

Teens and Commercial Tobacco in Minnesota: Highlights from the 2023 Youth Tobacco Survey

May 2024



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We express our thanks to the thousands of students who completed the Minnesota Youth Tobacco Survey in 2023 and in previous years for their willingness to answer questions about their experiences with commercial tobacco. We are equally indebted to the principals, teachers, and staff who worked to make sure the survey went smoothly at schools around the state. ICF Macro, Inc. and its team of local survey administrators made all the arrangements with schools and administered the survey in the selected classrooms. In addition, ICF Macro, Inc. drew the school samples, programmed the online survey, and prepared the initial data file, including sample weights.

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Finally, we thank the many dedicated people throughout the state who support the well-being of our young people by encouraging them to reject commercial tobacco use. We hope this information will help everyone better understand the trends and characteristics of teen commercial tobacco use in Minnesota.

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Executive Summary

New data from the 2023 Minnesota Youth Tobacco Survey (MYTS) reveal that fewer middle school and high school students are vaping than there were three years ago. However, signs of nicotine dependence have intensified among those who vape. These results suggest that fewer young people are experimenting with vaping but those who vape may need help to stop.

Fewer Minnesota teens vape. In 2023, 13.9% or about one in seven high school students reported having vaped in the past 30 days, a statistically significant decline from 19.3% in 2020. In addition, fewer students in 2023 have ever tried vaping (19.6%) compared with students in 2020 (23.6%). Believing that commercial tobacco products are dangerous is protective against their use, and more Minnesota teens in 2023 are understanding that vaping is not harmless. The share of students who believe vaping is less addictive or less harmful than smoking cigarettes decreased significantly since 2020, and this change in awareness may have contributed to the decline in vaping experimentation and use during this time.

Four of five Minnesota teens who vape may be nicotine dependent. In 2023, a larger share of students who vape are vaping frequently and report signs of dependence. The 2023 MYTS revealed that among students who vaped in the past 30 days, 49.5% vaped on at least 20 of the past 30 days, a 47% increase in frequent vaping since 2020 and a 165% increase since 2017. In 2023, 79.6% of students who vape reported having experienced one or more signs of dependence, such as intolerable cravings and reaching for their e-cigarette without thinking about it. About seven in 10 students who vape want to quit, and nearly two-thirds have tried to quit, with some having tried to quit as many as 10 or more times, without success. The Minnesota Department of Health offers free and confidential quitting assistance designed especially for teens but few teens who vape (6.8%) are aware that My Life My Quit is available to them.

Flavored commercial tobacco appeals to Minnesota teens. The tobacco industry has for decades added flavors to tobacco to make their products more enticing and palatable to new users. In 2023, 76.3% of Minnesota students who experimented with commercial tobacco reported that the first product they ever tried was flavored with menthol or another flavor. Flavors appeal to youth, and the tobacco industry's continued practice of flavoring tobacco products effectively attracts Minnesota students to use them: in 2023, 93.3% of students who vape used a flavored vape in the past 30 days (vs. tobacco-flavored or unflavored). Vaping liquids come in over 15,000 flavors, and students who vape are more likely than students who use other types of commercial tobacco products to use flavored products.

Few Minnesota teens use conventional tobacco products. In contrast with vaping, Minnesota teens are overwhelmingly rejecting cigarettes, cigars, and smokeless tobacco. Use of these products plummeted in 2020 and remained very low in 2023. In 2023, less than five percent of high school students reported having used these tobacco products in the past 30 days: cigarettes (4.5%), cigars (4.0%), and smokeless tobacco (2.0%).

Medical and dental clinics could be better utilized in youth tobacco prevention and cessation.

The Public Health Service recommends health care providers ask adolescent patients about their use of commercial tobacco and provide counseling interventions to aid them in cessation. However, only 37.4% of students who had seen a doctor in the past year reported having been asked about vaping and 32.4% had been advised not to vape. Among students who had seen a dentist in the past year, only 7.9% had been asked and 10.8% had been advised not to vape.

Minnesota is making progress in protecting teens from exposure to secondhand smoke but not secondhand aerosol.

Young people who are repeatedly exposed to secondhand smoke are at increased risk for developing asthma and other health problems. The percentage of Minnesota teens who were recently exposed to secondhand smoke has declined since 2020. In 2023, 42.3% reported exposure to secondhand smoke in the past 7 days in one or more locations, down significantly from 46.9% in 2020. The long-term health risks from exposure to secondhand e-cigarette aerosol are unknown, but many of the elements identified in e-cigarette aerosol are known to cause respiratory distress and disease. Three in 10 (30.0%) Minnesota students were exposed to secondhand e-cigarette aerosol in the past 30 days, a statistically significant increase from 2017.

Rates of commercial tobacco use vary across different racial and ethnic groups. Asian and Black non-Hispanic students reported the lowest rates of commercial tobacco use - 4.5% and 6.2% respectively – compared to rates of 10.3% for white students and 12.5% for Hispanic students. The highest rates were among multi-racial (non-Hispanic) students (19.4%) and American Indian students (27.3%).

Introduction

The Minnesota Department of Health (MDH) regularly conducts the Minnesota Youth Tobacco Survey (MYTS) to provide comprehensive information needed to understand commercial tobacco use among young people and to design and evaluate prevention efforts. MDH conducted the ninth MYTS in 2023.

Commercial tobacco products are manufactured and sold by the tobacco industry, including cigarettes, e-cigarettes or “vapes,” cigars, and chew. Commercial tobacco is different from tobacco used by American Indian communities for sacred purposes. Commercial tobacco products, including vapes, contains highly addictive nicotine, carcinogenic and other harmful chemicals, and many have added fruity and candy-like flavors that appeal to kids. All references to tobacco use in this report refer to use of commercial tobacco products only.

The Minnesota Youth Tobacco Survey measures use of 13 types of commercial tobacco products and includes additional questions related to use of cigarettes and electronic cigarettes (also known as e-cigarettes or vapes). The survey also measures exposure to commercial tobacco advertising, secondhand smoke, secondhand e-cigarette aerosol, and other topics. Many questions on the MYTS also appear on the annually administered National Youth Tobacco Survey to enable comparisons between Minnesota and national trends.

For each survey administration, 100 public schools across the state are selected at random and invited to participate. Typically, about 70 schools participate in the study, and more than 4,000 students in grades 6-12 provide responses, generating overall response rates of 60% or higher. The data are weighted to better represent statewide demographics. The 2020 survey

administration period ended early when schools switched to distance learning for the pandemic, resulting in a smaller than usual sample size (see [Teens and tobacco in Minnesota: Highlights from the 2020 Youth Tobacco Survey](#) for more information). To address declining school participation the 2023 MYTS administration differed from previous MYTS administrations in that a larger number of schools were selected for the initial sample (55 middle schools and 60 high schools).

This report presents highlights from the 2023 survey results, and where possible, changes over time. All references to tobacco use in this document refer to use of commercial tobacco products only and not use of traditional tobacco for sacred purposes.¹ The MYTS covers a broad range of tobacco-related concepts from a representative sample of about 4,000 Minnesota students. Tobacco use disparities and inequities are briefly discussed in this report. For more robust data on disparities by race/ethnicity and other characteristics, see the Minnesota Student Survey page on MDH's Center for Health Statistics website: <https://www.health.state.mn.us/data/mchs/surveys/mss/index.html>. Finally, the terms used in this report to identify racial and ethnic groups reflect the 2023 MYTS. Future iterations of the MYTS and this report will use terms consistent with MDH's data standards.

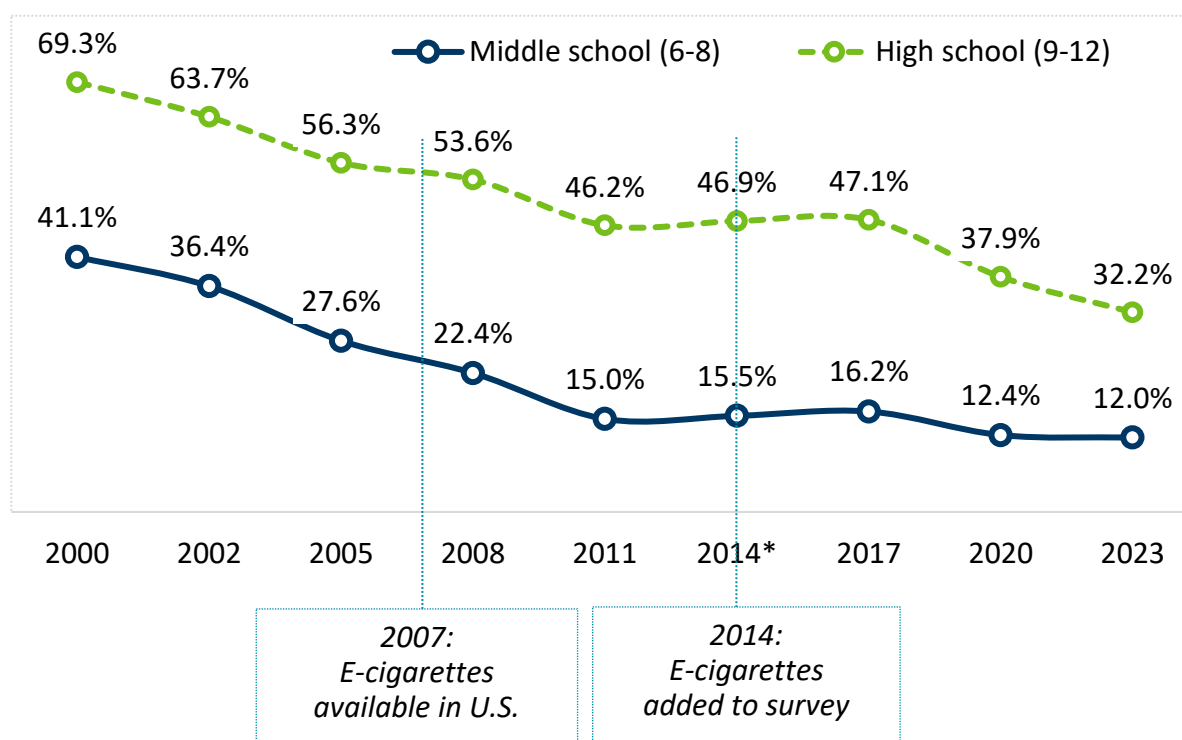
Commercial Tobacco Initiation and Current Use

Initiation

Commercial tobacco products deliver nicotine to the user, and nicotine is highly addictive. The younger people are when they start using commercial tobacco, the more difficult it is for them to quit. For decades, cigarettes were the path to harmful nicotine addiction. However, e-cigarettes have now surpassed cigarettes as the most used commercial tobacco product among young people. E-cigarettes are battery-powered devices that allow users to inhale, or vape, aerosolized liquid (e-juice). At the national level, in 2023, 17.0% of middle school and high school students reported having ever tried an e-cigarette; in comparison, 6.7% reported having ever tried a conventional cigarette.²

Trying or experimenting with commercial tobacco is a first step that may eventually lead to regular use and dependence. Public health organizations and schools are working to reduce the number of young people who take this initial step. Nationally, in 2023, 27.9% of high school and 14.7% of middle school students had ever tried a commercial tobacco product.²

Figure 1. Percent of Minnesota students who have ever tried a commercial tobacco product, 2000-2023.



Source: Minnesota Youth Tobacco Survey, 2000-2023.

* Questions about snus and hookah were also added to the 2014 survey.

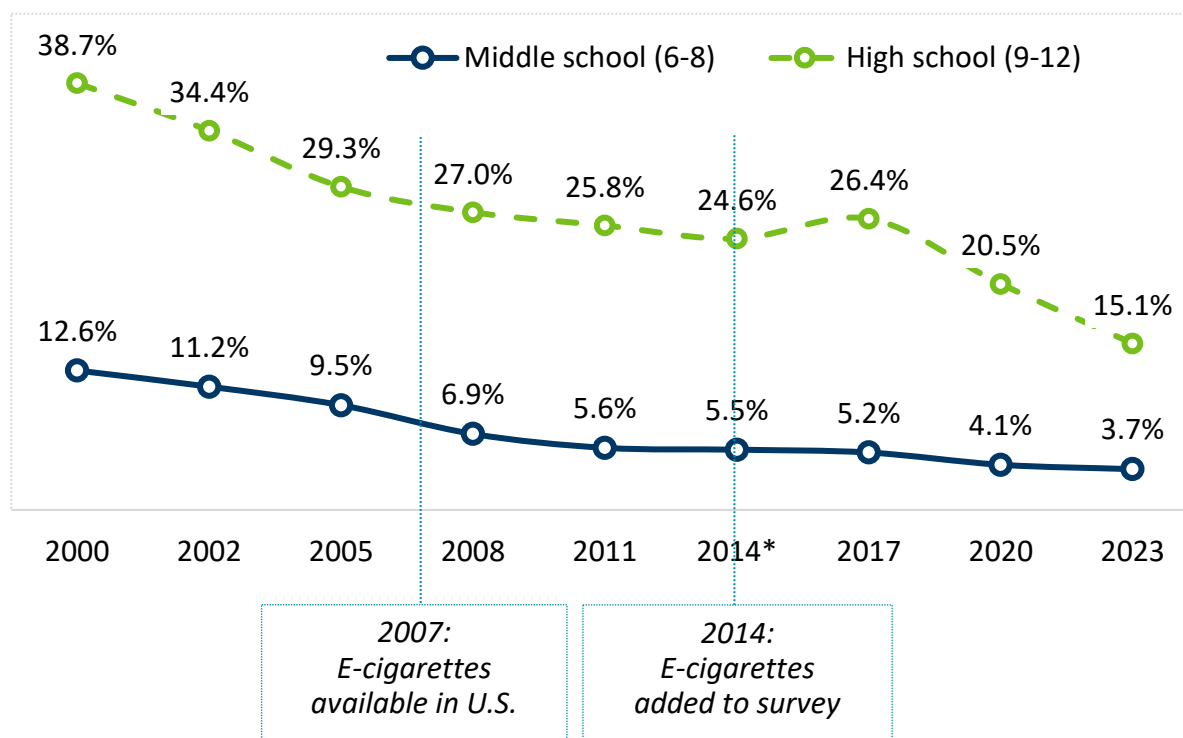
In 2023, 32.2% of Minnesota high school and 12.0% of middle school students had tried at least one commercial tobacco product in their lifetimes (Figure 1), a statistically significant decline among high school students. About one in five students (19.6%) had ever tried a vape, a statistically significant drop from 2020 (23.6%). One in 10 students (11.1%) reported having ever smoked a cigarette, statistically unchanged from 2020 (11.3%).

The percentage of Minnesota high school students who reported having ever vaped significantly declined from 35.4% in 2020 to 27.7%. Among middle school students, the percentages remained statistically unchanged from 7.9% in 2020 to 7.7% in 2023.

Current Use

Current use of commercial tobacco is defined as having used commercial tobacco products on one or more days in the past 30 days. Current use is an important measure of the commercial tobacco threat because it reflects how many teens have not only tried commercial tobacco products but also used them recently, which may indicate more regular use. The Centers for Disease Control and Prevention (CDC) reported that 12.6% of high school and 6.6% of middle school students nationally were current tobacco users in 2023, a statistically significant decline among high school students.²

Figure 2. Percent of students who used a commercial tobacco product in the past 30 days: 2000-2023.



Source: Minnesota Youth Tobacco Survey, 2000-2020.

* Questions about e-cigarettes, hookah, and snus were added to the MYTS for the first time in 2014.

