2015 Wisconsin Healthy Smiles Survey

The Oral Health of Wisconsin's Ninth Grade Children

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EXECUTIVE SUMMARY

During the 2014-15 school year, the Wisconsin Department of Health Services completed the Wisconsin *Healthy Smiles Survey* on the oral health of Wisconsin's ninth grade students. A total of 1,162 students participated in the survey, which consisted of a dental screening and self-report questionnaire. Dental screenings were completed by licensed dental professionals following the Basic Screening Survey (BSS) protocol from the Association of State and Territorial Dental Directors (ASTDD). In addition, students completed a brief self-report questionnaire, which was linked to the BSS results. Overall, we observed that tooth decay, which is common among younger children, is also prevalent among Wisconsin adolescents. Levels of tooth decay and access to protective dental sealants varied significantly by race, ethnicity, and income.

1,162

ninth grade students participated in the survey.

The survey consisted of a dental screening and a self-report questionnaire.

KEY FINDINGS

- Tooth decay is a significant public health problem in Wisconsin, as 55 percent of ninth grade students have experienced tooth decay. This falls short of the Healthy People 2020 target (48%).
- Three percent of ninth grade students had rampant tooth decay.
- Seventeen percent of ninth grade students had untreated tooth decay. All students with untreated tooth decay had early or urgent treatment needs.
- Twenty-eight percent of ninth grade students had dental sealants on at least five permanent molars.
- Disparities were observed by race and ethnicity for untreated tooth decay, early or urgent treatment needs, and dental sealants. For example, nearly two times as many non-Hispanic Black students had untreated decay compared to non-Hispanic White students.
- Nearly 50 percent of ninth grade students reported brushing their teeth fewer than two or more times per day.
- Students experiencing tooth or mouth pain two or more times in the past year were more than two times as likely to receive lower grades in school compared to students experiencing pain less frequently.

55% of ninth grade students have experienced tooth decay.

28% of ninth grade students have had dental sealants on at least five permanent molars.

Non-Hispanic White ninth graders are twice as likely to have five or more dental sealants compared to Non-Hispanic Black adolescents.

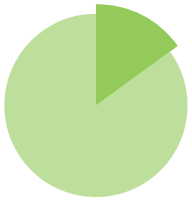
BACKGROUND

Among children and adolescents, caries (tooth decay or cavities) is the most prevalent chronic disease. Nationally, nearly 60 percent of adolescents 12 to 19 years of age have had caries in permanent (adult) teeth, while 15 percent have untreated decay.[1, 2] Certain subgroups are disproportionally affected by poor oral health, including untreated tooth decay. For example, minority adolescents, particularly non-Hispanic Black adolescents, have more untreated decay compared to their non-Hispanic White counterparts. Similarly, adolescents from families with lower incomes have more untreated decay compared to adolescents from higher income families, suggesting economic barriers may contribute to inadequate care for oral disease.[3] In addition to oral disease, racial and ethnic disparities in evidence-based preventive treatments such as dental sealants have persisted nationally. Non-Hispanic Black, non-Hispanic Asian, and Hispanic children are less likely than non-Hispanic White children to receive dental sealants, which protect molars from tooth decay.[3]

Adolescents have distinctive oral health needs compared to younger children and adults due to their stage of development and risk factors unique to this period. The risk for caries and periodontal disease (inflammation of the tissues surrounding teeth) is high in this age group due to biologic factors such as immature enamel, greater tooth surface, and hormonal changes during puberty.[1] In addition,
environmental and behavioral factors contribute to adolescents' risk for poor oral health. For example, low-income adolescents may have less access to preventive dental services due to cost of dental care, which could lead to tooth decay or gum disease.[1, 4, 5] Also, adolescents are typically responsible for brushing and flossing as well as being more in charge of other important behavioral

60%

of adolescents nationally 12-19 years old have had caries in permanent (adult) teeth.



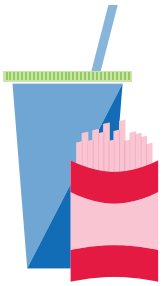
15% of adolescents nationally 12-19 years old have untreated tooth decay.

Poor oral health may have consequences for psycosocial well-being.

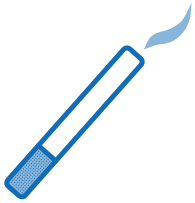
factors, including dietary choices. Some dietary choices may result in poorer nutrition, more snacking, or increased consumption of beverages high in sugar or acid. At this age adolescents may also initiate use of tobacco and may participate in sports that could result in orofacial injuries, particularly when a mouthguard is not used.[1] There is some evidence that adolescents with a greater number of decayed teeth experience greater psychological and social discomfort and disability. This suggests diminished quality of life among adolescents with poor oral health.[6] In addition, adolescents with poorer oral health are more likely to perform poorly in school and miss school days due to dental pain compared to those with better oral health.[7]

Despite increased vulnerability to oral disease and associated poor outcomes during adolescence, dental caries is highly preventable. High school may be a final opportunity to educate adolescents about best practices in oral
hygiene, the importance of oral health, and risk factors for oral disease before students leave their homes for work or education. In addition, providing treatment for existing problems before students transition out of their homes is important, as this age group may begin to assume responsibility for scheduling dental appointments and out-of-pocket costs and may experience changes in insurance status for dental services.

This report summarizes findings from Wisconsin's 2015 *Healthy Smiles Survey*, conducted in public high schools statewide. The report highlights demographic groups at highest risk for poor oral health while exploring risk factors for oral health problems among adolescents in Wisconsin.



Some dietary choices may result in poorer nutrition, more snacking, or increased consumption of beverages high in sugar or acid.



At this age adolescents may also initiate use of tobacco.

METHODS

The Wisconsin *Healthy Smiles Survey* included a representative sample of ninth grade students in Wisconsin public schools. All public schools with at least 25 ninth grade students enrolled during the 2013-14 school year were included in the sampling frame (410 schools with 65,925 ninth grade students). The sampling frame was ordered by percent of students eligible for free or reduced price school meals (FRPM), which is used as a surrogate for income. Systematic sampling with implicit stratification by FRPM eligibility was used to randomly select 20 schools.

If a school declined to participate, a school within the same sampling interval was randomly selected as a replacement school. If a replacement school declined to participate, the sampling interval was dropped and no additional replacement school was selected.

Student participation was based on passive consent. A parent or guardian only signed and returned the form if they did not want his or her child to participate. However, if the form was not returned but a child indicated verbally that he or she did not want to participate in the screening, the child was not screened.

Screeners included dental hygienists and dentists licensed in Wisconsin. Screeners completed a visual inspection of the mouth using headlamps and disposable mouth mirrors following recommended infection control procedures. All screeners attended a training webinar that included a didactic review of the goals of the screening and diagnostic criteria outlined in the ASTDD publication Basic Screening Surveys: An Approach to Monitoring Community Oral Health. Following the didactic review, the screeners attended a calibration session, which was conducted in a school setting with ninth grade students. The purpose of the

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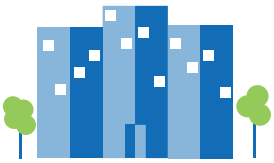
schools were included in the sampling frame.



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schools were randomly selected by systematic sampling with implicit stratification.

calibration session was to standardize implementation of the protocol and recording of indicators across all screeners.

Four clinical indicators were collected as part of the BSS conducted by screeners, including: 1) the number of teeth with treated decay, 2) the number of teeth with untreated decay, 3) the number of permanent molars with sealants, and 4) treatment urgency. Two additional indicators were calculated. Caries experience was the occurrence of either treated or untreated decay in one or more teeth, and rampant decay was the occurrence of treated or untreated decay in seven or more permanent teeth. Definitions for each indicator can be found in Table 1.

