Association Between Caregiver Opposition to Topical Fluoride and Dental Radiographs

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Abstract

Association between caregiver opposition to topical fluoride and dental radiographs

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Purpose: The primary objective of this study was to examine the association between caregiver opposition to topical fluoride and opposition to dental radiographs. The secondary aim was to identify reasons for dental radiograph opposition.

Methods: The study was conducted at six pediatric dentistry clinics, all affiliated with universities or hospitals. English-speaking caregivers of children aged < 18 years were eligible to participate. A 108-item web-based survey was administered from February to November 2024. The predictor variable was topical fluoride opposition (no/yes) and the outcome was dental radiograph opposition (no/yes). Confounder-adjusted logistic regression models were used to assess the association.

Results: Nine-hundred-sixty-nine caregivers were included in the study. Mean child age was 7.4 years (SD 4.19), mean caregiver age was 40.6 years (SD 8.29), 81% of caregivers were female, 53% self-reported as white, and 56% were insured by Medicaid. Thirty-eight percent of caregivers

were opposed to topical fluoride, and 31% were opposed to dental radiographs. There was a significant positive association between topical fluoride opposition and dental radiograph opposition (Odds Ratio = 7.04, 95% CI: 4.72-10.65, $p < 0.001$). The top three reasons for dental radiograph opposition were concerns about unknown future harm (58%), radiation accumulation (51%), and cancer risk (47%).

Conclusions: Caregivers opposed to topical fluoride were significantly more likely to oppose dental radiographs for their child, emphasizing the need for targeted interventions and education focusing on common reasons for opposition.

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I. INTRODUCTION:

Radiographs (also referred to commonly as x-rays) are used regularly in dental practice to facilitate oral care.[1]These include bitewing, periapical, panoramic, and cephalometric radiographs, as well as cone-beam computed tomography (CBCT) and dental magnetic resonance imaging. These technologies enable clinicians to detect and monitor dental caries, periodontal disease, dentofacial growth and development, dental and skeletal relationships, and craniofacial pathologies.[2-5] Dental radiographs also play a critical role in guiding clinical procedures, assessing treatment success, and initiation of follow-up care.

While there are benefits to the use of radiographic imaging, there are also risks associated with this technology.[3] X-rays are considered ionizing radiation because they can produce ions by removing tightly bound electrons from an atom or molecule.[6] This can lead to cellular and DNA damage.[7-9] The primary health concern is the long-term stochastic effects and sublethal damage to DNA, which may cause cancers.[7] Compared to adults, the pediatric population is at a higher risk of developing cancer after being exposed to radiation—in particular, thyroid, leukemia, brain, skin, and breast cancers. This is due to the more radiosensitive physiological nature of their developing tissues and organs. [8-10]

The American Dental Association (ADA) and the American Academy of Pediatric Dentistry (AAPD) have developed radiographic guidelines based upon the clinician's clinical judgment and the radiology concept of ALARA–as low as (is) reasonably achievable.[2, 7, 11-13] Accordingly, dentists must weigh the risks and benefits of taking radiographs and be prepared to discuss them with caregivers who provide consent. As a result, caregivers may express hesitancy or opposition toward dental radiographs for their children.[14] The American Dental Association and American Academy of Oral and Maxillofacial Radiology state that

abdominal (gonadal) and thyroid shielding is no longer recommended and should be discontinued in routine practice, which may exacerbate caregiver radiograph hesitancy.[2, 4, 13, 15, 16] While hesitancy and opposition on topics of childhood vaccines, amalgam restorations, and fluoride have been studied extensively, there has been little research on the precursors of caregiver radiograph refusal.[12, 17]

Based on similarities between hesitancy prompted by fluoride and radiographs, the primary objective of this study was to examine the association between caregiver opposition to topical fluoride and opposition to dental radiographs. The secondary aim was to identify reasons for radiograph opposition.

II. METHODS:

Study Design, population, and procedures

The study was conducted at six pediatric dentistry clinics: The University of Washington Center for Pediatric Dentistry (UW CPD), Seattle Children's Hospital (SCH), Seattle Children's Hospital Odessa Brown Children's Clinic (OBCC), Oregon Health & Science University Hospital (OHSU), Cincinnati Children's Hospital Medical Center (CCHMC), and Children's National Hospital (CNH). All English-speaking parents and caregivers of children aged <18 years who were current patients of record were eligible to participate. Participant recruitment took place between February 2, 2024, and December 19, 2024. Caregivers were approached by study staff during routine dental checkups or treatment visits and were asked to participate in the voluntary study. A 108-item web-based Research Electronic Data Capture (REDCap) survey was administered. (see Supplemental Materials—Appendix A) Participants completed the survey on their electronic device. Only one caregiver per household was eligible to complete the survey. For participants with multiple children, the index child was specified as the participant's youngest child. Informed consent for the study was obtained from participating caregivers prior to enrollment. All survey questions were optional, and participants could discontinue the survey at any time. If a participant was unable to complete the survey during the child's dental appointment, they were allowed to complete the survey at a later time. All participants who submitted an electronic survey were entered into a raffle for the chance to win a prize. The study was approved by the University of Washington Intuitional Review Board (IRB #: STUDY00019387).

Survey development

This survey was the third wave of a previously administered questionnaire designed to assess caregiver attitudes toward pediatric oral health practices. The instrument was revised based on findings from earlier waves and informed by qualitative research aimed at understanding caregiver opposition to topical fluoride. The updated survey included items assessing oral health knowledge, beliefs and reasons for opposing topical fluoride, and beliefs and reasons for opposing dental radiographs. To ensure content validity and clarity, the revised instrument was pre-tested with a small sample of caregivers prior to broader distribution. The primary objective of the survey was to identify factors underlying caregiver opposition to these evidence-based preventive measures.

Predictor variable

The predictor variable was caregiver opposition to topical fluoride. 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 child/children?" Responses were recoded into a binary variable, with those indicating no opposition (0) versus those indicating any opposition (≥1), consistent with the published conceptualization of topical fluoride opposition. [12, 18]

Outcome variable

The outcome variable was caregiver opposition to dental radiographs, which was defined as dental x-rays. 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 dental x-rays for your child/children?" Consistent with the predictor variable, responses were recoded into a binary variable, with those indicating no opposition (0) versus those indicating any opposition (≥1).