In 2023, 15.1% of Minnesota high school had used one or more commercial tobacco products in the past 30 days (Figure 2), a statistically significant decrease from 20.5% among high school students from 2020. Among middle school students 3.7% had recently used a commercial tobacco product, no statistically significantly different from 4.1% in in 2020. Statewide, an estimated 48,277 students in grades 6 through 12 used a commercial tobacco product in the past 30 days, 16,329 fewer students than in 2020.

Current Use by Product Type

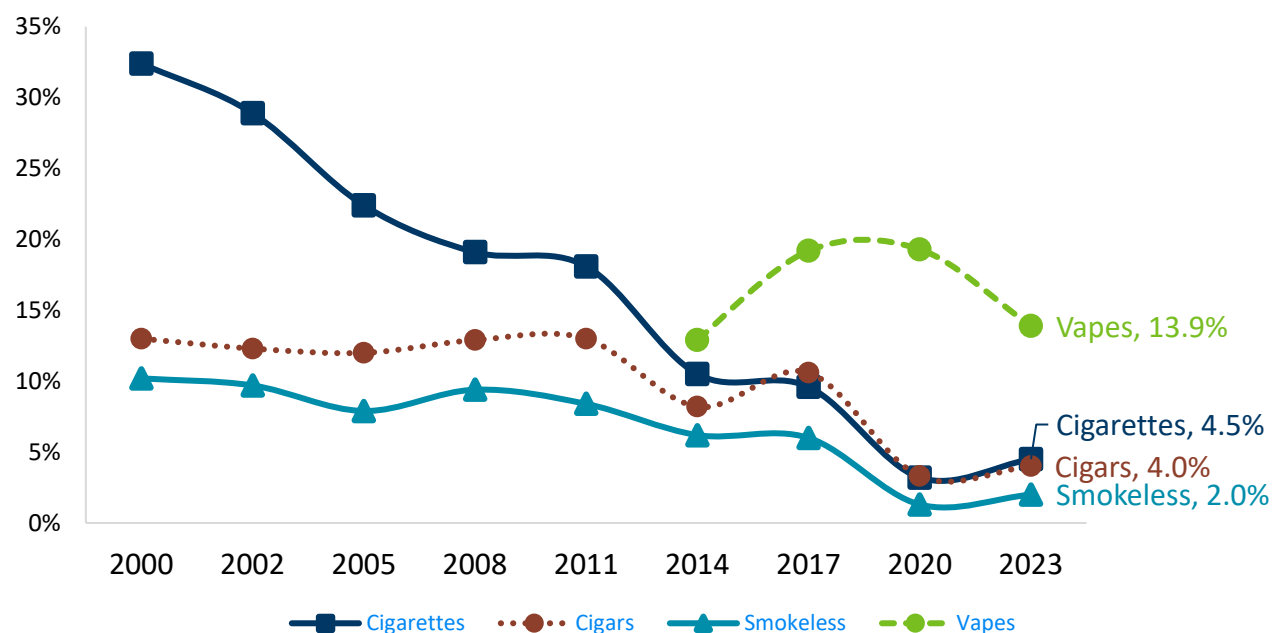
Commercial tobacco policy and tobacco control efforts affect tobacco use. The tobacco industry continually adapts to market conditions by changing promotional tactics, modifying existing products, and introducing new ones. As a result, the mix of commercial tobacco products used by students frequently changes. Cigarettes no longer dominate the tobacco market among youth.

E-cigarettes were introduced to the U.S. in 2007 and initially marketed as an alternative to smoking cigarettes. E-cigarettes are battery-powered devices that allow users to inhale, or “vape,” aerosolized liquid (e-juice). Nearly all e-liquids contain nicotine.³ The tobacco industry produces these products with sleek designs and appealing flavors, enticing adolescents to use them in alarming numbers.

E-cigarettes are not safe for youth. Nicotine is highly addictive and can harm the developing adolescent brain. Because the brain is still developing until about age 25, youth and young adult

exposure to nicotine can more easily lead to addiction and disrupt attention and learning. No amount of nicotine is safe for youth.⁴

Figure 3. Percent of high school students who used a tobacco product in the past 30 days, by type of tobacco product: 2000-2023.



Source: Minnesota Youth Tobacco Survey, 2000-2023.

* Questions about e-cigarettes were added to the MYTS for the first time in 2014.

The 2023 MYTS shows that 13.9% of high school students had vaped in the past 30 days, a statistically significant decline from 2020 (Figure 3). Among middle school students, 2.2% reported having vaped in the past 30 days. Nationally, in 2023 10.0% of high school students and 1.1% of middle school students had vaped in the past 30 days.²

In Minnesota, high school students' use of conventional tobacco products (cigarettes, cigars, and smokeless tobacco) declined markedly from 2017 to 2020 but may have rebounded slightly in 2023 (Figure 3). For example, in 2023 4.5% of high school students reported they had smoked cigarettes in the past 30 days. This percentage was 3.2% in 2020. Use of cigars was 3.3% in 2020 and is now 4.0%, and use of smokeless tobacco was 1.3% in 2020 and is now 2.0%. The increased use of these products in 2023 is not large enough to be statistically significant, but it is concerning that the difference for all three product types is in the same direction. Middle school students' current use of cigarettes (1.4%), cigars (0.8%), and smokeless tobacco (1.0%) remained low and statistically unchanged from 2020.

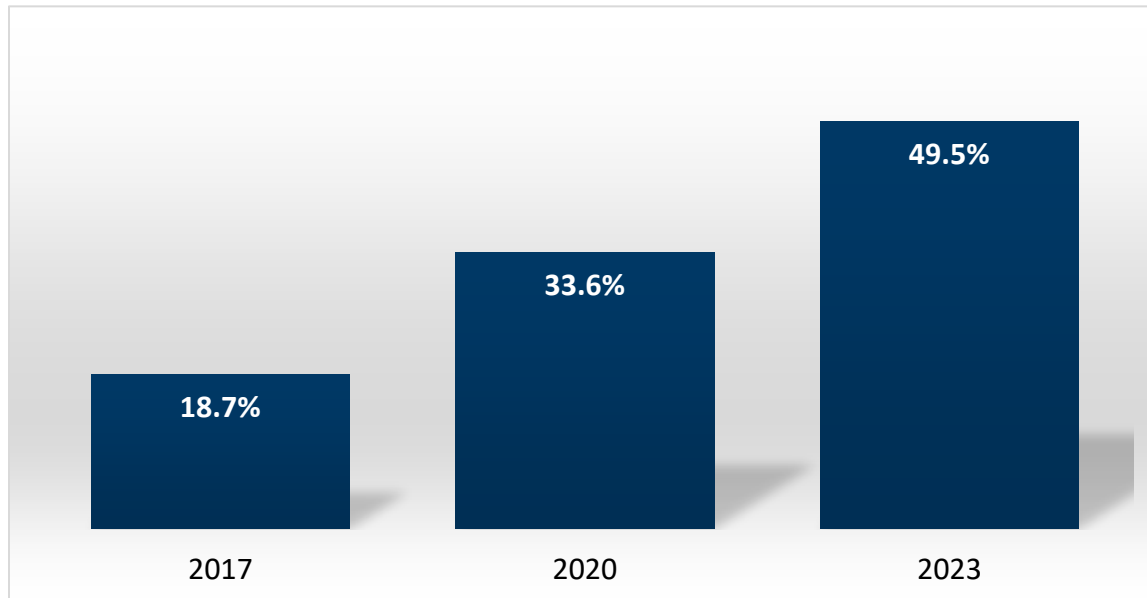
Nicotine Dependence

Nicotine is highly addictive. Adolescents and young adults are particularly susceptible to addiction because their brains are still developing. The 2023 MYTS included several measures of dependence on nicotine and e-cigarettes.

Frequent Use

One sign of nicotine dependence is frequent use, defined as use on 20 or more of the past 30 days.

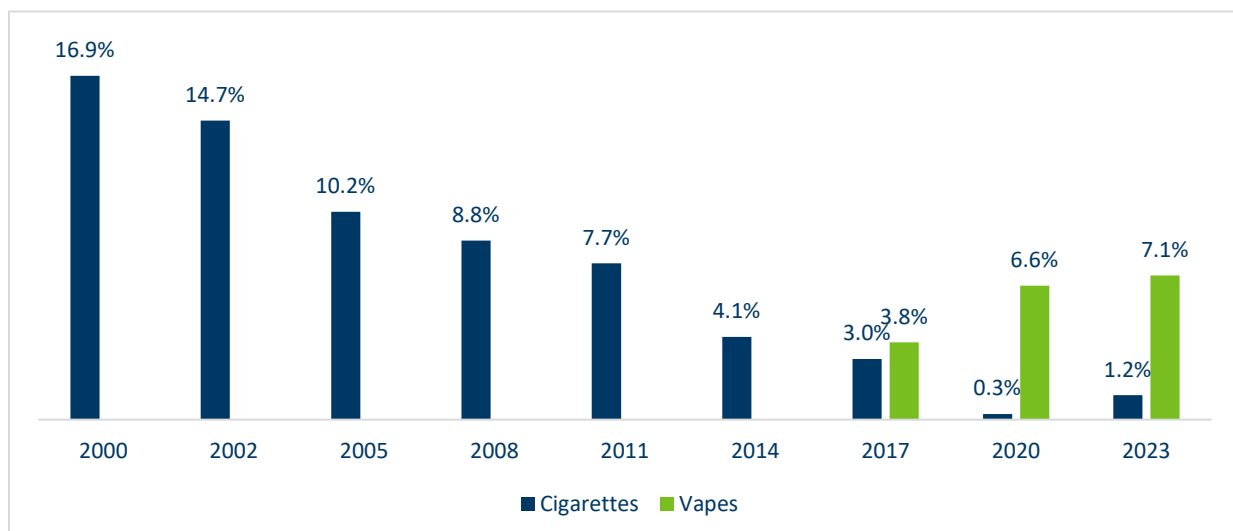
Figure 4. Percent of students who currently use e-cigarettes who reported frequent use, by year, 2017-2023



Source: Minnesota Youth Tobacco Survey, 2023. Denominator: students who reported having vaped in the past 30 days.

In 2023, 49.5% of students who currently use e-cigarettes reported frequently using them, a 47% increase from 2020 and a startling 165% increase from 2017 (Figure 4). In contrast, the percent of students who frequently smoke cigarettes declined 47% from 28.8% in 2017 to 15.2% in 2020.

Figure 5. Percent of high school students who reported frequent use of cigarettes or vapes – a sign of nicotine dependence, 2000-2023



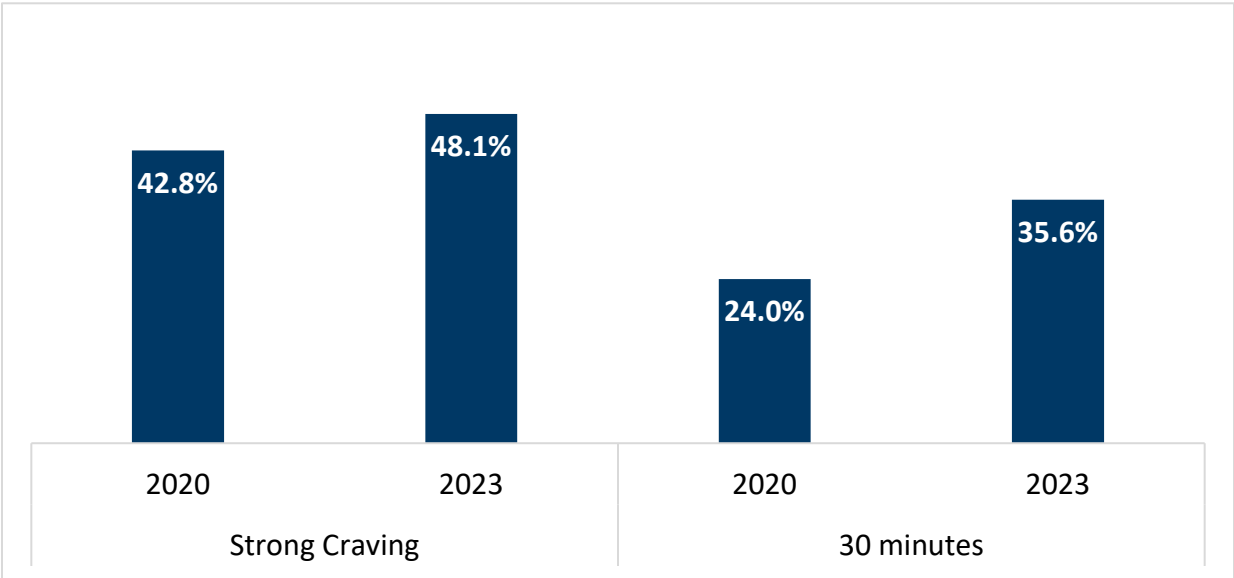
Source: Minnesota Youth Tobacco Survey, 2000-2023. Denominator: high school students (grades 9-12). Note: days vaped was added to MYTS in 2017.

The percentage of high school students who frequently vape is substantially higher than the percentage who frequently smoke cigarettes (Figure 5). Frequent use is associated with dependence. In 2023, 92.6% percent of students who vaped frequently reported signs of e-cigarette dependence. The percentage of U.S. adults who use e-cigarettes that are frequent users increased from about 35% in 2017 to nearly 45% in 2020, suggesting that adults are also increasingly experiencing nicotine dependence if they vape.⁵

Cravings and Time to First Tobacco Use

Experiencing strong cravings and using commercial tobacco products within 30 minutes of waking are well-established signs of nicotine dependence. Nationally, in 2019-2020, 28.3% of middle school and high school students who used a tobacco product within the past 30 days reported strong cravings for tobacco in the past 30 days, and 15.7% wanted to use tobacco within 30 minutes of waking.⁶

Figure 6. Percentage of current tobacco users who reported strong cravings or who wanted to use tobacco within 30 minutes of waking, by year.



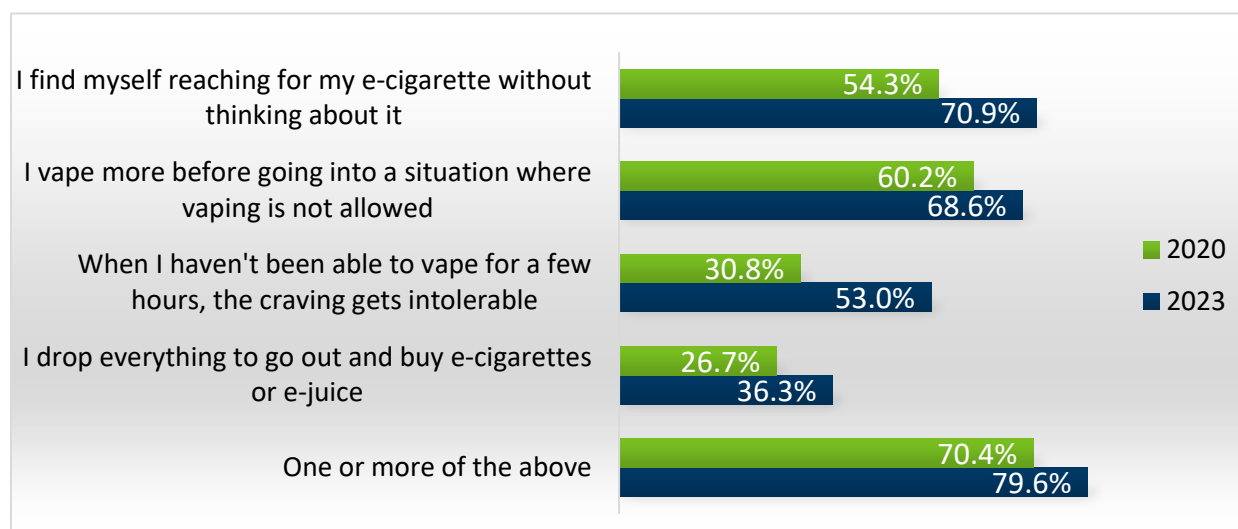
Source: Minnesota Youth Tobacco Survey, 2020-2023. Denominator: students who reported having vaped in the past 30 days. Students are counted in the numerator if they reported experiencing the symptom rarely or more often.

