Promising Approaches to Address Higher Prevalence of Smoking and Vaping Among Rural Youth

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http://www.med.uvm.edu/behaviorandhealth/home

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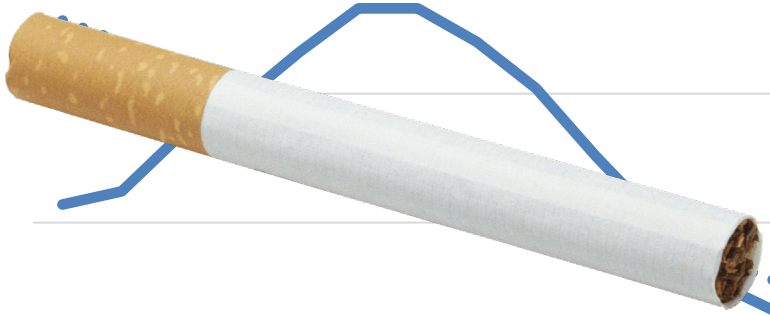
Past 30-Day Cigarette Use Among Youth - MTF 1991-2019



Cigarette ideals:

- Standardized product
- Engineered for nicotine delivery, taste, satisfaction
- Easy to use

2019: 3.7%

30%
25%
20%
15%
10%
5%
0%

1991 1996 2001 2006 2011 2016

Past 30-Day Use
Linear (Past 30-Day Use)

http://www.monitoringthefuture.org/data/19data/19drtbl7.pdf

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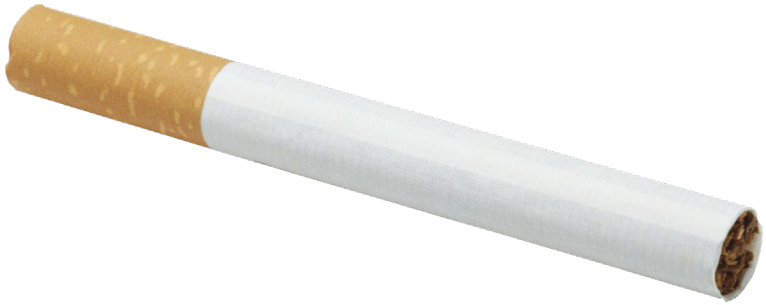
Nicotine delivery has evolved



Cigarette ideals:

- Standardized product
- Engineered for nicotine delivery, taste, satisfaction
- Easy to use

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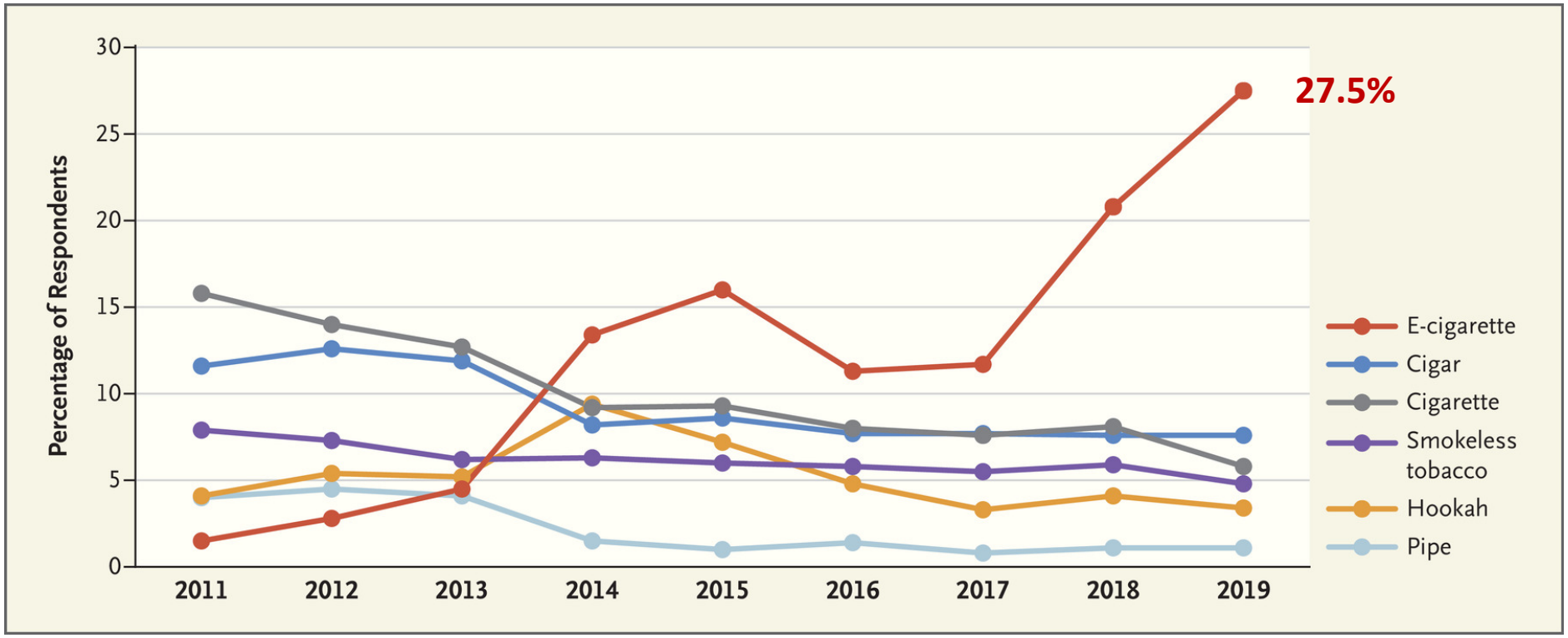
2019: Past 30-day tobacco use in high school students