Covariates

The following caregiver-reported variables were included in the regression models as covariates: child age; caregiver age, gender, ethnicity, education level, insurance type; child dental insurance type; and annual household income. These variables were selected a priori based on theoretical relevance and prior literature and were assessed as potential confounders in the relationship between caregiver opposition to topical fluoride and opposition to dental radiographs.

Both child and caregiver age were reported in years. Caregiver gender was included as man (reference group), woman, non-binary or third gender, prefer to self-identify.[19] Caregiver race was included as white (reference group) or non-white based on caregivers' self-reported race in one or more categories adopted from the U.S. Census Bureau classification (White, American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or other Pacific Islander, other).[20] Caregiver ethnicity was included as either Hispanic or non-Hispanic (reference group).

Caregiver education categories were: less than high school diploma, high school equivalent, some college/two-year degree, four-year degree (reference group), or more than four years. Child and caregiver dental insurance categories were: private (reference group), Medicaid/public, or no insurance. Annual household income was reported using five categories: <$25,000, $25,000 to $50,000, $50,000 to $75,000, $75,000 to $150,000 (reference group), and ≥ $150,000.

Dental Radiograph barrier and facilitator variables

Barriers and facilitators to dental radiographs were assessed through caregiver responses to a series of belief- and attitude-based statements regarding dental radiographs. Caregivers were asked to indicate their level of agreement with each statement using a four-point Likert scale: *Strongly agree*, *Agree*, *Disagree*, or *Strongly disagree*. Items were developed to capture both perceived barriers (e.g., concerns about radiation exposure or safety) and facilitators (e.g., beliefs in the diagnostic utility or preventive value of radiographs). Responses were analyzed to explore patterns that may inform caregiver acceptance or opposition to dental radiographs.

Statistical analysis

Confounder-adjusted logistic regression models were used to assess the association between caregiver opposition to topical fluoride, dental radiographs, and various covariates. Covariates were selected *a priori* based on theoretical relevance and prior literature as potential confounders, and included child age; caregiver age, gender, ethnicity, education level, insurance type; child dental insurance type; and annual household income.

Unadjusted and adjusted odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for each covariate, with statistical significance determined by p-values (<0.05). Statistical analyses were conducted using R statistical software (version 4.3.2). Chi-squared and t-tests ($\alpha = 0.05$) were used to identify differences in sociodemographic characteristics. Logistic regression models (both unadjusted and adjusted) were used to examine the association between caregivers' opposition to topical fluoride and their opposition to dental X-rays ($\alpha = 0.05$).

III. RESULTS:

Participant demographics

Nine-hundred-sixty-nine caregivers were included in the study. Mean child age was 7.4 years (SD 4.19) and mean caregiver age was 40.6 years (SD 8.29). Eighty-one percent of caregivers were female, 53% self-reported as white, and 49% completed a four-year degree or more. Medicaid was the leading form of dental insurance, covering 69% of children and 56% of caregivers. (Table 1)

Opposition to topical fluoride and dental radiographs

Several sociodemographic factors were significantly associated with topical fluoride opposition. Fifty-five percent of non-white caregivers (n =128) opposed topical fluoride compared to 45% of white caregivers (n = 105). Caregivers with high school equivalent or less showed the highest rates of topical fluoride opposition (52/102 = 50%). This can be compared with those with more than four years of higher education (47/171 =27%). There was a higher rate of topical fluoride opposition with 43% of caregivers with Medicaid insurance (161/378 =43%), compared to 29% of caregivers with private insurance (79/268 =29%). Similarly, 43% of caregivers with children covered by Medicaid insurance (247/571 = 43%) opposed fluoride, compared to 30% of caregivers with children covered by private insurance (76/250 = 30%). Fluoride opposition varied across income levels, with middle-income groups opposing at higher rates than those with annual household income <25,000 (20%, n= 50) and those earning ≥ 150,000 (9%, n=20, $p < 0.001$).

Thirty-eight percent of caregivers (n = 252) were opposed to topical fluoride and 31% of caregivers (n = 211) were opposed to dental radiographs. There was a significant positive association between topical fluoride opposition and dental radiograph opposition. After adjusting for covariates, caregivers who opposed topical fluoride had an adjusted odds ratio of 7.04 for opposing dental radiographs compared to those who did not oppose topical fluoride. (95% CI: 4.72-10.65, $p < 0.001$) (Table 2) Caregiver age, gender, race, and insurance type were not significantly associated with radiograph opposition. Household income and education level also did not demonstrate statistically significant associations with radiograph opposition. Although fluoride opposition was associated with education, income, and insurance type, these same variables were not independently associated with radiograph opposition.

Barriers and facilitators for dental radiographs

Among caregivers opposed to radiographs, the top three reasons for dental radiograph opposition were concerns about unknown future harm (58%), radiation build-up in the child's body (51%), and cancer risk (47%). Key facilitators for caregivers opposed to dental radiographs were trust in dentist's recommendations for x-rays (89%) and using x-rays to assess permanent teeth (90%). However, caregivers who opposed radiographs were less likely to consent to x-rays in the primary dentition, with only 73% (n = 163) agreeing that dental x-rays for baby teeth were acceptable if recommended by a dentist, compared to 87% (n = 422) of those who did not oppose radiographs. There was no statistically significant difference between those opposed and unopposed to radiographs for the following facilitators: taking x-rays to assess dental pain from cavities, crowded teeth, or to help the dentist make treatment decisions ($p > 0.05$). (Table 3)

IV. DISCUSSION:

This study examined the association between caregiver opposition to topical fluoride and opposition to dental radiographs. Our findings revealed that 38% of caregivers were opposed to topical fluoride and 31% of caregivers were opposed to dental radiographs. Caregivers who oppose topical fluoride were also significantly more likely to oppose dental radiographs. Additionally, major barriers to dental radiograph acceptance included concerns about unknown future harm, radiation accumulation, and cancer risk. Trust in dentist recommendations was identified as a key facilitator for dental radiograph acceptance. These results indicate that underlying skepticism towards one preventative intervention, like topical fluoride, may extend to other preventative dental procedures. This is consistent with previous research suggesting that caregivers who are hesitant about one form of preventative care may be distrustful of other interventions like childhood vaccines [12, 21, 22]

Despite 31% of caregivers reporting opposition to dental radiographs, 89% of those individuals indicated they would accept radiographs if recommended by a dentist. This highlights the strong influence of provider trust on caregiver decision-making and suggests that true refusal rates may be lower than reported opposition rates imply. These findings represent a key communication opportunity for providers, while still acknowledging that a subset of caregivers—approximately 11%—who remain hesitant despite clinical recommendations.

