fluoride opposition. Specifically, a 1-point increase in intensive parenting attitudes score was significantly associated with a 0.3-point increase in topical fluoride opposition score after adjusting for confounders.

There are at least two possible explanations for our finding. Caregivers with more intensive parenting attitudes may perceive their children to be at lower risk for tooth decay, in part, because they actively supervise behaviors related to their child's oral health, including diet and toothbrushing routines. However, post-hoc analyses revealed no significant association between intensive parenting attitudes score and child cavity experience. Specifically, 62.3% of children of caregivers with low intensive parenting attitudes (defined as an intensive parenting attitudes score of ≤5, the median intensive parenting attitudes score) had a cavity experience compared to 62.4% of caregivers with high intensive parenting attitudes (defined as an intensive parenting attitudes score of >5), indicating that intensive parenting attitudes were not related to tooth decay. This suggests that caregivers with intensive parenting attitudes are unlikely to have children who are at lower cavity risk. While there are no published studies on the topic, caregivers with more intensive parenting attitudes may believe in the oral health benefits of behaviors such as oil pulling, using fluoride-free toothpastes, and giving their child 100% organic juices that still contain added sugar, leading them to perceive that their child is not at risk for tooth decay despite the fact that the behaviors fail to lower cavity risk (Viger 2020). This is consistent with previous vaccine literature showing caregivers with more intensive parenting

attitudes practicing health promoting activities, such as eating organic and/or home-grown food, cooking from scratch to reduce preservative consumption, and reducing exposure to toxins, that caregivers saw as boosting the natural immunity of their child and protecting them from diseases, thereby eliminating the need for vaccines (Ward et al. 2017). One potential solution to this challenge is to better understand the oral health behaviors of caregivers with intensive parenting attitudes to see if these behaviors actually increase dental cavity risk in their children. There is also a need for additional research to identify ways for dentists to improve cavity risk communication and to assess if caregivers with intensive parenting attitudes require tailored approaches.

Another possible explanation for this finding is that caregivers with more intensive parenting attitudes may seek out more information about topical fluoride from sources including social media, family members, or community members, and make health decisions based on the information they find through these sources. Research suggests that there is a significant amount of inaccurate health-related information regarding fluoride on social media (Basch et al. 2019; Lotto et al. 2022). In addition, concerns and negative sentiments about the negative side effects of topical fluoride tend to be shared more regularly than positive messages on social media (Eliacik 2021). Even when information about topical fluoride was not obtained through online sources, caregivers may receive inconsistent information about fluoride from family members, health care clinicians, and community members, resulting in confusion and difficulty assessing whether the information about fluoride is accurate (Burgette et al. 2022). Similarly, caregivers with more intensive parenting attitudes may be obtaining inconsistent information about topical fluoride as they seek out more information from various sources, resulting in confusion and skepticism and leading them to be opposed to it for their child. Further research should identify information sources caregivers are using to learn about topical fluoride, specifically, and evaluate effective strategies dentists can use to communicate information about topical fluoride without appearing biased.

The findings from this study have implications for clinical practice and future research. Clinicians can tailor communication strategies based on the caregiver's level of intensive parenting attitudes to discuss appropriate risk-based recommendations about topical fluoride for the caregiver's child. If a child is at high cavity risk, providers could use techniques such as motivational interviewing to initiate fluoride conversations and determine the underlying concerns the caregiver may have about topical fluoride. They can then listen and address the specific concern for this caregiver. On the other hand, if a child is at low cavity risk, he/she may not need topical fluoride applied at each dental visit, and the provider should clearly communicate this to the caregiver and focus on maintaining a healthy diet and adequate toothbrushing techniques. However, a child's cavity risk is dynamic. Changes in medications,

diet (frequency of intake, types of foods and beverages), and oral homecare routine (frequency and technique of toothbrushing and flossing, type of dentifrice) can change cavity risk. Therefore, cavity risk must be assessed at each visit and discussed with the caregiver. Future research should expand on these findings to determine effective communication strategies based on the caregiver's level of intensive parenting attitudes and level of engagement in discussion.

This study had two main limitations. Although the survey was administered at sites throughout the United States, most of the data was collected from one region, which may limit the generalizability of our findings. Further research should be done to evaluate if our data is an accurate representation of the general population. The eligibility criteria of this study only included English-speaking parents. This excludes differences that may be present among different cultures and non-English speaking families, as reported in a previous study that revealed differential applicability of a fluoride hesitancy model among Latino and non-Latino caregivers as well as Spanish-speaking and English-speaking Latino caregivers (Cruz et al. 2024). Further studies should expand the population to non-English speaking parents to confirm if cultural differences play a role in intensive parenting attitudes and topical fluoride decision-making.

CONCLUSION

Intensive parenting attitudes were significantly associated with topical fluoride opposition. Parents with more intensive parenting attitudes were more opposed to topical fluoride opposition for their child. The findings from this study can help clinicians assess a caregiver's level of intensive parenting attitudes and tailor effective communication strategies for families to make informed decision and receive appropriate risk-based preventive services based on their child's cavity risk.