https://www.nejm.org/doi/full/10.1056/NEJMp1916171

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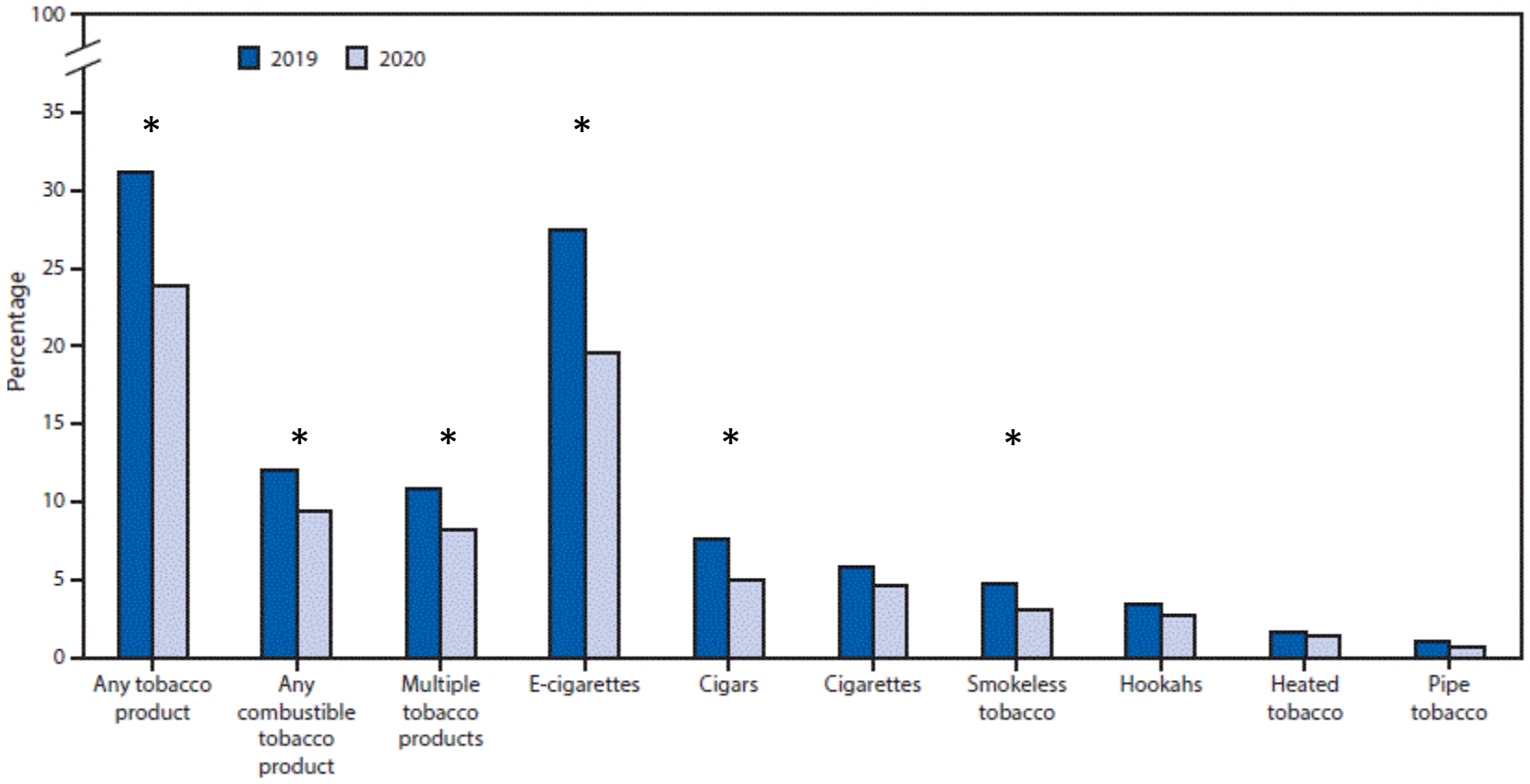
Declines in past 30-day tobacco use in high school students (2019-2020)



https://www.cdc.gov/mmwr/volumes/69/wr/mm6950a1.htm

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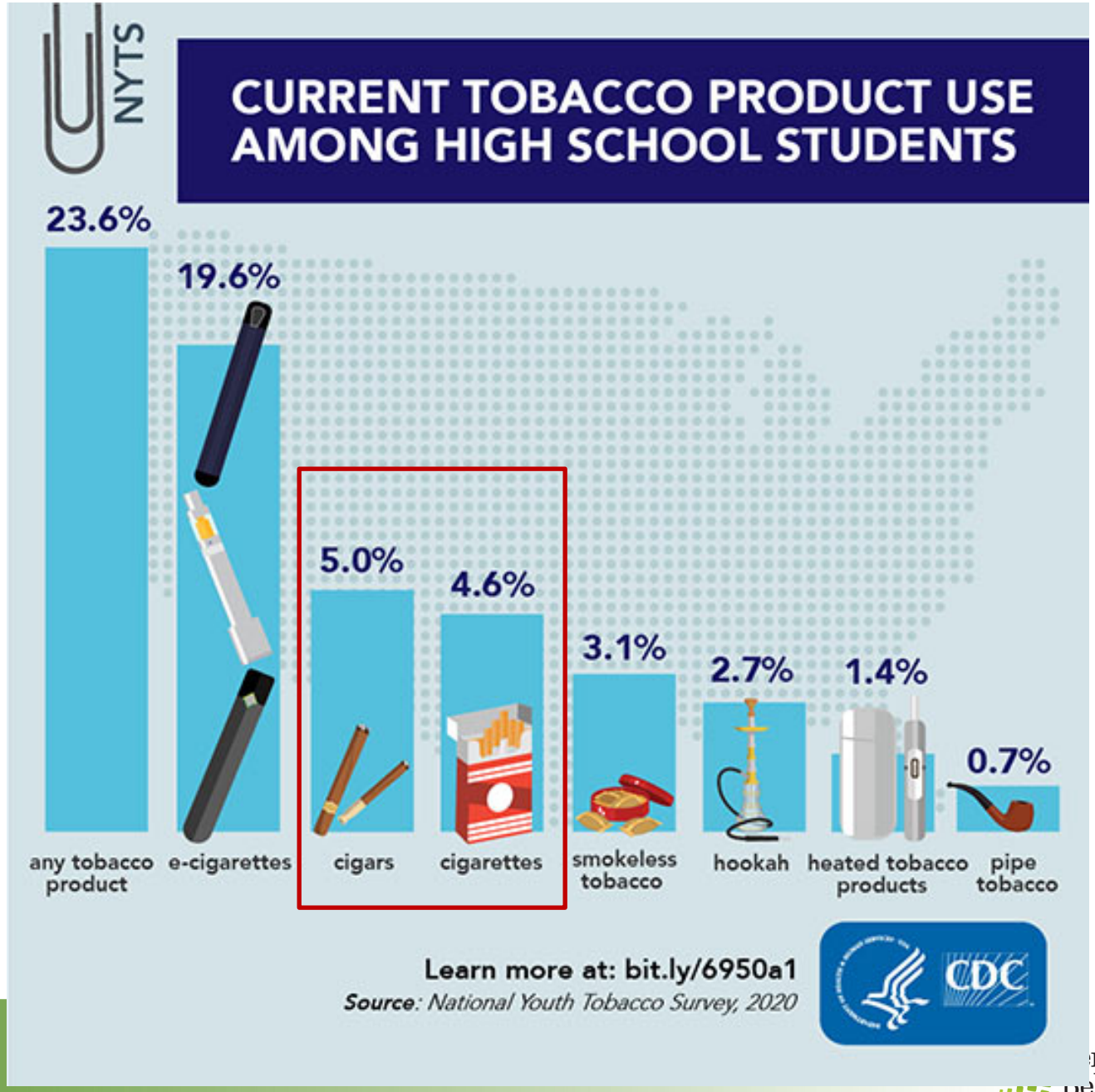
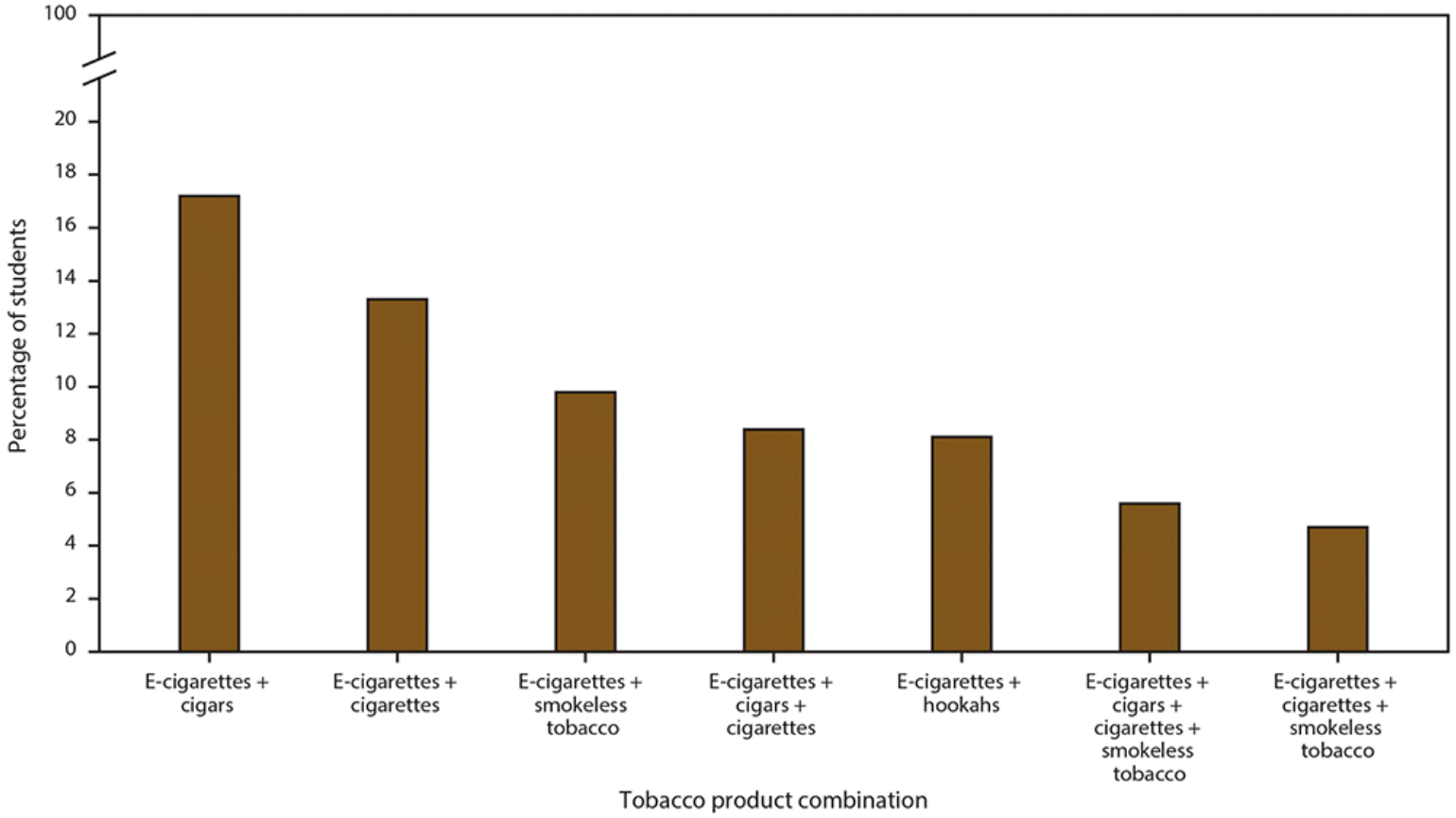