In 2023, more Minnesota teens who are current commercial tobacco users experienced strong cravings for tobacco and wanted to use tobacco within 30 minutes of waking (Figure 6). Almost half of Minnesota students who used a tobacco product in the past 30 days reported feeling like they really “needed to use a tobacco product” in those 30 days, up from 42.8% in 2020. More than a third of current tobacco users (35.6%) reported wanting to use tobacco in the first half hour of their day, an increase from 24.0% in 2020. These are strong indicators that in 2023 more Minnesota teens who use tobacco products are nicotine dependent than in 2020.

E-cigarette Dependence Scale

The MYTS asks how often students who use e-cigarettes experience four signs of nicotine dependence. A response of at least “rarely,” as opposed to “never,” on one or more of the four items is considered a sign of dependence.

Figure 7. Percent of students who currently use e-cigarettes and reported having experienced a sign of dependence, by year, 2020-2023.



Source: Minnesota Youth Tobacco Survey, 2020-2023. Denominator: students who reported having vaped in the past 30 days. Students are counted in the numerator if they reported experiencing the symptom rarely or more often.

In 2023, four out of five (79.6%) students who vaped in the past 30 days reported one or more signs of dependence (Figure 7) (78.7% of high school and 87.7% of middle school students who currently use e-cigarettes). In 2023, the most reported sign of dependence was reaching for one’s e-cigarette without thinking about it: 67.6% of middle school and 71.2% of high school students reported having experienced this sign (Figure 7).

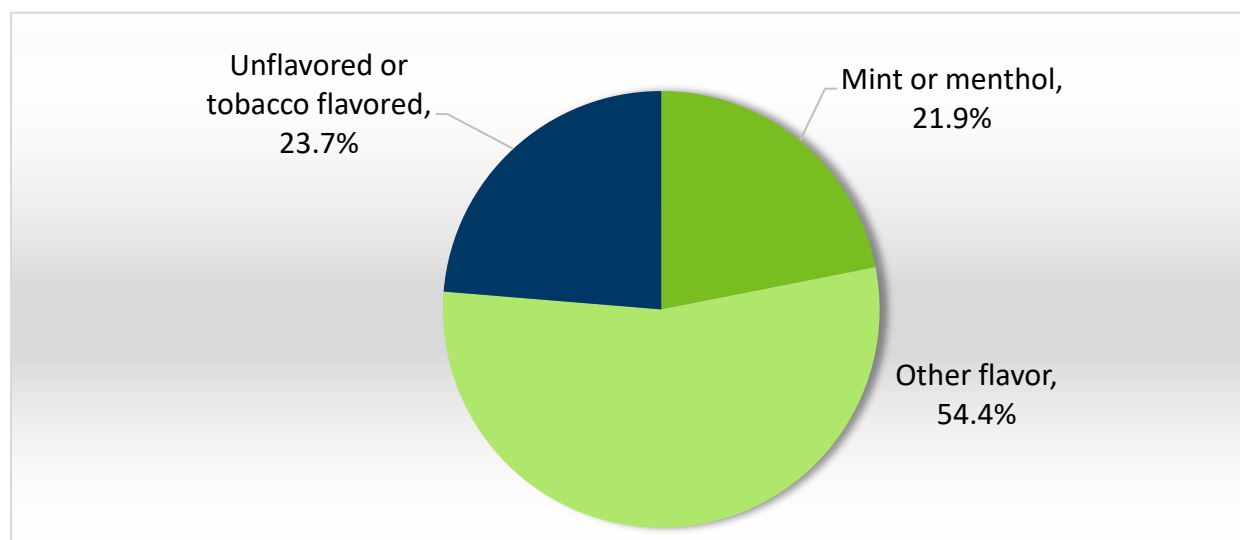
Use of Flavored Tobacco Products

Menthol is an ingredient derived from peppermint or other mint oils that the tobacco industry adds to cigarettes and other tobacco products. Menthol makes smoking easier by masking the harshness and irritation that people feel when they inhale cigarette smoke. Youth who experiment with menthol cigarettes are more likely to transition to regular smoking than those who start with non-menthol cigarettes.⁷

The tobacco industry has a long history of adding fruity and other sweet flavors to tobacco products that primarily appeal to children and young adults. Tobacco companies were legally prohibited from adding these flavors to cigarettes in 2009, but they were allowed to continue selling menthol-flavored cigarettes, and they continue to flavor cigars, e-cigarettes, and other tobacco products with kid-friendly flavors such as “Gummi Bear,” “Blue Raz Confection”⁸ and “Cherry Dynamite”⁹ to hook a new generation of commercial tobacco users. More than 80 percent of teenagers reported their first tobacco product was flavored,¹⁰ and the majority of a random sample of California teens and young adults felt advertisements for flavored e-liquids were aimed at people their age or younger.¹¹ Many localities have restricted sales of menthol

and other flavored commercial tobacco to make it more difficult for young people to get these products.

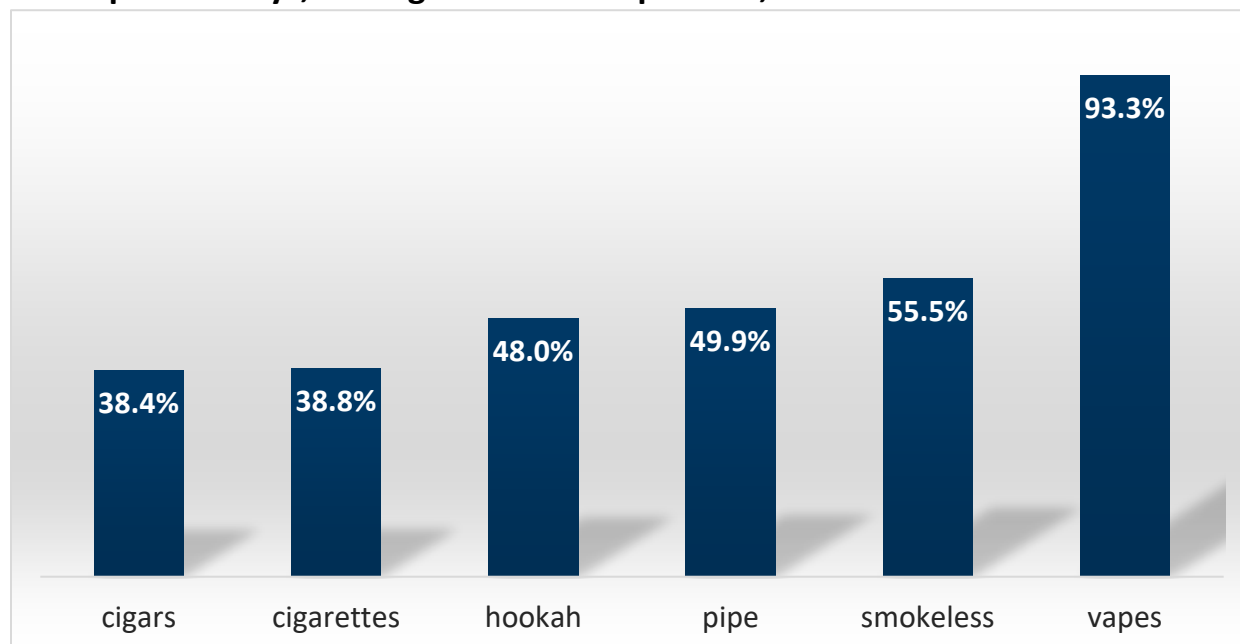
Figure 8. Percent of students who reported that the first tobacco product they ever tried was mint or menthol, some other flavor, or unflavored, 2023.



Source: Minnesota Youth Tobacco Survey, 2023.

Flavors increase the appeal of commercial tobacco products for young people in Minnesota. In 2023, about three of four Minnesota students (76.3%) reported that the first commercial tobacco product they ever tried was flavored (Figure 8), about one in five students who have ever vaped cited “they come in flavors, such as mint, candy, fruit, or chocolate” as a reason for vaping, and fewer students are interested in vaping when the flavor offered is tobacco (21.2%) versus any flavor (36.9%).

Figure 9. Percent of students who used a flavored commercial tobacco product in the past 30 days, among users of that product, 2023.



Source: Minnesota Youth Tobacco Survey, 2023. Note: the denominator for each column is students who reported having used that type of commercial tobacco product in the past 30 days.

In 2023, four in five students who use commercial tobacco (81.2%) reported using a menthol or other flavored product during the past 30 days (Figure 9), statistically unchanged from 2020. Of the tobacco products students use, e-cigarettes are the most likely to be flavored. More than nine in ten students who currently use e-cigarettes (93.3%) reported using a flavored e-cigarette in the past 30 days.

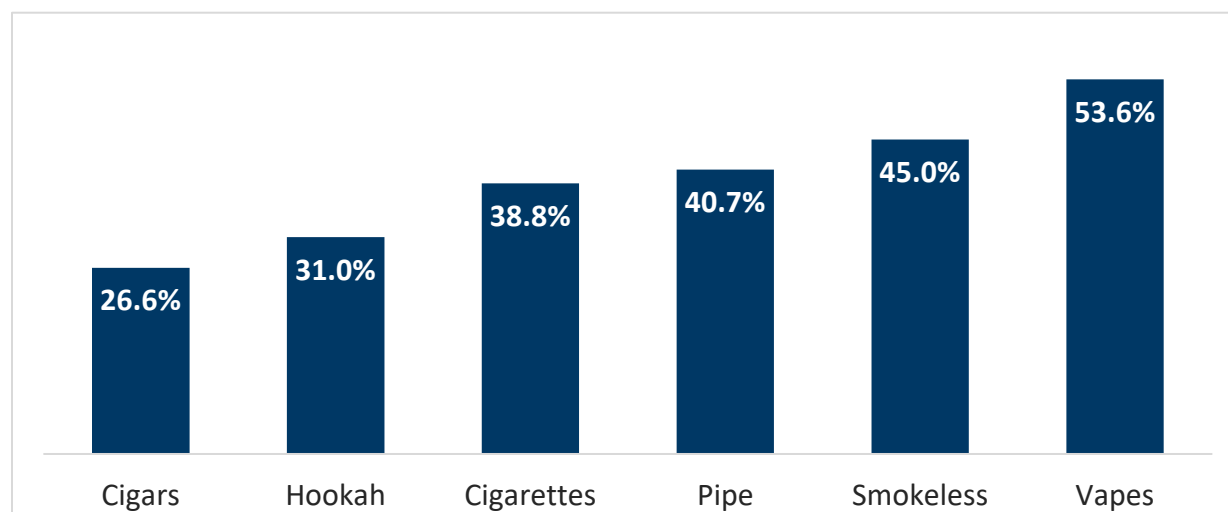
Nationally in 2023, 86.9% of students who used a commercial tobacco product in the past 30 days reported having used a flavored product.² By product type, use of flavored products ranged from 40.4% of students who smoked cigarettes to 89.4% of U.S. students who vaped.

Menthol Use

Menthol was first added to cigarettes by chance in the 1920's when a young Ohio man stored his cigarettes alongside menthol crystals and discovered the cigarettes had a pleasant minty taste.¹² He began making and selling mentholated cigarettes to others. Tobacco companies took notice, and they also began adding menthol to cigarettes, manipulating menthol levels and using targeted marketing to enhance their appeal to women, African Americans, and young people. By 2006, menthol cigarettes were 20% of cigarette sales. Menthol cigarettes are still used disproportionately by these targeted groups.

The 2009 Family Smoking Prevention and Tobacco Control Act authorized the Food and Drug Administration (FDA) to regulate tobacco products and effectively banned cigarette makers from adding candy, fruit, and spice flavors to cigarettes, but menthol was exempted from the ban.¹³

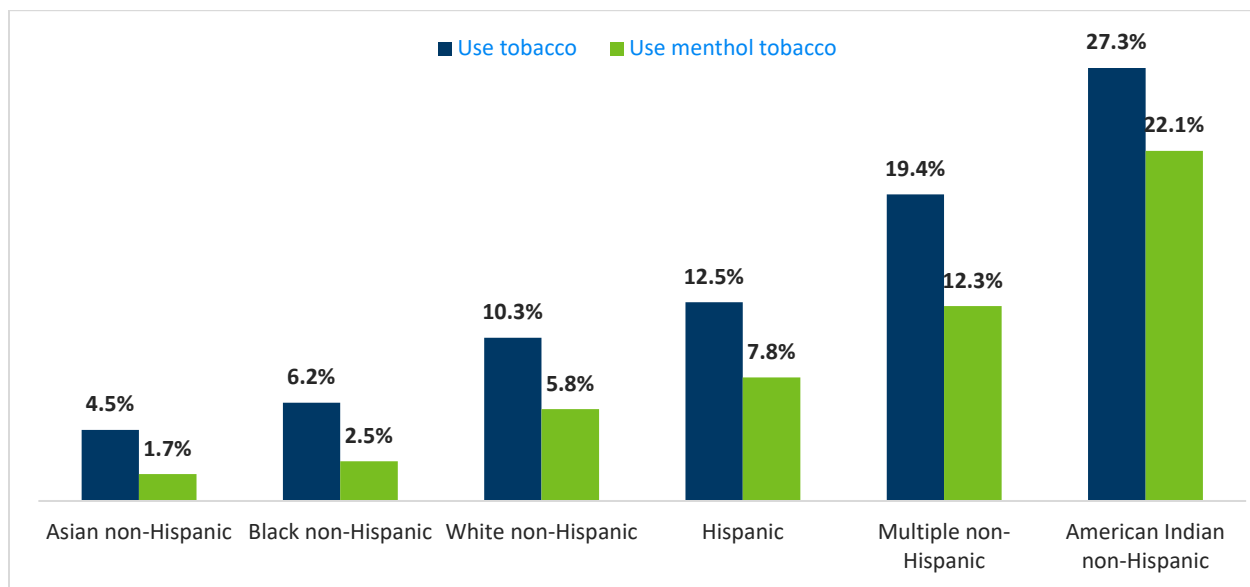
Figure 10. Menthol (or mint flavor) prevalence, by product type, 2023



Source: Minnesota Youth Tobacco Survey, 2023. Denominator: students who used that product in the past 30 days.

Menthol and mint-flavored commercial tobacco products continue to be a problem for youth in Minnesota. In 2023, 38.8% of students who had smoked a cigarette in the past 30 days reported having smoked menthol cigarettes (Figure 10). This is larger than the share of Minnesota adult smokers whose usual brand is menthol (28.5% in 2021).¹⁴ More than half of teens who vape and nearly half of those who use smokeless tobacco reported having used those products flavored with mint or menthol (Figure 10).

Figure 11. Percent of Minnesota students who used any tobacco (blue columns) and who used menthol tobacco (green columns) in the past 30 days, by race, grades 6-12



Source: Minnesota Youth Tobacco Survey, 2023. Denominator: students in grades 6-12 (dark blue columns); students who used a commercial tobacco product in the past 30 days.