TABLE 1 | BSS Diagnostic Criteria for Indicators

BASIC SCREENING SURVEY INDICATOR	DIAGNOSTIC CRITERIA
TREATED DECAY	The presence of any type of filling, including temporary fillings. Treated decay also includes teeth that were extracted due to decay.
UNTREATED DECAY	The presence of a dental cavity (caries) in which the screener can readily observe breakdown of the enamel surface. This protocol only includes cavitated lesions as untreated decay.
CARIES EXPERIENCE	This is a calculated indicator from treated decay and untreated decay. All students with either treated or untreated decay or both have caries experience.
RAMPANT DECAY	The presence of seven or more permanent teeth with treated and/or untreated decay.
DENTAL SEALANTS	The presence of at least one sealant on a permanent molar tooth. The sealant can cover all or part of the pits or fissures or can be partially lost and is still counted.
TREATMENT URGENCY	Ninth graders with no obvious problems were coded as having no treatment needs. Ninth graders with untreated decay without accompanying signs or symptoms of pain, infection, or swelling were coded as having early treatment needs, or dental problems that need attention as soon as possible. Ninth graders with untreated decay with accompanying signs or symptoms were coded as having urgent treatment needs, or dental problems that need immediate attention.

In addition, screeners collected demographic information, including sex and date of birth, and whether the student had braces, which were defined as the presence of banded braces, palate expanders, or other orthodontic appliances used to straighten teeth. Removable and fixed retainers were not included as braces. For the self-report portion of the survey, students completed 21 questions about race, ethnicity, parental education, perceptions of their oral health, toothbrushing behavior, oral pain, school absences due to oral health problems, consumption of various beverages (including sugar-sweetened and acidic beverages), sports-related oral injuries, and the use of mouthguards when playing sports. The BSS and the self-report questionnaire were linked with a unique identification number. If the unique identification number was missing, date of birth and sex were used for linking.

The data were weighted to account for the complex sampling scheme and nonresponse. Descriptive statistics were generated to estimate the proportion of adolescents experiencing each clinical indicator and selected self-report items as well as comparisons between groups. Chi-squared tests were used to determine statistically significant differences between groups. Logistic regression models were used to estimate odds ratios for some outcomes (e.g., odds of good grades in school for different oral health factors). All analyses were completed using the statistical software program SAS version 9.4. SAS survey procedures for weighted data were used.

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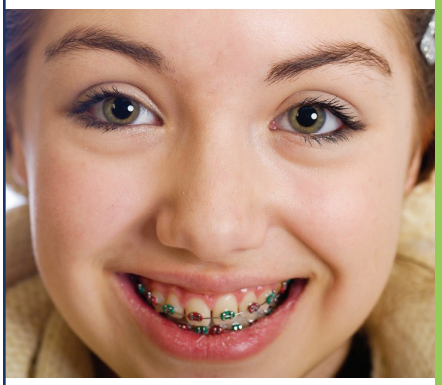
Students completed 21 questions in the self-report portion of the survey.



RESULTS

A total of 1,163 ninth grade students from 10 schools completed the oral health screening and self-report survey from March to April 2015, representing a statewide sample. A total of 1,162 students had BSS and self-report survey data available for analysis, while one student only completed the self-report and was excluded. Ten schools opted to participate, resulting in a 50 percent participation rate at the school strata level. The total student participation rate was 72 percent.

DEMOGRAPHICS

Demographics of the ninth grade students included in the sample are shown in Table 2. The majority of the students were non-Hispanic White (64%) and 14 to 15 years of age (94%).

TABLE 2 | **Sex, age, race and ethnicity, and receipt of FRPM for ninth graders with an oral health screening**

	Number of students (unweighted)*	Number of students (weighted)	Percentage of students
TOTAL	1,162	32,952	100.0
SEX			
Male	584	17,550	53.3
Female	577	15,402	46.7
AGE			
14	353	9,694	29.4
15	717	21,363	64.8
16-17	92	1,906	5.8
RACE AND ETHNICITY			
Hispanic	159	3,635	11.0
Non-Hispanic White	510	21,093	64.0
Non-Hispanic Black	332	4,754	14.4
Other**	161	3,480	10.6
FREE OR REDUCED PRICED MEALS			
Does not receive FRPM	365	14,693	50.9
Receives FRPM	674	14,186	49.1

*The number unweighted represent the actual number of students screened, whereas the number weighted represents the statewide number of students while accounting for overrepresentation or underrepresentation during sampling. When reporting, it is appropriate to use the weighted counts.

**Other includes Non-Hispanic American Indian and Alaska Native, Non-Hispanic Asian, Native Hawaiian and Pacific Islander, multi-racial, and unknown.

BSS INDICATORS

We examined clinical indicators from the BSS for all students statewide, including treated and untreated tooth decay, rampant decay, dental sealants, and treatment needs.

Dental sealants are plastic coatings applied to the chewing surfaces of back teeth. They are a safe, effective, evidence-based way to prevent tooth decay on the biting surfaces of molar teeth. The majority (61.8%) of ninth graders had the presence of at least one sealant on a permanent molar. However, only 28 percent of students had sealants on five to eight permanent molars. The maximum number of permanent molars that can be sealed per child is eight. In addition, 38 percent of students had no sealants. This suggests that some students in Wisconsin public schools either have not had access to preventive dental services or no longer have access to these services.

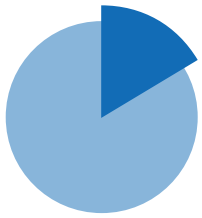
The experience of tooth decay is relatively common among ninth grade students statewide. Caries experience is a combination of treated decay, untreated decay, or both in the permanent teeth. More than half of adolescents had caries experience (55.2%). Approximately 17 percent of ninth grade students had untreated decay in one or more teeth, which represents nearly 5,500 students. In addition, 3.3 percent (1,090 students) had rampant decay (Figure 1). While this is a fairly low prevalence, it is significant because these students have already experienced a substantial amount of decay (seven or more teeth) in their permanent dentition by ninth grade.

One out of six ninth graders (17.1%) had early or urgent treatment needs, indicating that they had untreated decay with or without signs or symptoms of pain, infection, or swelling. While the majority of students had early

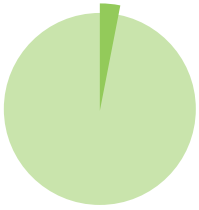
FIGURE 1.

NINTH GRADE STUDENTS WITH CARIES EXPERIENCE, UNTREATED DECAY, AND RAMPANT DECAY, WISCONSIN, 2015

55.2% caries experience



16.5% untreated decay



3.3% rampant decay

treatment needs (15.7%), indicating a need to see a dentist as soon as possible, there were some students that needed to see a dentist immediately for urgent dental care. These students may experience pain, difficulty concentrating in school, or school absences as a consequence of unmet dental needs.

HEALTHY PEOPLE 2020 ORAL HEALTH INDICATORS

Healthy People 2020 (HP 2020) provides 10-year national objectives for improving the health of Americans. These objectives provide targets toward which states and communities can work. HP 2020 contains three objectives that are relevant to this report and population:

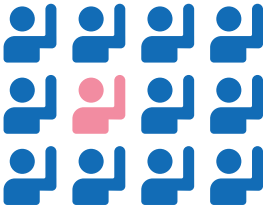
- Reduce the proportion of adolescents aged 13 to 15 years with dental caries experience in their permanent teeth.
- Reduce the proportion of adolescents aged 13 to 15 years with untreated dental decay in their permanent teeth.
- Increase the proportion of adolescents aged 13 to 15 years who have received dental sealants on one or more of their first permanent molars and one or more of their second permanent molars.