NYTS
CURRENT TOBACCO PRODUCT USE AMONG HIGH SCHOOL STUDENTS
23.6%
any tobacco product
19.6%
e-cigarettes
5.0%
cigars
4.6%
cigarettes
3.1%
smokeless tobacco
2.7%
hookah
1.4%
heated tobacco products
0.7%
pipe tobacco
Learn more at: bit.ly/6950a1
Source: National Youth Tobacco Survey, 2020
CDC

E-cigarettes are not used alone!



https://www.cdc.gov/tobacco/data_statistics/mmwrs/byyear/2019/ss6812a1/index.html

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Change in prevalence of youth cigarette use, 2008-2010 vs. 2014-2016

- Reductions in past-month cigarette smoking over time in youth overall
  - Greater reductions in urban youth
- Similar prevalence of cigarette use in 2008-2010 by rural/urban status
  - 54% higher odds of cigarette use in rural youth (vs. urban) in 2014-2016

TABLE 1—Prevalence and Pairwise Contrasts for AOR of Current Cigarette Smoking Among Those Aged 12–17 Years, by Rural and Urban Residence and by Period: United States, National Survey on Drug Use and Health, 2008–2010 and 2014–2016

	Adjusted[a] Smoking Prevalence, %	AOR[a] (95% CI)
Change in cigarette smoking between periods by residence		
Urban		0.44 (0.40, 0.48)
2008–2010	8.3	
2014–2016	3.8	
Rural		0.64 (0.55, 0.75)
2008–2010	8.7	
2014–2016	5.8	
Rural vs urban cigarette smoking in each period		
2008–2010		1.06 (0.95, 1.18)
Rural	8.7	
Urban	8.3	
2014–2016		1.54 (1.32, 1.80)
Rural	5.8	
Urban	3.8	

Note. AOR = adjusted odds ratio; CI = confidence interval.

[a]Adjusted models included gender, race/ethnicity, 1- vs 2-parent households, family income, and health insurance status.

Ziller EC, Lenardson JD, Paluso NC, Talbot JA, Daley A. *Am J Public Health.* 2019;109(5):771-773. PubMed PMID: 30897002.