The longer-term impact of the tobacco industry having targeted American Indian and African American communities is apparent in higher tobacco use prevalence among American Indian students compared with other racial/ethnic groups and the higher share of American Indian students who use menthol products. In contrast, efforts to reduce disparities for Black students' tobacco use and use of menthol appear to be working. The percentage of Black students who use commercial tobacco and the share of black students who use menthol tobacco products is below the overall average. This encouraging result for Black students in Minnesota is consistent with Minnesota Student Survey data and national trends.¹⁵

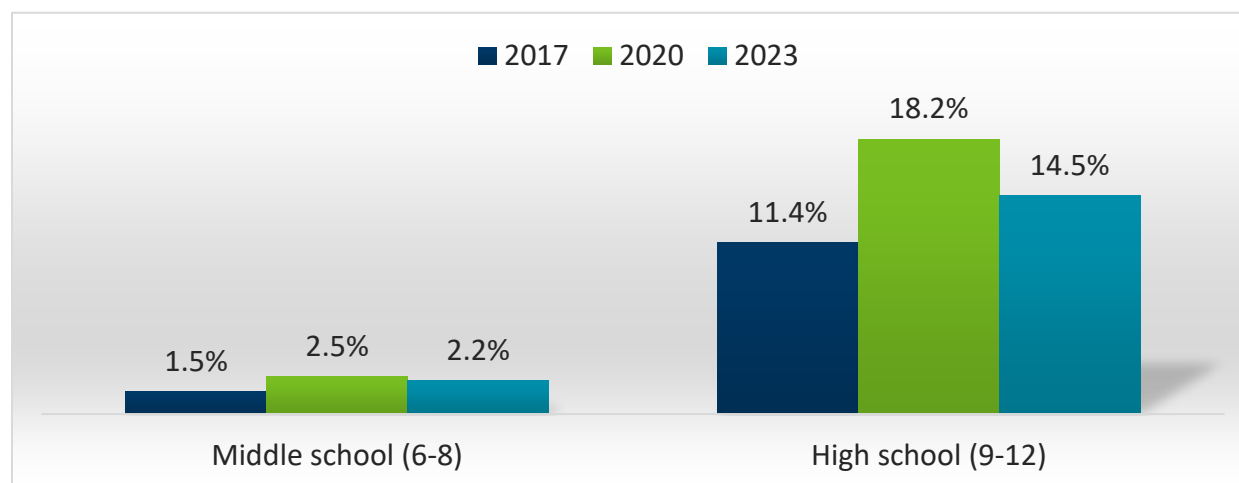
In Minnesota, at least 30 localities have passed flavored commercial tobacco restrictions, including major cities and small towns.¹⁶ Some have restricted sales of flavored tobacco products including menthol tobacco products, and others have limited flavored tobacco product sales to adult-only locations. Reducing the availability of menthol and other flavored tobacco is an effective strategy to prevent youth initiation and use.

E-cigarettes and Cannabis

Vaping devices can be used to vaporize cannabis or THC oil or wax. (THC is the primary psychoactive ingredient in cannabis, commonly called marijuana, pot, or weed.) Vaping cannabis may appeal to youth because vaping may be perceived as more modern and vaping produces less odor than smoking cannabis through a joint, pipe, or blunt (a hollowed-out cigar filled with marijuana). THC concentrations in vaporized hash oil or wax can be considerably higher and therefore more potent than smoking or eating cannabis. Recent research suggests that vaping cannabis may pose greater risk for acute lung injuries, seizures, and acute psychiatric symptoms than smoking cannabis.¹⁷

Cigarette smoking has a well-established association with later cannabis use. Studies are beginning to show that early vaping and use of other tobacco products¹⁸⁻²⁰ also increases risk for cannabis initiation. The MYTS asked students whether they had ever used an e-cigarette device with marijuana, THC or hash oil, or THC wax.

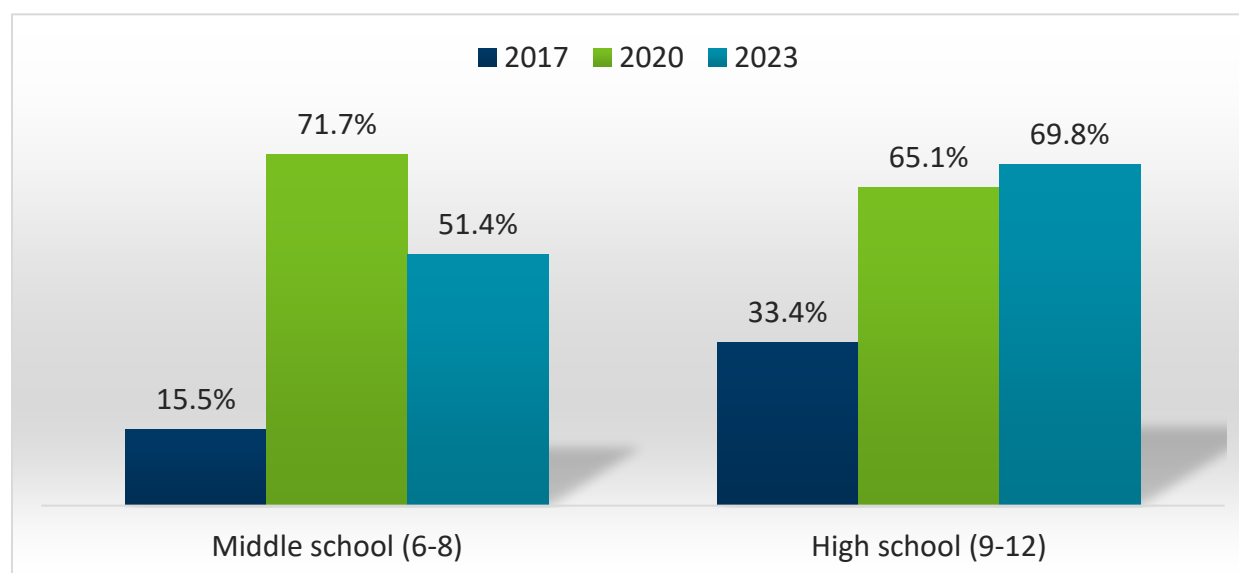
Figure 12. Percent of middle school and high school students who have ever used an e-cigarette device to vape cannabis/THC, by year, 2017-2023.



Source: Minnesota Youth Tobacco Survey, 2017-2023.

The percent of high school students who reported using e-cigarettes to vape cannabis decreased from 18.2% in 2020 to 14.5% in 2023. (Figure 12). This decline in vaping cannabis is somewhat surprising, because THC use is increasingly socially acceptable as more states legalize recreational use. Minnesota legalized medical use of cannabis in 2014 and in June 2023 became the 23rd state to legalize recreational use for adults 21 and older.²¹ However, as youth use of alcohol, commercial tobacco (including e-cigarettes) and cannabis has been dropping over time,²² vaping cannabis appears to be declining as well.

Figure 13. Percent of current e-cigarette users who have ever used an e-cigarette device to vape marijuana/THC, by year, 2017-2023.



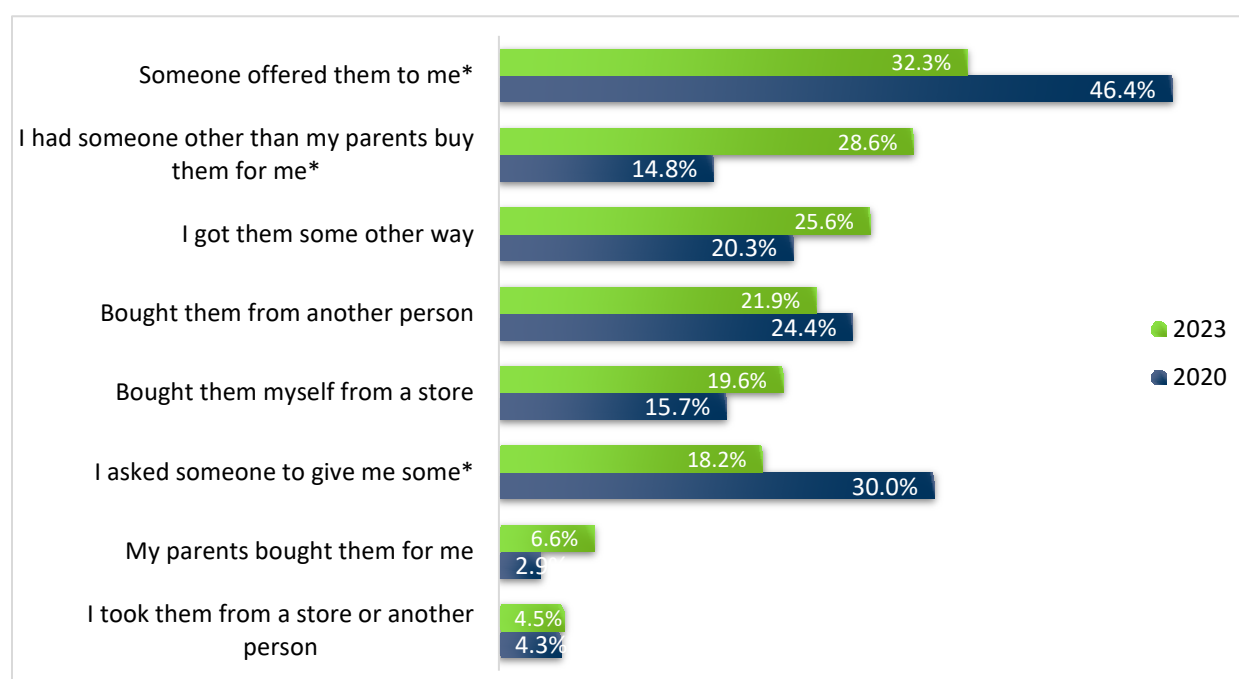
Source: Minnesota Youth Tobacco Survey, 2017-2023.

While the number of Minnesota students who vape THC is declining, the behavior appears to be concentrated among high school students who vape. About seven of 10 high school students who currently vape nicotine (69.8%) reported having ever vaped marijuana, which is twice the percentage from 2017 (Figure 13). In 2023, the percentage of Minnesota middle school students who vape who reported having ever vaped THC decreased from 71.7% to 51.4%.

Youth Access to Vapes

Adolescents often obtain commercial tobacco products, such as cigarettes, cigars, smokeless tobacco, or vapes, from other people rather than by going to a store and buying them. However, a substantial number of underage youth report purchasing tobacco products themselves, underscoring the need for better enforcement of existing tobacco restrictions.

Figure 14. How students who currently use e-cigarettes got their e-cigarettes, 2023.



Source: Minnesota Youth Tobacco Survey, 2020-2023. Note: Students could check more than one source, so percentages add to more than 100%. * Indicates a statistically significant change from 2020.

Young people continue to get access to commercial tobacco products through social sources. About a third of students who used e-cigarettes in the past 30 days reported someone offered e-cigarettes to them (32.3%), 28.6% asked someone other than their parents to buy e-cigarettes for them (Figure 14), and 21.9% bought them from another person. In 2023, 69.3% of students who vape reported a social source for their vaping products, a statistically significant decline from 79.1% in 2020. This reduction in using social sources for vaping products is consistent with the intended effect of Minnesota’s “Tobacco 21” law which raised the legal age to purchase tobacco products to 21 in August 2020. Raising the legal age to purchase tobacco makes it less likely that someone in high school or younger will have friends old enough to legally buy commercial tobacco products.

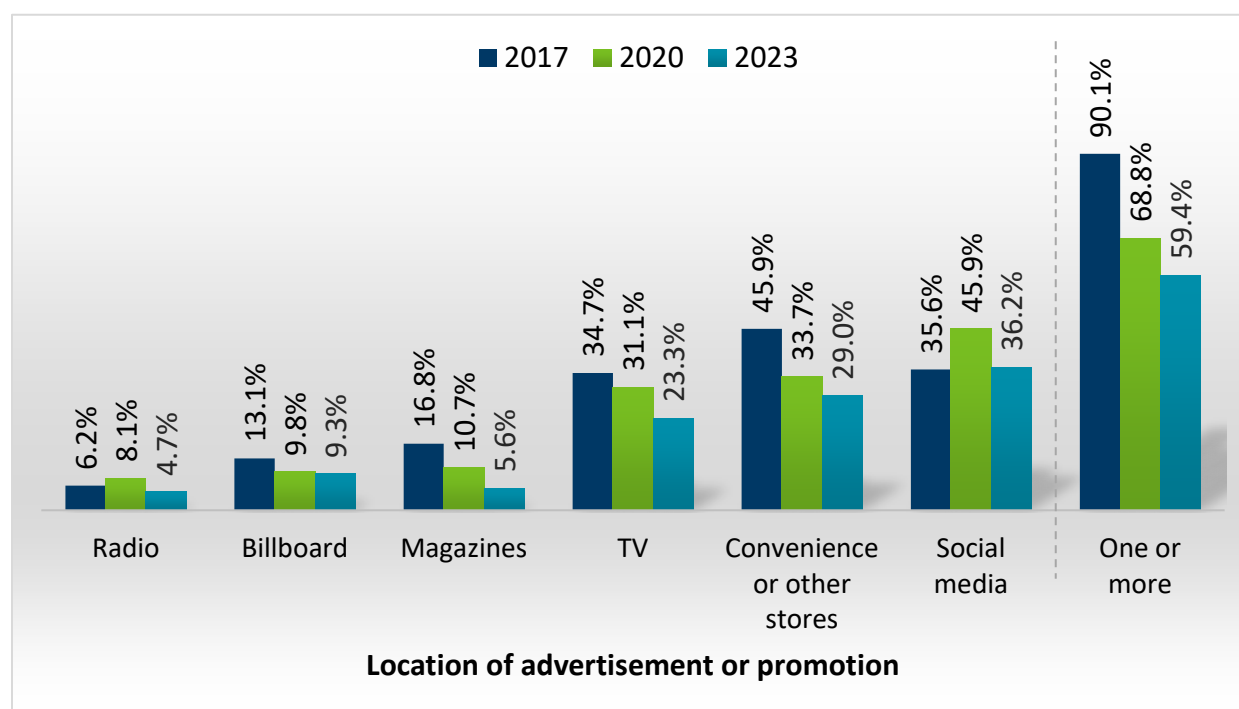
Despite the implementation of Tobacco 21, 19.6% of high school students reported they bought e-cigarettes from a store (including online stores). While not a statistically significant increase

from 2020 (15.7%), this result is not the decrease we expected given the new law. Students who vaped and personally bought vaping products reported they got their products from vape shops (52.4%), gas stations or convenience stores (42.9%), the internet (18.3%), and other retailers. This suggests that current federal and local age restrictions for purchase are not enough to prevent teens from buying tobacco products directly from retailers. Cities and counties can help reduce teen access to commercial tobacco products by regularly conducting retailer compliance checks to promote enforcement of T21.

Tobacco Advertising

E-cigarette advertising is pervasive and uses the same themes of freedom, glamour, and rebellion that were used to market cigarettes.²³ The tobacco industry spends about \$9 billion dollars marketing their products every year, outspending commercial tobacco prevention funding by about 12 to 1.²⁴ Tobacco product advertising works: it reaches youth²⁵ and promotes initiation.^{26,27} The CDC notes that e-cigarette use has increased considerably among U.S. teens in recent years along with e-cigarette advertising expenditures.²⁸

Figure 15. Percentage of students who reported having seen an advertisement or promotion for e-cigarettes, by source, by year, 2017-2023.



