

Primary Care Interventions for Prevention and Cessation of Tobacco Use in Children and Adolescents

US Preventive Services Task Force Recommendation Statement

US Preventive Services Task Force

IMPORTANCE Tobacco use is the leading cause of preventable death in the US. An estimated annual 480 000 deaths are attributable to tobacco use in adults, including from secondhand smoke. It is estimated that every day about 1600 youth aged 12 to 17 years smoke their first cigarette and that about 5.6 million adolescents alive today will die prematurely from a smoking-related illness. Although conventional cigarette use has gradually declined among children in the US since the late 1990s, tobacco use via electronic cigarettes (e-cigarettes) is quickly rising and is now more common among youth than cigarette smoking. e-Cigarette products usually contain nicotine, which is addictive, raising concerns about e-cigarette use and nicotine addiction in children. Exposure to nicotine during adolescence can harm the developing brain, which may affect brain function and cognition, attention, and mood; thus, minimizing nicotine exposure from any tobacco product in youth is important.

OBJECTIVE To update its 2013 recommendation, the USPSTF commissioned a review of the evidence on the benefits and harms of primary care interventions for tobacco use prevention and cessation in children and adolescents. The current systematic review newly included e-cigarettes as a tobacco product.

POPULATION This recommendation applies to school-aged children and adolescents younger than 18 years.

EVIDENCE ASSESSMENT The USPSTF concludes with moderate certainty that primary care-feasible behavioral interventions, including education or brief counseling, to prevent tobacco use in school-aged children and adolescents have a moderate net benefit. The USPSTF concludes that there is insufficient evidence to determine the balance of benefits and harms of primary care interventions for tobacco cessation among school-aged children and adolescents who already smoke, because of a lack of adequately powered studies on behavioral counseling interventions and a lack of studies on medications.

RECOMMENDATION The USPSTF recommends that primary care clinicians provide interventions, including education or brief counseling, to prevent initiation of tobacco use among school-aged children and adolescents. (B recommendation) The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of primary care-feasible interventions for the cessation of tobacco use among school-aged children and adolescents. (I statement)

JAMA. 2020;323(16):1590-1598. doi:10.1001/jama.2020.4679

- [← Editorial page 1563](#)
- [← Related article page 1599 and JAMA Patient Page page 1626](#)
- [+ Audio and Supplemental content](#)
- [+ CME Quiz at jamacmelookup.com](#)

Group Information: The US Preventive Services Task Force (USPSTF) members are listed at the end of this article.

Corresponding Author: Douglas K. Owens, MD, MS, Stanford University, 615 Crothers Way, Encina Commons, Mail Code 6019, Stanford, CA 94305-6006 (chair@uspstf.net).

Summary of Recommendations

The USPSTF recommends that primary care clinicians provide interventions, including education or brief counseling, to prevent initiation of tobacco use among school-aged children and adolescents.	B
The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of primary care-feasible interventions for the cessation of tobacco use among school-aged children and adolescents.	I

See the Figure for a more detailed summary of the recommendation for clinicians. See the Practice Considerations section for more information on effective interventions to prevent initiation of tobacco use and for suggestions for practice regarding the I statement. USPSTF indicates US Preventive Services Task Force.

Tobacco use is the leading cause of preventable death in the US.¹ An estimated annual 480 000 deaths are attributable to tobacco use in adults, including secondhand smoke.¹ It is estimated that every day about 1600 youth aged 12 to 17 years smoke their first cigarette² and that about 5.6 million adolescents alive today will die prematurely of a smoking-related illness.^{1,3} Although conventional cigarette use has gradually declined among children in the US since the late 1990s,⁴ tobacco use via electronic cigarettes (e-cigarettes) is quickly rising and is now more common among youth than cigarette smoking. e-Cigarette sales in the US market have risen rapidly since 2007,⁵ and e-cigarette use by youth has been tracked in the National Youth Tobacco Survey since 2011.¹ From 2011 to 2019, current e-cigarette use increased from 1.5% to 27.5% among high school students^{6,7} (from an estimated 220 000 to 4.11 million students); in 2019, 5.8% of high school students (an estimated 860 000 students) used conventional cigarettes.⁷

e-Cigarette products usually contain nicotine,⁸ which is addictive, raising concerns about e-cigarette use and nicotine addiction in children.⁵ Evidence suggests an association between e-cigarette use in nonsmoking adolescents and subsequent cigarette smoking in young adults. Ever use of e-cigarettes is associated with increased risk of ever use of combustible tobacco products.⁹ In addition, as the degree of e-cigarette use increases, frequency and intensity of smoking cigarettes also increases.⁹ Exposure to nicotine during adolescence can harm the developing brain, which may affect brain function and cognition, attention, and mood^{1,5,10,11}; thus, minimizing nicotine exposure from any tobacco product in youth is important. In 2019, an outbreak of e-cigarette, or vaping, product use-associated lung injury (EVALI) occurred in the US; approximately 15% of patients hospitalized with EVALI were younger than 18 years.¹² Vitamin E acetate, an additive to some tetrahydrocannabinol-containing e-cigarettes, was found to be strongly linked to the outbreak.¹² Other tobacco products high school students report using include cigars, cigarillos, and little cigars (7.6%); smokeless tobacco (4.8%); hookahs (3.4%); and pipe tobacco (1.1%).⁷ In 2019, cigar use (including cigarillos and little cigars) surpassed cigarette use in high school students.⁷ See the Definitions section for more information on tobacco products and terminology used in this US Preventive Services Task Force (USPSTF) recommendation.