Rural-urban differences in youth cigarette use, 1998-2018

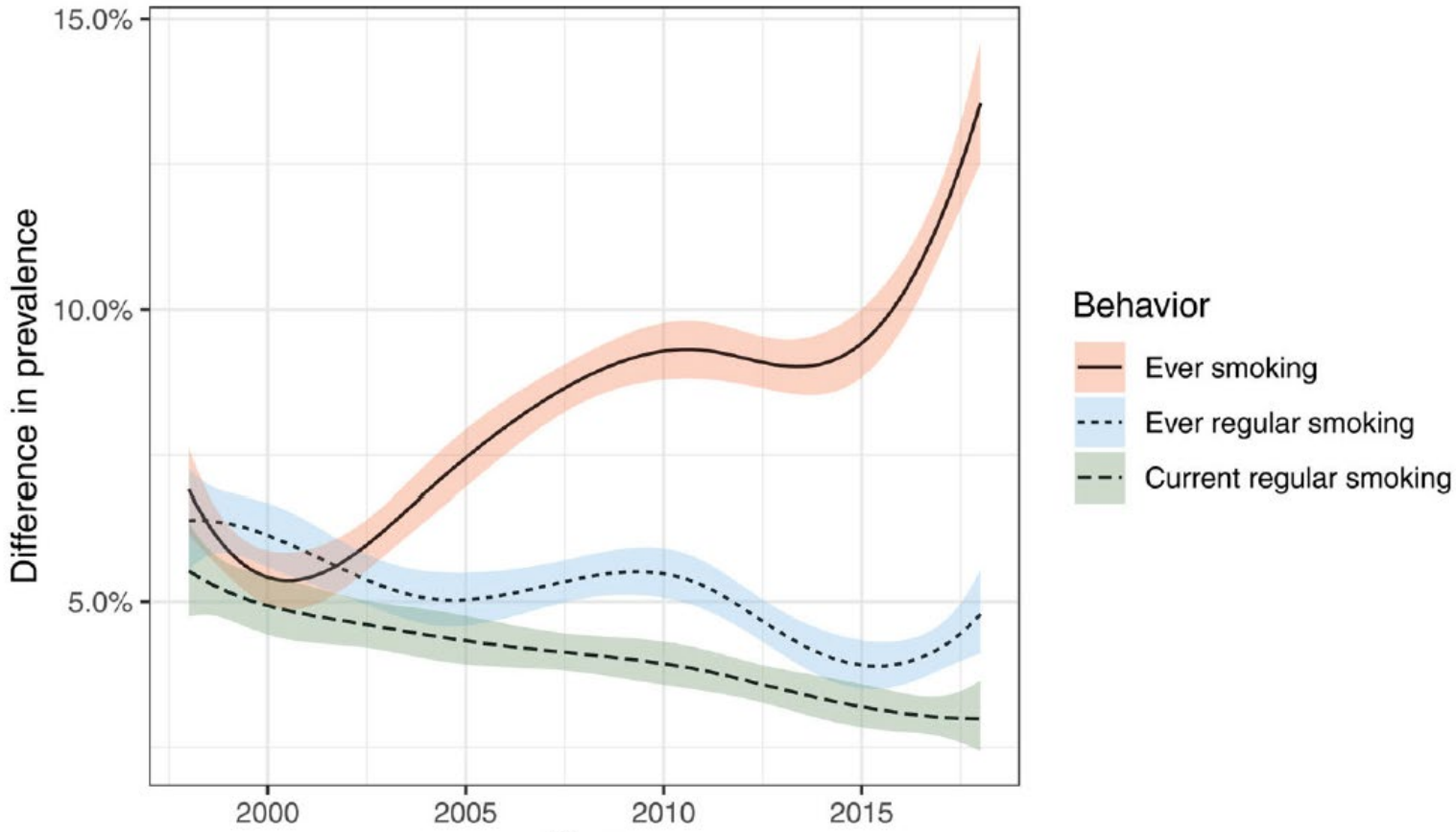

FIGURE 1 Rural-urban difference in prevalence of ever smoking, ever regular smoking, and current regular smoking based on modeled intercept-only time-varying effect models

Kim S, Selya A. Rural disparities in adolescent smoking prevalence. *The Journal of Rural Health.* 2021. PubMed PMID: 34339070.

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Higher prevalence of cigarette, smokeless tobacco, e-cigarette use in rural youth, 2011-2016

	Middle School Adjusted risk ratio (RR): rural vs urban 95% CI for aRR	High School Adjusted risk ratio (RR): rural vs urban 95% CI for aRR
Conventional cigarettes	1.64 (1.39–1.96)	1.43 (1.28–1.59)
Smokeless tobacco	2.63 (2.08–3.33)	2.04 (1.75–2.38)
Hookah/waterpipe	0.94 (0.77–1.15)	0.75 (0.66–0.86)
Electronic cigarettes	1.26 (1.04–1.54)	1.13 (0.97–1.35)

Note: Risk ratios from logistic regression modeling prevalence of use, adjusting for age, sex, race, and survey year.

Wiggins AT, Huntington-Moskos L, Rayens EA, Rayens MK, Noland M, Butler K, Hahn EJ. *The Journal of Rural Health.* 2020;36(1):48-54. PubMed PMID: 30865335.

Kansas: Greater increase in e-cigarette use in rural vs. urban youth, 2018-2019

TABLE 2 Changes in Current E-cigarette Use Among Youth From 2018 to 2019, 2018–2019 KCTC Student Surveys (n = 132 803)

Factors (n = 132 803)	Prevalence of Current E-Cigarette Use			
	Percentage (95% CI)		Change Across Years	
	2018	2019	Change	P^b
Overall	8.2 (8.0 to 8.4)	12.6 (12.3 to 12.8)	4.4 (4.1 to 4.8)	<.0001
Urbanicity[c]				
Urban	9.8 (9.5 to 10.2)	11.9 (11.5 to 12.2)	2.1 (1.6 to 2.6)	<.0001
Rural	6.7 (6.4 to 7.0)	13.4 (13.0 to 13.8)	6.7 (6.3 to 7.2)	<.0001

Three-fold higher increase in e-cigarette use in rural vs. urban youth

Dai H, Chaney L, Ellerbeck E, Friggeri R, White N, Catley D. *Pediatrics.* 2021;147(5). PubMed PMID: 33875537.

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Why greater tobacco use in rural youth?

1. **Co-occurring risk factors** (lower education, lower income, lower employment, White non-Hispanic race/ethnicity)
   - May influence tobacco use norms, exposure to peer and parental tobacco use

Shared and unique risk factors for tobacco use among rural versus urban adolescents

Unique for rural youth

- Adult user in the house
- Male family member offer
- Delay discounting
- Favorable smoker prototype

Table 4
Adjusted odds ratios and 95% confidence intervals (CIs) for weighted logistic regressions testing predictors of prevalent ever-use of any tobacco product by two-year follow-up by region.

Variable	Prevalent any tobacco ever-use by two years			
	Rural		Urban	
	OR	95% CI	OR	95% CI
Age	1.56	1.25–1.94	1.32	1.09–1.61
Race	–	–	–	–
White				
Non-white				
Parent education	–	–	–	–
Some college or above				
High school or less				
Household income	–	–		
$50,000 or more			1.90	0.99–3.64
Less than $50,000				
Parent relationships	–	–	–	–
0–1				
> 1				
Adult user in the house			–	–
Yes	2.45	1.15–5.22		
No	Ref	–		
Household smoking rules	–	–	–	–
Smoking allowed/ no rules				
Smoking not allowed				
Male family member offer			–	–
Yes (susceptible)	4.07	1.70–9.71		
No (not susceptible)	Ref	–		
Peer use	–	–		
Yes			2.45	1.26–4.78
No			-	-
Any deviant behavior				
Yes	2.52	1.16–5.46	4.05	1.77–9.29
No	Ref	–	Ref	–
Mean sensation seeking			1.85	1.27–2.69
Delay discounting (log-transformed K-score)	1.24	1.01–1.54	–	–
Risk perceptions			–	–
Smoking prototypes	1.29	1.02–1.64	–	–
Exposure to POS advertising	–	–	–	–

– Indicates where a variable was not included in the multivariable model due to it not being significant in the univariate model.

Roberts ME, Teferra AA, Keller-Hamilton B, Patterson JG, Ferketich AK.. *Prev Med.* 2020;140:106239. PubMed PMID: 32853669.

Why greater tobacco use in rural youth?

1. **Co-occurring risk factors** (lower education, lower income, lower employment, White non-Hispanic race/ethnicity)
   - May influence tobacco use norms, exposure to peer and parental tobacco use

2. **Geographic isolation**
   - Independent predictor of cigarette/e-cigarette experimentation and polyuse

Geographic isolation predicts tobacco product use among youth: A latent class analysis

TABLE 3 Isolation scores and sociodemograhics as a function of latent class membership

	n (%) or *M* (*SD*)					
	Full sample (N = 566)	Nonusers (n = 386)	Cigarette/ECIG experimenters (n = 70)	Current ECIG users (n = 65)	Polytobacco users (n = 45)	*P* value
Isolation score	6.1 (1.1)	5.7 (0.9)	6.4 (1.2)	5.9 (1.1)	6.4 (1.4)	<.001

		Isolation score
ECIG (vs non)	B (SE), *P* value	−0.06 (0.08), .445
	OR (CI)	0.94 (0.82, 1.08)
Exp (vs non)	B (SE), *P* value	0.26 (0.11), .013
	OR (CI)	1.30 (1.09, 1.54)
Poly (vs non)	B (SE), *P* value	0.42 (0.22), .039
	OR (CI)	1.51 (1.06, 2.17)
Exp (vs ECIG)	B (SE), *P* value	0.32 (0.16), .057
	OR (CI)	1.38 (1.07, 1.78)
Poly (vs ECIG)	B (SE), *P* value	0.48 (0.23), .041
	OR (CI)	1.61 (1.10, 2.37)
Poly (vs Exp)	B (SE), *P* value	0.16 (0.26), .548
	OR (CI)	1.17 (0.76, 1.17)

Blank MD, Ozga JE, Romm KF, Douglas A, Alexander L, Doogan NJ, Wilson M, Dino G. *The Journal of Rural Health.* 2021. PubMed PMID: 33978979.

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Why greater tobacco use in rural youth?