HP 2020's target for dental caries experience is 48.3 percent. Wisconsin has room for improvement for this indicator, as 54.6 percent of ninth grade students in the state have caries experience. HP 2020's target for untreated decay is 15.3 percent. While Wisconsin has met this target, as 15.3 percent of ninth grade students in

CONSEQUENCES OF UNMET URGENT DENTAL NEEDS

PAIN

DIFFICULTY CONCENTRATING



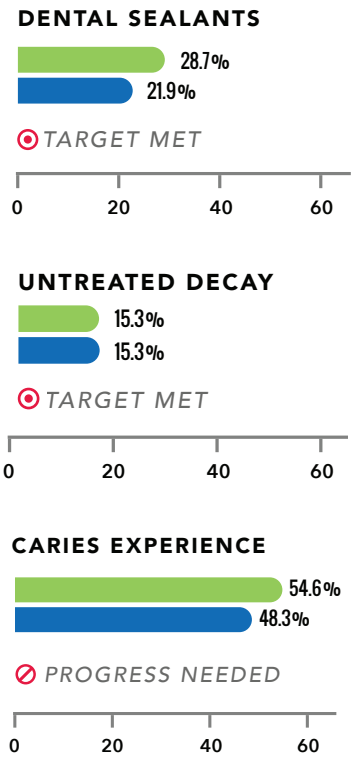
SCHOOL ABSENSCES

the state have untreated decay, continued improvement below 15.3 percent is desired. HP 2020's target for dental sealants is 21.9 percent. Wisconsin has met, and exceeded, the HP 2020 objective for dental sealants among adolescents (28.7%). Figure 2 compares Wisconsin-specific data to the HP 2020 targets.

Note the Wisconsin estimates are for ninth grade students aged 14 to 15 years, as we did not have any students age 13 years. Thus, our estimates could underestimate or overestimate the true proportion of adolescents with caries experience, untreated decay, and dental sealants. In addition, the number of permanent molar sealants was recorded but first and second molar sealants were not differentiated during data collection. The assumption is being made that anyone with at least five molar sealants has them on the first molars and at least one on the second molars. This assumption may underestimate the number meeting the HP 2020 criteria.

FIGURE 2.

HEALTHY PEOPLE 2020 ADOLESCENT ORAL HEALTH TARGETS AND WISCONSIN DATA, 2015



DISPARITIES IN BASIC SCREENING SURVEY INDICATORS

Understanding differences in clinical indicators of oral health may help target prevention and intervention efforts to groups of students disproportionately affected by poor oral health. We examined clinical indicators by sex, age, race and ethnicity, and whether the student reported receiving FRPM. We opted to use student report of FRPM rather than school-level FRPM eligibility because using student reports provides a more accurate indication of family income level. Early and urgent treatment needs were combined into one category rather than examining each separately due to small sample sizes for different demographic groups. All differences between groups are statistically significant unless noted otherwise.

The prevalence of caries experience, untreated decay, and sealants (any sealants and zero to four sealants versus five to eight sealants) were similar for male and female ninth grade students, indicating no differences by sex (Appendix Table 8). A higher proportion of the oldest ninth graders (16 to 17 years) had caries experience compared to younger students (14 to 15 years) though this difference was not statistically significant. In addition, a higher proportion of the oldest ninth graders had untreated decay compared to younger students (Figure 3). Of note, older students may represent a more vulnerable group of students compared to the majority of ninth graders. They are completing the ninth grade later than expected and may face additional challenges, such as educational difficulties. How the differences between these students and the majority of Wisconsin ninth graders affect oral health is unclear, but should be considered when interpreting any results by age.

FIGURE 3.

NINTH GRADE STUDENTS WITH CARIES EXPERIENCE AND UNTREATED DECAY BY AGE, WISCONSIN,2015

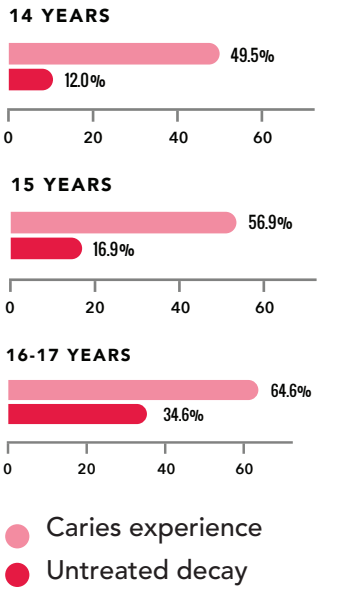
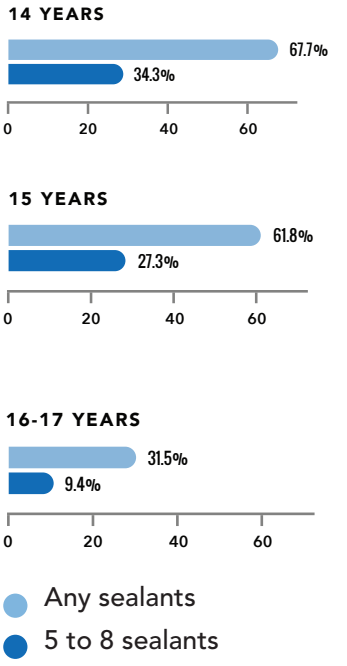


FIGURE 4.

NINTH GRADE STUDENTS WITH DENTAL SEALANTS BY AGE, WISCONSIN,2015

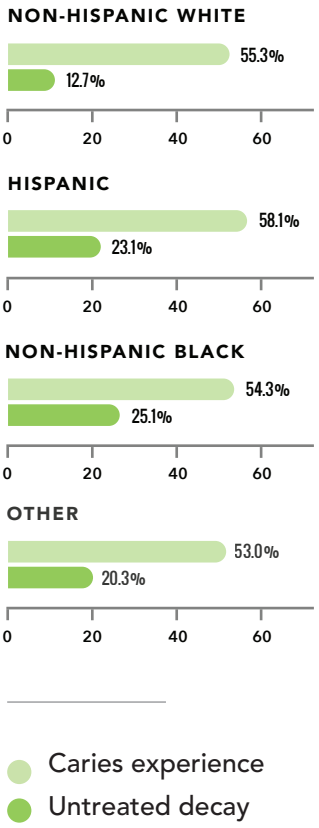


Fewer ninth graders who were 16 or 17 years of age had at least one dental sealant (32%) compared to 14-year-olds (68%) and 15-year-olds (62%). A similar pattern was observed for dental sealants on five to eight permanent molars, where the highest proportion of students with sealants on the majority of permanent molars was 14-year-olds (34%) and 15-year-olds (27%) compared to 16-and 17-year-olds (9%). See Figure 4.

Some differences in oral health status were observed by race and ethnicity. While there was no difference in the prevalence of caries experience between racial and ethnic groups, there was a higher prevalence of untreated decay among non-Hispanic Black students, Hispanic students, and students of Other race compared to non-Hispanic White students (Figure 5).

FIGURE 5.

NINTH GRADE STUDENTS WITH CARIES EXPERIENCE AND UNTREATED DECAY BY RACE AND ETHNICITY, WISCONSIN, 2015

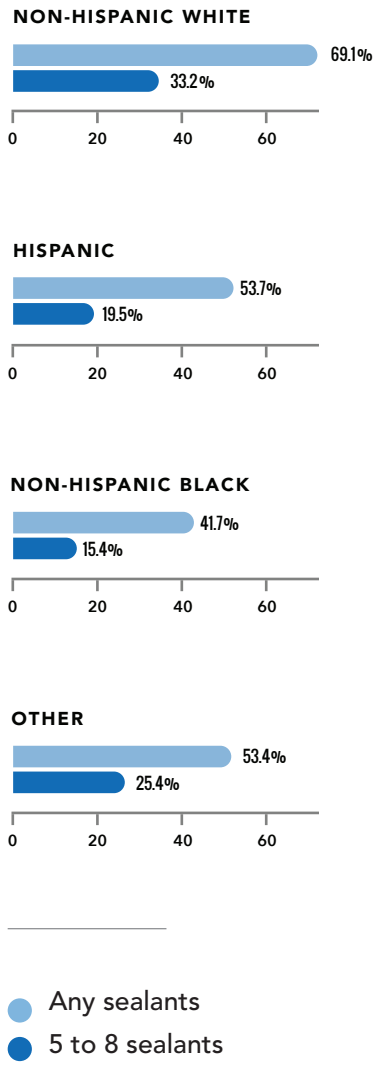


Importantly, Wisconsin's overall success in meeting the HP 2020 target for untreated decay (15.3%) masks racial and ethnic disparities for this indicator. Among all students, only non-Hispanic White ninth graders meet the HP 2020 target, while all other racial and ethnic groups failed to meet this target. This finding is similar when we limit to students aged 14 to 15 years.