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Table 1. Descriptive Characteristics of Caregivers' Views on Topical Fluoride and their Intensive Parenting Attitudes Score (N=1,042)

Variable	Mean (standard deviation) / n (%)*
Topical Fluoride Opposition	2.04 (3.11)
Intensive Parenting Attitudes Score	4.90 (1.56)
Caregiver Age	41.70 (8.80)
Caregiver Gender	
Woman	761 (73.00)
Man	200 (19.20)
Non-binary or third gender	5 (0.50)
Prefer to self-identify	1 (0.10)
Caregiver Race	
American Indian or Alaska Native	15 (1.40)
Asian	167 (16.00)
Black or African American	82 (7.90)
Native Hawaiian or other Pacific Islander	12 (1.20)
White	578 (55.50)
Other	78 (7.50)
Caregiver Ethnicity	
Not Hispanic	826 (79.30)
Hispanic	129 (12.40)
Caregiver Education	
Less than high school diploma	26 (2.50)
High school diploma or equivalent (e.g., GED)	124 (11.90)
Some college or 2-year college degree	277 (26.60)
4-year college degree	240 (23.00)
More than 4-year degree	297 (28.50)
Household Income	
Less than $15,000	62 (6.00)
$15,000 - $24,999	89 (8.50)
$25,000 - $49,999	201 (19.30)
$50,000 - $74,999	164 (15.70)
$75,000 - $99,999	105 (10.10)
$100,000 - $149,999	152 (14.60)
$150,000 or more	162 (15.50)
Child Dental Insurance Type	
Private	470 (45.10)
Public	367 (35.20)
No insurance	81 (7.80)
Other	27 (2.60)

* Mean (standard deviation) are reported for continuous variables (topical fluoride opposition, intensive parenting attitudes score, caregiver age). Frequency (n) (percentage; %) are reported for categorical variables (caregiver gender, caregiver race, caregiver ethnicity, caregiver education, annual household income, child dental insurance type).

Table 2. Bivariate Analyses to Determine Confounders in the Association between Intensive Parenting Attitudes and Topical Fluoride Opposition (N=1,042)

Variable	Statistical Test Used	Intensive Parenting Attitudes[a]	Topical Fluoride Opposition[a]
Caregiver age*	Pearson Correlation	0.12*	0.09*
Caregiver gender	ANOVA[b]		
Woman		4.89 [4.77, 5.01]	1.93 [1.71, 2.15]
Man		4.95 [4.73, 5.16]	1.90 [1.49, 2.31]
Non-binary or third gender		4.25 [2.73, 5.77]	1.80 [-2.54, 6.14]
Prefer to self-identify		4.90 [4.80, 5.00]	9.00 [1.74, 2.12]
Caregiver race	ANOVA[b]		
American Indian or Alaska Native		4.93 [4.06, 5.81]	1.27 [0.23, 2.30]
Asian		4.99 [4.77, 5.22]	2.56 [2.07, 3.04]
Black of African American		4.40 [4.08, 4.71]	2.13 [1.46, 2.81]
Native Hawaiian or other Pacific Islander		4.36 [3.61, 5.12]	0.75 [-0.55, 2.05]
White		4.91 [4.78, 5.03]	1.69 [1.45, 1.92]
Other		4.94 [4.56, 5.31]	2.08 [1.738, 2.78]
Caregiver ethnicity	ANOVA[b]		
Not Hispanic		4.91 [4.80, 5.02]	1.92 [1.71, 2.13]
Hispanic		4.78 [4.50, 5.05]	1.90 [1.37, 2.43]
Caregiver education*	ANOVA[b]		
Less than high school diploma		5.50 [4.82, 6.18]	2.96 [1.49, 4.44]
High school diploma or equivalent (e.g., GED)		5.00 [4.66, 5.34]	2.31 [1.73, 2.88]
Some college or 2-year college degree		4.63 [4.46, 4.80]	2.07 [1.69, 2.44]
4-year college degree		4.98 [4.78, 5.18]	2.00 [1.61, 2.38]
More than 4-year degree		4.99 [4.82, 5.16]	1.46 [1.15, 1.76]
Annual Household Income	ANOVA[b]		
Less than $15,000		4.83 [4.36, 5.30]	2.56 [1.70, 3.43]
$15,000 - $24,999		4.86 [4.50, 5.22]	2.43 [1.73, 3.13]
$25,000 - $49,999		4.69 [4.45, 4.92]	2.27 [1.83, 2.72]
$50,000 - $74,999		4.97 [4.75, 5.19]	1.96 [1.47, 2.45]
$75,000 - $99,999		5.13 [4.81, 5.44]	1.79 [1.25, 2.33]
$100,000 - $149,999		5.03 [4.79, 5.27]	1.44 [1.01, 1.87]
$150,000 or more		4.93 [4.70, 5.15]	1.14 [0.77, 1.50]
Child Dental Insurance Type	ANOVA[b]		
Private		4.94 [4.80, 5.08]	1.47 [1.22, 1.72]
Public		4.84 [4.67, 5.01]	2.31 [1.98, 2.63]
No insurance		4.94 [4.60, 5.27]	2.78 [2.00, 3.55]
Other		5.15 [4.57, 5.73]	2.33 [1.03, 3.64]

[a] Coefficient reported for Pearson correlation statistical test. Mean [95% confidence interval] recorded for ANOVA statistical test.

[b] ANOVA = One-way analysis of means

* = p-value<0.05

Table 3. Adjusted Regression Model of the Association between Intensive Parenting Attitudes and Topical Fluoride Opposition (N=1,042)

Variable	Estimate	Standard Error	Confidence interval
Intensive parenting attitudes score*	0.261	0.063	[0.138, 0.385]
Caregiver age	0.004	0.011	[-0.018, 0.026]
Caregiver education			
High school diploma or equivalent	-0.613	0.658	[-1.902, 0.677]
Some college or 2-year college degree	-0.709	0.627	[-1.939, 0.520]
4-year college degree	-0.933	0.631	[-2.170, 0.303]
More than 4-year degree*	-1.482	0.623	[-2.704, -0.259]

* = p-value<0.05

The adjusted model controlled for the following confounders: caregiver age and caregiver education.