3. Access to cheaper tobacco products

- Higher odds of dollar stores selling tobacco products in rural census tracts vs. urban

Table 2 Odds of census tract containing ≥1 dollar store that sells tobacco (yes/no) as a function of census tract characteristics, California, 2019 (n=6716)

	Characteristics of census tracts with ≥1 dollar store (n=524)		Characteristics of census tracts with no dollar stores (n=6192)		Unadjusted models		Adjusted models	
	Mean	SD	Mean	SD	OR	95% CI	aOR	95% CI
Census tract characteristics								
Intercept							0.07	0.05 to 0.09
Race/ethnicity								
% NH African American	7.25	11.32	5.56	8.61	1.16	1.08 to 1.25	1.02	0.93 to 1.12
% Hispanic (any race)	56.39	26.91	38.19	26.26	1.57	1.4 to 1.76	0.88	0.75 to 1.03
% NH Asian/Pacific Islander	5.79	8.92	13.8	15.34	0.42	0.34 to 0.52	0.62	0.52 to 0.75
% NH multiple races/ AIAN/other	2.56	2.41	3.52	2.76	0.97	0.84 to 1.12	0.79	0.69 to 0.92
% NH white	28.01	26.91	38.92	26.09	–		–	
Age								
% school-age youth (ages 5–17)	19.57	5.03	16.23	5.43	2	1.81 to 2.22	1.51	1.33 to 1.72
% young adults (ages 18–24)	10.7	3.97	9.68	5.81	1.15	1.07 to 1.24	1.02	0.9 to 1.15
Median household income	$45 602	$15 752	$71 253	$32 984	0.23	0.2 to 0.28	0.31	0.25 to 0.38
Urban–rural classification (RUCA code)	n	%	n	%				
Urban	438	83.59	5882	94.99	Ref	Ref	Ref	Ref
Large rural	40	7.63	182	2.94	2.95	2.07 to 4.21	1.75	1.18 to 2.61
Small rural	46	8.78	128	2.07	4.83	3.4 to 6.85	3.61	2.39 to 5.46

Intercepts not presented for bivariate models; estimates denote change in odds of ≥1 dollar store in census tract for each one SD increase in the census tract characteristic.
AIAN, American Indian and Alaska Native; aOR, adjusted OR; NH, non-Hispanic; RUCA, Rural–Urban Commuting Area.

Raskind IG, Vishwakarma M, Schleicher NC, Andersen-Rodgers E, Henriksen L. *Tob Control.* 2021. PubMed PMID: 34607887.

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Why greater tobacco use in rural youth?

3. **Access to cheaper tobacco products**
   - Higher odds of dollar stores selling tobacco products in rural census tracts vs. urban

4. **Unequal implementation of tobacco control policies**
   - Local Tobacco21 policies more likely to be voluntarily adopted in urban vs. rural settings

Geographical distribution and social determinants of Tobacco 21 policy adoption and retail inspections in the United States, 2015-2019

Table 3. Multi-level analysis of factors in association with voluntary T21 adoption as of December 2019

Predictive variables	AOR (95% CI)	p
State tobacco regulation		
Comprehensive smoke-free air laws (yes vs no)	3.63 (2.74–4.82)	<0.0001
Tobacco licensing (yes vs no)	1.96 (1.42–2.71)	<0.0001
Local characteristics		
Urban vs rural[a]	1.25 (1.07–1.46)	0.005
Retail violation of minor sales[b]	0.72 (0.61–0.85)	<0.0001
Zip code level SES[c] (%)		
Non-Hispanic Black	1.03 (1.00–1.06)	0.0759
Hispanic	1.19 (1.14–1.24)	<0.0001
Asian	1.12 (1.06–1.19)	<0.0001
American Indians	0.87 (0.84–0.90)	<0.0001
15–17 years old	0.89 (0.83–0.96)	<0.0001
18–20 years old	0.97 (0.94–1.00)	<0.0001
Bachelor's degree and above	1.05 (1.02–1.08)	0.003
Persons living in poverty	1.01 (0.98–1.03)	0.0553

a The Rural-Urban Commuting Area (RUCA) codes are from the USDA. A binary indicator was created for urban (Metropolitan) versus rural (Micropolitan, Small Town and Rural). b The underage tobacco inspection data were obtained from the FDA compliance inspection database. Retail violation of underage sales included warning letter, civil money penalty, and no-tobacco-sale order. c Per 10% increase. SES: socioeconomic status. AOR: adjusted odds ratio.

Dai H, Tamrakar N, Rathnayake N, Samson K.. *Tob Induc Dis.* 2021;19:55. PubMed PMID: 34602933. PubMed Central PMCID: PMC8445336.

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Community Guide to Preventive Services

Intervention	Outcomes Addressed	CPSTF Finding
Comprehensive Tobacco Control Programs	Cessation Initiation Secondhand Smoke Exposure	**Recommended** August 2014
Smoke-Free Policies	Cessation Initiation Secondhand Smoke Exposure	**Recommended** November 2012
Interventions to Increase the Unit Price for Tobacco Products	Cessation Health Disparities Initiation	**Recommended** November 2012
Mass-Reach Health Communication Interventions	Cessation Initiation	**Recommended** April 2013
Reducing Out-of-Pocket Costs for Evidence-Based Cessation Treatments	Cessation	**Recommended** August 2012
Quitline Interventions	Cessation	**Recommended** August 2012
Mobile Phone-Based Cessation Interventions	Cessation	**Recommended** December 2011
Internet-Based Cessation Interventions	Cessation	**Recommended** December 2019
Mass Media - Cessation Contests	Cessation	Insufficient Evidence May 2000

https://www.thecommunityguide.org/

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Evidence-based strategies: Prevention

- **Policy interventions**
  - Youth access (Tobacco21)
  - Smokefree indoor air
  - Taxes
  - Restricting advertising

- **Countermarketing campaigns**
  - Ensuring adequate exposure to mass media campaigns; follow CDC best practice guidelines
  - Targeting products with higher prevalence (e.g., smokeless tobacco)
  - Using graphic images of tobacco-related health harms

- NOTE: Tailoring messages for rural youth (e.g., incorporating culturally specific themes in countermarketing campaigns and working with members of target communities to generate content).
  - The inclusion of rural themes in mass media advertisements did not appear to affect their impact.

Talbot JA, Williamson ME, Pearson K, et al. Advancing Tobacco Prevention and Control in Rural America. National Network of Public Health Institutes. https://nnphi.org/wp-content/uploads/2019/02/AdvancingTobaccoPreventionControlRuralAmerica.pdf. Published 2019.