More non-Hispanic White students had dental sealants compared to non-Hispanic Black, Hispanic, and students of Other race. Similarly, more non-Hispanic White students had between five and eight sealants on permanent molars compared to students in all other racial and ethnic groups (Figure 6). This suggests differential access to dental sealants for some racial and ethnic groups.

FIGURE 6.

NINTH GRADE STUDENTS WITH DENTAL SEALANTS BY RACE AND ETHNICITY, WISCONSIN, 2015



There was a higher prevalence of caries experience among students receiving FRPM (58.5%) compared to students not receiving FRPM (52.2%), though this finding was only marginally significant. More than twice as many students receiving FRPM had untreated decay compared to students not receiving FRPM (22.6% vs. 9.7%; Figure 7). These disparities suggest that progress in improving oral health among economically vulnerable students is necessary.

The prevalence of any dental sealants was lower for students receiving FRPM (50.1%) compared to students not receiving FRPM (71.8%). Similarly, fewer students receiving FRPM had dental sealants on five to eight molars (21.1%) compared to students not receiving FRPM (36.4%). See Figure 8.

SELF-REPORT SURVEY PERCEPTIONS OF ORAL HEALTH

How individuals perceive their oral health may be important in oral disease and in seeking dental care, though researchers have reported misperceptions about oral health among adolescents. Most ninth grade students considered their oral health to be good or fairly good (97.1%). Results were similar across racial and ethnic groups, age and student receipt of FRPM. A lower proportion of males considered their oral health to be good or fairly good compared to females (93.0% vs. 97.2%). Similarly, most ninth grade students reported they took care of their teeth well or fairly well (94.6%). Results were similar across groups with the exception of sex. A lower proportion of males reported they took care of their teeth well or fairly well compared to females (92.4% vs. 97.0%). Fifteen percent of ninth graders reported worrying about the appearance of their teeth. There were no differences between racial and ethnic groups, age categories, and school FRPM. A higher proportion of

FIGURE 7.

NINTH GRADE STUDENTS WITH CARIES EXPERIENCE AND UNTREATED DECAY BY RECEIPT OF FRPM, WISCONSIN, 2015

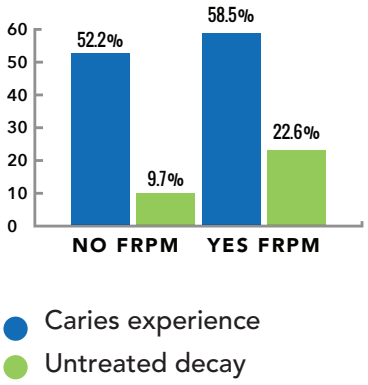
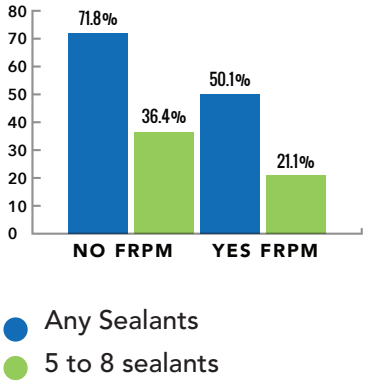


FIGURE 8.

NINTH GRADE STUDENTS WITH DENTAL SEALANTS BY RECEIPT OF FRPM, WISCONSIN, 2015



females reported worrying about the appearance of their teeth compared to males (18.4% vs. 12.3%). Likewise, a higher proportion of students receiving FRPM worried about the appearance of their teeth compared to students not receiving FRPM (19.7% vs. 12.9%). Fewer ninth grade students with untreated decay considered their oral health to be good or very good compared to students with no untreated decay (88.2% vs. 96.3%). In addition, fewer students with untreated decay reported taking care of their teeth well or very well compared to students with no untreated decay (87.4% vs. 96.0%; Table 3).

TABLE 3 **Perceived oral health among ninth grade students with by untreated decay status, Wisconsin, 2015**

	Untreated decay (n=5,424) (%)	No Untreated decay (n=27,538) (%)	P*
Consider oral health to be good or very good	88.2	96.3	0.01
Take care of teeth well or fairly well	87.4	96.0	0.02
Worry about the appearance of teeth	18.4	14.5	0.38

* $p<0.05$ is statistically significant.

Though there were differences between students with and without untreated decay, the majority of students, regardless of untreated decay status, reported good or very good oral health and taking care of their teeth well. For students with untreated decay, this may represent misperceptions about oral health compared to observed oral health, which was reported previously in the literature with this age group. Alternately, students may experience factors such as genetic predisposition to caries, minimal exposure to fluoridated water, or lack of access to dental care, which may affect oral health despite efforts to care for the mouth and teeth.

ORAL HEALTH ACCESS AND BEHAVIORS

Regular dental visits are important for preventing oral disease and early treatment of decay or other oral health conditions as they arise. The majority of ninth grade students (79.3%) reported they had been to the dentist or dental hygienist in the past year. Results were similar for males and females but disparities were observed by age, race and ethnicity, and student receipt of FRPM (Figures 9-11).

FIGURE 9.

NINTH GRADE STUDENTS WHO LAST SAW A DENTIST OR DENTAL HYGIENIST WITHIN THE PAST YEAR BY AGE, WISCONSIN, 2015

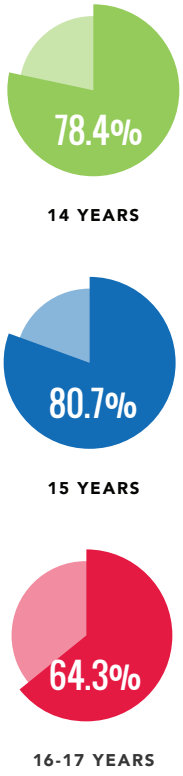


FIGURE 10.

NINTH GRADE STUDENTS WHO LAST SAW A DENTIST OR DENTAL HYGIENIST WITHIN THE PAST YEAR BY RACE AND ETHNICITY, WISCONSIN, 2015

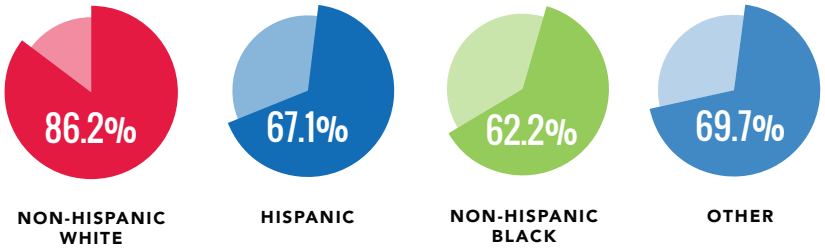
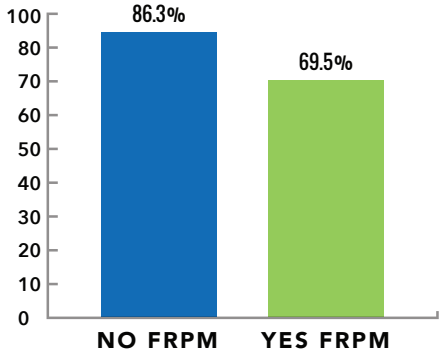


FIGURE 11.

NINTH GRADE STUDENTS WHO LAST SAW A DENTIST OR DENTAL HYGIENIST WITHIN THE PAST YEAR BY STUDENT RECEIPT OF FRPM, WISCONSIN, 2015



Just over half of ninth grade students (51.8%) reported brushing their teeth two or more times per day. Results were similar across racial and ethnic groups, and age. A higher proportion of females reported brushing their teeth two or more times per day compared to males (59.3% vs. 45.1%). A lower proportion of students receiving FRPM reported brushing their teeth two or more times per day compared to students not receiving FRPM (45.9% vs. 59.6%).