USPSTF Assessment of Magnitude of Net Benefit

Available evidence on interventions to prevent and help youth quit tobacco use almost exclusively focus on cigarette smoking. For this recommendation, the US Preventive Services Task Force (USPSTF) found this evidence to be most applicable to smoking combustible products (including cigarettes, cigars, cigarillos, and little cigars) and use of e-cigarettes (“vaping”).

See the **Figure** and **Table 1** for more information on the USPSTF recommendation rationale and assessment. For more details on the methods the USPSTF uses to determine the net benefit, see the USPSTF Procedure Manual.¹³ For a summary of the evidence that served as the basis for the recommendations, see the review of the evidence on the benefits and harms of primary care interventions for tobacco use prevention and cessation in children and adolescents.^{14,15}

Prevention

The USPSTF concludes with moderate certainty that primary care-feasible behavioral interventions, including education or brief counseling, to prevent tobacco use in school-aged children and adolescents have a **moderate net benefit**. The USPSTF found adequate evidence that behavioral counseling interventions, such as face-to-face or telephone interaction with a health care clinician, print materials, and computer applications, can have a moderate effect in preventing initiation of tobacco use in school-aged children and adolescents. The USPSTF sought but found no evidence on the harms of behavioral counseling interventions for the prevention or cessation of tobacco use; however, the USPSTF bounds the magnitude of potential harms of behavioral counseling interventions as no greater than small, based on the absence of reported harms in the literature and the noninvasive nature of the interventions (Table 1).

Cessation

The USPSTF concludes that there is **insufficient evidence** to determine the balance of benefits and harms of primary care interventions for tobacco cessation among school-aged children and adolescents who already smoke, because of a lack of adequately powered studies on behavioral counseling interventions and a lack of studies on medications.

The USPSTF found inadequate evidence on the benefit of behavioral counseling interventions for tobacco cessation in school-aged children and adolescents because many studies had small sample sizes and may not have been adequately powered to detect a benefit, making it unclear whether the observed lack of effect of interventions was the result of intervention failure or lack of statistical power. Although the USPSTF found no evidence on the harms of behavioral counseling interventions, it bounds the magnitude of potential harms of behavioral counseling interventions as no greater than small, based on the absence of reported harms in the literature and the noninvasive nature of the interventions.

The USPSTF found inadequate evidence on the benefits and harms of medications for tobacco cessation in children and adolescents, primarily because of an inadequate number of studies that have evaluated tobacco cessation medications in this population. Potential harms depend on the specific medication (Table 1).

Practice Considerations

Patient Population Under Consideration

This recommendation applies to school-aged children and adolescents younger than 18 years. The USPSTF has issued a separate recommendation statement on interventions for tobacco use cessation in adults 18 years and older, including pregnant persons.¹⁶

Definitions

“Tobacco use” refers to use of any tobacco product. As defined by the US Food and Drug Administration (FDA), tobacco products include any product made or derived from tobacco intended for human consumption (except products that meet the definition of drugs), including, but not limited to, cigarettes, cigars (including cigarillos and little cigars), dissolvable tobacco, hookah tobacco, nicotine gels, pipe tobacco, roll-your-own tobacco, smokeless tobacco

Figure. Clinician Summary: Primary Care Interventions for Prevention and Cessation of Tobacco Use in Children and Adolescents