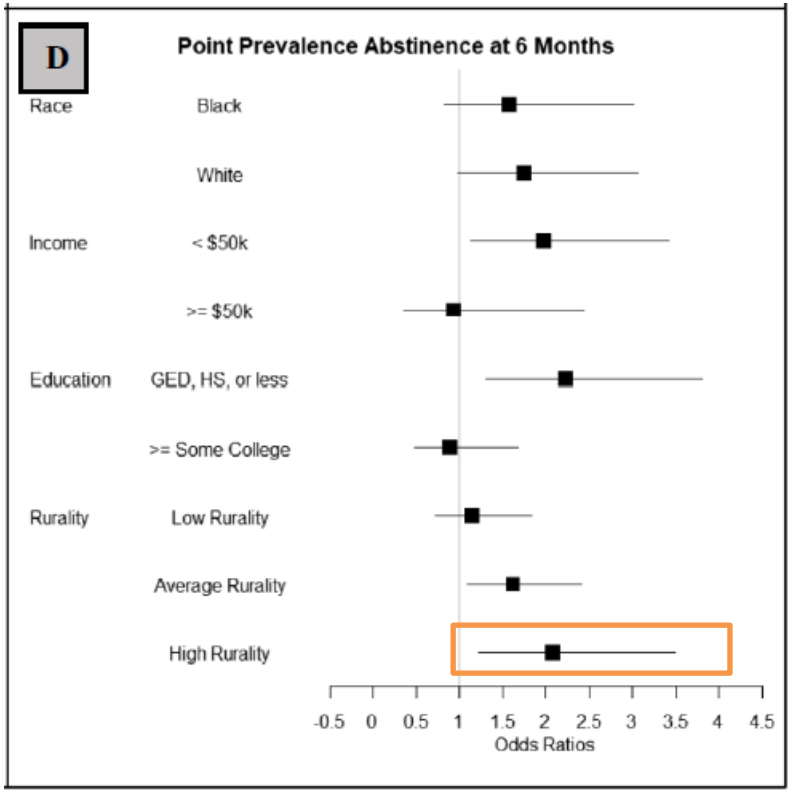
Evidence-based strategies: Cessation

- **Policy/systems interventions**
  - Smokefree indoor air
  - Taxes
  - Improve provider use of cessation best practices
    - Harness electronic health records/quitline referral
- **Media campaigns promoting cessation**
  - Ensuring adequate exposure to mass media campaigns; follow CDC best practice guidelines
  - Targeting products with higher prevalence (e.g., smokeless tobacco)
  - Using graphic images of tobacco-related health harms
- **Delivery of cessation treatments in both health care and non-clinical settings**
  - Boosting quitline referrals, free NRT
  - Use of non-clinician providers (e.g., pharmacists)
  - Development of mobile phone-based programs/remote delivery

Talbot JA, Williamson ME, Pearson K, et al. Advancing Tobacco Prevention and Control in Rural America. National Network of Public Health Institutes. https://nnphi.org/wp-content/uploads/2019/02/AdvancingTobaccoPreventionControlRuralAmerica.pdf. Published 2019.

Reducing barriers to cessation treatment in young people

- **Web-based cessation programs**
- **Text message cessation programs**
- **Nicotine replacement therapy sampling**
  - Providing a two-week supply of NRT at the point of care (i.e, primary care visits) could reduce barriers to trying NRT and improve cessation.



Dahne J, et al. *Prev Med.* 2020;136:106096.

Center on Rural Addiction
UNIVERSITY OF VERMONT

Helping patients by helping providers.

UVM CORA's mission is to expand addiction-treatment capacity in HRSA-designated rural counties by providing consultation, resources, training, and evidence-based technical assistance to healthcare providers and other staff.

www.uvmcora.org

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Items in your Toolkit

UVMCORA.org

Tobacco Toolkit

Thanks for checking out the "tools" in your Tobacco Toolkit! We hope that you find these items helpful when you feel the urge to smoke or vape.

Keep them with you throughout the day to deal with cravings.

Best wishes!

Nicotine Replacement Therapy (NRT)

NRT reduces withdrawal feelings by giving you a small, controlled amount of nicotine — but none of the other dangerous chemicals found in tobacco products or e-cigarettes. This small amount of nicotine helps satisfy your craving for nicotine and reduces the urge to use tobacco or e-cigarettes.

Nicotine Patch

Gives a small and steady amount of nicotine throughout the day. Put a new one on every 24 hours.

Nicotine Mini-Lozenge

Gives a boost of nicotine to reduce cravings. Using lozenges every 1-2 hours can help you prevent a craving or to get through one.

Stress Ball

Keep your hands busy! Try squeezing this fun, squishy stress ball to reduce tension and work through cravings. Remember that cravings may come on strong, but they will go away if you can wait them out.

Chewing Gum

Distract your mind and your mouth! When not using nicotine lozenges, chew gum instead. Or try using a toothpick, sucking on a piece of hard candy, or drinking a glass of water. These distractions can keep cravings away.

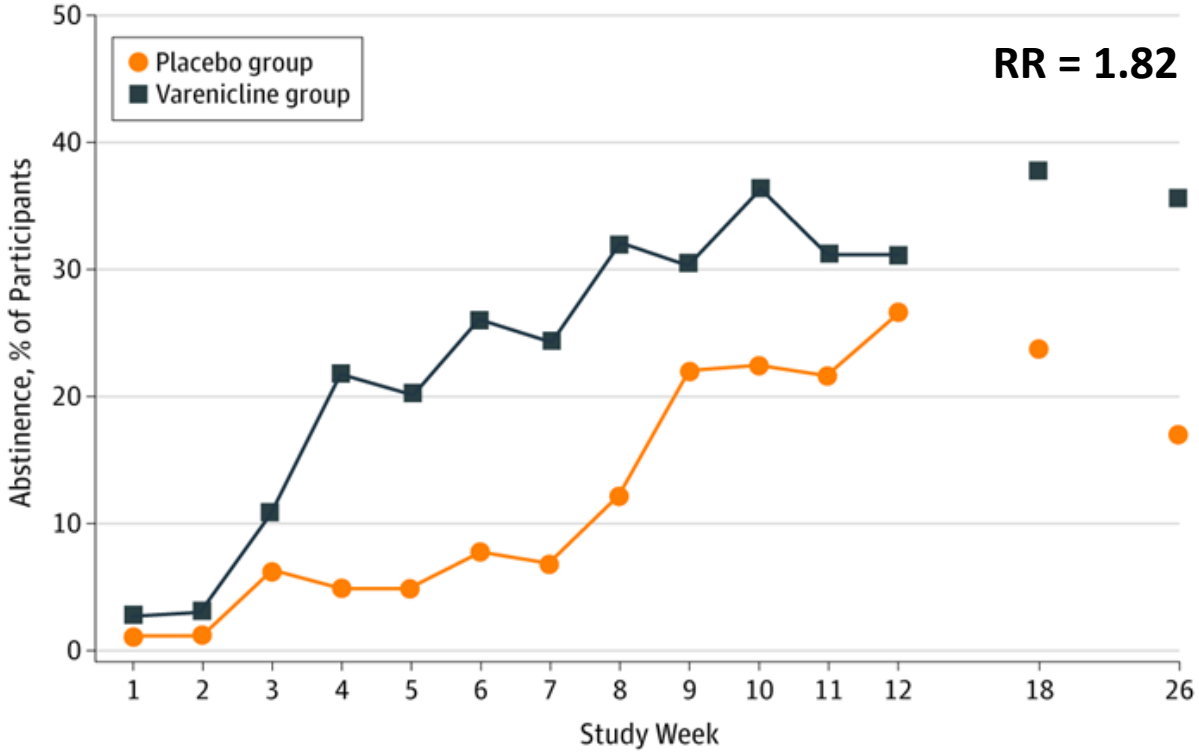
Lip Balm

Something for your mouth and your hands! Reach for the lip balm and put it on whenever you start to have a craving. Store it in your pocket or bag and reapply throughout the day. You'll nourish your lips while distracting your mouth and your hands.

Varenicline for cessation in young people (ages 14-21)

Table 2. Abstinence Outcor

End Point
Primary Efficacy Outcome
Cotinine-confirmed abstinen (≤50 ng/mL)
End of treatment (week 1 RR (95% CI)
Varenicline group, % (9
Placebo group, % (95%



No. of participants with available data at each visit														
Placebo	76	69	62	59	60	50	57	49	50	49	46	45	40	41
Varenicline	65	59	54	50	49	50	49	50	46	44	48	45	43	42

Gray KM, et al. *JAMA Pediatrics.* 2019;173(12):1146-1153.