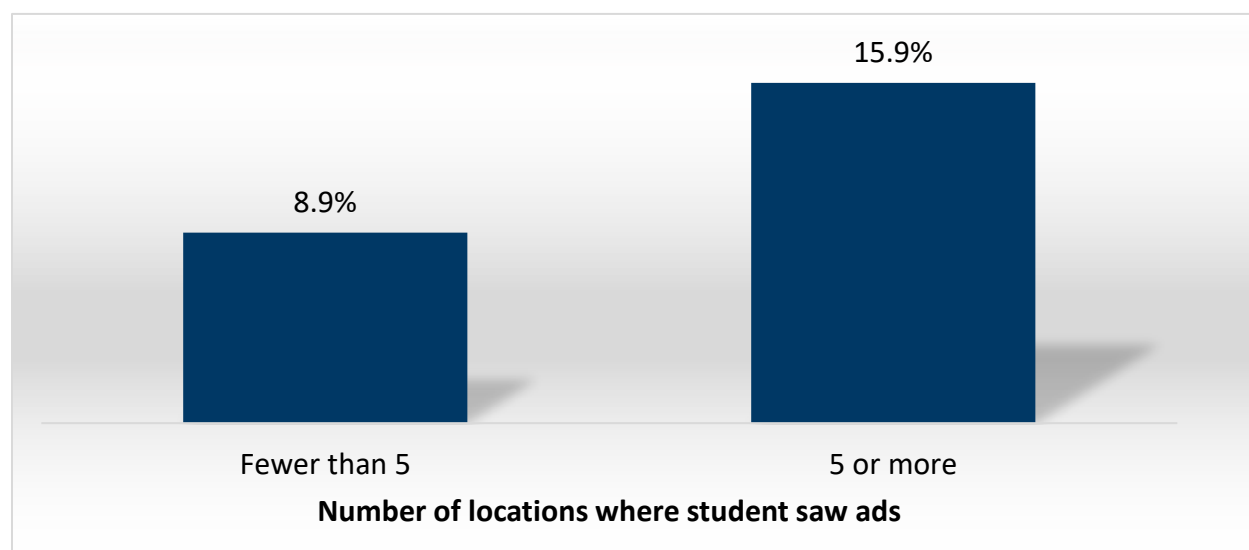
Source: Minnesota Youth Tobacco Survey, 2017-2023.

Significantly fewer students in 2023 (59.4%) reported having recently seen ads or promotions for e-cigarettes than students in 2020 (68.8%) (Figure 15). Fewer students reported having seen ads on TV, billboards, or in magazines. The drop in the share of students who reported having seen ads in stores is important, because recall of ads in stores is associated with future e-cigarette initiation.²⁹

In 2023, significantly fewer teens reported seeing ads for vaping products in convenience and other stores. Eliminating advertising at the point of sale is essential because these ads are intended to stimulate desire for the product precisely when the target is making decisions and

can access the products. There was also a significant decrease in the percent of students who reported seeing e-cigarette ads on social media. This is good news because teens typically spend more time on social media than they do shopping in brick-and-mortar stores; a recent study reported that teens typically get over seven hours of screen time daily, in addition to time spent using screens for school or homework.³⁰

Figure 16. Percent of students who used e-cigarettes in past 30 days, by exposure to e-cigarette advertising, 2023.



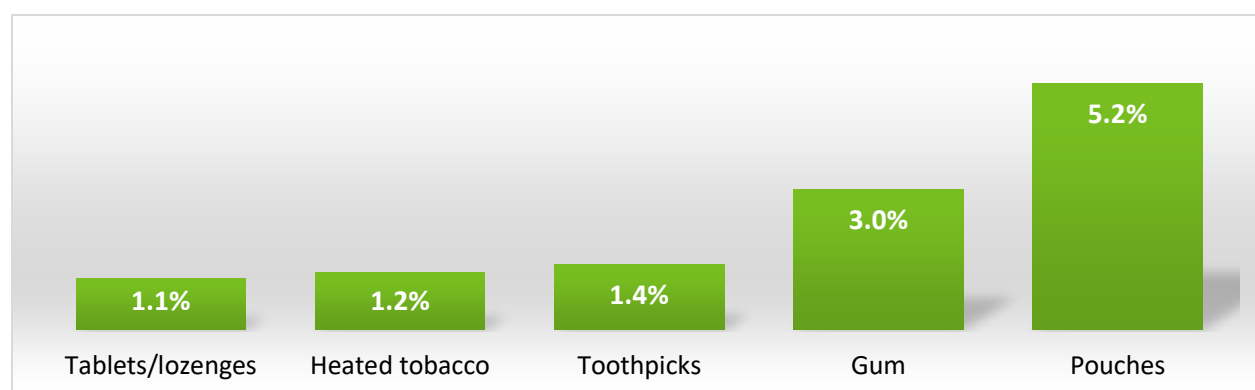
Source: Minnesota Youth Tobacco Survey, 2023.

Minnesota students who reported exposure to e-cigarette advertising and promotions in many locations were more likely to report current use of e-cigarettes. Notably, students who reported they saw ads for e-cigarettes in five or more locations (such as social media, convenience stores, or TV) were more likely to report current (past 30-day) use of e-cigarettes than those who had seen ads in fewer or no locations (15.9% versus 8.9%) (Figure 16).

Emerging Nicotine and Tobacco Products

The worldwide market for commercial tobacco products is projected to generate revenue of nearly a trillion dollars in 2024.³¹ As tobacco control efforts drive down cigarette sales in the U.S. and other countries, tobacco companies continue to profit by engineering new ways to deliver addictive nicotine that will keep existing customers and hook new ones. Prominent among these are five emerging types of tobacco products: heated tobacco products, and nicotine infused pouches, toothpicks, tablets or lozenges, and gum. Heated tobacco products (e.g., IQOS) heat but do not burn commercial tobacco. Nicotine-infused products do not contain tobacco leaf. The 2023 National Youth Tobacco Survey revealed that 3.1% of high school students had ever tried nicotine pouches, while 3.5% had tried other oral nicotine products, and 1.6% had tried a heated tobacco product.²

Figure 17. Percentage of Minnesota high school students who have ever tried an emerging nicotine product or heated tobacco product, 2023.



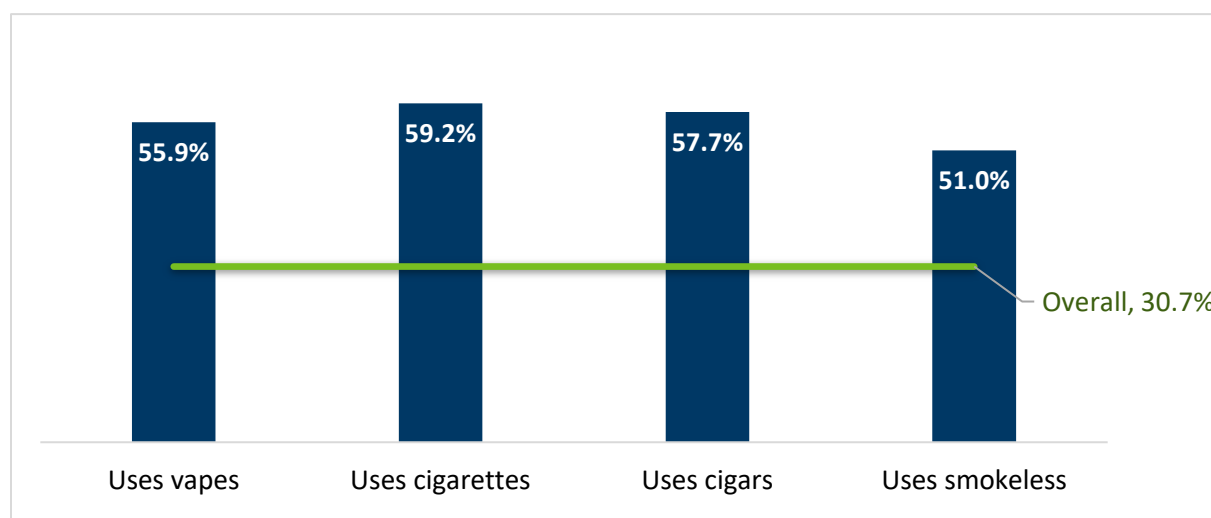
Source: Minnesota Youth Tobacco Survey, 2023. Denominator: high school students (grade 9-12). Note: less than 1% of middle school students (grade 6-8) reported having tried each of these products.

In Minnesota, 5.2% of high school students reported having ever tried nicotine pouches. Three percent of students had tried nicotine gum, 1.4% had tried nicotine infused toothpicks, and 1.1% had tried nicotine tablets or lozenges. Just over one percent (1.2%) had ever tried heated tobacco (Figure 17). High school students who live in greater Minnesota were 2.4 times more likely to report having ever tried nicotine pouches (7.0%) than those who live in the 7-county metro area (2.9%).

Commercial Tobacco Use and Mental Health

A strong relationship exists between adolescent exposure to nicotine and depression, anxiety, and stress.^{23,32} Teens with mental health disorders are more likely to initiate commercial tobacco use and are at increased risk for long-term nicotine dependence than teens without these disorders. This association may stem from a genetic predisposition for both the disorder and tobacco use, or teens who have these challenges attempting to self-medicate their symptoms. However, research shows that tobacco use contributes to the development of mood disorders. For example, a study that followed people from birth provided evidence that smoking during adolescence was linked to depression onset.³³ Studies of siblings, twins, and animals also support a causal relationship between nicotine exposure during adolescence and the development of long-term mental health problems.

Figure 18. Percent of students who reported symptoms of anxiety or depression, by tobacco use status, 2023.



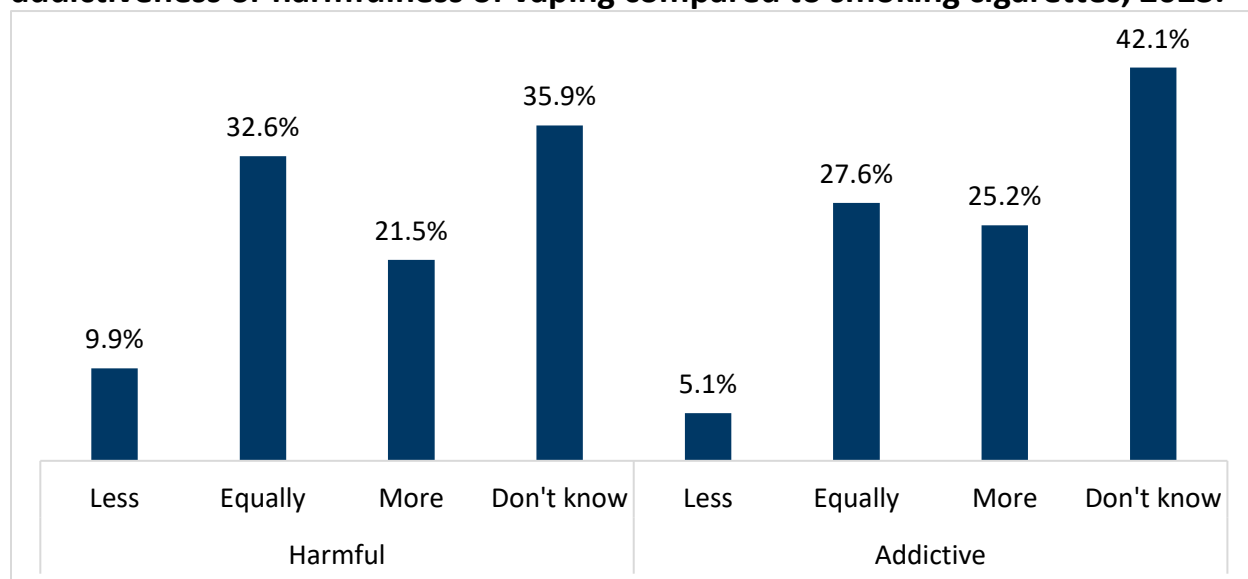
Source: Minnesota Youth Tobacco Survey, 2023. Denominator: students who reported having used the product within the past 30 days.

In Minnesota, a larger share of students who currently vape, smoke cigarettes, smoke cigars, or use smokeless tobacco report symptoms of anxiety or depression than students overall (Figure 18).

Beliefs about Vaping

Beliefs about nicotine and commercial tobacco products can influence young people to try, continue using, or quit using tobacco products. For example, negative perceptions of the tobacco industry are associated with intention to quit and attempts to quit smoking among young adults.³⁴ Perceptions of the risks and benefits of using tobacco products consistently associate with use and predict future use. The perceived risks and benefits of using tobacco vary by product type³⁵ and those beliefs can change in response to media, research findings, industry marketing, prevention messaging campaigns, and other influences. Believing that tobacco products are dangerous is protective against their use. Nationally, the percentage of teens who believe e-cigarettes are harmful and addictive has increased over time.³⁶

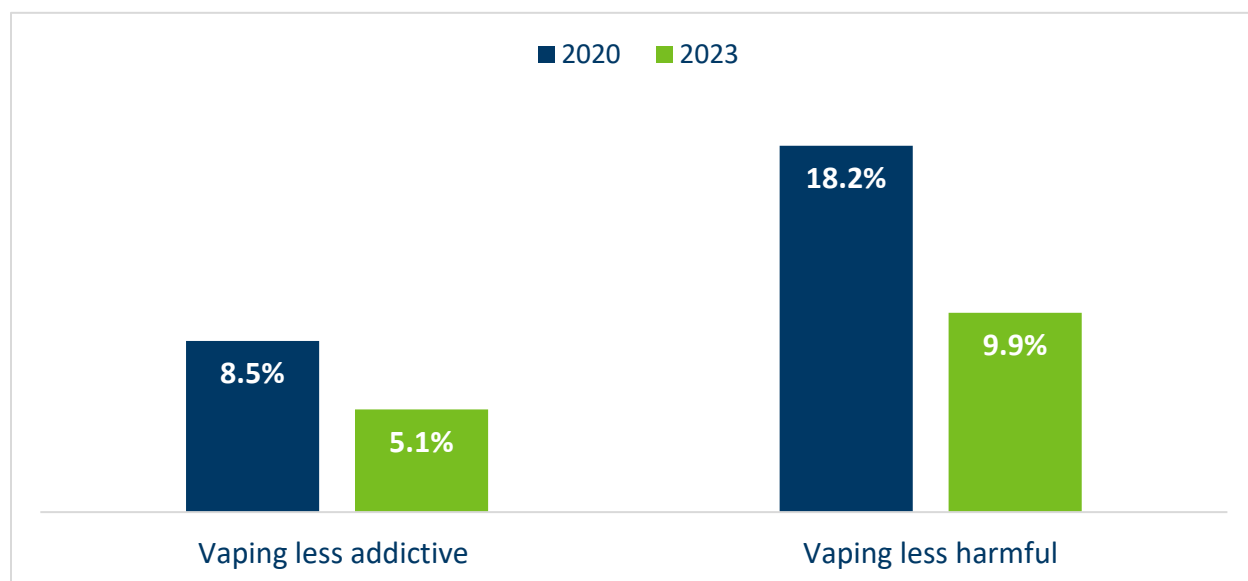
Figure 19. The percentage of Minnesota students with beliefs about the addictiveness or harmfulness of vaping compared to smoking cigarettes, 2023.



Source: Minnesota Youth Tobacco Survey, 2023.

In 2023, 21.5% of Minnesota teens indicated they believe vaping is more harmful than smoking cigarettes, and 25.2% believe vaping is more addictive than smoking cigarettes (Figure 19).

Figure 20. Percentage of Minnesota students who believe vaping is less addictive or less harmful than smoking cigarettes, by year, 2020-2023



Source: Minnesota Youth Tobacco Survey, 2020-2023.

The share of students in 2023 who believe vaping is *less* harmful (9.9%) or *less* addictive than smoking cigarettes (5.1%) decreased significantly since 2020 (Figure 20Error! Reference source not found.). Given that negative beliefs about these products are protective against using them, this shift in beliefs may have contributed to the decline in vaping prevalence during this time.