April 2020

What does the USPSTF recommend?	School-aged children and adolescents who have not started to use tobacco: Grade B Provide interventions, including education or brief counseling, to prevent initiation of tobacco use.
	School-aged children and adolescents who use tobacco: I statement The evidence is insufficient to assess the balance of benefits and harms of primary care-feasible interventions for cessation of tobacco use.
To whom does this recommendation apply?	School-aged children and adolescents younger than 18 years.
What's new?	This recommendation is consistent with the 2013 USPSTF recommendation, with some key updates: <ul style="list-style-type: none"> • Adds a new I statement on interventions for the cessation of tobacco use in school-aged children and adolescents. • Includes e-cigarettes as a tobacco product.
How to implement this recommendation?	<p><i>Definition of tobacco use:</i> Tobacco use refers to any tobacco product, including cigarettes, cigars (including cigarillos and little cigars), as well as vaping e-cigarettes.</p> <ol style="list-style-type: none"> 1. Determine if youth are using tobacco. 2. If youth are not using tobacco: <ul style="list-style-type: none"> • Provide behavioral counseling interventions to all youth to prevent tobacco use. <ul style="list-style-type: none"> ◦ Effective behavioral counseling interventions to prevent initiation of tobacco use include face-to-face counseling, telephone counseling, and computer-based and print-based interventions. 3. If youth are using tobacco: <ul style="list-style-type: none"> • The evidence is insufficient to recommend for or against providing interventions to youth for cessation of tobacco use. <ul style="list-style-type: none"> ◦ Existing studies on behavioral interventions to help youth quit tobacco use have been too heterogeneous and too small to detect a benefit. ◦ No medications are currently approved by the US Food and Drug Administration for tobacco cessation in children and adolescents. • Use clinical judgment to decide how to best help youth who use tobacco.
What are other relevant USPSTF recommendations?	The USPSTF has made recommendations on behavioral and pharmacotherapy interventions for tobacco smoking cessation in adults, including pregnant women, and primary care behavioral interventions to reduce illicit drug and nonmedical pharmaceutical use in children and adolescents. These recommendations are available at https://www.uspreventiveservicestaskforce.org .
Where to read the full recommendation statement?	Visit the USPSTF website (https://www.uspreventiveservicestaskforce.org) to read the full recommendation statement. This includes more details on the rationale of the recommendation, including benefits and harms; supporting evidence; and recommendations of others.

The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision-making to the specific patient or situation.

USPSTF indicates US Preventive Services Task Force.

Table 1. Summary of USPSTF Rationale^a

Rationale	Prevention	Cessation
Benefits of intervention	Adequate evidence that behavioral counseling interventions can have a moderate effect in preventing initiation of tobacco use in school-aged children and adolescents	<ul style="list-style-type: none"> • Inadequate evidence on behavioral counseling interventions for cessation of tobacco use in school-aged children and adolescents because many studies had small sample sizes and may not have been adequately powered to detect a benefit • Inadequate evidence on medications for cessation of tobacco use in school-aged children and adolescents because of an inadequate number of studies
Harms of intervention	Adequate evidence to bound harms of behavioral counseling interventions as no greater than small based on the absence of reported harms in the evidence, the noninvasive nature of the interventions, and the low likelihood of serious harms	<ul style="list-style-type: none"> • Adequate evidence to bound harms of behavioral counseling interventions as no greater than small, based on the absence of reported harms in the evidence, the noninvasive nature of the interventions, and the low likelihood of serious harms • Inadequate evidence on harms of medications
USPSTF assessment	Moderate certainty that primary care-relevant behavioral interventions to prevent tobacco use in school-aged children and adolescents have a moderate net benefit	Insufficient evidence to determine the balance of benefits and harms of primary care interventions for tobacco cessation in school-aged children and adolescents who already smoke

Abbreviation: USPSTF, US Preventive Services Task Force.

^a See the eFigure in the Supplement for explanation of USPSTF grades and levels of evidence.

products (including dip, snuff, snus, and chewing tobacco), vapes, e-cigarettes, hookah pens, and other electronic nicotine delivery systems. "Smoking" generally refers to the inhaling and exhaling of smoke produced by combustible tobacco products such as cigarettes, cigars, and pipes. "Vaping" refers to the inhaling and exhaling of aerosols produced by e-cigarettes.¹⁷ Vape products usually

Table 2. Behavioral Counseling Interventions for Prevention of Tobacco Use in Children and Adolescents^a

Characteristic	Mode of intervention delivery			
	Print ²⁰⁻²⁸	Face-to-face ^{20,21,29-32}	Telephone ^{21,22,24,28-30}	Computer ^{21,31,33}
Intervention recipient	Child (aged 7-19 y), parent, or both	Child (aged 11-19 y) or both parent and child	Child (aged 9-17 y), parent, or both	Child (aged 10-17 y)
Intervention intensity	Variable. Included stickers, newsletters, activity books, or activity guides	1 to 8 visits Main intervention or part of multimodal intervention	1 to 4 booster calls Always provided in conjunction with print material or face-to-face counseling	1 to 6 sessions Interactive or web-based programs
Examples of materials provided for practice ^b	Prescriptions with preprinted antitobacco messages were given to adolescents covering tobacco-free offices, tobacco advertising, tobacco and sports, smokeless tobacco, nicotine and tobacco addiction, passive smoking, tobacco's effect on teeth, and negative consequences of tobacco use ²⁰	Use of 5A model: Clinician asked about smoking, advised continued abstinence, and referred to peer counselor who continued the model (assess, assist, arrange follow-up) using motivational interviewing and behavior change counseling ²⁹	Use of 5A model: Clinician asked about smoking, advised continued abstinence, and referred to peer counselor who continued the model (assess, assist, arrange follow-up) using motivational interviewing and behavior change counseling ²⁹	Computer screenshots ³¹
Practice settings	Medical care settings (primary care, dental care, or family planning) and nonmedical settings (school setting after school hours)			
Interventionist	Clinicians or other health care practitioners, dentists, dental hygienists, health educators, health counselors, peer counselors, study-trained counselor, or study-trained workshop leader			
Demonstrated benefit	No difference in effectiveness was seen by intervention recipient, clinician, modality, or setting. Overall, behavioral interventions had a relative risk reduction for initiation of smoking of 0.82 (95% CI, 0.73-0.92).			