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Vaping cessation – a national priority for young people

- Free quit vaping text message program
- In five weeks (Jan – Feb 2019):
  - 13,421 teens and 13,750 young adults had already joined
  - At two-week assessment, 61% of respondents indicated they had reduced or stopped using e-cigarettes altogether.

Graham AL, et al. *Nicotine Tob Res.* 2020;22(5):859-860.

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JAMA Internal Medicine

RCT: Effectiveness of a Vaping Cessation Text Message Program Among Young Adult e-Cigarette Users

POPULATION

1253 Men, 1303 Women
26 Nonbinary or other gender

Young adults aged 18-24 y who vaped nicotine in the past 30 d and were interested in quitting

Mean (SD) age, 20.4 (1.7) y

INTERVENTION

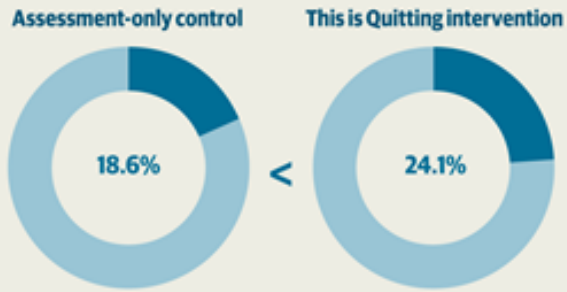
2588 Individuals randomized

1284 Assessment-only control
Monthly assessment of e-cigarette use and abstinence via incentivized text message for 6 mo

1304 This is Quitting intervention
Assessment-only control plus automated, youth-tailored, interactive text message program for vaping cessation that delivers social support and cognitive and behavioral coping skills training

FINDINGS

Young adults who received the This is Quitting intervention had significantly higher vaping abstinence rates at 7 mo compared with those in the control group (odds ratio, 1.39; 95% CI, 1.15-1.68)



Point prevalence abstinence at 7 mo:

Assessment-only control:
18.6% (95% CI, 16.7%-20.8%)

This is Quitting intervention:
24.1% (95% CI, 21.8%-26.5%)

SETTINGS / LOCATIONS

National recruitment to an online study in the US

PRIMARY OUTCOME

30-d Point prevalence abstinence from vaping, as measured by self-reported abstinence from e-cigarette use 7 mo after randomization, analyzed under intent to treat

Graham AL, Amato MS, Cha S, Jacobs MA, Bottcher MM, Papandonatos GD. Effectiveness of a vaping cessation text message program among young adult e-cigarette users: a randomized clinical trial. *JAMA Intern Med*. Published online May 17, 2021. doi:10.1001/jamainternmed.2021.1793

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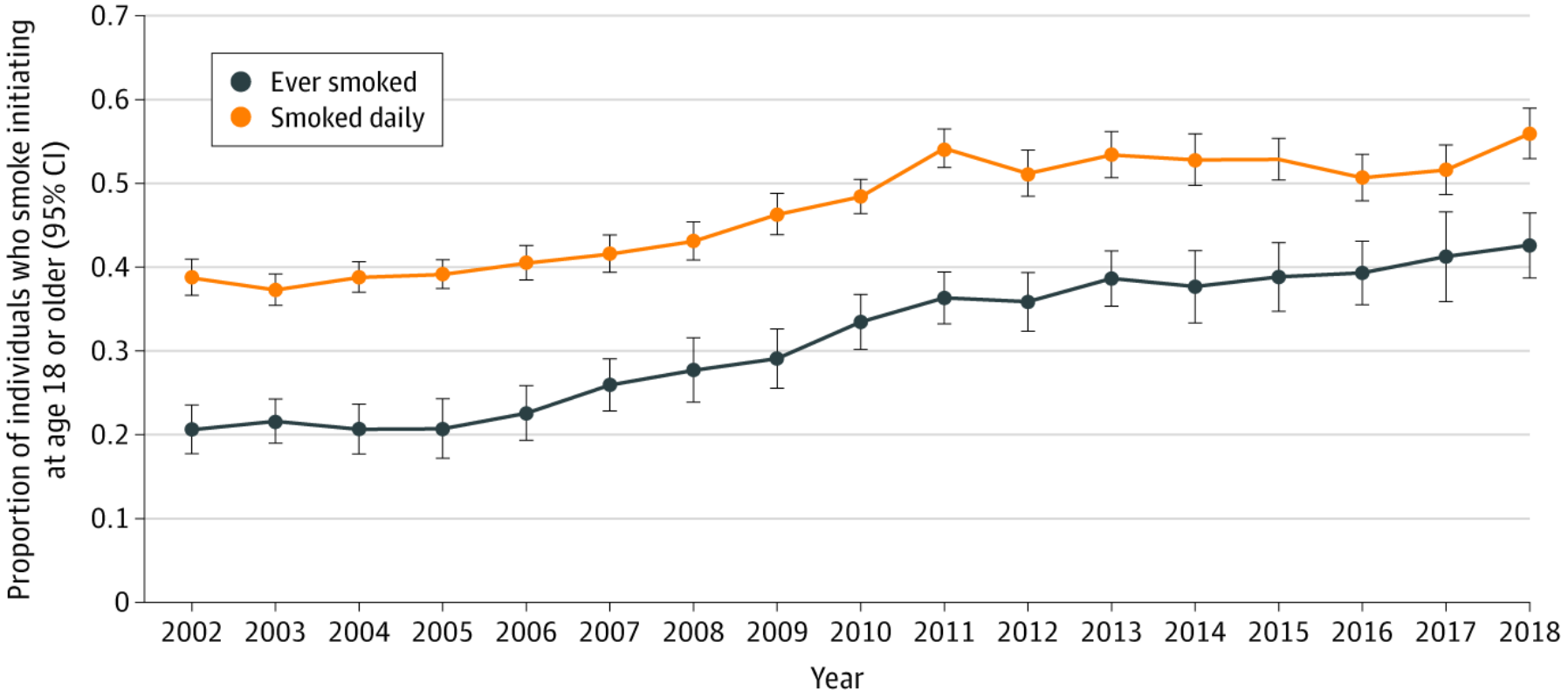
OTHER CHALLENGES AND CONSIDERATIONS

Cigarette initiation increasing in young adulthood



Barrington-Trimis JL, et al. *JAMA Netw Open.* 2020;3(10):e2019022.

