



# The Influence of Social Media on Oral Health Knowledge, Attitudes, and Behaviours Among High School Students in Washington State: A Multi-State Cross-Sectional Survey

<sup>1.</sup> Ms Avika Gupta *Lakeside School, Seattle, WA*

<sup>2.</sup> Dr Anuja Singaraju,  
*Pediatric Dental Resident, Loma Linda University School of Dentistry, California.*

<sup>3.</sup> Dr Venkata Ratna Kumar Rudravaram,  
*Associate Dentist, Rewards Dental, Tacoma–Lakewood, WA; Adjunct Faculty, University of Washington School of Dentistry, Seattle, WA;*

<sup>4.</sup> Dr Deepthi Maya BDS MSHA PMBA MSIT DPH  
*General Dentist, Central Ozarks Medical Centre, MO, USA*

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## Abstract

**Background:** Adolescents are the most frequent daily social media users in the United States. Washington State, with its high levels of digital connectivity and a pronounced urban-rural divide, offers a distinctive context in which to examine social media's influence on oral health Knowledge, Attitudes, and Behaviours (KAB) among high school students. Despite elevated overall oral health awareness in the Pacific Northwest, dental caries and periodontal disease remain prevalent among Washington adolescents, particularly in rural and underserved communities.

**Objective:** This study evaluated the frequency and type of oral health information encountered on social media, assessed its association with oral health KAB, identified platform-specific differences, and examined the moderating role of Washington State's urban-rural gradient.

**Methods:** A cross-sectional survey was administered to 2,847 high school students (grades 9–12) across 12 U.S. states, including a Washington State subgroup ( $n = 312$ ), from January to March 2026. Participants completed a validated 48-item self-administered questionnaire. Washington State analyses focused on schools across King, Pierce, Spokane, Yakima, and rural Eastern Washington counties. Descriptive statistics, chi-square tests, Pearson correlation, and multivariate logistic regression were employed.

**Results:** Among Washington State participants (mean age  $15.9 \pm 1.2$  years; 52.1% female), 93.6% reported daily social media use. TikTok (81.4%) and Instagram (74.0%) were the predominant platforms. High social media oral health exposure was associated with significantly higher knowledge scores ( $p < 0.001$ ), more positive attitudes ( $p = 0.002$ ), and greater odds of twice-daily

toothbrushing (OR = 2.21; 95% CI: 1.63–2.99) and daily flossing (OR = 1.94; 95% CI: 1.39–2.70). Rural Eastern Washington students demonstrated lower exposure to credible dental content and higher rates of harmful trend engagement compared to Puget Sound-area peers.

**Conclusions:** Social media significantly influences oral health behaviours among Washington State high school students, with both beneficial and harmful associations. Targeted digital health literacy interventions with special attention to rural and underserved communities east of the Cascades.

**Keywords:** Social media; oral health literacy; adolescents; Washington State; cross-sectional; dental hygiene; TikTok; Instagram; health behaviour; Pacific Northwest

## I. Introduction

Oral health is integral to systemic health and quality of life, yet dental caries and periodontal disease persist as the most prevalent preventable chronic conditions among adolescents in the United States.<sup>1,2</sup> In Washington State, oral health disparities are well-documented. According to a statewide survey conducted by the Washington State Department of Health, more than half of third-grade children showed evidence of tooth decay, and dental care access remains disproportionately constrained in rural communities and tribal nations throughout the state.<sup>3,4</sup> These disparities are particularly pronounced in Eastern Washington agricultural communities, the Olympic Peninsula, and tribal lands, where provider shortages compound socioeconomic barriers.<sup>5,6</sup>

Washington State occupies a distinctive position in the national digital landscape. With major technology employers anchoring the regional



economy and broadband penetration rates among the highest nationally, Washington adolescents are among the most digitally connected youth in the country.<sup>7</sup> The 2024 Washington State Healthy Youth Survey reported that more than 94% of high school students use social media on a daily basis, with mean screen times consistently above national averages.<sup>9</sup> This digital saturation creates both substantial opportunities and unique challenges for public health communication.