Clarifying Misconceptions About Radiation Risk

Caregivers' primary concerns about radiographs focused on increased risk of future illness. However, these fears are likely based on misconceptions about radiation exposure in dentistry, overestimating its risk or associating it with more harmful forms of medical

imaging.[15]. In reality, dental imaging doses are relatively low. Intraoral X-rays range from 7-17 μSv, and CBCT scans are approximately 103-175 μSv. This is much lower than medical CT scans, which deliver 180-1500 μSv for the head and up to 5300 μSv for the abdomen. According to the National Council on Radiation Protection 2009 data report, the average annual natural background radiation is 3.1mSv. In comparison, a typical dental radiographs only delivers 0.007mSv accounting for less than 0.3% of an individual's natural annual exposure. [23] To address caregiver concerns about the future health risks, educational materials should explain dental X-ray exposure in the context of everyday environmental levels. Additionally, they should highlight modern techniques—such as rectangular collimation, optimal patient positioning, and ALARA practices—further reduce radiation doses.[13, 15, 23]

Challenges Arising from Updated Radiographic Guidelines

Recent shielding updates from the American Dental Association and the American Academy of Oral and Maxillofacial Radiology state, *"Abdominal and thyroid shielding during diagnostic intraoral, panoramic, cephalometric, and CBCT imaging is no longer recommended, and the use of these forms of protective shielding should be discontinued as routine practice."* [13, 15, 16] This recommendation is based upon research indicating that shielding for dental radiographs may obstruct the primary X-ray beam, requiring additional images to be taken. Additionally, radiation doses to the gonadal region from scattered radiation are negligible, and shielding does not reduce radiation absorbed by reproductive organs outside the primary field.[15, 24-26] Although these changes are evidence-based, many caregivers may find them difficult to accept because they conflict with long-standing shielding practices. By fostering open, empathetic discussions and providing context for modern imaging protocols, dental practitioners can help alleviate fears and promote informed decision-making. [27]

Public Health Implications

The findings of this study highlight the critical public health issue of caregiver opposition to topical fluoride and dental radiographs. Caregivers who oppose topical fluoride are disproportionately likely to oppose dental radiographs—hindering early diagnosis and effective treatment and placing children at higher risk of caries. [18, 28, 29] Addressing the underlying causes of caregiver opposition will play a vital role in improving oral health outcomes, particularly in children at highest risk. [30-32]

This study found that caregiver demographics did not significantly predict dental radiograph opposition. However, caregivers and children with Medicaid insurance were more likely to oppose topical fluoride. Additionally, caregivers with a high school equivalent or less showed the highest rates of topical fluoride opposition, with almost double the rate of opposition compared with caregivers with more than four years of higher education. These findings indicate that personal beliefs about safety, necessity, and trust in healthcare providers may play a stronger role in caregiver decision-making than demographic factors alone.

Because caregivers who oppose fluoride are more likely to oppose dental radiographs, screening for one form of hesitancy may help identify families at risk of refusing other preventive treatments. Similarly, integrated educational materials that present fluoride and radiographs together could reinforce their complementary roles in preventing and detecting dental disease. Visual aids can also be tailored to address specific caregiver concerns, such as radiation exposure and fluoride toxicity, enhancing comprehension and building trust. It may also be beneficial to compare dental radiation to medical and everyday sources. This contextualizes risk while highlighting modern dose-reduction techniques like rectangular collimation, optimal positioning, and ALARA practices. Involving caregivers in decision-making through open and

transparent discussions and may also help hesitant caregivers feel more in control of their child's health choices. For those who remain opposed to topical fluoride and radiographs, alternative preventative and diagnostic options should be considered Xylitol, hydroxyapatite toothpastes, near-infrared light transillumination, and optical coherence tomography may be appealing to these families.[33-38]

Study Limitations

This study had several limitations. While 969 caregivers were included in the study, approximately 25% did not answer all questions, creating missing data points. We adjusted for this missing data in the final statistical analysis and when calculating statistical significance. This study also relied on self-reported survey data, which may be subject to social desirability bias or misclassification of caregiver attitudes. Additionally, caregiver responses regarding opposition to topical fluoride and dental radiographs were transformed into binary variables for statistical analysis. While this approach facilitated model interpretation, it may have obscured more nuanced differences among caregivers who expressed moderate levels of opposition. Collapsing these responses into binary categories does not capture the full spectrum of attitudes and may limit the ability to detect gradient effects in caregiver hesitancy. Lastly, the sample was limited to English-speaking caregivers, which may restrict the generalizability of the findings to non-English-speaking populations. Future research should focus on developing and testing targeted educational materials and exploring these associations in more diverse populations.

V. CONCLUSION:

Caregivers opposed to topical fluoride in dental settings were significantly more likely to oppose dental radiographs for their children. Concerns about unknown future harm, radiation build-up in a child's body, and cancer risk were common barriers to radiograph acceptance, while trust in dentist recommendations was a key facilitator. These findings emphasize the need for targeted interventions and education focusing on common reasons for opposition. Improved messaging has the potential to increase acceptance of preventative dental treatments and reduce barriers to early diagnosis and treatment of oral health conditions.

VI. TABLES

TABLE 1: Description of Sociodemographic Characteristics of Caregivers Who Participated in a Survey Study on Topical Fluoride and Radiograph Opposition

Sociodemographic Characteristics of Caregivers	Overall	Topical Fluoride Opposition		
	N (%)	Not Opposed n (%)	Opposed n (%)	p value
Child Age (Mean (SD))	7.40 (4.19) (range: 1-17)	7.62 (4.18) (range: 1-17)	7.21 (4.16) (range: 1-17)	0.174
Caregiver Age (Mean (SD))	40.61 (8.29) (range: 20-72)	41.13 (8.28) (range: 20-72)	39.76 (8.25) (range: 20-68)	0.038
Caregiver Gender				0.180
Male	123 (18%)	81 (19%)	42 (17%)	
Female	544 (81%)	334 (80%)	210 (83%)	
Non-binary	4 (1%)	4 (1%)	0 (0%)	
Missing data	298			
Caregiver Race				0.005
White	332 (53%)	227 (57%)	105 (45%)	
Non-white	300 (47%)	172 (43%)	128 (55%)	
Missing data	337			
Caregiver Ethnicity				1.000
Hispanic	96 (14%)	60 (14%)	36 (14%)	
Non-Hispanic	572 (86%)	355 (86%)	217 (86%)	
Missing data	301			
Caregiver Education Level				0.003
Less Than High School Diploma	20 (3%)	12 (3%)	8 (3%)	
High School Equivalent or Less	102 (15%)	50 (12%)	52 (21%)	
Some College/Two Year Degree	217 (32%)	130 (31%)	87 (34%)	
Four-Year Degree	162 (24%)	103 (25%)	59 (23%)	
More Than Four Years	171 (25%)	124 (30%)	47 (19%)	
Missing data	297			
Caregiver Dental Insurance Type				0.001
Private	268 (40%)	189 (45%)	79 (31%)	
Medicaid/Public	378 (56%)	217 (52%)	161 (64%)	
No Insurance	26 (4%)	13 (3%)	13 (5%)	
Missing data	297			
Child Dental Insurance Type				0.001
Private	250 (30%)	174 (35%)	76 (23%)	
Medicaid/Public	571 (69%)	324 (65%)	247 (76%)	