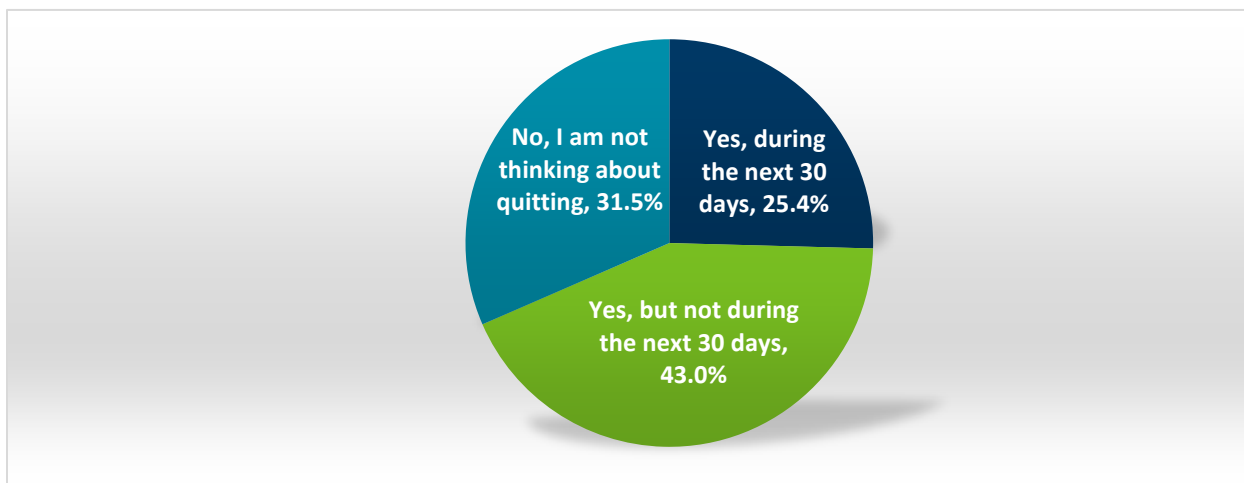
Quitting Commercial Tobacco

Most young people who use commercial tobacco products want to quit and have tried to quit.³⁷ In 1998 the Youth Tobacco Cessation Collaborative (YTCC) was established to help youth quit tobacco by ensuring that every young person who uses tobacco has access to cessation interventions that work for them.³⁸ The YTCC identified research goals related to youth cessation, for example examining how quit intentions and attempts relate to youth quit attempts and success. The 2020 National Youth Tobacco Survey revealed that 62.5% of current tobacco users intended to quit. Similarly, 65.4% of current tobacco users reported having tried to quit in the past year.

Intentions to Quit

Studies show that intending to quit using commercial tobacco is a strong predictor of future quit attempts and quit success.³⁹ Tworek and her colleagues analyzed the 2012 National Youth Tobacco Survey data and found that 52.8% of youth who currently use tobacco intended to quit using all tobacco products.⁴⁰ Students who smoked cigarettes had the highest prevalence of intentions to quit (56.8%), followed by students who used e-cigarettes (50.9%), cigars (48.4%), pipe (47.2%), or smokeless tobacco (44.9%).

Figure 21. Intention to quit among students who reported having used a tobacco product in the past 30 days, 2023.



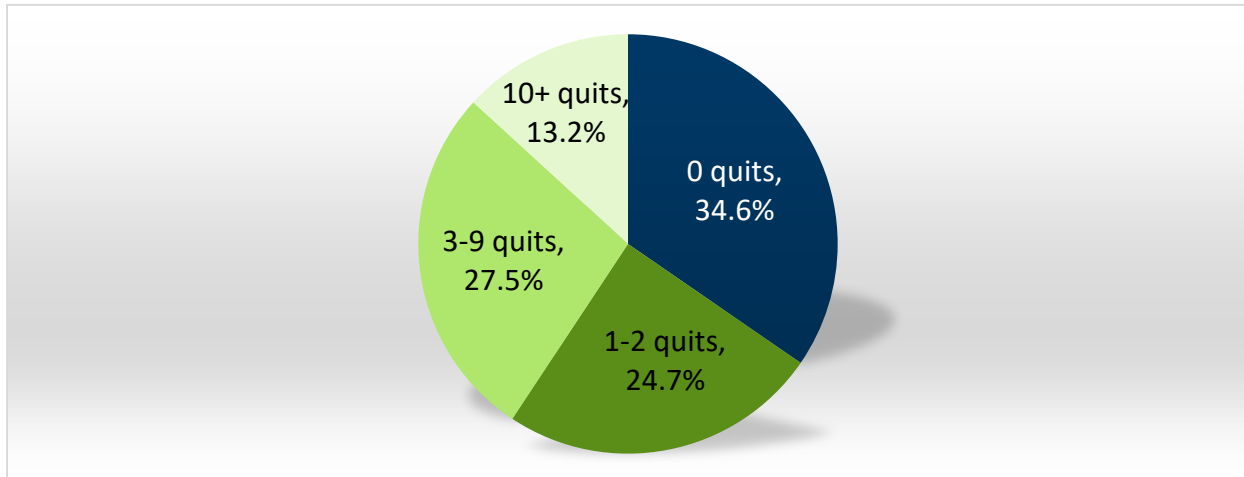
Source: Minnesota Youth Tobacco Survey, 2023. Note: this chart excludes students who had used a product within the past 30 days but reported they had “already quit” using all tobacco.

In 2023, 68.5% of Minnesota students who had used a commercial tobacco product in the past 30 days intended to quit using all tobacco products at some time in the future, while 25.4% intended to quit using all tobacco products within the next 30 days, a strong signal of a serious desire to quit and a reliable predictor of a future quit attempt⁴¹ (Figure 21). The percentage of students who reported wanting to quit within the next 30 days is a statistically significant increase from 2020 (15.6%).

Quit Attempts

Studies on youth smoking cessation suggest that social and environmental factors affect youth quitting. For example, perceptions that tobacco use is socially unacceptable, smoking restrictions in public places, and household rules against commercial tobacco use can increase cessation.⁴² Studies also suggest that young adults who recognize the negative health effects, have access to and make use of cessation resources, have tried to quit before, and have lower addiction levels tend to be more successful at quitting for good.^{43,44}

Figure 22. Number of quit attempts within the past 12 months among students who reported having used a tobacco product within the past 30 days, 2023.



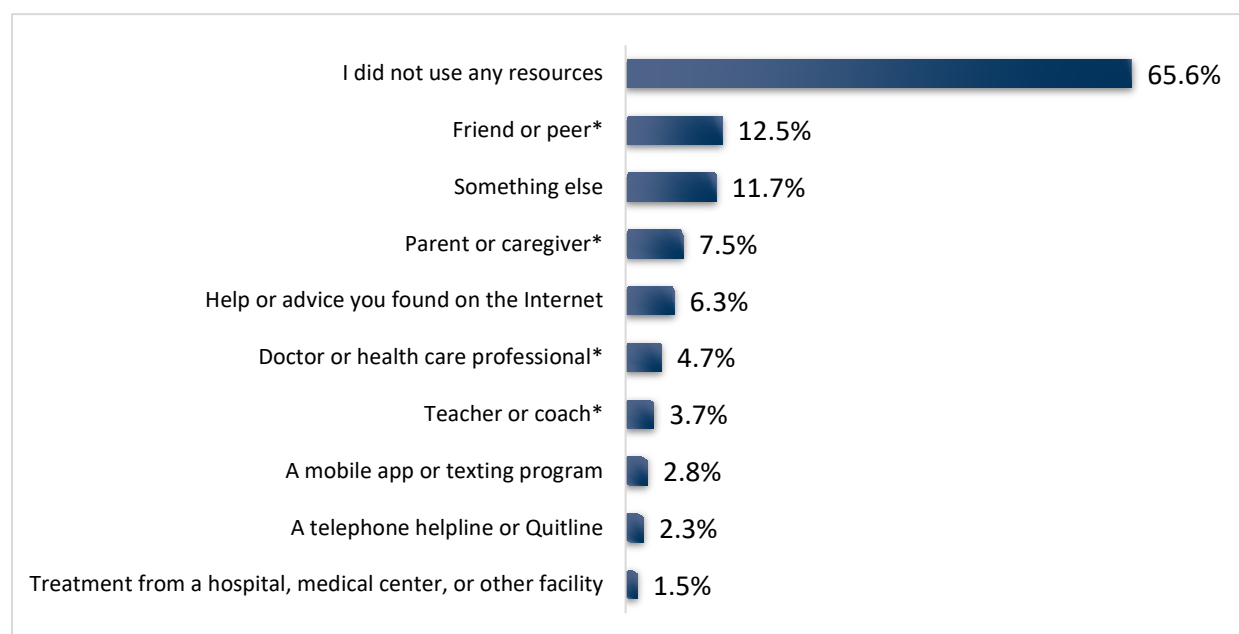
Source: Minnesota Youth Tobacco Survey, 2023.

In 2023, 65.4% of students who were current commercial tobacco users reported having stopped using all tobacco for one day or longer in the past year because they were trying to quit for good (see green areas of Figure 22). About one in eight (13.2%) Minnesota students who are current tobacco users had tried to quit 10 or more times in the past year but are still using tobacco products. Only 34.6% of students who are current tobacco users reported not having tried to quit in the past year (Figure 22). These percentages are statistically unchanged from 2020.

Quitting Assistance

Many young people who use commercial tobacco think about quitting and try to quit, but few know about or have accessed services designed to support adolescents through the quitting process. Even when services are available, some young people report little interest in getting professional or other kinds of help.⁴⁵ Others may not approach cessation services that seem designed for adults.⁴⁶ Adolescents who regularly use tobacco have as much difficulty with cessation, withdrawal symptoms, and relapse as adults and could benefit from pharmacotherapy⁴⁷ or other help to quit.

Figure 23. Sources of help to quit, among students who tried to quit vaping, 2023.



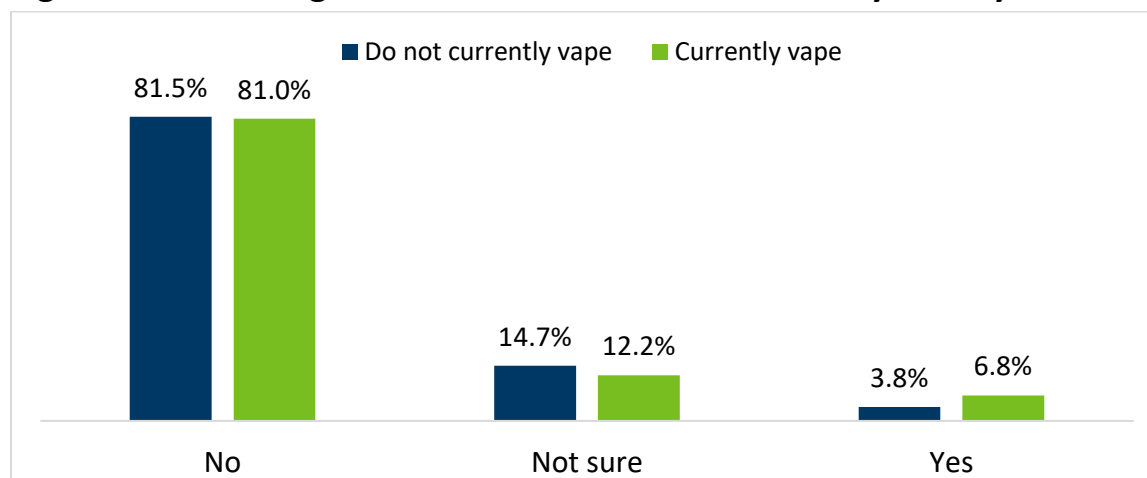
Source: Minnesota Youth Tobacco Survey, 2023; * “help or advice from...”

In 2023, two-thirds of Minnesota students who vape and tried to quit did not use source of help to quit, not even advice found on the internet (Figure 23). About one in ten (12.5%) got help from a friend and 7.5% from a parent or caregiver. Less than 5% got help from a health care provider (4.7%), or sought professional cessation services through a mobile app or texting program (2.8%) or through a telephone helpline or Quitline (2.3%).

Awareness of My Life My Quit

While less is known about adolescent e-cigarette cessation, health organizations and state governments are building on what works for commercial tobacco cessation among adults to develop and offer e-cigarette cessation programs and resources specifically for teens to meet their unique needs.^{48,49} In April 2020, the Minnesota Department of Health launched the state’s first free youth cessation program, My Life, My Quit, a free service for teens to access help online and quit coaching by texting, chat, or phone.⁵⁰

Figure 24. Percentage of students who have heard of My Life My Quit.



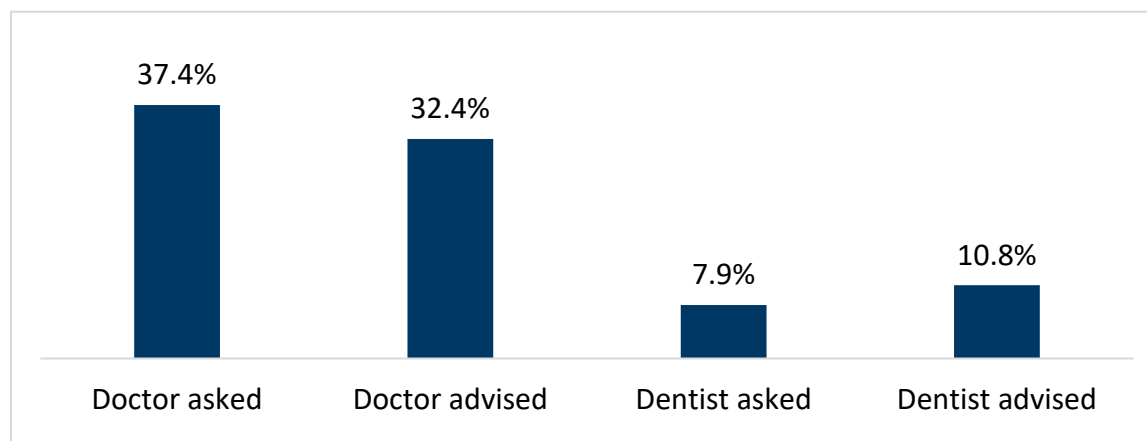
Source: Minnesota Youth Tobacco Survey, 2023.

In 2023, few students in Minnesota had heard of My Life My Quit. Just 3.8% of students who do not vape and 6.8% of students who vape reported having heard of the program (Figure 24).

The Role of Health Care Providers

The Public Health Service recommends health care providers ask adolescent patients about their use of commercial tobacco and provide counseling interventions to aid them in cessation.⁵¹ Health care providers play a crucial role in encouraging and assisting patients to make decision that can affect their health, such as quitting smoking. Doctors and other health care practitioners who ask their patients about their tobacco use, advise those who use tobacco products to quit, and also refer or directly connect them to cessation support services can increase the number of quit attempts and the number of people who successfully quit for good.⁵² However, health care providers may overlook teens when assessing for tobacco use.

Figure 25. Percentage of students who were asked if they vape or were advised not to vape by a health care provider, 2023.



Source: Minnesota Youth Tobacco Survey, 2023.