Beverages may promote or hinder tooth health. For example, decades of research indicate that consumption of fluoridated water results in fewer and less severe cavities among children and adults. Community water fluoridation programs adjust fluoride levels in public water supplies to a level that is optimal for strengthening teeth.[8] By contrast, beverages high in acid or sugar may erode tooth enamel, making the teeth more vulnerable to decay.[9] Forty-four percent of ninth grade students reported drinking water four or more times per day. Results were similar by race and ethnicity, age, sex, and student receipt of FRPM. Consumption of beverages high in sugar or acid (e.g., soda, sports drinks, energy drinks, lemonade, sweetened tea, sweetened coffee, diet soda, or fruit juice) two or more times per day was examined because regular consumption of these beverages may promote tooth decay. Twenty-nine percent of ninth grade students consumed beverages high in sugar or acid at least twice per day. Results were similar by sex and age. However, non-Hispanic Black students were more than twice as likely to consume beverages high in sugar or acid at least two times per day compared to non-Hispanic White students (Figure 12). In addition, students receiving FRPM were more than twice as likely to consume beverages high in sugar or acid at least two times per day compared to students not receiving FRPM (Figure 13).

FIGURE 12.

NINTH GRADE STUDENTS WHO CONSUME BEVERAGES HIGH IN SUGAR OR ACID AT LEAST TWO TIMES PER DAY BY RACE AND ETHNICITY, WISCONSIN, 2015

22.3%
NON-HISPANIC WHITE

27.4%
HISPANIC

53.4%
NON-HISPANIC BLACK

38.8%
OTHER

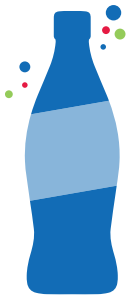
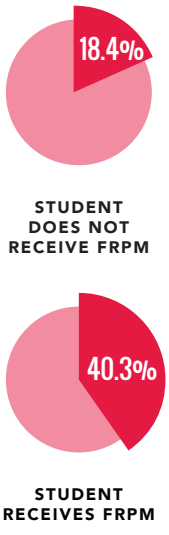


FIGURE 13.

NINTH GRADE STUDENTS WHO CONSUME BEVERAGES HIGH IN SUGAR OR ACID AT LEAST TWO TIMES PER DAY BY STUDENT RECEIPT OF FRPM, WISCONSIN, 2015



ORAL HEALTH ACCESS AND BEHAVIORS:
RELATIONSHIP TO CLINICAL INDICATORS

Access to dental care and individual behaviors may affect oral disease, including tooth decay. We examined clinical indicators from the BSS in relation to dental access and individual behaviors. Only 59 percent of ninth grade students with untreated decay reported visiting a dentist or dental hygienist in the past year compared to 83 percent of ninth grade students without untreated decay. This difference was statistically significant and likely reflects poor access among some students in Wisconsin. A higher proportion of students with caries experience and untreated decay reported consuming beverages high in sugar or acid two or more times per day compared to students without these oral health problems. Further, ninth grade students with tobacco use in the past month were twice as likely to have caries experience compared to students with no tobacco use (5.0% vs. 2.4%). A similar finding was observed for untreated decay, though the difference was not statistically significant. (Table 4).

TABLE 4 | Oral health behaviors among ninth grade students with caries experience or untreated decay, Wisconsin, 2015

	Caries Experience			Untreated Decay		
	YES (n= 18,197) (%)	NO (n= 14,766) (%)	P*	YES (n= 5,424) (%)	NO (n= 27,538) (%)	P*
Saw dentist or dental hygienist in the past 12 months	79.7	78.7	0.58	58.5	83.0	<0.01
Brushes teeth 2+ times per day	49.6	54.4	0.22	43.4	53.4	0.12
Consumes water 4+ times per day	42.3	46.1	0.27	41.6	44.5	0.53
Consumes beverages high in sugar or acid 2+ times per day	32.5	24.8	0.05	39.1	27.1	<0.01
Tobacco use in past 30 days	5.0	2.4	<0.01	6.5	3.3	0.09

* $p<0.05$ is statistically significant.

IMPACT OF ORAL HEALTH ON EXPERIENCE OF PAIN AND GRADES IN SCHOOL

Poor oral health may affect school performance, as pain associated with unmet dental needs may hinder learning due to difficulties concentrating and greater school absences. Nearly 15 percent of ninth grade students had orthodontic devices such as braces. More students with braces or other orthodontic devices reported missing school two or more times (13.7%) compared to students without braces or orthodontic devices (4.7%). Consequently, we limited the subsequent analysis to students without orthodontic devices. Disparities by race and ethnicity, age, and student receipt of FRPM were not examined due to the small number of students who reported missing school due to problems with their teeth.

Approximately 5 percent of ninth grade students missed school two or more times in the past 12 months because of problems with their teeth or mouth, while about 1 percent missed school four or more times. While these percentages seem relatively low, the estimates translate into more than 1,400 students who missed at least two school days due to oral health problems. If these students also experience discomfort or pain, they may also be less able to concentrate at school. Ninth grade students with untreated decay were two times as likely to miss school two or more times due to teeth or mouth problems (7.6%) compared to students without untreated decay (4.0%).

1,400

More than 1,400 students missed at least two school days due to oral health problems.

2x

Students with untreated decay were two times as likely to miss school two or more times due to teeth or mouth problems compared to students without untreated decay.

More than one in four ninth grade students (25.7%) reported having painful or sore teeth or mouth two or more times in the past year. Disparities were observed by sex, age, and student receipt of FRPM (Figures 14-16). For example, students receiving FRPM were more than twice as likely to experience pain two or more times in the past year.

FIGURE 14.

PAIN IN TEETH OR MOUTH TWO OR MORE TIMES IN THE PAST YEAR BY AGE, WISCONSIN, 2015

FIGURE 15.

PAIN IN TEETH OR MOUTH TWO OR MORE TIMES IN THE PAST YEAR BY RACE AND ETHNICITY, WISCONSIN, 2015

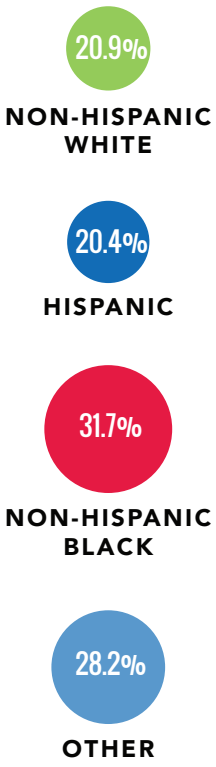


FIGURE 16.

PAIN IN TEETH OR MOUTH TWO OR MORE TIMES IN THE PAST YEAR BY STUDENT RECEIPT OF FRPM, WISCONSIN, 2015

Odds ratios are a measure of association between an exposure and an outcome, but are not able to assess causality. Table 5 shows the odds of lower grades (Cs, Ds, Fs, or other) in school for selected indicators from the BSS and self-report questionnaire. Students with untreated decay and early or urgent treatment needs were about two times as likely to receive lower grades in school compared to students with no untreated decay and no obvious treatment needs. Students experiencing tooth or mouth pain two or more times in the past year were more than twice as likely to receive lower grades in school compared to students experiencing pain less frequently.