^a Adapted from Table 7 in Selph et al¹⁴ and a modified Template for Intervention Description and Replication (TIDieR) checklist.³⁴

^b The US Preventive Services Task Force does not endorse any specific intervention. Materials listed here represent examples of materials that were used in reviewed studies and that are publicly available. Other studies may reference practice materials, but either their websites are no longer active, they use outdated modes of communication (eg, VHS tape), or the material is in a non-English language.

contain nicotine, which is the addictive ingredient in tobacco. Substances other than tobacco can also be used to smoke or vape.

Assessment of Risk

All youth are considered at risk of initiating tobacco use. Interventions to prevent the initiation of tobacco use should be provided to all youth who have not started using tobacco products yet, regardless of the presence or absence of other risk factors. The following risk factors may increase the risk of tobacco use in youth: being male, white race, not college-bound, from a rural area, having parents with lower levels of education, parental smoking, having childhood friends who smoke, being an older adolescent, experiencing highly stressful events, and perceiving tobacco use as low risk.^{18,19}

Interventions to Prevent Tobacco Use and Implementation Considerations

Various behavioral counseling intervention types are effective in preventing tobacco initiation in children, including face-to-face counseling, telephone counseling, and computer-based and print-based interventions.¹⁴

Individual interventions target specific audiences (the child/adolescent, the parent, or both) and a variety of age ranges. For example, in the reviewed studies,¹⁴ interventions for children aged 7 to 10 years tended to be print-based materials, whereas face-to-face counseling and telephone- and computer-based interventions typically targeted children older than 10 years. Interventions targeting parents tended to be print- or telephone-based. The number of contacts made with intervention recipients also varied, ranging from 1 to 8 contacts.¹⁴ The intensity of the interventions varied, with the content of the print materials ranging from stickers to informational newsletters or an activity book (for children) or activity guide (for parents). For telephone-based interventions, telephone counseling was usually provided in conjunction with another

modality such as print materials or face-to-face counseling. Based on the evidence reviewed,¹⁴ no specific component of behavioral counseling interventions (such as intervention modality, target audience, duration of intervention, or intervention setting) appeared to make an intervention more or less effective. Thus, clinicians have a broad range of effective behavioral counseling interventions from which to choose. For additional information about behavioral counseling interventions to prevent tobacco use, see Table 2, the Additional Tools and Resources section, and the Box.

Most of the evidence on behavioral counseling interventions to prevent tobacco use focused on prevention of cigarette smoking.¹⁴ Given the similar contextual and cultural issues currently surrounding the use of e-cigarettes in youth and the inclusion of e-cigarettes as a tobacco product by the FDA, the USPSTF concludes that the evidence on interventions to prevent cigarette smoking could be applied to prevention of e-cigarette use as well. The USPSTF also concludes that the evidence could be applied to prevention of cigar use, which includes cigarillos and little cigars.

Additional Tools and Resources

Primary care clinicians may find the resources listed in the Box useful in talking with children and adolescents about the harms of tobacco use.

Other Related USPSTF Recommendations

The USPSTF has made recommendations on behavioral and pharmacotherapy interventions for tobacco smoking cessation in adults, including pregnant women,¹⁶ and primary care behavioral interventions to reduce illicit drug and nonmedical pharmaceutical use in children and adolescents.³⁵

Box. Additional Tools and Resources for Talking With Children and Adolescents About the Harms of Tobacco Use**Centers for Disease Control and Prevention**

Youth Tobacco Prevention
https://www.cdc.gov/tobacco/basic_information/youth/index.htm

Fact Sheet on Youth and Tobacco Use
https://www.cdc.gov/tobacco/data_statistics/fact_sheets/youth_data/tobacco_use/index.htm

Quick Facts on the Risks of e-Cigarettes for Kids, Teens, and Young Adults

https://www.cdc.gov/tobacco/basic_information/e-cigarettes/Quick-Facts-on-the-Risks-of-E-cigarettes-for-Kids-Teens-and-Young-Adults.html

US Food and Drug Administration

Think e-Cigs Can't Harm Teens' Health?
<http://www.fda.gov/tobacco-products/public-health-education/think-e-cigs-cant-harm-teens-health>