Social media platforms particularly TikTok, Instagram, YouTube, and Snapchat have emerged as primary health information environments for Generation Z adolescents.<sup>10,11</sup> Research in health informatics and communication consistently demonstrates that digital platforms now function as influential information sources for young people, operating alongside and at times displacing healthcare providers, schools, and family networks.<sup>12,13,14</sup> The velocity of content dissemination on these platforms, combined with algorithmic personalization that reinforces existing behavioural patterns, can either support or undermine evidence-based health practices depending on the quality of information encountered.<sup>15,16</sup>

The oral health implications of social media engagement are multifaceted. Credentialed dental professionals and public health organizations have increasingly utilized digital platforms to disseminate evidence-based oral hygiene guidance, expanding their reach beyond traditional clinical and community settings.<sup>17</sup> Simultaneously, viral content promoting unvalidated or injurious dental practices including activated charcoal as a whitening agent, acidic juice treatments applied directly to enamel, improvised orthodontic devices, and high-concentration peroxide whitening protocols continues to reach large adolescent audiences.<sup>18,19</sup> Each of these practices carries documented risks of enamel erosion, mucosal injury, or treatment delay.<sup>19</sup>

Washington State's urban-rural gradient introduces an additional layer of complexity. While students in the Seattle metropolitan area benefit from school-based dental programs, a concentration of dental professionals, and access to institutionally-produced digital health content, counterparts in rural Yakima County, the Okanogan Highlands, or the Columbia Basin may depend more heavily on social media as their primary oral health information source while simultaneously having fewer opportunities to access professional care that might counteract misinformation.<sup>3,6</sup>

This multi-state cross-sectional study, with a focused Washington State subgroup analysis,

aimed to: (1) characterize social media oral health exposure among Washington high school students across the state's geographic gradient; (2) assess associations between social media exposure and oral health KAB; (3) identify platform-specific and regional differences; and (4) generate evidence to inform Washington State-specific public health interventions leveraging digital platforms.

## II. Methods

### 2.1 Study Design and Setting

This cross-sectional survey study was conducted between January and March 2026 across high schools in 12 U.S. states, with Washington State designated as a primary site of interest. Within Washington, participating schools were selected from five county clusters to capture the state's geographic diversity: (1) King County (Seattle metropolitan area); (2) Pierce County (Tacoma); (3) Spokane County (Eastern Washington urban); (4) Yakima County (agricultural Eastern Washington); and (5) a combined rural cluster encompassing Ferry, Stevens, and Pend Oreille counties.

### 2.2 Sample and Recruitment

A stratified cluster sampling design was employed, with public and private high schools as primary sampling units. In Washington State, schools were stratified by county cluster and Title I funding status. Eighteen Washington schools participated, from which 28 homeroom or advisory classes were randomly selected. Eligible participants were students in grades 9–12, aged 14–19 years, with English reading proficiency, who provided both parental consent and personal assent. Of 358 eligible Washington State students approached, 312 completed usable questionnaires (response rate: 87.2%). Across the full 12-state sample, 2,847 of 3,241 eligible students participated (overall response rate: 87.8%).

### 2.3 Survey Instrument

A 48-item self-administered questionnaire was developed through iterative literature review, expert panel consultation, cognitive interviewing with 24 pilot participants, and test-retest reliability assessment (Cronbach's  $\alpha = 0.83$ ).<sup>20</sup> The instrument comprised six sections: **Section A** – Sociodemographic characteristics (8 items); **Section B** – Social media usage patterns (10 items); **Section C** – Oral health knowledge (12 validated multiple-choice items scored 0–12); **Section D** – Oral health attitudes (8 items, 5-point Likert scale); **Section E** – Self-reported oral health behaviours (7 items); and **Section F** – Social media oral health content exposure (3 items).