TABLE 5 | **Odds of lower grades in school for selected indicators, Wisconsin, 2015**

	As or Bs (n=20,211) (%)	Cs, Ds, Fs, or other (n=10,683) (%)	Crude OR	95% CI
Untreated decay	13.2	21.5	1.8	1.2 – 2.7
Caries experience	54.4	56.4	1.1	0.8 – 1.5
Rampant decay	3.3	3.1	0.9	0.4 – 2.0
Early or urgent treatment needs	14.0	21.9	1.7	1.1 – 2.6
Presence of dental sealants	64.6	58.8	0.8	0.5 – 1.2
Teeth painful or sore two or more times in the past year	18.7	31.6	2.2	1.1 – 4.1

OR=Odds Ratio
CI=Confidence Interval

SPORTS-RELATED OROFACIAL INJURIES

Participation in sports is associated with a higher risk of orofacial injuries (e.g., loosening of teeth, fracture of teeth, broken bones, bruises on the face, or cuts on lips, tongue, or cheek) due to collisions, falls, and contact with objects.[1] The National Federation of State High School Associations (NFHS) includes a Sports Medicine Advisory Committee, which mandates the use of mouthguards for some sports—field hockey, ice hockey, lacrosse, football, and wrestling (only required if the student wears braces).[10]

Thirty percent of ninth grade students reported playing a sport that requires mouthguard use per NFHS regulations. Among those students, 26 percent reported having an orofacial injury while playing sports. The majority of students playing a mandated mouthguard sport with an orofacial injury reported wearing a mouthguard always or very often (70%).

Orofacial injuries can occur in other sports where mouthguard use is not mandated. Eighty-four percent of ninth grade students reported playing a sport that includes possible contact with other players, a stick, or a ball (contact sports). The official position of the NFHS states that student athletes should consider mouthguard use for any sport with these characteristics, as these sports may put students at greater risk of orofacial injuries. Among students playing contact sports, 24 percent reported having an orofacial injury while playing sports. Of those with a reported injury, only 32 percent reported wearing a mouthguard always or very often.

Approximately one in four students playing either sports with mandated mouthguard use or contact sports experienced an orofacial injury. While the majority of ninth graders playing sports with mouthguard requirements reported frequent use of mouthguards, less than one-third of ninth graders playing contact sports reported frequent use of mouthguards. Efforts to educate school and club sports staff on the benefits of mouthguard use for any sport associated with elevated risk for orofacial injuries may help protect students from injuries.

1/3

less than one-third of ninth graders playing contact sports reported frequent use of mouthguards.

LIMITATIONS

Several limitations should be noted. The BSS protocol is a visual screening with a mirror and headlamp and does not include the use of dental explorers, magnification devices, or radiographs, which results in an underestimation of untreated decay. In addition, participating schools had a higher average FRPM eligibility rate (48.7%) compared to our sampling frame (38.4%) and original sample (40.5%). Thus, our results may not be generalizable and may underrepresent schools with lower FRPM eligibility rates.

Further, participating schools had fewer non-Hispanic White ninth grade students compared to all schools statewide (42.8% vs. 72.5%) and more non-Hispanic Black ninth grade students (41.1% vs. 11.4%), which could also affect generalizability of our results. However, race and ethnicity for participating students was closer to statewide proportions (64.1% for non-Hispanic White students and 14.4% for non-Hispanic Black students). Some demographic groups had small sample sizes, which affects the reliability of the estimates and limits interpretation of disparities in oral health indicators. In these cases, we do not report estimates in the main text of the document, but do retain the estimates in the supplemental data tables (see Appendix). Those estimates should be interpreted with caution. Further iterations of this survey could enable combining data over multiple years, leading to more robust results.

While we trained and calibrated screeners to ensure that the BSS protocols were interpreted and implemented similarly by all, it is possible that there were differences in judgment for some indicators. For the self-report, we did not require that students answer all questions on the survey, so completion rates for different items vary. Further, we discovered that some items (e.g., frequency of beverage consumption) were somewhat difficult to complete for students, which could affect the reliability of some responses. Several of the self-report items may be subject to social desirability bias (e.g., frequency of tooth brushing) or recall bias.

CONCLUSIONS

The Wisconsin Healthy Smiles Survey of ninth grade students filled a gap in our understanding of oral health status of adolescent students statewide. Wisconsin met or exceeded the HP 2020 targets for dental sealants and untreated decay, but fell short of the target for caries experience. The number of students experiencing caries demonstrates that tooth decay is a significant problem among Wisconsin adolescents. Prevention programs such as school-based sealant programs are important in reducing caries experience, as they reach students before adolescence. The majority of ninth grade students had at least one dental sealant, which is encouraging and suggests that sealant programs are reaching students. However, far fewer students had dental sealants on five to eight permanent molars, indicating that some students are vulnerable to tooth decay in their second permanent molars. Currently most school-based dental sealant programs target kids in elementary schools and some middle schools. Expanding coverage into more middle and high schools will help to ensure that students receive sealants on all permanent molars.

Our findings suggest that the burden of oral disease is greater for students from minority populations, lower income students, and students completing the ninth grade at an older age. Statewide successes in oral health obscure some of these disparities. For example, while Wisconsin met the HP 2020 target for untreated decay, only non-Hispanic White students met or exceeded the target. This is particularly concerning in light of poorer access to dental care among minority and low-income students. Non-White students and low-income students were less likely to report visiting a dentist in the past year. Further, fewer minority and low-income students had dental sealants, indicating the need for greater outreach to these groups to ensure access to sealant programs. The disparities observed indicate the need for action among state, private, and local partners to ensure equitable access to key dental services for prevention and treatment of existing or developing problems.

Having untreated decay, treatment needs, and painful or sore teeth two or more times in the past year was associated with poor grades in school. Students with these oral health problems may experience pain or discomfort, disrupting concentration in school, which may in turn affect school performance. In addition, they may miss time from school due to dental pain or dental appointments. These problems could have long-term implications for school-based learning that extend beyond one school year, particularly if treatment is not provided. Thus, it is critical to improve access to and utilization of dental services.

REFERENCES

1. American Academy of Pediatric Dentistry. 2010. Guideline on adolescent oral health care. Clinical Guidelines Reference Manual, 35(6), 142-9.

2. National Center for Health Statistics. 2015. Dental caries and sealant prevalence in children and adolescents in the United States, 2011-2012. Available at: http://www.cdc.gov/nchs/data/databriefs/db191.htm.

3. Feinberg, M. 2015. Minority oral health in America: Despite progress, disparities persist. 2015. Available at: http://robinkelly.house.gov/sites/robinkelly.house.gov/files/2015%20Kelly%20Report.pdf.

4. Centers for Disease Control Division of Oral Health. 2013. Disparities in oral health. Available at: http://www.cdc.gov/OralHealth/oral_health_disparities/.

5. Dye BA & Thornton-Evans G. 2010. Trends in oral health by poverty status as measured by Healthy People 2010 objectives. Public Health Reports, 125, 817-30.

6. Broder HL, Slade G, Caine R & Reisine S. 2000. Perceived impact of oral health conditions among minority adolescents. Journal of Public Health Dentistry, 60(3), 189-92.

7. Jackson SL, Vann WF, Kotch JB, Pahel BT & Lee JY. 2011. Impact of poor oral health on children's school attendance and performance. American Journal of Public Health, 101(10), 1900-6.

8. Centers for Disease Control. 2015. Fluoridation Basics. Available at: http://www.cdc.gov/fluoridation/basics/

9. Erickson PR, Alevizos DL, & Rindelaub DJ. Soft drinks: hard on teeth. Northwest Dentistry, March-April 2001, 15-19.

10. National Federation of State High School Associations and Sports Medicine Advisory Committee. Position Statement and Recommendations for Mouthguard Use in Sports. Available at: http://www.nfhs.org/media/1014750/mouthguard-nfhs-smac-position-statement-october-2014.pdf

APPENDIX: DATA TABLES

Throughout the data tables, there are references to both unweighted and weighted numbers. The number of unweighted students represents the actual number of students screened, whereas the number of weighted students represents the statewide number of students while accounting for overrepresentation or underrepresentation during sampling. When reporting, it is appropriate to use the weighted counts.

Many data tables include columns for 95 percent confidence intervals and p-values. It is helpful to report confidence intervals with the percentage provided in the table, as narrow confidence intervals help us feel more confident in the percentage we report. P-values are used to describe whether differences between groups are statistically significant. If a p-value is <0.05, that difference is statistically significant.