The Real Cost Campaign
<https://www.fda.gov/tobacco-products/public-health-education/real-cost-campaign>

National Cancer Institute

Become a Smokefree Teen
<https://teen.smokefree.gov>
 1-800-QUIT-NOW

Office of the Surgeon General

Know the Risks: e-Cigarettes & Young People
<https://e-cigarettes.surgeongeneral.gov/knowtherisks.html>

2016 Surgeon General's Report: e-Cigarette Use Among Youth and Young Adults
https://www.cdc.gov/tobacco/data_statistics/sgr/e-cigarettes/index.htm

2012 Surgeon General's Report: Preventing Tobacco Use Among Youth and Young Adults
https://www.cdc.gov/tobacco/data_statistics/sgr/2012/index.htm

Suggestions for Practice Regarding the I Statement on Cessation**Potential Preventable Burden**

Nearly 90% of adult daily smokers smoked their first cigarette by age 18 years.¹ In 2019, an estimated 1.43 million high school and middle school students reported current use of cigars, 1.15 million high school and middle school students reported current use of conventional cigarettes, and 5.38 million high school and middle school students reported current use of e-cigarettes.⁷ Of high school and middle school students who used any tobacco product in the past 12 months, 57.5% reported that they had at least 1 quit attempt⁷; however, most quit attempts fail, and about 80% will go on to smoke into adulthood.³⁶ Immediate adverse health effects in child and adolescent cigarette smokers include increased negative respiratory effects such as impaired lung growth, early onset of lung function decline, respiratory and asthma-related symptoms (eg, coughing and wheezing), and early abdominal aortic atherosclerosis.^{1,36} Concerns regarding use of e-cigarettes in adolescence includes nicotine dependence and toxicity, harm to the

developing brain, its use as a bridge to conventional cigarette smoking, and inhalation of carcinogens.⁵

Although the evidence on behavioral counseling interventions to prevent tobacco use in children and adolescents is robust, fewer studies with smaller sample sizes are available that evaluate the effect of behavioral counseling interventions or pharmacotherapy on tobacco cessation.¹⁴ The pooled effect of the trials that evaluated behavioral counseling interventions for tobacco cessation in primary care settings did not find a significant reduction in smokers after the intervention.¹⁴ However, the study interventions were heterogeneous and most of the studies were small, making it difficult to determine whether interventions were unsuccessful at helping children and adolescents to stop using tobacco, or whether they were underpowered to detect a difference in tobacco cessation.

No medications are currently approved by the FDA for tobacco cessation in children and adolescents. The label for varenicline now states that it is not indicated in children and adolescents 16 years and younger because its efficacy in this population has not been demonstrated.³⁷ Few trials have been published on medication use for tobacco cessation in children and adolescents (1 trial on nicotine replacement therapy [NRT] and 2 trials on bupropion sustained-release [SR]). Trials were relatively small, and all included behavioral counseling in addition to pharmacotherapy. None found a significant difference in quit rates at the end of treatment.¹⁴ One additional published trial on varenicline for cessation was identified; however, it was not considered in the USPSTF evidence review because the trial included young adults and the mean age of participants was older than the age in the inclusion criteria of the evidence review.

Given the insufficient evidence to identify effective interventions to help youth quit using tobacco, the USPSTF is calling for more research in this area.

Potential Harms

The USPSTF found no evidence on harms from behavioral counseling interventions for tobacco cessation¹⁴; however, these harms are likely small to none based on the absence of reported harms in the evidence, the noninvasive nature of the interventions, and the low likelihood of serious harms.

The USPSTF found the evidence on harms from medications for tobacco cessation in children and adolescents to be inadequate. None of the published trials reported any serious harms; however, study sizes were relatively small.¹⁴ The single trial of NRT found a greater number of headaches, cough, abnormal dreams, muscle pain, and patch-related adverse events with NRT.³⁸ Bupropion carries a boxed warning for increased risk of suicidality in children, adolescents, and young adults, with other concerns for increased risk of seizure, hypertension, mania, visual problems, and unusual thoughts and behaviors.³⁹ Varenicline is not indicated in children 16 years and younger; therefore, no warnings specific to this age group are included in its label.³⁷ For older populations, labeling includes warnings and precautions for neuropsychiatric adverse events, including suicidality, seizures, interaction with alcohol, cardiovascular events, sleepwalking, angioedema, serious skin reactions, and nausea.³⁷

Current Practice

Approximately one-third to one-half of children and adolescents who have visited a clinician in the past year were asked about their tobacco

use.^{40,41} Of those who reported tobacco use in the past 30 days, approximately one-fourth were advised to quit.^{40,41}

Update of Previous USPSTF Recommendation

This recommendation replaces the 2013 USPSTF recommendation on primary care interventions to prevent tobacco use in children and adolescents.⁴² It is consistent with the 2013 recommendation, which similarly issued a B recommendation for primary care clinicians to provide interventions to prevent initiation of tobacco use among children and adolescents. New to the current recommendation is the inclusion of e-cigarettes as a tobacco product. Also new to the current recommendation is the I statement on insufficient evidence on interventions for cessation of tobacco use among this population. The USPSTF is calling for more research to identify interventions (behavioral counseling or pharmacotherapy) to help children and adolescents who use tobacco to quit.