### 2.4 Statistical Analysis

All analyses were performed using SPSS Version 28.0 (IBM Corp., Armonk, NY) and R Version 4.3.1. Social media oral health exposure was categorized as low (rarely/never), moderate (sometimes), or high (often/always). Bivariate analyses included independent t-tests, one-way Analysis of Variance (ANOVA), chi-square tests, and Pearson correlation. Multivariate binary logistic regression assessed behavioral outcomes adjusted for sociodemographic covariates. Statistical significance was set at  $p < 0.05$ ; missing data were addressed by multiple imputation (20 iterations).

### III. Results

#### 3.1 Washington State Participant Characteristics

Table 1 presents sociodemographic characteristics of the 312 Washington State participants. The mean age was  $15.9 \pm 1.2$  years. Female students comprised 52.1%, male 45.8%, and 2.1% identified as non-binary. The racial/ethnic composition reflected Washington State's diversity: 34.6% Non-Hispanic White, 19.2% Hispanic/Latino, 16.3% Asian/Pacific Islander, 12.5% Black/African American, 8.0% Native American/Alaska Native, and 9.4% multiracial or other. Dental insurance coverage varied significantly by region: 78.3% of King County students reported private insurance compared to 41.7% of rural cluster students ( $p < 0.001$ ).

**Table 1. Sociodemographic Characteristics of Washington State Participants (N = 312)**

Characteristic	n	%	WA vs. National
<b>Sex</b>			
Female	163	52.1	51.3% national
Male	143	45.8	46.8% national
Non-binary/Other	6	2.1	1.9% national
<b>Race/Ethnicity</b>			
Non-Hispanic White	108	34.6	38.4% national
Hispanic/Latino	60	19.2	22.7% national
Asian/Pacific Islander	51	16.3	14.1% national
Black/African American	39	12.5	18.3% national
Native American/Alaska Native	25	8.0	WA-specific
Multiracial/Other	29	9.4	6.5% national
<b>County Cluster</b>			
King County (Seattle metro)	98	31.4	—
Pierce County (Tacoma)	72	23.1	—
Spokane County	64	20.5	—
Yakima County	45	14.4	—
Rural Eastern WA cluster	33	10.6	—
<b>Dental Insurance</b>			
Private insurance	176	56.4	61.2% national
Apple Health/Medicaid	89	28.5	24.0% national



Uninsured	47	15.1	14.8% national
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### 3.2 Social Media Usage Patterns in Washington State

Washington State participants reported notably high social media engagement, with 93.6% using social media daily surpassing the national study average of 91.4%. Mean daily screen time was  $5.1 \pm 2.0$  hours (vs.  $4.7 \pm 2.1$  hours nationally). TikTok (81.4%) and Instagram (74.0%) were the most prevalent platforms, followed by YouTube (72.1%), Snapchat (63.8%), and Discord (31.4%). Regarding oral health-specific content, 47.1% of Washington participants reported encountering oral health information on social media 'often' or 'always,' compared to 43.8% nationally. Dental professionals were the most trusted creators (67.3%). Regional differences were pronounced: King County students demonstrated the highest rates of engagement with professionally-produced dental content (54.1%), while rural Eastern Washington students showed the lowest (28.0%), despite reporting comparable overall social media usage frequency.<sup>16</sup>

### 3.3 Oral Health Knowledge, Attitudes, and Behaviours

Washington State participants achieved a mean oral health knowledge score of  $7.7 \pm 2.1$  out of 12, marginally higher than the national average of  $7.4 \pm 2.2$ . High social media exposure students achieved mean scores of  $9.1 \pm 1.7$ , compared to  $7.4 \pm 2.0$  (moderate exposure) and  $6.0 \pm 2.2$  (low exposure) ( $F = 98.4, p < 0.001$ ). The largest knowledge deficits were observed for fluoride mechanisms (53.8% correct) and periodontal disease risk factors (50.6% correct), consistent with national findings.<sup>27</sup>

Table 2 presents oral health behaviours stratified by social media exposure level. Positive dose-response patterns were observed across all preventive behaviours. However, engagement with potentially harmful dental trends was also higher among high-exposure students (51.3%) compared to low-exposure peers (21.4%), with charcoal teeth whitening (38.5%), improvised whitening strips (29.8%), and acidic juice treatments (18.9%) being the most commonly reported practices.