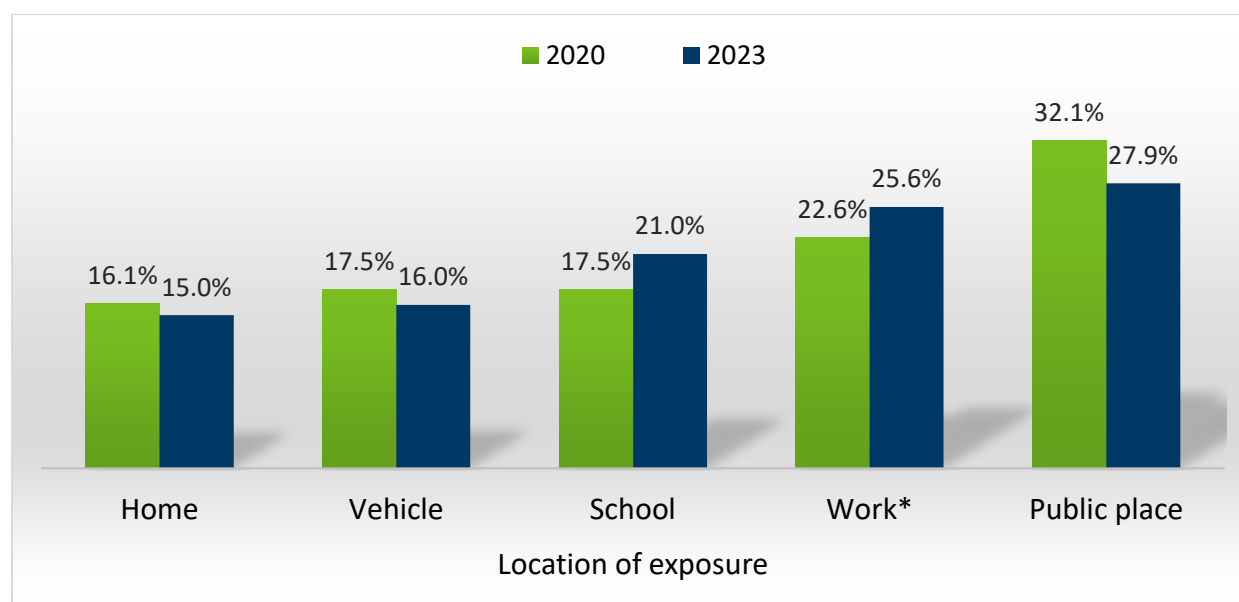
In 2023, few Minnesota students reported that someone in their doctor's office or dentist's office had asked or advised them about vaping: 37.4% of students who had visited the doctor in

the past year reported having been asked by their doctor whether they vape, and 32.4% reported having been advised not to vape by their doctor. Only 7.9% of students who had visited the dentist in the past year reported having been asked if they vape, and 10.8% had been advised by their dentist not to vape (Figure 25). For comparison, the 2010 Minnesota Adult Tobacco Survey revealed that 80.2% of Minnesota adults who had visited a health care provider in the past year had been asked whether they smoke.⁵³ Physicians and dentists could play a larger role in youth tobacco prevention and cessation by asking all their teenage patients whether they vape and advising them not to vape.

Exposure to Secondhand Smoke

Tobacco smoke contains more than 7,000 chemicals, including hundreds that are toxic and 70 known to cause cancer. Children who are exposed to secondhand smoke (smoke from burning tobacco) are at increased risk for sudden infant death syndrome, acute respiratory infections, middle ear disease, more severe asthma, respiratory symptoms, and slowed lung growth.⁵⁴ Widespread smoke-free laws in workplaces and public buildings have substantially reduced exposure to secondhand smoke, but secondhand smoke exposure is still a health concern for many children. The 2016 National Youth Tobacco Survey revealed that 29% of students were exposed to secondhand smoke in the home or a vehicle.⁵⁵

Figure 26. Percent of students who were exposed to secondhand smoke in various locations, 2020-2023.

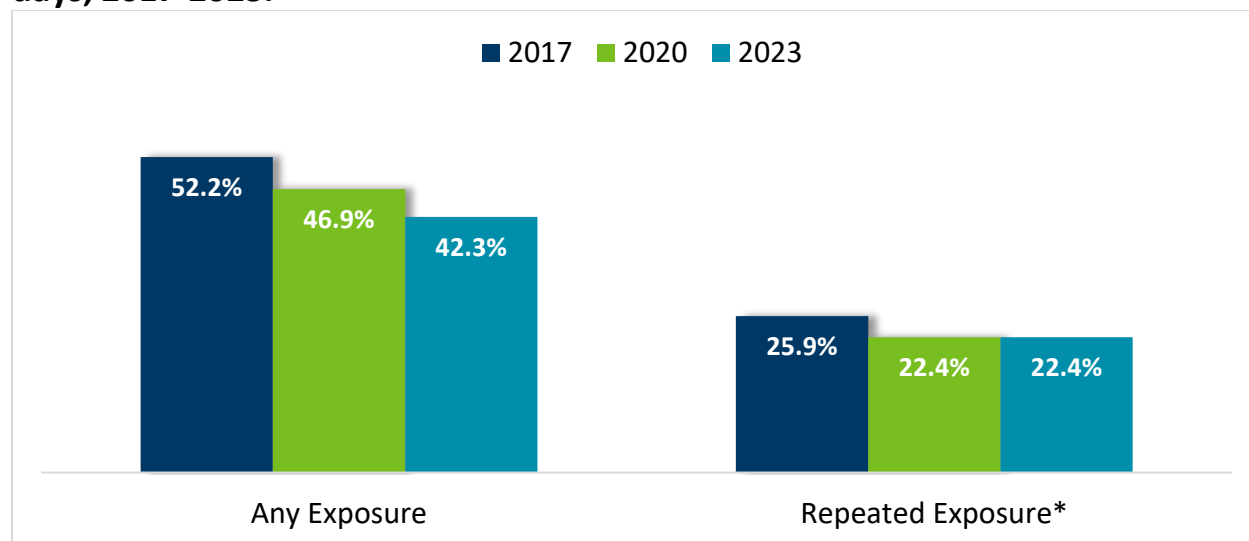


Source: Minnesota Youth Tobacco Survey, 2020-2023. Denominator: students *Denominator excludes those who do not have a job or who did not work during the past 7 days.

Compared to 2020, in 2023 a higher percentage of Minnesota students reported having breathed the smoke of someone else's cigarette at school and a lower percentage breathed someone else's cigarette smoke at an indoor or outdoor public place (Figure 26). For all other locations, the differences between 2020 and 2023 were not statistically significant.

About one in four students who live in multi-family housing (26.0%) reported smelling tobacco smoke in their building in the past 7 days, and this changed very little from 2020 (24.7%).

Figure 27. Percent of students who were exposed or repeatedly exposed* to secondhand smoke at home, at work, in a vehicle, or in a public place in past 7 days, 2017-2023.



Source: Minnesota Youth Tobacco Survey, 2017-2023.

*Repeated exposure is 3 or more days of exposure in any of these settings: home, vehicle, school, workplace, or public place.

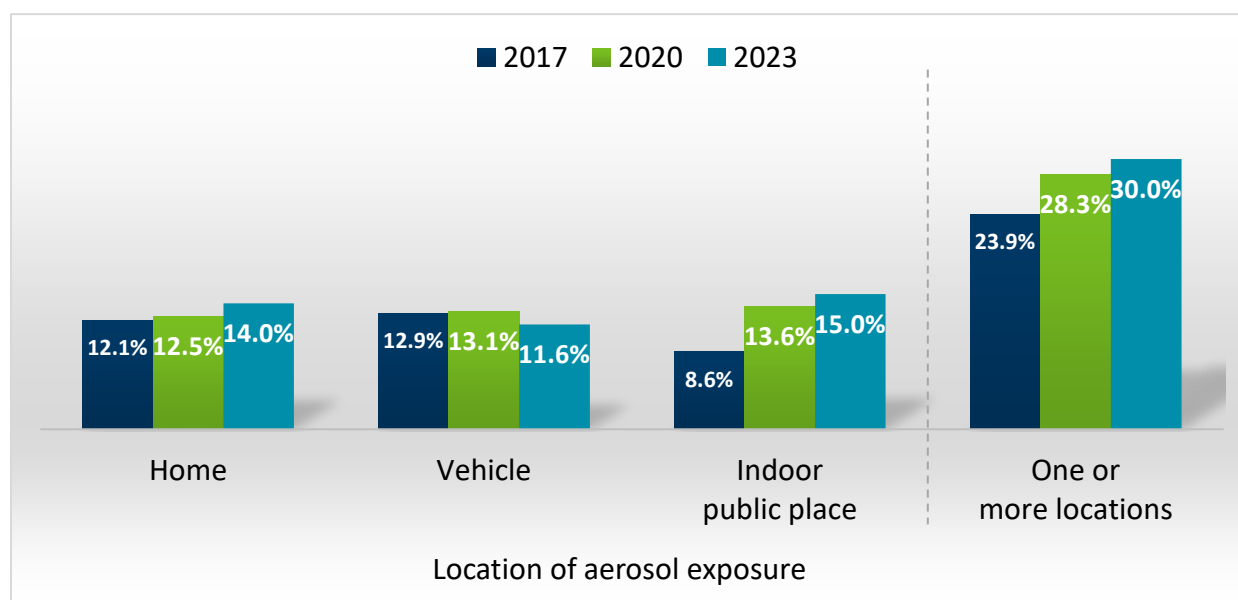
In 2023, 42.3% of Minnesota students reported they were exposed to secondhand smoke in the past 7 days, a significant reduction in prevalence from 2020 (Figure 27). However, the percentage of students who reported having been repeatedly exposed to secondhand smoke did not change from 2020 (22.4%) (Figure 27).

Exposure to Secondhand Aerosol

Little is known about the health effects of secondhand exposure to e-cigarette aerosol (exhaled e-cigarette “vapor”) on non-users, especially on vulnerable populations such as people who have asthma. E-cigarette aerosol contains nicotine; carcinogens; ultra-fine particulate matter exceeding background levels; and metals, such as nickel and chromium, that exceed levels associated with conventional secondhand smoke.⁵⁶

Although the long-term risks of secondhand aerosol exposure are unknown, studies show that e-cigarette use contaminates the air under controlled⁵⁷ and real-world conditions,⁵⁸ extending the potential health risks beyond the user.⁵⁹ Recent studies provide evidence that exposure to secondhand aerosol from e-cigarettes has immediate effects on respiratory mechanics and exhaled inflammatory biomarkers⁶⁰ and is associated with asthma exacerbation among adolescents.⁶¹

Figure 28. Percent of students who were exposed to secondhand e-cigarette aerosol in the past 30 days, by location of exposure.



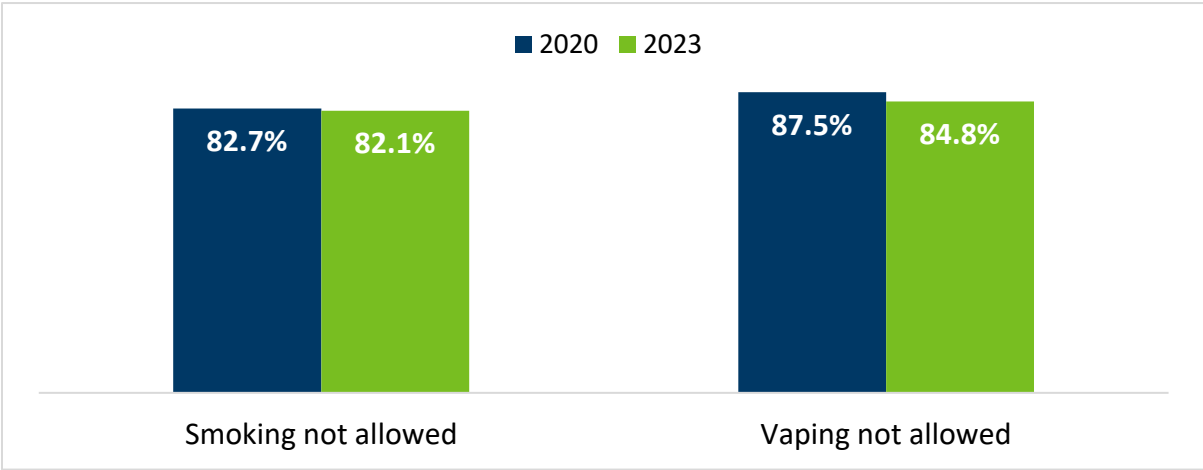
Source: Minnesota Youth Tobacco Survey, 2017-2023.

In 2023, 30.0% of students reported having been exposed to e-cigarette aerosol in the past 30 days in one or more locations, a significant increase from 23.9% in 2017 (Figure 28). None of the differences from 2020 to 2023 in exposure prevalence were statistically significant.

Household Rules Against Smoking and Vaping

All Minnesotans are protected by “Freedom to Breathe” which prohibits smoking or vaping in nearly all public indoor spaces. Public policies like Freedom to Breathe are becoming more common, but they rarely address private spaces, where children are more likely to be exposed to secondhand smoke or aerosol.⁶² These rules tend to be more common in households with children under the age of 18 and less common among households with members who use tobacco products.^{63,64}

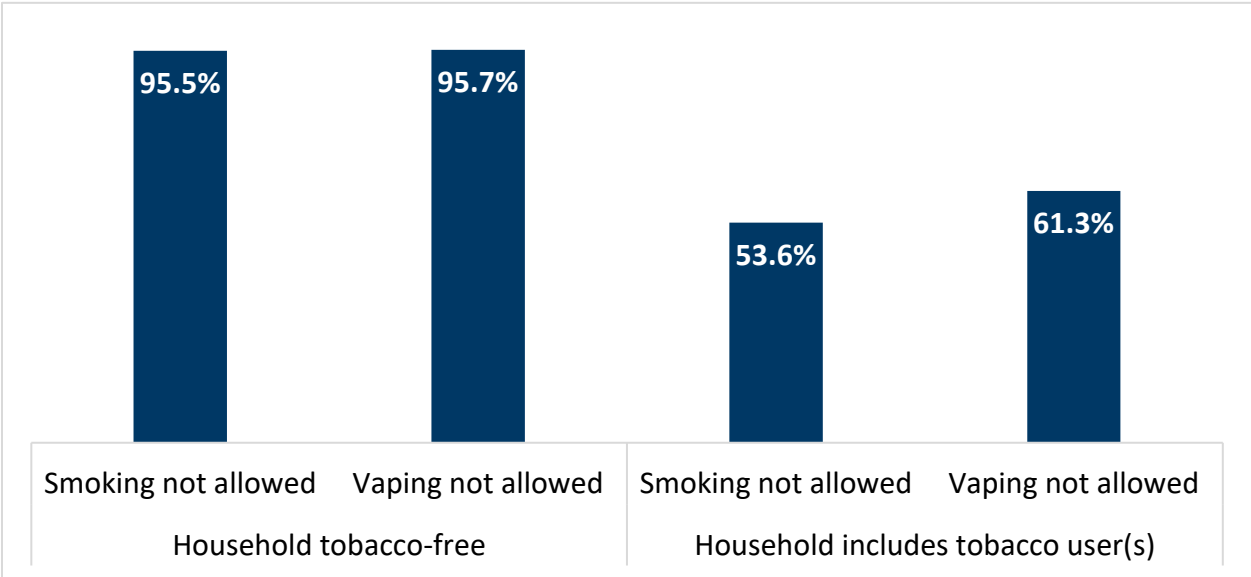
Figure 29. Percentage of students who report having household rules against smoking or vaping in their homes and cars, by year, 2020-2023



Source: Minnesota Youth Tobacco Survey, 2020-2023.

Four of five students (82.1%) reported that smoking is never allowed in their home or vehicles, and 84.8% reported vaping is never allowed in those places (Figure 29). The percentage of students protected by household rules against smoking is essentially unchanged from 2020, but the percentage of students protected by household rules against vaping is a significant decrease from 2020.

Figure 30. Percentage of Minnesota students protected by household rules against smoking or vaping, by household tobacco use status 2023



Source: Minnesota Youth Tobacco Survey, 2023.