TABLE 6 | Participating ninth grade students and schools compared to original sample and schools in sampling frame (unweighted)

	NUMBER OF SCHOOLS	NUMBER OF NINTH GRADERS	AVERAGE % FRPM	% NH WHITE	% NH BLACK	% HISPANIC
Sampling frame	410	65,925	38.4	72.5	11.4	9.6
Original sample	20	3,851	40.5	64.9	18.2	10.7
Participating schools	10	1,706	48.7	42.8	41.1	10.0
Participating students	10	1,162	NA	64.1	14.4	11.0

NH=Non-Hispanic

TABLE 7 | Basic Screening Survey indicators for Wisconsin ninth grade students (weighted)

	NUMBER OF STUDENTS	PERCENT OF STUDENTS	95% CONFIDENCE INTERVAL
Treated decay	15,561	47.2	39.4 – 55.1
Untreated decay	5,424	16.5	8.0 – 24.9
Caries experience	18,197	55.2	46.5 – 64.0
Rampant decay	1,090	3.3	1.0 - 5.6
No treatment needs	27,313	82.9	74.4 – 91.3
Early treatment needs	5,174	15.7	7.7 – 23.7
Urgent treatment needs	^	^	^
Presence of dental sealants	20,360	61.7	43.5 – 80.0
Presence of 5-8 dental sealants	9,323	28.3	15.9 – 40.6

^Relative standard error > 50. This estimate is unreliable and has been suppressed.

TABLE 8 | Basic Screening Survey indicators for Wisconsin ninth grade students stratified by sex (weighted)

	MALE (N=17,550)		FEMALE (N=15,402)		
	%	95% CI	%	95% CI	P-VALUE
Treated decay	44.9	35.2 – 54.7	49.8	42.7 – 57.0	0.16
Untreated decay	15.5	6.9 – 24.1	17.5	8.8 – 26.3	0.27
Caries experience	52.9	42.9 – 62.9	57.8	49.0 – 66.5	0.16
Rampant decay	2.7†	0.6 – 4.8	4.0	1.4 – 6.6	0.06
No treatment needs	84.0	75.3 – 92.7	81.6	73.1 – 90.1	0.19
Early or urgent treatment needs	16.0	7.3 – 24.7	18.4	9.9 – 26.9	0.19
Presence of dental sealants	60.9	42.0 – 79.8	62.7	44.4 – 81.0	0.60
Presence of 5-8 dental sealants	28.7	14.8 – 42.6	27.8	16.2 – 39.4	0.77

CI=Confidence Interval

†Relative standard error >30. Estimate may be unreliable and should be interpreted with caution.

TABLE 9 | Basic Screening Survey indicators for Wisconsin ninth grade students stratified by age (weighted)

	14 YEARS (N=9,694)		15 YEARS (N=21,363)		16-17 YEARS (N=1,906)		
	%	95% CI	%	95% CI	%	95% CI	P-VALUE
Treated decay	43.2	34.6 – 51.9	49.1	39.3 – 59.0	45.9	27.8 – 63.9	0.43
Untreated decay	12.0	5.3 – 18.7	16.9	7.5 – 26.2	34.6	17.7 – 51.5	<0.01
Caries experience	49.5	39.8 – 59.2	56.9	45.9 – 68.0	64.6	48.9 – 80.2	0.18
Rampant decay	^	^	4.0†	1.3 – 6.7	^	^	^
No treatment needs	87.4	80.5 – 94.3	82.5	73.3 – 91.7	64.1	47.9 – 80.3	<0.01
Early or urgent treatment needs	12.6	5.7 – 19.5	17.5	8.3 – 26.7	35.9	19.7 – 52.1	<0.01
Presence of dental sealants	67.7	48.0 – 87.3	61.8	43.2 – 80.4	31.5	12.3 – 50.7	<0.01
Presence of 5-8 dental sealants	34.3	17.9 – 50.6	27.3	14.9 – 39.6	9.4†	0.5 – 18.3	0.01

CI=Confidence Interval
†Relative standard error >30. Estimate may be unreliable and should be interpreted with caution.
^Relative standard error > 50. This estimate is unreliable and has been suppressed.

TABLE 10 | Basic Screening Survey indicators for Wisconsin ninth grade students stratified by race and ethnicity (weighted)

	NH WHITE (N=21,093)		NH BLACK (N=4,754)		HISPANIC (N=3,635)		OTHER** (N=3,480)		
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	P-VALUE
Treated decay	49.4	39.7 – 59.2	38.6	27.8 – 49.5	50.6	34.6 – 65.4	42.1	35.7 – 48.4	0.16
Untreated decay	12.7	2.8 – 22.7	25.1	19.2 – 30.9	23.1	12.3 – 33.8	20.3	11.0 – 29.6	0.01
Caries experience	55.3	42.8 – 67.7	54.3	46.3 – 62.2	58.1	39.6 – 76.6	53.0	44.4 – 61.5	0.96
Rampant decay	2.2†	0.4 – 4.0	4.2	1.8 – 6.6	7.7†	0.4 – 15.1	^	^	0.01
No treatment needs	86.4	76.5 – 96.3	74.7	69.2 – 80.2	76.5	66.0 – 87.0	79.3	69.9 – 88.6	0.01
Early or urgent treatment needs	13.6†	3.7 – 23.5	25.3	19.8 – 30.8	23.5	13.0 – 34.0	20.7	11.4 – 30.1	
Presence of dental sealants	69.1	49.1 – 89.1	41.7	24.0 – 59.4	53.7	40.3 – 67.0	53.4	31.9 – 74.8	<0.01
Presence of 5-8 dental sealants	33.2	18.8 – 47.6	15.4	10.9 – 19.8	19.5	10.5 – 28.6	25.4†	6.8 – 44.0	<0.01

CI=Confidence Interval
NH=Non-Hispanic
**Other includes American Indian and Alaska Native, Native Hawaiian and Pacific Islander, multi-racial, and unknown.
†Relative standard error >30. Estimate may be unreliable and should be interpreted with caution.
^Relative standard error > 50. This estimate is unreliable and has been suppressed.

TABLE 11 | Basic Screening Survey indicators for Wisconsin ninth grade students stratified by student receipt of FRPM (weighted)

	DOES NOT RECEIVE FRPM (N=14,693)		RECEIVES FRPM (N=14,186)		
	%	95% CI	%	95% CI	P-VALUE
Treated decay	45.5	37.2 – 55.9	47.7	37.3 – 58.1	0.80
Untreated decay	9.7†	1.6 – 17.7	22.6	16.2 – 29.0	<0.01
Caries experience	52.2	43.6 – 60.8	58.5	49.0 – 67.9	0.10
Rampant decay	2.0†	0.1 – 3.9	4.8	1.5 – 8.1	<0.01
No treatment needs	89.6	81.5 – 97.7	76.6	70.7 – 82.5	<0.01
Early or urgent treatment needs	10.4†	2.3 – 18.5	23.4	17.5 – 29.3	<0.01
Presence of dental sealants	71.8	51.6 – 92.0	50.1	35.9 – 64.4	<0.01
Presence of 5-8 dental sealants	36.4	21.1 – 51.6	21.1	12.7 – 29.5	0.01

CI=Confidence Interval

†Relative standard error >30. Estimate may be unreliable and should be interpreted with caution.