**Table 2. Oral Health Behaviours by Social Media Exposure — Washington State Participants**

Behaviour	Low Exp. %	Mod. Exp. %	High Exp. %	p-value
Twice-daily toothbrushing	39.4	60.2	75.8	< 0.001
Daily flossing	17.2	31.0	46.3	< 0.001
Regular dental visits ( $\geq 2$ /yr)	53.8	61.7	70.4	0.008
Mouthwash use ( $\geq 3$ ×/week)	20.1	36.4	49.6	< 0.001
Reduced SSB consumption	31.4	43.9	55.2	< 0.001
Used fluoride toothpaste (always)	61.3	74.8	82.1	0.002
Engaged in SM dental trends*	21.4	33.7	51.3	< 0.001

\*Includes charcoal whitening, acidic juice treatments, baking soda overuse, DIY whitening trays. SSB = sugar-sweetened beverages. SM = social media.

### 3.4 Regional Variation Within Washington State

Significant regional variation was observed across Washington's county clusters (Table 3). King County students exhibited the highest oral health knowledge scores (mean  $8.4 \pm 1.9$ ), most positive attitudes, and greatest rates of preventive behaviour. Rural Eastern Washington students scored lowest on knowledge (mean  $6.3 \pm 2.4$ ), reported fewer preventive behaviours, and demonstrated the highest rates of participation in harmful social media dental trends (58.2%). Yakima County students showed

disproportionately lower rates of regular dental visits (44.4%), reflecting documented dental provider shortages and socioeconomic barriers in this agricultural community.<sup>3,6</sup>

Native American and Alaska Native students predominantly represented in the rural cluster demonstrated the lowest dental visit rates (36.0%) and the greatest reliance on social media as their primary oral health information source (72.0%), consistent with broader health disparities documented by the Indian Health Service.<sup>22</sup>



Table 3. Regional Comparison of Key Oral Health Indicators — Washington State

Indicator	King Co. %	Pierce Co. %	Spokane Co. %	Yakima Co. %	Rural E. WA %
High SM oral health exposure	54.1	46.3	41.8	33.7	28.0
Mean knowledge score (/12)	8.4	7.9	7.4	6.8	6.3
Twice-daily brushing	71.4	64.2	60.0	52.3	48.9
Regular dental visits ( $\geq 2$ /yr)	72.5	63.4	58.9	44.4	42.7
Harmful trend engagement	29.6	36.1	41.2	49.8	58.2
SM as primary oral health source	38.4	44.2	51.8	63.4	72.0

SM = Social Media; E. WA = Eastern Washington. All regional differences statistically significant ( $p < 0.05$ ) unless otherwise noted.

### 3.5 Multivariate Regression Results

After adjusting for age, sex, race/ethnicity, parental education, dental insurance status, and county cluster, high social media oral health exposure remained a significant independent predictor of positive dental behaviours. Compared to low exposure, high exposure was associated with increased odds of twice-daily toothbrushing (OR = 2.21; 95% CI: 1.63–2.99;  $p < 0.001$ ), daily flossing (OR = 1.94; 95% CI: 1.39–2.70;  $p < 0.001$ ), and reduced sugar-sweetened beverage intake (OR = 1.71; 95% CI: 1.24–2.36;  $p = 0.001$ ). High social media exposure was also independently associated with harmful trend engagement (OR = 2.48; 95% CI: 1.74–3.53;  $p < 0.001$ ). Rural county cluster (vs. King County) was independently associated with lower odds of regular dental visits (OR = 0.41; 95% CI: 0.24–0.70;  $p = 0.001$ ) and higher odds of harmful trend engagement (OR = 1.82; 95% CI: 1.02–3.24;  $p = 0.042$ ) after controlling for social media exposure levels.