However, among students whose household includes someone who uses at least one commercial tobacco product, only 53.6% reported rules against smoking and only 61.3% reported rules against vaping in these places (Figure 30).

Table 1. Respondent Characteristics, 2017-2023.

		2017		2020		2023	
		Count	Percent	Count	Percent	Count	Percent
Number of surveys		4112	100.0%	2184	100.0%	4233	100.0%
Grade	6 th	416	10.2%	355	16.3%	624	14.8%
	7 th	599	14.6%	429	19.7%	675	16.0%
	8 th	837	20.5%	256	11.7%	801	19.0%
	9 th	531	13.0%	483	22.1%	529	12.5%
	10 th	1086	26.6%	220	10.1%	734	17.4%
	11 th	338	8.3%	250	11.5%	506	12.0%
	12 th	283	6.9%	188	8.6%	348	8.2%
	Total	4090	100.0%	2183	100.0%	4217	100.0%
Grade level	Middle school (6-8)	1860	45.2%	1040	47.7%	2098	49.6%
	High school (9-12)	2252	54.8%	1141	52.3%	2135	50.4%
	Total	4112	100.0%	2181	100.0%	4233	100.0%
Gender	Male	2039	50.2%	1108	50.9%	2127	50.7%
	Female	2024	49.8%	1068	49.1%	2072	49.3%
	Total	4063	100.0%	2176	100.0%	4199	100.0%
Region school is located	Metro (7 counties)	1880	45.7%	712	32.6%	2083	49.2%
	Greater MN (80 counties)	2232	54.3%	1472	67.4%	2150	50.8%
	Total	4112	100.0%	2184	100.0%	4233	100.0%
Race and ethnicity-mutually exclusive groups	American Indian Non-Hispanic	131	3.2%	20	0.9%	43	1.0%
	Asian Non-Hispanic	188	4.7%	117	5.4%	303	7.2%
	Black Non-Hispanic	354	8.8%	191	8.8%	350	8.3%
	Pacific Islander Non-Hispanic	16	0.4%	2	0.1%	12	0.3%
	White Non-Hispanic	2610	64.6%	1453	67.2%	2662	63.4%
	Multiple Races Non-Hispanic	272	6.7%	148	6.8%	259	6.2%
	Hispanic	470	11.6%	232	10.7%	568	13.5%
	Total	4041	100.0%	2163	100.0%	4197	100.0%

Source: Minnesota Youth Tobacco Survey, 2017-2023. Category total counts vary due to missing data from unanswered survey questions. N/A means “not applicable.”

References

1. Traditional tobacco use connects native youth to culture, community, and health. Published online November 29, 2022. Accessed January 30, 2024. <https://www.health.state.mn.us/communities/tobacco/initiatives/tfc/stories/201905/index.html>
2. Birdsey J. Tobacco product use among US middle and high school students—National Youth Tobacco Survey, 2023. *MMWR Morb Mortal Wkly Rep*. 2023;72.
3. Romberg AR, Lo EJM, Cuccia A, et al. Patterns of nicotine concentrations in electronic cigarettes sold in the United States, 2013-2018. *Drug Alcohol Depend*. Published online 2019.
4. Minnesota Department of Health. Health risks of nicotine for youth. Published October 3, 2022. <https://www.health.state.mn.us/communities/tobacco/nicotine/index.html>
5. Boakye E, Osuji N, Erhabor J, et al. Assessment of patterns in e-cigarette use among adults in the US, 2017-2020. *JAMA Netw Open*. 2022;5(7):e2223266-e2223266.
6. Parms TA, Valverde R, Park-Lee E, et al. Symptoms of tobacco dependence among middle and high school tobacco users—data from the 2019–2020 National Youth Tobacco Survey. *Addict Behav*. 2023;137:107537.
7. Nonnemaker J, Hersey J, Homsy G, Busey A, Allen J, Vallone D. Initiation with menthol cigarettes and youth smoking uptake. *Addiction*. 2013;108(1):171-178.
8. Pink Spot Vapors. The 12 best e-liquid flavors: which flavors are most popular. Accessed April 9, 2024. <https://pinkspotvapors.com/the-12-best-e-liquid-flavors-which-flavors-are-most-popular/>
9. Swisher Sweets. Our Cigarillos. Accessed April 9, 2024. <https://swishersweets.com/pages/our-cigarillos>
10. Ambrose BK, Day HR, Rostron B, et al. Flavored tobacco product use among US youth aged 12-17 years, 2013-2014. *JAMA*. 2015;314(17):1871-1873.
11. McKelvey K, Baiocchi M, Ramamurthi D, McLaughlin S, Halpern-Felsher B. Youth say ads for flavored e-liquids are for them. *Addict Behav*. 2019;91:164-170.
12. Lee YO, Glantz SA. Menthol: putting the pieces together. *Tob Control*. 2011;20(Suppl 2):ii1-ii7.
13. *Family Smoking Prevention and Tobacco Control Act*. Vol H.R. 1256.; 2009. <https://www.fda.gov/tobacco-products/rules-regulations-and-guidance/family-smoking-prevention-and-tobacco-control-act-table-contents>
14. Lee M. Crude prevalence of tobacco and menthol tobacco use in Minnesota, BRFSS 2021. Published online June 14, 2023.
15. Miech RA, Leventhal AM, Johnson LD. Recent, national trends in US adolescent use of menthol and non-menthol cigarettes. *Tob Control*. 2023;32(e1):e10-e15.

16. Campaign for Tobacco-Free Kids. States & localities that have restricted the sale of flavored tobacco products. Published February 14, 2024. Accessed March 20, 2024. <https://assets.tobaccofreekids.org/factsheets/0398.pdf>
17. Sharma P, Mathews DB, Nguyen QA, Rossmann GL, A Patten C, Hammond CJ. Old dog, new tricks: a review of identifying and addressing youth cannabis vaping in the pediatric clinical setting. *Clin Med Insights Pediatr*. 2023;17:11795565231162297.
18. Audrain-McGovern J, Stone MD, Barrington-Trimis J, Unger JB, Leventhal AM. Adolescent e-cigarette, hookah, and conventional cigarette use and subsequent marijuana use. *Pediatrics*. 2018;142(3):e20173616.
19. Dai H, Catley D, Richter KP, Goggin K, Ellerbeck EF. Electronic cigarettes and future marijuana use: a longitudinal study. *Pediatrics*. 2018;141(5). doi:10.1542/peds.2017-3787
20. Dai H, Hao J. Electronic cigarette and marijuana use among youth in the United States. *Addict Behav*. 2017;66:48-54.
21. MPR News Staff. Recreational cannabis is now legal in Minnesota. Here's what we know. [mprnews.org](https://www.mprnews.org/story/2023/08/01/recreational-cannabis-is-now-legal-in-minnesota-heres-what-we-know). Published August 1, 2023. Accessed March 13, 2024. <https://www.mprnews.org/story/2023/08/01/recreational-cannabis-is-now-legal-in-minnesota-heres-what-we-know>
22. Wilder Research. *2022 Minnesota Student Survey Findings and Trends: Minnesota Prevention Alliance*.; 2023. Accessed March 13, 2024. https://www.wilder.org/sites/default/files/imports/MSS_MNPreventionAlliance_Report_3-23.pdf
23. US Department of Health and Human Services. *E-Cigarette Use Among Youth and Young Adults. A Report of the Surgeon General*. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2016.
24. Campaign for Tobacco-free Kids. U.S. state and local issues: broken promises to our children. Published January 10, 2024. Accessed April 9, 2024. <https://www.tobaccofreekids.org/what-we-do/us/statereport>
25. Marynak K, Gentzke A, Wang TW, Neff L, King BA. Exposure to electronic cigarette advertising among middle and high school students—United States, 2014–2016. *Morb Mortal Wkly Rep*. 2018;67(10):294.
26. Cruz TB, Rose SW, Lienemann BA, et al. Pro-tobacco marketing and anti-tobacco campaigns aimed at vulnerable populations: a review of the literature. *Tob Induc Dis*. 2019;17.
27. Ali FRM, Marynak KL, Kim Y, et al. E-cigarette advertising expenditures in the United States, 2014–2018. *Tob Control*. 2020;29(e-1):e124-e126.
28. Centers for Disease Control and Prevention. E-cigarette use among youth is rising as e-cigarette advertising grows. Smoking & Tobacco Use. Published December 9, 2019. <https://www.cdc.gov/tobacco/infographics/youth/index.htm#ecigs>

29. Loukas A, Paddock EM, Li X, Harrell MB, Pasch KE, Perry CL. Electronic nicotine delivery systems marketing and initiation among youth and young adults. *Pediatrics*. 2019;144(3).
30. Rideout V, Robb MB. The Common Sense census: media use by tweens and teens, 2019. *Common Sense Media*. Published online 2019.
31. statista. Tobacco Products - Worldwide. Accessed February 22, 2024. [https://www.statista.com/outlook/cmo/tobacco-products/worldwide#:~:text=The%20Tobacco%20Products%20market%20worldwide,\(CAGR%202024%2D2028\)](https://www.statista.com/outlook/cmo/tobacco-products/worldwide#:~:text=The%20Tobacco%20Products%20market%20worldwide,(CAGR%202024%2D2028).).
32. US Department of Health and Human Services. Preventing tobacco use among youth and young adults: A report of the Surgeon General. Published online 2012.
33. Boden JM, Fergusson DM, Horwood LJ. Cigarette smoking and depression: tests of causal linkages using a longitudinal birth cohort. *Br J Psychiatry*. 2010;196(6):440-446.
34. Nguyen N, Lisha NE, Neilands TB, Jordan JW, Ling PM. Differential associations between anti-tobacco industry attitudes and intention to quit smoking across young adult peer crowds. *Am J Health Promot*. 2019;33(6):876-885.
35. Roditis M, Delucchi K, Cash D, Halpern-Felsher B. Adolescents' perceptions of health risks, social risks, and benefits differ across tobacco products. *J Adolesc Health*. 2016;58(5):558-566.
36. Ma H, Gaudiello E, Sheeran P, Sanzo N, Sutfin EL, Noar SM. National Youth Tobacco Surveys (2014–2019) show increasing beliefs in the harm and relative addiction of e-cigarettes but decreasing associations between those beliefs and e-cigarette use. *Addict Behav*. 2023;144:107713.
37. Zhang L, Gentzke A, Trivers KF, VanFrank B. Tobacco cessation behaviors among US middle and high school students, 2020. *J Adolesc Health*. 2022;70(1):147-154.
38. Youth Tobacco Cessation Collaborative. Youth Tobacco Cessation Collaborative. Accessed February 2, 2021. <http://www.youthtobacco cessation.org/>
39. Hyland A, Borland R, Li Q, et al. Individual-level predictors of cessation behaviours among participants in the International Tobacco Control (ITC) Four Country Survey. *Tob Control*. 2006;15(suppl 3):iii83-iii94.
40. Tworek C, Schauer GL, Wu CC, Malarcher AM, Jackson KJ, Hoffman AC. Youth tobacco cessation: quitting intentions and past-year quit attempts. *Am J Prev Med*. 2014;47(2):S15-S27.
41. Smit ES, Hoving C, Schelleman-Offermans K, West R, de Vries H. Predictors of successful and unsuccessful quit attempts among smokers motivated to quit. *Addict Behav*. 2014;39(9):1318-1324.
42. Wakefield MA, Chaloupka FJ, Kaufman NJ, Orleans CT, Barker DC, Ruel EE. Effect of restrictions on smoking at home, at school, and in public places on teenage smoking: cross sectional study. *BMJ*. 2000;321(7257):333-337.

43. Rose JS, Chassin L, Presson CC, Sherman SJ. Prospective predictors of quit attempts and smoking cessation in young adults. *Health Psychol.* 1996;15(4):261.
44. Breslau N, Peterson EL. Smoking cessation in young adults: age at initiation of cigarette smoking and other suspected influences. *Am J Public Health.* 1996;86(2):214-220.
45. Helgertz SR. *Teens and Tobacco in Minnesota: Highlights from the 2020 Youth Tobacco Survey.* Minnesota Department of Health; 2021.
<https://www.health.state.mn.us/communities/tobacco/data/docs/2020mytsreport.pdf>
46. Milton MH, Maule CO, Yee SL, Backinger C, Malarcher AM, Husten CG. Youth tobacco cessation; a guide for making informed decisions. Published online 2004.
47. Karpinski JP, Timpe EM, Lubsch L. Smoking cessation treatment for adolescents. *J Pediatr Pharmacol Ther.* 2010;15(4):249-263.
48. Public Health Law Center. Addressing student tobacco use in schools: alternative measures. Accessed April 9, 2024.
<https://publichealthlawcenter.org/sites/default/files/resources/Addressing-Student-Tobacco-Use-in-Schools-2019.pdf>
49. Daley J. With teen vaping exploding, Colorado's QuitLine will now help users as young as 12. CPR News. <https://www.cpr.org/2018/11/12/with-teen-vaping-exploding-colorados-quitline-will-now-help-users-as-young-as-12/>
50. National Jewish Health. My Life, My Quit.
51. Public Health Service. PHS guideline recommendations: how to help adolescents quit smoking. Published online February 4, 2021.
52. Schroeder SA. What to do with a patient who smokes. *JAMA.* 2005;294(4):482-487.
53. Whittet MN, Boyle RG, Lee JK, et al. Frequency of smoking cessation interventions from health care providers in Minnesota. Published online 2012.
54. Centers for Disease Control and Prevention. Health effects of secondhand smoke. Smoking & Tobacco Use.
55. Agaku IT, Odani S, King BA, Armour BS. Prevalence and correlates of secondhand smoke exposure in the home and in a vehicle among youth in the United States. *Prev Med.* 2019;126:105745.
56. Wilson N, Hoek J, Thomson G, Edwards R. Should e-cigarette use be included in indoor smoking bans? *Bull World Health Organ.* 2017;95(7):540.
57. Schripp T, Markewitz D, Uhde E, Salthammer T. Does e-cigarette consumption cause passive vaping? *Indoor Air.* 2013;23(1):25-31. doi:10.1111/j.1600-0668.2012.00792.x
58. Chen R, Aherrera A, Isichei C, et al. Assessment of indoor air quality at an electronic cigarette (Vaping) convention. *J Expo Sci Environ Epidemiol.* 2018;28(6):522-529. doi:10.1038/s41370-017-0005-x

59. Hess IM, Lachireddy K, Capon A. A systematic review of the health risks from passive exposure to electronic cigarette vapour. *Public Health Res Pr.* 2016;26(2):e2621617.
60. Tzortzi A, Teloniatis S, Matiampa G, et al. Passive exposure of non-smokers to e-cigarette aerosols: sensory irritation, timing and association with volatile organic compounds. *Environ Res.* 2020;182:108963.
61. Alnajem A, Redha A, Alroumi D, et al. Use of electronic cigarettes and secondhand exposure to their aerosols are associated with asthma symptoms among adolescents: a cross-sectional study. *Respir Res.* 2020;21(1):1-9.
62. Parks MJ, Kingsbury JH, Boyle RG, Evered S. Household implementation of smoke-free rules in homes and cars: a focus on adolescent smoking behavior and secondhand smoke exposure. *Am J Health Promot.* 2019;33(1):70-78.
63. Parks MJ, Kingsbury JH, Boyle RG, Evered S. Smoke-free rules in homes and cars among smokers and nonsmokers in Minnesota. *Prev Chronic Dis.* 2018;15.
64. Helgertz S, Claire AS, Kingsbury J. Peer reviewed: statewide prevalence of smoke-free and vape-free homes, by tobacco product use, Minnesota, 2018. *Prev Chronic Dis.* 2020;17.