No Insurance	7 (1%)	3 (1%)	4 (1%)	
Missing data	141			
Annual Household Income				0.000
<$25,000	108 (16%)	58 (14%)	50 (20%)	
$25,000-$50,000	147 (22%)	84 (20%)	63 (25%)	
$50,000-$75,000	141 (21%)	77 (19%)	64 (26%)	
$75,000-$150,000	153 (23%)	102 (25%)	51 (21%)	
≥ $150,000	114 (17%)	92 (22%)	22 (9%)	
Missing data	306			

Sociodemographic Characteristics of Caregivers	Overall	Radiograph Opposition		
	N (%)	Not Opposed n (%)	Opposed n (%)	p value
Child Age (Mean (SD))	7.40 (4.19) (range: 1-17)	7.67 (4.14) (range: 1-17)	7.05 (4.18) (range: 1-17)	0.067
Caregiver Age (Mean (SD))	40.61 (8.29) (range: 20-72)	40.92 (NA) (range: 20-72)	39.95 (8.24) (range: 20-67)	0.161
Caregiver Gender				0.194
Male	123 (18%)	90 (20%)	33 (16%)	
Female	544 (81%)	366 (80%)	178 (84%)	
Non-binary	4 (1%)	4 (1%)	0 (0%)	
Missing data	298			
Caregiver Race				0.089
White	332 (53%)	243 (55%)	89 (47%)	
Non-white	300 (47%)	200 (45%)	100 (53%)	
Missing data	337			
Caregiver Ethnicity				0.076
Hispanic	96 (14%)	58 (13%)	38 (18%)	
Non-Hispanic	572 (86%)	401 (87%)	171 (82%)	
Missing data	301			
Caregiver Education Level				0.277
Less Than High School Diploma	20 (3%)	12 (3%)	8 (4%)	
High School Equivalent or Less	102 (15%)	65 (14%)	37 (18%)	
Some College/Two Year Degree	217 (32%)	158 (34%)	59 (28%)	
Four-Year Degree	162 (24%)	115 (25%)	47 (22%)	
More Than Four Years	171 (25%)	111 (24%)	60 (28%)	
Missing data	297			
Caregiver Dental Insurance Type				0.187
Private	268 (40%)	190 (41%)	78 (37%)	
Medicaid/Public	378 (56%)	257 (56%)	121 (57%)	

No Insurance	26 (4%)	14 (3%)	12 (6%)	
Missing data	297			
Child Dental Insurance Type				0.824
Private	236 (32%)	164 (33%)	72 (31%)	
Medicaid/Public	492 (67%)	330 (66%)	162 (69%)	
No Insurance	4 (1%)	3 (1%)	1 (0%)	
Missing data	237			
Annual Household Income				0.396
<$25,000	108 (17%)	66 (15%)	42 (20%)	
$25,000-$50,000	147 (22%)	103 (23%)	44 (21%)	
$50,000-$75,000	141 (21%)	96 (21%)	45 (22%)	
$75,000-$150,000	153 (23%)	111 (24%)	42 (20%)	
≥ $150,000	114 (17%)	78 (17%)	36 (17%)	
Missing data	306			

p-values < 0.05 highlighted with red text

TABLE 2: Bivariate Regression Coefficients Between Radiograph Opposition and Each Covariate and Covariate-Adjusted Regression Model for Surveyed Caregivers for Radiograph Opposition

Covariates	Bivariate Regression Coefficients Between Radiograph Opposition and Each Covariate		Covariate-Adjusted Regression Model for Surveyed Caregivers for Radiograph Opposition	
	Unadjusted Odds Ratio (95% CI)	p value	Adjusted Odds Ratio (95% CI)	p value
Topical Fluoride Opposition				
Not Opposed *	-	-	-	-
Opposed	6.97 (4.96, 9.88)	0.000	7.04 (4.72, 10.65)	0.000
Child Age (Years)	0.97 (0.93, 1.01)	0.096	0.98 (0.93, 1.03)	0.416
Caregiver Age (Years)	0.99 (0.97, 1.01)	0.163	1.00 (0.97, 1.03)	0.994
Gender				
Male *	-	-	-	-
Female	1.33 (0.86, 2.08)	0.205	1.28 (0.80, 2.10)	0.316
Race				
White *	-	-	-	-
Non-white	1.37 (0.97, 1.92)	0.074	1.35 (0.94, 1.95)	0.108
Ethnicity				
Non-Hispanic *	-	-	-	-
Hispanic	1.54 (0.98, 2.39)	0.059	1.31 (0.75, 2.24)	0.332
Education Level		0.280		0.336
Four-Year Degree *	-	-	-	-
Less Than High School Diploma	1.63 (0.60, 4.20)	0.316	0.83 (0.25, 2.50)	0.746
High School Equivalent or Less	1.39 (0.82, 2.36)	0.218	1.13 (0.62, 2.07)	0.681
Some College/Two Year Degree	0.91 (0.58, 1.44)	0.696	0.75 (0.45, 1.24)	0.258
More Than Four Years	1.32 (0.83, 2.11)	0.236	1.26 (0.76, 2.11)	0.369
Caregiver Dental Insurance Type		0.200		0.206
Private *	-	-	-	-
Medicaid/Public	1.15 (0.82, 1.62)	0.431	1.17 (0.59, 2.38)	0.664
No Insurance	2.09 (0.91, 4.72)	0.077	2.54 (0.86, 7.65)	0.093
Child Dental Insurance Type		0.770		0.921
Private *	-	-	-	-
Medicaid/Public	1.12 (0.80, 1.57)	0.513	0.95 (0.47, 1.85)	0.873
No Insurance	0.76 (0.04, 6.04)	0.813	0.59 (0.02, 7.25)	0.691
Annual Household Income		0.400		0.514
$75,000-$150,000 *	-	-	-	-
<$25,000	1.68 (1.00, 2.85)	0.052	1.71 (0.85, 3.48)	0.137
$25,000-$50,000	1.13 (0.68, 1.87)	0.635	1.20 (0.64, 2.26)	0.575
$50,000-$75,000	1.24 (0.75, 2.05)	0.403	1.25 (0.68, 2.31)	0.477
≥ $150,000	1.22 (0.72, 2.07)	0.463	1.38 (0.75, 2.53)	0.296