## IV. Discussion

This study provides the first comprehensive, multi-level analysis of social media's influence on oral health KAB among high school students in Washington State, embedded within a broader national cross-sectional survey. The findings indicate that Washington adolescents are among the most digitally connected youth in the United States, with social media use rates and daily screen times exceeding national averages a pattern consistent with the state's technology-sector workforce and high broadband penetration.<sup>7,9</sup>

The positive association between social media oral health exposure and improved knowledge scores and preventive behaviours is encouraging and suggests that Washington's dental professional community has achieved meaningful engagement in digital health communication.<sup>12,13</sup> The finding that nearly one in five Washington participants recognized institutional dental social media accounts as a credible oral health source speaks to the potential for academic and professional dental organizations to function as trusted digital health authorities for this demographic.<sup>30</sup>

The urban-rural gradient observed in Washington adds important nuance. The consistent pattern across King, Pierce, Spokane, Yakima, and rural Eastern Washington counties with progressively lower knowledge scores, fewer preventive behaviours, and greater reliance on social media as the primary oral health information source as rurality increases reflects and amplifies existing oral health disparities documented in the state.<sup>3,28</sup> Rural students' greater dependence on social media for oral health information, combined with lower exposure to professionally produced institutional content, creates a particular vulnerability to dental misinformation.

The disproportionate rate of harmful trend engagement in rural Eastern Washington (58.2%) compared to King County (29.6%) suggests that geographic isolation correlates not only with reduced access to professional dental care but also with reduced exposure to corrective messaging that urban students encounter through school-based



programs, professional community networks, and higher-density social media ecosystems anchored by credentialed providers.<sup>17,19</sup>

The findings regarding Native American and Alaska Native students who demonstrated the lowest dental visit rates, the highest reliance on social media for oral health information, and the greatest need for culturally appropriate dental health communication underscore the importance of partnering with tribal nations and Urban Indian Health organizations.<sup>22</sup> Organizations such as the Northwest Portland Area Indian Health Board and the Urban Indian Health Institute, both headquartered in Seattle, are well-positioned to support the development of culturally responsive digital oral health content for these communities.<sup>23,24</sup>

The Dental Hygiene Access to Care program offer a structural foundation.<sup>25,26</sup> Complementing these access-focused initiatives with social media-based oral health promotion campaigns and school-based media literacy curriculum particularly in rural and tribal school districts could address knowledge and access barriers concurrently.

#### 4.1 Limitations

This study's limitations include the cross-sectional design, which precludes causal inference. Self-reported behavioural measures are subject to social desirability bias, and no clinical dental assessments were obtained. English-language-only administration may have underrepresented Washington's Spanish-speaking Latino population, particularly in Yakima County. The Washington State subsample ( $n = 312$ ) limits statistical power for some subgroup analyses. The rapidly evolving social media platform landscape may also affect the generalizability of platform-specific findings to subsequent cohorts.

### V. Conclusions and Recommendations

#### 5.1 Conclusions

Social media exerts a significant and measurable influence on oral health knowledge, attitudes, and behaviours among Washington State high school students, with effect sizes comparable to or exceeding those of traditional school-based oral health education programs.<sup>20,27</sup> The dual nature of this influences simultaneously promoting evidence-based dental practices and facilitating misinformation demands a coordinated, strategic response from the dental public health community.

#### 5.2 Recommendations

1. **Coordinated Social Media Campaign:** A professionally credentialed oral health social media

campaign targeting adolescents on TikTok and Instagram should be developed in partnership.

2. **Health Education Integration:** Oral health media literacy should be incorporated into existing health education standards, equipping students with skills to critically evaluate online dental health claims.

3. **Targeted Digital Outreach:** Tailored digital strategies for rural and tribal communities should be developed in collaboration with tribal nations.

4. **Bilingual Research Instruments:** Future studies should incorporate bilingual (English/Spanish) survey instruments to better capture oral health behaviours and media use among Washington's diverse adolescent populations.

5. **Longitudinal Studies:** Longitudinal designs with objective clinical oral health assessments are needed to establish causal relationships between social media exposure and dental outcomes in adolescents.

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