Supporting Evidence

Scope of Review

The USPSTF commissioned a systematic review^{14,15} to evaluate the benefits and harms of primary care interventions for tobacco use prevention and cessation in children and adolescents. The current systematic review newly included e-cigarettes as a tobacco product.

Benefits of Primary Care Interventions

Nearly all studies evaluated the effect of interventions on smoking prevention and cessation. As mentioned previously, the USPSTF determined that this evidence could be applied to other forms of tobacco use, including e-cigarette use.

Prevention

Fourteen trials (n = 25 049) reported on the effects of behavioral counseling interventions to prevent the initiation of smoking.¹⁴ Nine of these trials enrolled only children who were nonsmokers at baseline, while 5 trials enrolled both smokers and nonsmokers but reported results by baseline smoking status. The weighted mean age of participants was 12.8 years, although eligible ages ranged from 7 to 19 years across studies.¹⁴

Most studies used interventions that targeted the child/adolescent, although some targeted both children and parents/caregivers and a few targeted only the parents/caregivers. Intervention content included health education, readiness to act or change, and parenting skills (communication and positive parenting). Delivery settings of interventions varied and included primary care clinics, dental clinics, schools (after hours), and the child's home. Various types of interventions were used, including print materials, face-to-face counseling, telephone support, and computer-based interventions. Six of the studies used only a single intervention type, and 8 studies used combinations of various interventions (eg, telephone counseling plus print materials or face-to-face counseling plus a computer-based intervention). Most studies reported that fewer youth initiated smoking when they received a behavioral counseling intervention (follow-up was

most commonly at 12 months but ranged from 7 to 36 months).¹⁴ This finding was not always statistically significant for individual studies; however, this reduction was statistically significant when results from trials were pooled: 7.4% vs 9.2% of participants initiated smoking in the intervention groups vs the control groups (relative risk, 0.82 [95% CI, 0.73-0.92]; 13 studies; n = 21 700).¹⁴ No effect modification was found by intervention type, setting, or target population (child vs parent).¹⁴

Cessation

Nine trials (n = 2516) reported on the effects of behavioral counseling interventions on smoking cessation in youth; 6 trials had fewer than 65 participants analyzed per intervention group.¹⁴ Four trials enrolled only smokers, while 5 trials enrolled both smokers and nonsmokers but reported results by baseline smoking status.¹⁴ The weighted mean average age of participants in cessation trials was much older than in the prevention trials (16.6 years [range, 12-19 years]).¹⁴

Nearly all interventions targeted the child/adolescent and very few targeted parents/caregivers. Intervention content most commonly focused on assessing and facilitating the youth's readiness to change; a few interventions included health education. The delivery setting of interventions was most commonly a primary care or dental clinic; a few studies delivered interventions at home. Nearly all interventions used combinations of intervention types, most commonly face-to-face counseling; telephone- and computer-based interventions and print materials (1 intervention) were used less commonly. Two trials reported significant increases in smoking cessation rates in youth receiving interventions.^{21,43} One trial used a combination of motivational interviewing supplemented with handouts, a computer program, and telephone calls²¹; the other trial used a combination of 1 face-to-face session supplemented with 1 telephone call.⁴³ Meta-analysis of all 9 trials reported a risk reduction of percent smokers after the intervention that was not statistically significant (relative risk, 0.97 [95% CI, 0.93-1.01]); 80.6% of participants in the intervention groups were still smoking at the end of the study (range, 6-18 months), vs 84.1% in the control groups.¹⁴ However, given the small study sizes, it was unclear whether this finding was a result of the studies being underpowered to detect a change in smoking behavior. Additional analyses were performed to evaluate if various factors, such as intervention type, setting, target population (child vs parent), or study duration may modify whether an intervention was effective. No factors were identified that modified the effect of interventions.¹⁴

Three trials (n = 788) reported on the effect of medications on smoking cessation in youth.¹⁴ Two trials evaluated bupropion SR^{44,45} and 1 trial evaluated NRT.⁴⁶ All trials were relatively small (211 to 312 participants per trial), and all trials also included behavioral counseling interventions in addition to medications. One of the bupropion SR trials also included NRT for all participants.⁴⁴ None of the trials reported that medications improved cessation rates; smoking rates remained high in both the treatment and the control groups in all trials. In the bupropion SR trials, 87.5% to 93.8% of participants were still smoking at the 6-month follow-up^{44,45}; 95.6% of the NRT group and 93.4% of the control group were still smoking at 12 months in the NRT trial.⁴⁶ The USPSTF also identified 1 published trial of varenicline for tobacco cessation in older adolescents and young adults⁴⁷ and 1 unpublished trial of varenicline for

tobacco cessation in adolescents.^{48,49} Results from these trials were not considered by the USPSTF because of the older age of participants⁴⁷ and because the study results were not published in a peer-reviewed journal.^{48,49}