p values < 0.05 highlighted with red text

* Reference Group

TABLE 3: Barriers and Facilitators for Dental Radiographs

Barriers for Dental Radiographs	Overall N (%)	Not Opposed to Radiograph n (%)	Opposed to Radiograph n (%)	p value
Concerned child gets too much exposure				0.000
Strongly agree/ Agree	99 (14%)	30 (6%)	69 (31%)	
Strongly disagree/ Disagree	611 (86%)	456 (94%)	155 (69%)	
Missing data	259			
Concerned that it is not natural				0.000
Strongly agree/ Agree	119 (17%)	38 (8%)	81 (36%)	
Strongly disagree/ Disagree	591 (83%)	448 (92%)	143 (64%)	
Missing data	259			
Concern for unknown harm in the future				0.000
Strongly agree/ Agree	184 (26%)	54 (11%)	130 (58%)	
Strongly disagree/ Disagree	526 (74%)	432 (89%)	94 (42%)	
Missing data	259			
Concern for learning problems in child				0.000
Strongly agree/ Agree	65 (9%)	22 (5%)	43 (19%)	
Strongly disagree/ Disagree	644 (91%)	463 (95%)	181 (81%)	
Missing data	260			
Concerns for cause child to have Autism				0.000
Strongly agree/ Agree	45 (6%)	15 (3%)	30 (13%)	
Strongly disagree/ Disagree	664 (94%)	470 (97%)	194 (87%)	
Missing data	260			
Concern that is mostly a way for dentist to make money				0.000
Strongly agree/ Agree	64 (9%)	20 (4%)	44 (20%)	
Strongly disagree/ Disagree	646 (91%)	466 (96%)	180 (80%)	
Missing data	259			
Concern that caregiver is given enough information about them				0.000
Strongly agree/ Agree	110 (15%)	40 (8%)	70 (31%)	
Strongly disagree/ Disagree	600 (85%)	446 (92%)	154 (69%)	
Missing data	259			
Concern child may get cancer				0.000
Strongly agree/ Agree	146 (21%)	41 (8%)	105 (47%)	
Strongly disagree/ Disagree	563 (79%)	444 (92%)	119 (53%)	
Missing data	260			
Concern for radiation to build up in child's body				0.000
Strongly agree/ Agree	175 (25%)	61 (13%)	114 (51%)	
Strongly disagree/ Disagree	534 (75%)	424 (87%)	110 (49%)	
Missing data	260			
Concern not being told whole truth				0.000
Strongly agree/ Agree	113 (16%)	41 (8%)	72 (32%)	
Strongly disagree/ Disagree	595 (84%)	443 (92%)	152 (68%)	
Missing data	261			
Concern for feeling pressured by dentist to say yes				0.000
Strongly agree/ Agree	89 (13%)	28 (6%)	61 (27%)	
Strongly disagree/ Disagree	618 (87%)	456 (94%)	162 (73%)	
Missing data	262			
Concern for hurting child's IQ				0.000
Strongly agree/ Agree	55 (8%)	16 (3%)	39 (17%)	

Strongly disagree/ Disagree	652 (92%)	467 (97%)	185 (83%)	
Missing data	262			
Concern some research saying it's not safe				0.000
Strongly agree/ Agree	153 (22%)	51 (11%)	102 (46%)	
Strongly disagree/ Disagree	555 (78%)	433 (89%)	122 (54%)	
Missing data	261			
Concern some doctors do not approve of it				0.000
Strongly agree/ Agree	99 (14%)	35 (7%)	64 (29%)	
Strongly disagree/ Disagree	609 (86%)	449 (93%)	160 (71%)	
Missing data	261			
If there are no visible caries, X-rays are not needed				0.000
Strongly agree/ Agree	94 (13%)	36 (7%)	58 (26%)	
Strongly disagree/ Disagree	614 (87%)	448 (93%)	166 (74%)	
Missing data	261			

Facilitators for Dental Radiographs	**Overall N (%)**	**Not Opposed to Radiograph n (%)**	**Opposed to Radiograph n (%)**	**p value**
If child has cavities causing pain and need dental x-rays.				0.466
Strongly agree/ Agree	585 (83%)	396 (82%)	189 (84%)	
Strongly disagree/ Disagree	123 (17%)	88 (18%)	35 (16%)	
Missing data	261			
If my child has crowded teeth, dental x-rays are necessary.				0.417
Strongly agree/ Agree	600 (85%)	414 (86%)	186 (83%)	
Strongly disagree/ Disagree	107 (15%)	69 (14%)	38 (17%)	
Missing data	262			
If the dentist recommends dental x-rays, I think they are okay.				0.006
Strongly agree/ Agree	658 (93%)	459 (95%)	199 (89%)	
Strongly disagree/ Disagree	50 (7%)	25 (5%)	25 (11%)	
Missing data	261			
If the dentist recommends dental x-rays for baby teeth, I think they are okay.				0.000
Strongly agree/ Agree	585 (83%)	422 (87%)	163 (73%)	
Strongly disagree/ Disagree	123 (17%)	62 (13%)	61 (27%)	
Missing data	261			
If the dentist recommends dental x-rays for permanent teeth, I think they are okay.				0.002
Strongly agree/ Agree	664 (94%)	464 (96%)	200 (90%)	
Strongly disagree/ Disagree	43 (6%)	20 (4%)	23 (10%)	
Missing data	262			
If dental x-rays help my child's dentist make treatment decisions, I think dental x-rays are okay.				0.171
Strongly agree/ Agree	678 (96%)	468 (97%)	210 (94%)	
Strongly disagree/ Disagree	29 (4%)	16 (3%)	13 (6%)	
Missing data	262			

p-values < 0.05 highlighted with red text

VII. APPENDIX A. SUPPLEMENTARY DATA

Confidential

Preventive Care Hesitancy Survey

Please complete the survey below.Thank you!