TABLE 12 | Self-reported perceptions of oral health for Wisconsin ninth grade students (weighted)

	NUMBER OF STUDENTS	PERCENT OF STUDENTS	95% CI
Considers oral health good or fairly good	31,041	95.0	92.8 – 97.2
Takes care of teeth well or fairly well	30,924	94.6	92.2 – 96.9
Worries about the appearance of teeth	4,972	7.4	5.3 – 9.6
Experienced pain 2+ times in past year	6,429	22.9	17.5 – 28.4

CI=Confidence Interval

TABLE 13 | Self-reported perceptions of oral health for Wisconsin ninth grade students stratified by sex (weighted)

	MALE (N=17,550)		FEMALE (N=15,402)		
	%	95% CI	%	95% CI	P-VALUE
Considers oral health good or fairly good	93.0	89.0 – 97.0	97.2	95.8 – 98.6	0.02
Takes care of teeth well or fairly well	92.4	88.3 – 96.4	97.0	95.5 – 98.6	0.01
Worries about the appearance of teeth	12.3	8.9 – 15.6	18.4	12.3 – 24.6	0.02
Experienced pain 2+ times in past year	19.2	13.9 – 24.5	27.7	20.0 – 35.4	0.02

CI=Confidence Interval

TABLE 14 | Self-reported perceptions of oral health for Wisconsin ninth grade students stratified by age (weighted)

	14 YEARS (N=9,694)		15 YEARS (N=21,363)		16-17 YEARS (N=1,906)		
	%	95% CI	%	95% CI	%	95% CI	P-VALUE
Considers oral health good or fairly good	94.0	89.8 – 98.2	95.5	93.4 – 97.7	93.6	86.6 – 100.0	0.55
Takes care of teeth well or fairly well	93.6	89.1 – 98.2	95.3	93.1 – 97.5	90.8	80.8 – 100.0	0.37
Worries about the appearance of teeth	16.0	11.0 – 21.1	14.4	10.2 – 18.7	18.7	5.4 – 32.1	0.57
Experienced pain 2+ times in past year	18.8	11.8 – 25.8	23.7	18.8 – 28.7	39.6	21.5 – 57.6	<0.01

CI=Confidence Interval

TABLE 15 | Self-reported perceptions of oral health for Wisconsin ninth grade students stratified by race and ethnicity (weighted)

	NH WHITE (N=21,093)		NH BLACK (N=4,754)		HISPANIC (N=3,635)		OTHER** (N=3,480)		
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	P-VALUE
Considers oral health good or fairly good	95.6	92.7 – 98.4	95.9	95.3 – 96.6	92.4	86.4 – 98.4	92.7	86.7 – 98.7	0.30
Takes care of teeth well or fairly well	94.1	90.5 – 97.7	96.5	95.8 – 97.3	95.6	89.2 – 100.0	93.7	88.9 – 98.4	0.71
Worries about the appearance of teeth	14.2	9.6 – 18.7	19.5	14.5 – 24.5	16.5	9.4 – 23.5	13.8	6.3 – 21.4	0.21
Experienced pain 2+ times in past year	20.9	16.0 – 25.9	31.7	24.3 – 39.2	20.4	13.0 – 27.8	28.2	21.0 – 35.5	0.13

CI=Confidence Interval
NH=Non-Hispanic
**Other includes American Indian and Alaska Native, Native Hawaiian and Pacific Islander, multi-racial, and unknown.

TABLE 16 | Self-reported perceptions of oral health for Wisconsin ninth grade students stratified by students' self-reported receipt of FRPM (weighted)

	DOES NOT RECEIVE FRPM (N=14,693)		RECEIVES FRPM (N=14,186)		
	%	95% CI	%	95% CI	P-VALUE
Considers oral health good or fairly good	96.9	94.4 – 99.5	93.4	90.0 – 96.9	0.14
Takes care of teeth well or fairly well	96.5	93.3 – 99.6	93.8	90.6 – 97.0	0.30
Worries about the appearance of teeth	12.9	8.0 – 17.8	19.7	16.0 – 23.4	<0.01
Experienced pain 2+ times in past year	14.5	10.4 – 18.7	31.2	26.5 – 35.9	<0.01

CI=Confidence Interval

TABLE 17 | Self-reported oral health behaviors for Wisconsin ninth grade students (weighted)

	NUMBER OF STUDENTS	PERCENT OF STUDENTS	95% CI
Saw dentist or dental hygienist in the past 12 months	21,886	79.3	71.7 – 86.9
Brushes teeth 2+ times per day	17,042	51.8	44.9 – 58.6
Consumes water 4+ times per day	14,511	44.0	39.7 – 48.4
Consumes beverages high in sugar or acid 2+ times per day	9,579	29.1	19.6 – 38.5

CI=Confidence Interval

TABLE 18 | Self-reported oral health behaviors for Wisconsin ninth grade students stratified by sex (weighted)

	MALE (N=17,550)		FEMALE (N=15,402)		
	%	95% CI	%	95% CI	P-VALUE
Saw dentist or dental hygienist in the past 12 months	78.4	71.5 -85.4	80.3	71.1 – 89.4	0.49
Brushes teeth 2+ times per day	45.1	37.3 – 52.9	59.3	49.9 – 68.8	0.02
Consumes water 4+ times per day	45.0	38.2 – 51.8	42.9	38.2 – 47.6	0.57
Consumes beverages high in sugar or acid 2+ times per day	32.1	24.1 – 40.1	25.6	13.3 – 37.9	0.13

CI=Confidence Interval

TABLE 19 | Self-reported oral health behaviors for Wisconsin ninth grade students stratified by age (weighted)

	14 YEARS (N=9,694)		15 YEARS (N=21,363)		16-17 YEARS (N=1,906)		
	%	95% CI	%	95% CI	%	95% CI	P-VALUE
Saw dentist or dental hygienist in the past 12 months	78.4	68.2 – 88.6	80.7	73.5 – 88.0	64.3	49.4 – 79.1	0.04
Brushes teeth 2+ times per day	53.6	37.8 – 69.5	52.0	46.9 – 57.1	38.9	21.6 – 56.3	0.44
Consumes water 4+ times per day	42.1	31.3 – 52.8	44.2	36.9 – 51.5	51.8	42.8 – 60.8	0.65
Consumes beverages high in sugar or acid 2+ times per day	28.6	15.2 – 41.9	28.3	19.1 – 37.5	40.4	27.0 – 53.8	0.27

CI=Confidence Interval

TABLE 20 | Self-reported oral health behaviors for Wisconsin ninth grade students stratified by race and ethnicity (weighted)

	NH WHITE (N=21,093)		NH BLACK (N=4,754)		HISPANIC (N=3,635)		OTHER** (N=3,480)		
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	P-VALUE
Saw dentist or dental hygienist in the past 12 months	86.2	83.0 – 89.3	62.2	55.1 – 69.3	67.1	48.5 – 85.8	69.7	56.3 – 83.1	0.01
Brushes teeth 2+ times per day	52.0	43.9 – 60.2	46.2	40.8 – 51.6	58.5	44.6 – 72.4	50.6	36.8 – 64.4	0.34
Consumes water 4+ times per day	45.0	39.1 – 50.8	44.2	36.4 – 52.1	41.5	27.6 – 55.4	40.7	30.9 – 50.5	0.83
Consumes beverages high in sugar or acid 2+ times per day	22.3	17.2 – 27.3	53.4	46.5 – 60.2	27.4	14.4 – 40.5	38.8	26.2 – 51.4	0.04

CI=Confidence Interval
NH=Non-Hispanic
**Other includes American Indian and Alaska Native, Native Hawaiian and Pacific Islander, multi-racial, and unknown.

TABLE 21 | Self-reported oral health behaviors for Wisconsin ninth grade students stratified by percent of students' self-reported receipt of FRPM (weighted)

	DOES NOT RECEIVE FRPM (N=14,693)		RECEIVES FRPM (N=14,186)		
	%	95% CI	%	95% CI	P-VALUE
Saw dentist or dental hygienist in the past 12 months	86.3	81.1 – 91.5	69.5	60.7 – 78.2	<0.01
Brushes teeth 2+ times per day	59.6	51.8 – 67.5	45.9	39.6 – 52.1	<0.01
Consumes water 4+ times per day	44.0	37.3 – 50.7	42.7	37.5 – 47.8	0.72
Consumes beverages high in sugar or acid 2+ times per day	18.4	14.4 – 22.3	40.3	5.5 – 27.8	<0.01

CI=Confidence Interval

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