Harms of Primary Care Interventions

The USPSTF evaluated harms of behavioral counseling interventions from the 18 trials that reported on benefits of interventions on smoking prevention and smoking cessation, as well as 4 additional trials that reported on the effect of behavioral counseling interventions on smoking prevalence irrespective of baseline smoking status.¹⁴ None of the 22 trials reported adverse events or harms associated with behavioral counseling interventions.¹⁴ Some trials reported higher smoking rates at follow-up in intervention groups compared with control groups, but this finding was not statistically significant in any of the trials.

The USPSTF evaluated harms of medications for smoking cessation from 4 trials (n = 914)¹⁴; the 3 trials described above (2 of bupropion and 1 of NRT), as well as a fourth trial of bupropion SR that did not meet inclusion criteria for evidence on benefits because its follow-up was less than 6 months.⁵⁰ No difference in serious or severe adverse events was reported with bupropion vs control groups, although 2 trials reported that 4% of participants withdrew because of adverse events with bupropion.¹⁴ Some studies reported more headaches, cough, dream disturbance, insomnia, and irritability with bupropion than the control group.¹⁴ Although no cases were reported in the studies included in the current review, bupropion carries a boxed warning for increased risk of suicidality in children, adolescents, and young adults, and the insert also includes other concerns for increased risk of seizure, hypertension, mania, visual problems, and unusual thoughts and behaviors.³⁹ In the single NRT trial, NRT was associated with more headaches, cough, abnormal dreams, muscle pain, and patch-related adverse events than placebo.³⁸

Response to Public Comment

A draft version of this recommendation statement was posted for public comment on the USPSTF website from June 25 to July 22, 2019. Several comments requested that the USPSTF recommend behavioral counseling interventions for tobacco cessation in youth, given the known harms of tobacco use in youth and the lack of proven harms from counseling interventions. The USPSTF only recommends a preventive service when there is at least adequate evidence that there is a net benefit to providing the service; absence of harms from a service is not sufficient evidence for the USPSTF to recommend a preventive service. However, as with all findings of insufficient evidence, the USPSTF calls for more research on identifying ways to help youth who use tobacco to quit. The USPSTF has also clarified in its Practice Considerations section that given the finding of insufficient evidence, health care practitioners should determine if offering behavioral counseling for tobacco cessation to certain individuals is reasonable. Other comments requested clarification about which tobacco products the USPSTF recommendation addresses. The USPSTF clarified this in the USPSTF Assessment of Magnitude of Net Benefit section. Additional changes made to the recommendation statement in response to public comment include clarification of which population the recommendation applies to

(see the Practice Considerations section), use of the term "e-cigarettes" instead of "Electronic Nicotine Delivery Systems (ENDS)" throughout the document to be consistent with the field, and consideration of additional Research Needs and Gaps and Suggested Tools.

Research Needs and Gaps

More studies are needed to identify effective interventions to help children and adolescents who use tobacco products to quit.

- Larger, adequately powered studies and studies of new behavioral counseling interventions for cessation are needed.
- These studies should report tobacco cessation outcomes at 6 months or later and should also provide information on components of the behavioral counseling intervention provided in the study (such as intensity of delivery, frequency of contacts, content and type of counseling or materials provided, delivery setting of studies, and training of persons delivering the intervention).
- More studies are needed that evaluate the benefits and harms of medications to help youth with tobacco cessation.
- More research is needed on interventions tailored specifically to prevent initiation of use and promote cessation of e-cigarette use in youth. The landscape of e-cigarette devices is rapidly evolving, so research in this area is challenged by the need to be timely, flexible, and comprehensive.
- More research is also needed on interventions tailored specifically to prevent initiation of use and promote cessation of other types of tobacco (such as, but not limited to, cigars and smokeless tobacco) and interventions tailored to subpopulations with elevated tobacco use rates (such as African American youth, Native American/Alaska Native youth, LGBTQ youth, and youth with mental illness).