What is your phone number? _____

What is your email? _____

UNIVERSITY OF WASHINGTON
CONSENT FORM
PREVENTIVE CARE HESITANCY STUDY

Principal Investigator: Dr. Donald Chi, Professor of Oral Health Sciences, 206-616-4332

Researchers' statement
We are asking you to be in a research study. The purpose of this online consent form is to give you the information you will need to help you decide whether to be in the study or not. Please read the form carefully. You may ask questions about the purpose of the research, what we would ask you to do, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions, you can decide if you want to be in the study or not. If you decide to take part, the instructions at the end of the document will tell you what to do next.

Who is conducting this research study?
You are being asked to take part in research conducted by Dr. Donald Chi who is a researcher at the University of Washington School of Dentistry.

What is this research study about?
The purpose of this study is to better understand why some parents and caregivers of children are concerned about preventive care (like topical fluoride, dental x-rays, and vaccines) for their children. Topical fluoride (also known as tooth vitamin, fluoride varnish, etc.) is the sticky stuff painted onto teeth at visits to the dentist or doctor. It is used to prevent cavities. Dental x-rays are taken to help dentists see cavities between the teeth and other potential problems. Vaccines help prevent diseases like HPV (human papillomavirus).

What will I be asked to do if I take part?
The online survey will take 10-15 minutes to complete. The survey will have questions about preventive care and your child, as well as questions asking for other information about your health. The questions are not personal in nature. The most sensitive questions will be about your health and dental insurance status.

Your participation is voluntary. You can refuse to participate or withdraw your participation at any time with no penalty or loss of benefits to which you are otherwise entitled.

What are the risks and/or discomforts I might experience if I take part in the study?
While we do not anticipate any risks from taking part in the study, it is possible some questions may cause slight stress or discomfort. Breach of confidentiality is a risk, but there is a data security plan in place to minimize this risk. There is a low likelihood of these risks. If you feel uncomfortable with a question, you can refuse to answer that question or quit the study altogether. If you decide to quit the study before you have finished the survey, your answers will NOT be recorded.

Are there any benefits to me if I choose to take part in this study?
There are no direct benefits to you for taking part in this research. We hope that the information you provide will help researchers develop interventions to improve communication between health providers and caregivers of children about preventing cavities.

Will I be paid to take part in this study?
You will have the option to enter a drawing for one of five prizes: 1) an Apple iPad Air 5th Generation (1 available), 2) an electric toothbrush (2 available), 3) a $150 US Bank VISA gift card (2 available), 4) a $75 US Bank VISA gift card (4 available), or 5) a $50 US Bank VISA gift card (6 available). After you complete the survey, you will be asked to click a link that will launch a separate survey where you can enter your email address. The randomized drawing will take place in September 2025. We will contact winners via email no later than September 30th, 2025. Your email will NOT be linked with any data collected and will not be shared with anyone outside the research team.

How will information about me be kept private or confidential?
All efforts will be made to keep your data confidential. The link between any personal identifiers and the research data will be destroyed after the records retention period required by state and/or federal law. The National Institute for Dental and Craniofacial Research (NIDCR), the funding agency for this research, will have access to identifiable data. At the end of the survey, you will have the option to provide your email address to enter a drawing. This information will NOT be stored with your responses and will NOT be linked with any data collected.

We have a Certificate of Confidentiality from the United States National Institutes of Health. These protections only apply to data held in the United States. This helps us protect your privacy. The certificate means that we do not have to give out information, documents, or samples that could identify you even if we are asked to by a court of law in the United States. We will use the Certificate to resist any demands for identifying information.

We cannot use the Certificate to withhold your research information if you give your written consent to give it to an insurer, employer, or other person. Also, you or a member of your family can share information about yourself or your part in this research if you wish.

There are some limits to this protection. We will voluntarily provide the information to:
• members of the United States government who need it in order to audit or evaluate the research;
• individuals at the University of Washington, the funding agency, and other groups involved in the research, if they need the information to make sure the research is being done correctly;
• individuals who want to conduct secondary research if allowed by federal regulations and according to your consent for future research use as described in this form;
• to relevant authorities as required by other Federal, State, or local laws.

The Certificate expires on 08/31/2025. Any data collected after expiration is not protected as described above. Data collected prior to expiration will continue to be protected.

Who is funding this research study?
The study team and the University of Washington are receiving financial support from the National Institute for Dental and Craniofacial Research (NIDCR) to conduct this research.

Who can I call if I have questions?
If you have questions about this study, or feel you have been harmed by participating, you can contact the Principal Investigator: Dr. Donald Chi at the University of Washington School of Dentistry, at (206)616-4332 or email dchi@uw.edu.

If you have questions about your rights as a research participant, you can call the University of Washington IRB Human Subject Division at (206)543-0098 or call collect at (206)221-5940 or hsdinfo@uw.edu

First, we are interested in your thoughts about topical fluoride for your child. Topical fluoride is sometimes called fluoride varnish or tooth vitamins. Your child's dentist or doctor may offer topical fluoride during check-ups to help prevent cavities. The first set of questions are about you and your household

How many children under the age of 18 years live in your household? _____

What is the age of the youngest child in your household? _____ years

The next questions are about topical fluoride.

As a reminder topical fluoride is sometimes called fluoride varnish or tooth vitamins. Your child's dentist or doctor may offer topical fluoride during check-ups to help prevent cavities.

Have you ever been offered topical fluoride for any of your children?

◯ Yes
◯ No

Have you ever been offered topical fluoride for your child?

◯ Yes
◯ No

Have any of your children ever received topical fluoride?

◯ Yes
◯ No

Has your child ever received topical fluoride?

◯ Yes
◯ No

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? _____

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 child? _____

On a scale of 0 to 10 with "0" being "not at all concerned" and "10" being "extremely concerned", how concerned are you about topical fluoride for your children? _____

On a scale of 0 to 10 with "0" being "not at all concerned" and "10" being "extremely concerned", how concerned are you about topical fluoride for your child? _____

Regarding topical fluoride in general for your children, which statement below best describes you?

◯ I always say no
◯ Most of the time I say no
◯ Sometimes I say no
◯ I say yes, but I have thoughts about saying no
◯ I always say yes

Regarding topical fluoride in general for your child, which statement below best describes you?

