Epidemiological Study of Dental Caries and Cardiovascular Health in Children

HARVARD School of Dental Medicine

Abbey Kim, BS;[1] Alisa E. Lee, DMD;[2] Izzuddin M. Aris, PhD[3,4]

[1]Harvard School of Dental Medicine, Boston, MA; [2]Boston Children's Hospital, Boston, MA; [3]Harvard Medical School, Boston, MA; [4]Harvard Pilgrim Health Care Institute, Boston, MA

BACKGROUND & OBJECTIVE

- Dental caries and poor cardiovascular health (CVH) share a significant overlap in both risk factors and preventative measures, **yet their relationship remains largely unexplored in children and adolescent populations**.[1,2]
- Studies have increasingly investigated causal links between inflammatory oral diseases, namely periodontal disease, and cardiovascular disease in adults.[3,4]
- A recent large-scale prospective Danish cohort study found that severe dental caries and gingivitis in childhood predicted incident atherosclerotic cardiovascular disease in adulthood.[5]
- Objective: To investigate potential associations between **dental caries experience and poorer CVH among US children and adolescents,** with particular attention to whether **shared social drivers of health** may explain these associations.

METHODS

- Study population:
  - Used data from **National Health and Nutrition Examination Survey** (NHANES) 2013–2018 cycles.
  - 9,585 participants aged 2–19 years stratified by dentition stage: primary (2–5 years, n=1,825), mixed (6–11 years, n=3,818), and permanent (12–19 years, n=3,942).
- Dental caries experience:
  - Characterized by **DMFT index** (sum of decayed, missing due to caries, and filled teeth).
- Cardiovascular health:
  - American Heart Association's **"Life's Essential 8"** (LE8) framework assessed on 0–100 scale with higher scores indicating better CVH.[6]
    - High CVH defined as scores ≥80
  - Composed of behavioral metrics (diet, physical activity, nicotine exposure, sleep health) and biological metrics (BMI, blood lipids, blood glucose, blood pressure).
  - Overall, biological, and behavioral CVH scores were calculated as the unweighted average of all available metrics at each life stage.

- Statistical analyses:
  - Linear and logistic regression models estimated associations between DMFT and CVH at each life stage.
  - Adjusted for age, sex, race/ethnicity, family income, health insurance, and time since last dental visit.

KEY FINDING

Efforts to improve early CVH should incorporate oral health promotion and must fundamentally address the social inequities that shape both domains.

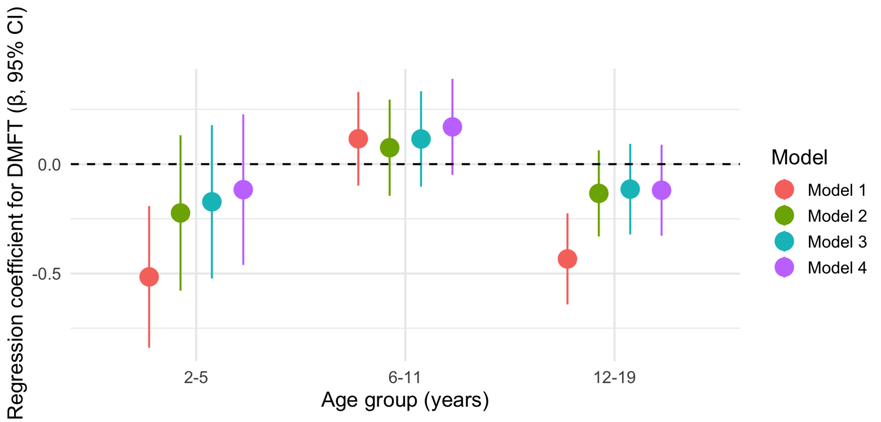

Figure 1. Linear regression analyses of the associations between DMFT and overall CVH scores by SDOH adjustment models[1]

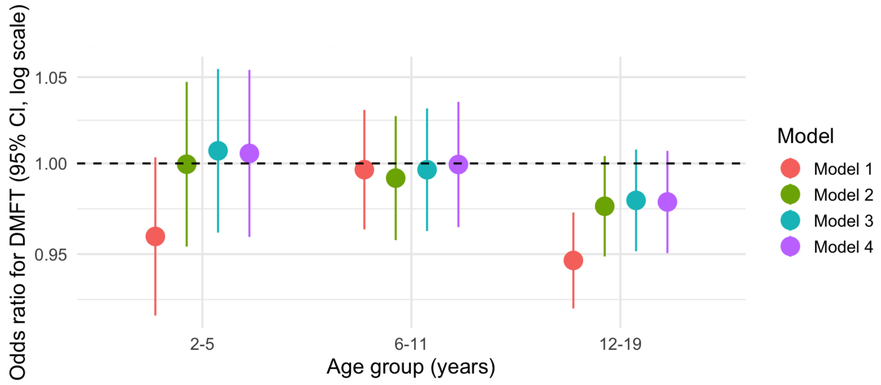

Figure 2. Logistic regression analyses of the associations between DMFT and high CVH scores by SDOH adjustment models[1]

[1] **Model 1:** Unadjusted. **Model 2:** Adjusted for age, sex, health insurance status, and last dental visit. **Model 3:** Additionally adjusted for family income-to-poverty index. **Model 4:** Additionally adjusted for race/ethnicity.

RESULTS

- **In unadjusted linear models, higher DMFT scores were associated with lower CVH scores** in ages 2–5 years and 12–19 years.
- **In unadjusted logistic models, higher DMFT was associated with lower odds of high CVH among ages 12–19 years**, but not in younger age groups.
- These associations were **substantially attenuated** after adjustment for **sociodemographic factors.**
- In ages **6–11 years, DMFT showed a small positive association with CVH**, likely reflecting BMI heterogeneity during the **adiposity rebound period**.

Characteristic	2–5 years (n = 1,825)	6–11 years (n = 3,818)	12–19 years (n = 3,942)
Sex			
Male	939 (51%)	1,926 (50%)	1,977 (50%)
Race/Ethnicity			
Mexican American	347 (19%)	791 (21%)	840 (21%)
Other Hispanic	183 (10%)	417 (11%)	396 (10%)
Non-Hispanic White	516 (28%)	1,056 (28%)	1,087 (28%)
Non-Hispanic Black	441 (24%)	925 (24%)	911 (23%)
Other Race	338 (19%)	629 (16%)	708 (18%)
Family Income-to-Poverty Index			
Low Income	774 (47%)	1,511 (44%)	1,495 (42%)
Health Insurance			
Private	674 (37%)	1,530 (40%)	1,672 (43%)
Last Dental Visit			
>2 years or never	347 (19%)	238 (6.2%)	433 (11%)
DMFT Index Score	1.36 (2.82)	2.10 (2.84)	2.45 (3.37)
Overall CVH Score	72.68 (15.84)	68.52 (16.66)	75.45 (13.40)
n (%); Mean (SD)			

Table 1. Characteristics of study participants, by life stage

CONCLUSION

- Social disadvantage in childhood establishes poor oral health phenotypes, potentially accompanied by biological changes with long-term cardiovascular implications.
- Persistence of these unfavorable oral and CVH trajectories into adulthood due to sustained social inequities, could ultimately culminate in elevated CVD risk.
- Interventions targeting social needs in childhood represent potentially high-impact strategies for simultaneously improving both current and future oral and CVH.
- Further studies are needed to better understand how biological and social mechanisms impact this relationship between oral health and CVH.

REFERENCES

CONTACT INFORMATION

abbeykim@hsdm.harvard.edu