

# Association between caregiver opposition to topical fluoride and dental radiographs

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## BACKGROUND

A variety of radiographic techniques—such as bitewing, periapical, panoramic, cephalometric, CBCT, and dental MRI—are essential in dentistry for diagnosing and monitoring conditions like caries, periodontal disease, dentofacial growth and development, craniofacial anomalies, oral pathologies, and treatment outcomes. Despite their clinical value, dental radiographs expose patients to ionizing radiation, which poses greater risks for children due to their increased radiosensitivity. To minimize radiation exposure, the ADA and AAPD recommend radiographs only when clinically necessary, following the ALARA principle, and utilizing modern safety techniques. Caregiver hesitancy may arise, especially given updated guidelines advising against routine use of thyroid and abdominal shielding.

Although caregiver hesitancy regarding vaccines and fluoride has been well documented, little is known about the underlying reasons for dental radiograph refusal. This study aimed to examine the association between caregiver opposition to topical fluoride and opposition to dental radiographs and to identify the most common reasons for radiograph opposition.

## 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: The University of Washington Center for Pediatric Dentistry (UW CPD), Seattle Children's Hospital (SCH), Seattle Children's Hospital Odessa Brown Children's Center (OBCC), Oregon Health & Science University Hospital (OHSU), Cincinnati Children's Hospital Medical Center (CCHMC), and Children's National Hospital (CNH). 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 survey included questions on oral health knowledge, beliefs and reasons for opposition to topical fluoride and dental radiographs. The goal of these questions was to understand why caregivers were opposed to topical fluoride and dental radiographs.

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).
- Eighty-one percent 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** (Figure 1). There was a significant **positive** association between topical fluoride opposition and dental radiograph opposition (Odds Ratio = 7.04, 95% CI: 4.72-10.65,  $p < 0.001$ ).
- 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%).

## FIGURE 1

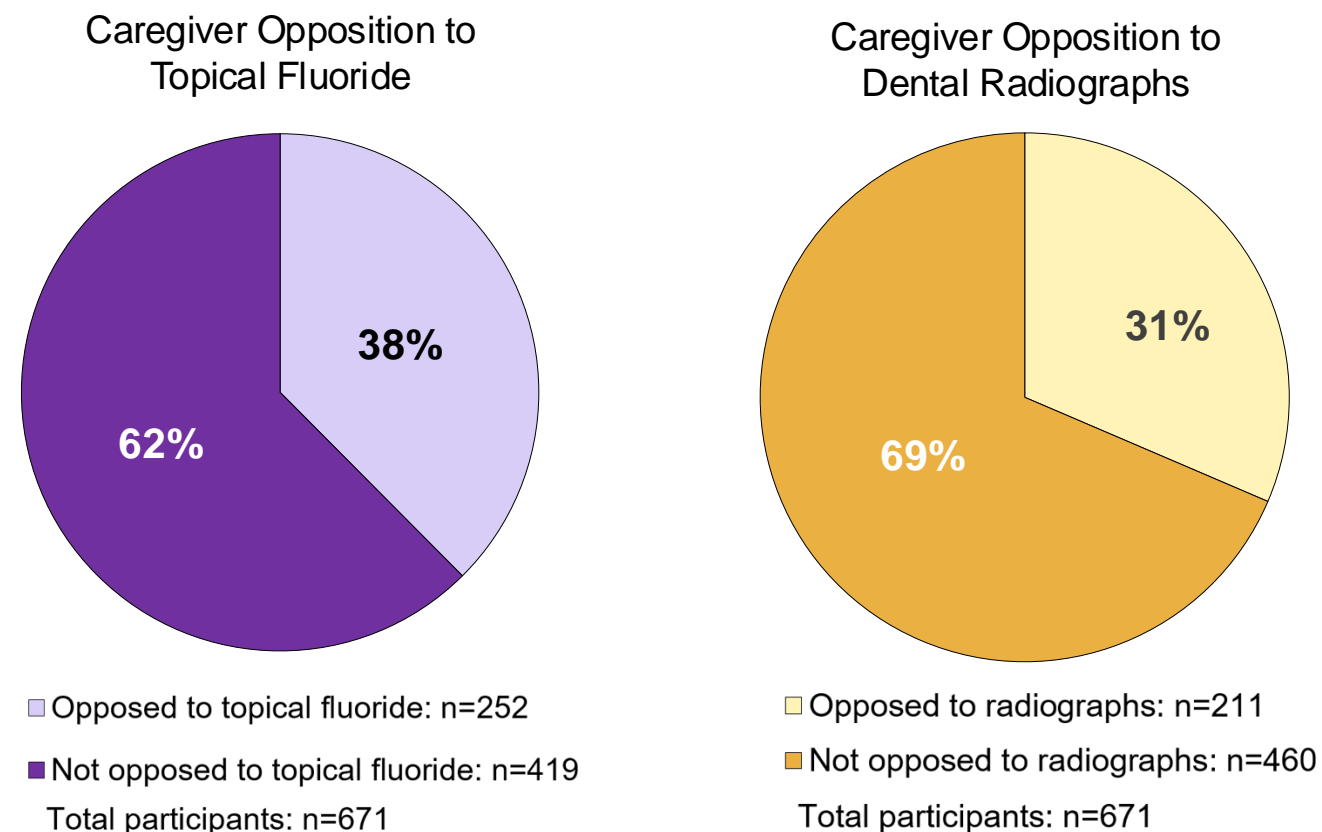


Figure 1 Percentage of Caregivers Opposed to Topical Fluoride and Dental Radiographs

## DISCUSSION

- In this study, **38% of caregivers opposed topical fluoride** and **31% opposed dental radiographs**; those who opposed fluoride were **significantly more likely** also to oppose radiographs.
- The most common **concerns** about **dental radiographs** included: **unknown future harm, radiation accumulation, and cancer risk**.
- Trust in the **dentist's recommendation** was the most cited facilitator of **radiograph acceptance**.
- Hesitancy towards one preventative measure may extend to others, reflecting broader skepticism toward other preventative dental procedures.
- Many caregiver concerns stem from **misconceptions about radiation**, despite dental X-rays delivering doses far lower than medical imaging or natural background exposure. Educational efforts should use everyday comparisons and highlight modern safety measures (*ALARA, rectangular collimation, patient positioning*).
- **Screening for fluoride hesitancy** may help identify broader patterns of preventive care resistance. Tailored education, integrated messaging, and alternative diagnostic and preventive options for those still opposed to topical fluoride and radiographs may support shared decision-making and improve acceptance.

## CONCLUSION

- Caregivers opposed to topical fluoride in dental settings were significantly more likely to oppose dental radiographs for their children.
- 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

## ACKNOWLEDGEMENTS

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