◯ I always say no
◯ Most of the time I say no
◯ Sometimes I say no
◯ I say yes, but I have thoughts about saying no
◯ I always say yes

I say no or have thought about saying no to topical fluoride because one or more of my children don't like getting it.

◯ Agree
◯ Disagree

I say no or have thought about saying no to topical fluoride because my child doesn't like getting it.

◯ Agree
◯ Disagree

I say no or have thought about saying no to topical fluoride because there was an out-of-pocket cost.

◯ Agree
◯ Disagree

If it were free or completely covered by insurance, would you still say no or think about saying no to topical fluoride?

◯ Yes
◯ No

Do you make choices about topical fluoride differently for each child?

◯ Yes
◯ No

The next questions are about the youngest child in your household.

Please tell us the age of your youngest child again: _____ years

What is your relationship to this child?

◯ Mother
◯ Father
◯ Other: _____

What is your child gender?

◯ Boy
◯ Girl

What is your child's race? Please select all that applies:

☐ American Indian or Alaskan Native
☐ Asian
☐ Black
☐ Hawaiian or Pacific Islander
☐ White or Caucasian
☐ Other: _____

Is your child of Hispanic, Latin, or Spanish origin?

◯ Yes
◯ No

What type of dental insurance does your child have?

◯ Private insurance
◯ Medicaid, public assistance
◯ My child does not have dental insurance
◯ Other: _____

Does your child currently need or use medicine prescribed by a doctor (other than vitamins)?

◯ Yes
◯ No

Caregivers have different thoughts about topical fluoride for their children. For each statement below, indicate how much you agree or disagree.

Please base your responses on your youngest child.

If my child's teeth are brushed regularly, they do not need topical fluoride.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

If my child has a healthy diet, they do not need topical fluoride.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

If my child goes to the dentist regularly, they do not need topical fluoride.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

If my child gets fluoride from toothpaste, they do not need topical fluoride.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I trust what my child's dentist says about topical fluoride.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

Caregivers may have concerns about topical fluoride. Some of these concerns are listed below. These may or may not apply to you. For each statement, please indicate your degree of concern.

As a reminder, please base your responses on your youngest child.

I am concerned about topical fluoride because my child already gets too much.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned about topical fluoride because my child might swallow it.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned about topical fluoride because it is not natural.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned topical fluoride may cause my child unknown harm in the future.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned topical fluoride may cause learning problems for my child.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned topical fluoride may cause my child to have autism.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned that topical fluoride is mostly a way for my child's dentist to make money.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned about topical fluoride because I am not given enough information about it.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned topical fluoride may cause my child to get cancer.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned topical fluoride may build up in my child's body.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned that I am not being told the whole truth about topical fluoride.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned that I will feel pressured at my child's dentist to say yes to topical fluoride.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned topical fluoride may hurt my child's IQ.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned about topical fluoride because some research says it is not safe.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned about topical fluoride because some doctors do not approve of it.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

Now we have some additional background questions about your youngest child.

Has your child ever had a cavity?

◯ Yes
◯ No

How likely is your child to get a cavity?

◯ Extremely likely
◯ Likely
◯ Unlikely
◯ Extremely unlikely

How bad would it be for your child to get a cavity?

◯ Extremely bad
◯ Somewhat bad
◯ Not that bad

What do you think about your child getting fluoride in their drinking water?

◯ Strongly oppose
◯ Somewhat oppose
◯ Somewhat favor
◯ Strongly favor

What do you think about your child using fluoride toothpaste?

◯ Strongly oppose
◯ Somewhat oppose
◯ Somewhat favor
◯ Strongly favor

Next, we are interested in your thoughts about dental x-rays for your child(ren). X-rays are also called radiographs. Your child's dentist may offer to take x-rays of your child's teeth during check-ups.

Have you ever been offered dental x-rays for any of your children?

◯ Yes
◯ No

Have you ever been offered dental x-rays for your child?

◯ Yes
◯ No

Have any of your children received dental x-ray?

◯ Yes
◯ No

On a scale of 0 to 10 with "0" being "not at all opposed" and "10" being "totally opposed", how opposed are you to dental x-rays for your children? _____

Has your child ever received dental x-rays?

◯ Yes
◯ No

On a scale of 0 to 10 with "0" being "not at all opposed" and "10" being "totally opposed", how opposed are you to dental x-rays for your children? _____

On a scale of 0 to 10 with "0" being "not at all concerned" and "10" being "extremely concerned", how concerned are you about dental x-rays for your children? _____

On a scale of 0 to 10 with "0" being "not at all concerned" and "10" being "extremely concerned", how concerned are you about dental x-rays for your child? _____

Regarding dental x-rays for your children, which statement below best describes you?

◯ I always say no
◯ Most of the time I say no
◯ Sometimes I say no
◯ I say yes, but I have thoughts about saying no
◯ I always say yes

Regarding dental x-rays for your child, which statement below best describes you?

◯ I always say no
◯ Most of the time I say no
◯ Sometimes I say no
◯ I say yes, but I have thoughts about saying no
◯ I always say yes

I say no or have thought about saying no to dental x-rays because one or more of my children don't like getting it.

◯ Agree
◯ Disagree

I say no or have thought about saying no to dental x-rays because my child doesn't like getting it.

◯ Agree
◯ Disagree

Caregivers have different thoughts about dental x-rays for their children. For each statement below, indicate how much you agree or disagree.

Please base your responses on your youngest child.

I trust what my child's dentist says about dental x-rays.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned about dental x-rays because my child already gets too many.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned about dental x-rays because they are not natural.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned dental x-rays may cause my child unknown harm in the future.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned dental x-rays may cause learning problems for my child.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned dental x-rays may cause my child to have autism.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned that dental x-rays are mostly a way for my child's dentist to make money.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned about dental x-rays because I am not given enough information about them.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned dental x-rays may cause my child to get cancer.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned the radiation from dental x-rays may build up in my child's body.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned that I am not being told the whole truth about dental x-rays.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned that I will feel pressured at my child's dentist to say yes to dental x-rays.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned dental x-rays may hurt my child's IQ.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned about dental x-rays because some research says they are not safe.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I am concerned about dental x-rays because some doctors do not approve of them.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

If my child has no visible cavities, they do not need dental x-rays.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

If my child has cavities that are causing pain, they need dental x-rays.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

If my child has crowded teeth, dental x-rays are necessary.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

If dental x-rays are needed for my child, I prefer that a lead apron be used.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

If my child's dentist recommends dental x-rays, I think they are okay.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

If my child's dentist recommends dental x-rays for baby teeth, I think they are okay.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

If my child's dentist recommends dental x-rays for permanent teeth, I think they are okay.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

If dental x-rays help my child's dentist make treatment decisions, I think dental x-rays are okay.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

Finally, we are interested in your thoughts about vaccines for your child. Vaccines are also sometimes called shots. Vaccines can help prevent diseases. Your child's physician or doctor may offer vaccines during medical check-ups. We are specifically interested in your thoughts about the HPV (human papillomavirus) vaccine if you have a child or children between ages 9 and 17 years.