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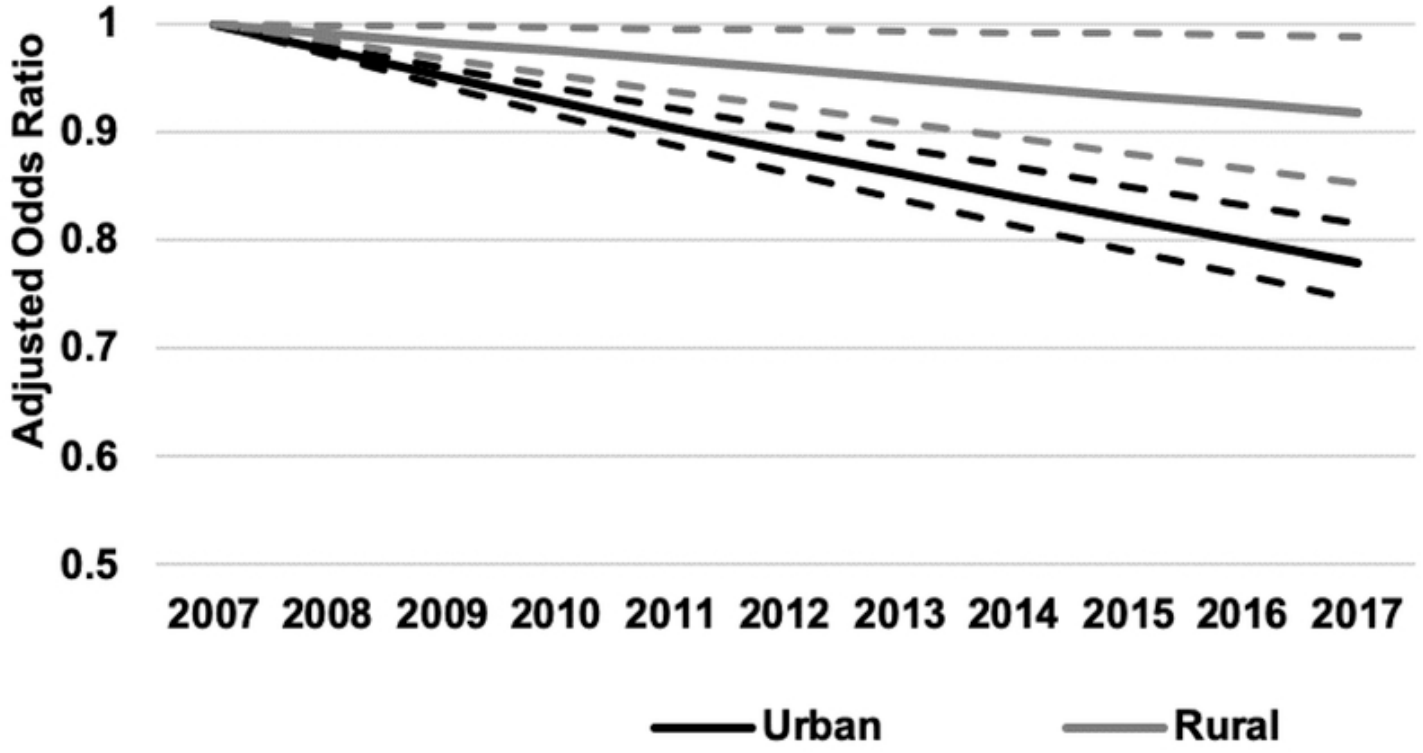
Changes in adult cigarette smoking



Urban and rural changes in cigarette smoking from 2007–2017.

Adjusted odds ratios (solid lines) and 95% confidence intervals (dotted lines) of current cigarette smoking relative to 2007 by geographic locality.

Coughlin LN, Bonar EE, Bohnert KM, Jannausch M, Walton MA, Blow FC, Ilgen MA. *Drug Alcohol Depend.* 2019;205:107699. PubMed PMID: 31707265.

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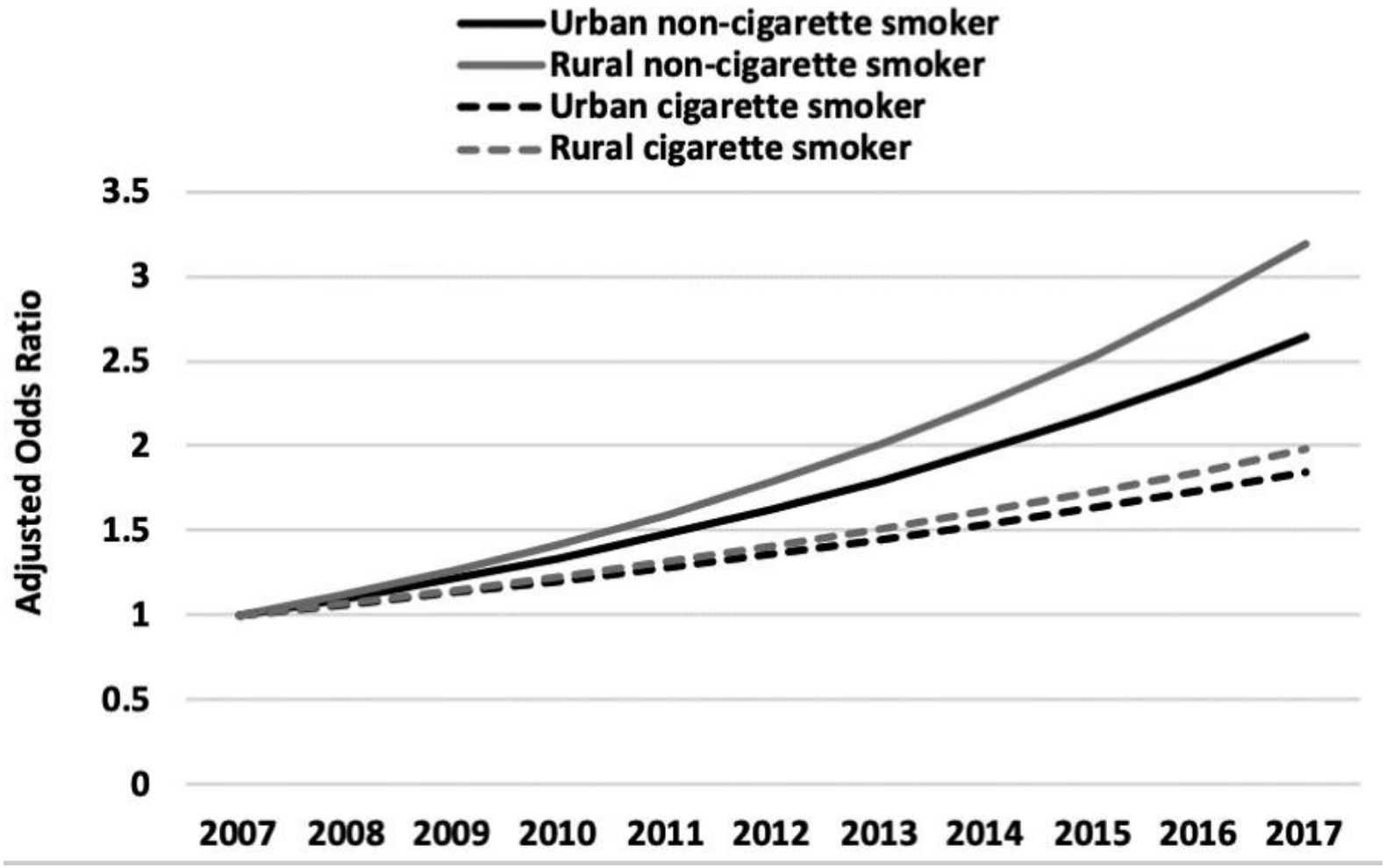
Changes in adult cannabis use by smoking status



Coughlin LN, Bonar EE, Bohnert KM, Jannausch M, Walton MA, Blow FC, Ilgen MA. *Drug Alcohol Depend.* 2019;205:107699. PubMed PMID: 31707265.

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Ongoing challenges

- Addressing use of multiple tobacco products
- Addressing co-use of tobacco and other substances
- Increasing reach and uptake of cessation interventions in young people
- Increasing reach and efficacy of prevention interventions into young adulthood

pace vermont
Policy and Communication Evaluation

To understand the impact of state-level policies and communication campaigns on substance use beliefs and behaviors in young Vermonters.

www.pacevt.org pace_vt

QUESTIONS?

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http://www.med.uvm.edu/behaviorandhealth/home