Do you have a child or children at least 9 years old but younger than 18 years old?

◯ Yes
◯ No

How old is your child? If you have multiple children of this age range, please indicate the age of your oldest child.
_____ years

Please base your responses on your oldest child.

What is this child's gender?

◯ Boy
◯ Girl

Has your child received at least one shot of the human papillomavirus (HPV) vaccine?

◯ Yes
◯ No
◯ Unsure

Some types of human papillomavirus (HPV) can cause mouth and throat cancers. The HPV vaccine can protect against some of these types of cancer. Based on this information, please answer the following questions.

Has a doctor or healthcare provider ever told you that your child should get the HPV vaccine?

◯ Yes
◯ No

Dentists can help patients prevent HPV-related mouth and throat cancers.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

I would expect my child's dentist to talk to me about the relationship between HPV and mouth and throat cancer.

◯ Strongly agree
◯ Agree
◯ Disagree
◯ Strongly disagree

How comfortable would you be with your child's dentist talking to you about the HPV vaccine for your child?

◯ Very comfortable
◯ Somewhat comfortable
◯ Somewhat uncomfortable
◯ Very uncomfortable

How comfortable would you be with receiving written information about the HPV vaccine from your child's dentist?

◯ Very comfortable
◯ Somewhat comfortable
◯ Somewhat uncomfortable
◯ Very uncomfortable

How comfortable would you be with your child's dentist recommending that your child gets the HPV vaccine?

◯ Very comfortable
◯ Somewhat comfortable
◯ Somewhat uncomfortable
◯ Very uncomfortable

In some states, dentists can administer the HPV vaccine after receiving training. How comfortable would you be with your child receiving the HPV vaccine from a dentist during a routine dental check-up appointment?

◯ Very comfortable
◯ Somewhat comfortable
◯ Somewhat uncomfortable
◯ Very uncomfortable

If the HPV vaccine were free or completely covered by insurance, would you get it for your child from a dentist office?

◯ Yes
◯ No

We have a few final background questions about you and your household.

In what U.S. state or territory do you currently live in?	◯ I do not live in a U.S. state or territory ◯ Alabama ◯ Alaska ◯ American Samoa ◯ Arizona ◯ Arkansas ◯ California ◯ Colorado ◯ Connecticut ◯ Delaware ◯ District of Columbia ◯ Florida ◯ Georgia ◯ Guam ◯ Hawaii ◯ Idaho ◯ Illinois ◯ Indiana ◯ Iowa ◯ Kansas ◯ Kentucky ◯ Louisiana ◯ Maine ◯ Maryland ◯ Massachusetts ◯ Michigan ◯ Minnesota ◯ Mississippi ◯ Missouri ◯ Montana ◯ Nebraska ◯ Nevada ◯ New Hampshire ◯ New Jersey ◯ New Mexico ◯ New York ◯ North Carolina ◯ North Dakota ◯ Northern Mariana Islands ◯ Ohio ◯ Oklahoma ◯ Oregon ◯ Pennsylvania ◯ Puerto Rico ◯ Rhode Island ◯ South Carolina ◯ South Dakota ◯ Tennessee ◯ Texas ◯ U.S. Virgin Islands ◯ Utah ◯ Vermont ◯ Virginia ◯ Washington ◯ West Virginia ◯ Wisconsin ◯ Wyoming
What is your zipcode?	_____
What is your age in years?	_____

What is your gender?

◯ Woman
◯ Man
◯ Non-binary or third gender
◯ Prefer to self-identify: _____

What is the highest degree or level of school you have completed?

◯ Less than high school diploma
◯ High school diploma or equivalent (e.g., GED)
◯ Some college or 2-year college degree
◯ 4-year college degree
◯ More than 4-year degree

What is your race? Please select all that apply:

☐ American Indian or Alaska Native
☐ Asian
☐ Black or African American
☐ Native Hawaiian or other Pacific Islander
☐ White
☐ Other: _____

Do you consider yourself to be Hispanic, Latino, or of Spanish origin?

◯ Yes
◯ No

What is your annual household income?

◯ Less than $15,000
◯ $15,000 but less than $25,000
◯ $25,000 but less than $50,000
◯ $50,000 but less than $75,000
◯ $75,000 but less than $100,000
◯ $100,000 but less than $150,000
◯ $150,000 or more

Please respond to the following statement about the food eaten in your household in the past 12 months: We worried whether our food would run out before we got money to buy more.

◯ Often true
◯ Sometimes true
◯ Never true
◯ Don't know

Please respond to the following statement about the food eaten in your household in the past 12 months: The food we bought just didn't last and we didn't have money to get more.

◯ Often true
◯ Sometimes true
◯ Never true
◯ Don't know

What type of dental insurance do you have?

◯ Private insurance
◯ Medicaid, public assistance
◯ I do not have dental insurance
◯ Other: _____

When schools are running normally, is any child in your household homeschooled?

◯ Yes
◯ No
◯ Not applicable - I do not have school-aged children

Is any child in your household eligible for free or reduced-cost breakfasts or lunches at school?

◯ Yes
◯ No
◯ Not applicable - I do not have school-aged children

Thank you for taking our survey. We have a few final questions for you.

Would you like to take part in future research?

◯ Yes
◯ No

If you would like to take part in future research, please enter your email address: _____

Your email address will not be linked to your survey responses.

At the end of the study, would you like an emailed summary of what we have learned?

◯ Yes
◯ No

At the end of the study, would you like to receive information about the preventive care measures mentioned in this survey?

◯ Yes
◯ No

Which preventive care measures do you want to receive more information on? Please select all that applies:

☐ Topical Fluoride
☐ Dental X-ray
☐ HPV Vaccine

Please enter your email address: _____

Your email address will not be linked to your survey responses.

Is there anything else you would like to tell us?

_____

After you submit the survey you will be taken to a new page to enter a drawing. Entry is optional.

VIII. REFERENCES:

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