Recommendations of Others

The American Academy of Pediatrics (AAP) recommends that pediatricians provide brief counseling to all children and adolescents to prevent tobacco use initiation, and that all teenagers be screened for tobacco and nicotine use. For adolescents who want to stop using tobacco, it recommends that tobacco dependence treatment, referral, or both be offered, and that tobacco dependence pharmacotherapy can be considered for adolescents who are moderately to severely dependent on tobacco who want to stop smoking. e-Cigarettes are not recommended as a treatment for tobacco dependence.⁵¹ The AAP also recommends that pediatricians screen children and adolescents, parents, and caregivers for e-cigarette use, and provide prevention counseling for children and adolescents. Further, it recommends that parents, caregivers, and adolescents who use e-cigarettes should be offered or referred to tobacco cessation counseling and FDA-approved tobacco dependence pharmacotherapy appropriate to their level of addiction and readiness to change and, again, that e-cigarettes are not recommended as a treatment for tobacco dependence. Last, the AAP recommends addressing parent and caregiver tobacco dependence as part of the pediatric visit.⁵² According to

the US Surgeon General, smoking cessation is beneficial at any age,⁵³ tobacco prevention efforts must focus on both adolescents and young adults,³⁶ and health care professionals should warn youth of the health risks of e-cigarettes and other nicotine-containing products.⁵ The American Academy of Family Physicians supports the 2013 USPSTF recommendation.⁵⁴

ARTICLE INFORMATION

The US Preventive Services Task Force (USPSTF)

members: Douglas K. Owens, MD, MS; Karina W. Davidson, PhD, MASc; Alex H. Krist, MD, MPH; Michael J. Barry, MD; Michael Cabana, MD, MA, MPH; Aaron B. Caughey, MD, PhD; Susan J. Curry, PhD; Katrina Donahue, MD, MPH; Chyke A. Doubeni, MD, MPH; John W. Epling Jr, MD, MSED; Martha Kubik, PhD, RN; Gbenga Ogedegbe, MD, MPH; Lori Pbert, PhD; Michael Silverstein, MD, MPH; Melissa A. Simon, MD, MPH; Chien-Wen Tseng, MD, MPH, MSEE; John B. Wong, MD.

Affiliations of The US Preventive Services Task Force (USPSTF) members:

Veterans Affairs Palo Alto Health Care System, Palo Alto, California (Owens); Stanford University, Stanford, California (Owens); Feinstein Institute for Medical Research at Northwell Health, Manhasset, New York (Davidson); Fairfax Family Practice Residency, Fairfax, Virginia (Krist); Virginia Commonwealth University, Richmond (Krist); Harvard Medical School, Boston, Massachusetts (Barry); University of California, San Francisco (Cabana); Oregon Health & Science University, Portland (Caughey); University of Iowa, Iowa City (Curry); University of North Carolina at Chapel Hill (Donahue); Mayo Clinic, Rochester, Minnesota (Doubeni); Virginia Tech Carilion School of Medicine, Roanoke (Epling Jr); Temple University, Philadelphia, Pennsylvania (Kubik); New York University, New York, New York (Ogedegbe); University of Massachusetts Medical School, Worcester (Pbert); Boston University, Boston, Massachusetts (Silverstein); Northwestern University, Evanston, Illinois (Simon); University of Hawaii, Honolulu (Tseng); Pacific Health Research and Education Institute, Honolulu, Hawaii (Tseng); Tufts University School of Medicine, Boston, Massachusetts (Wong).

Author Contributions: Dr Owens had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. The USPSTF members contributed equally to the recommendation statement.

Conflict of Interest Disclosures: Authors followed the policy regarding conflicts of interest described at <https://www.uspreventiveservicestaskforce.org/Page/Name/conflict-of-interest-disclosures>. All members of the USPSTF receive travel reimbursement and an honorarium for participating in USPSTF meetings. Dr Barry reported receiving grants and personal fees from Healthwise.

Funding/Support: The USPSTF is an independent, voluntary body. The US Congress mandates that the Agency for Healthcare Research and Quality (AHRQ) support the operations of the USPSTF.

Role of the Funder/Sponsor: AHRQ staff assisted in the following: development and review of the research plan, commission of the systematic evidence review from an Evidence-based Practice Center, coordination of expert review and public comment of the draft evidence report and draft recommendation statement, and the writing and preparation of the final recommendation statement and its submission for publication. AHRQ staff had no role in the approval of the final recommendation statement or the decision to submit for publication.

Disclaimer: Recommendations made by the USPSTF are independent of the US government. They should not be construed as an official position of AHRQ or the US Department of Health and Human Services.

Additional Contributions: We thank Tina Fan, MD, MPH (AHRQ), who contributed to the writing of the manuscript, and Lisa Nicoletta, MA (AHRQ), who assisted with coordination and editing.

Additional Information: The USPSTF makes recommendations about the effectiveness of specific preventive care services for patients without obvious related signs or symptoms. It bases its recommendations on the evidence of both the benefits and harms of the service and an assessment of the balance. The USPSTF does not consider the costs of providing a service in this assessment. The USPSTF recognizes that clinical decisions involve more considerations than evidence alone. Clinicians should understand the evidence but individualize decision-making to the specific patient or situation. Similarly, the USPSTF notes that policy and coverage decisions involve considerations in addition to the evidence of clinical benefits and harms.

REFERENCES

1. US Department of Health and Human Services. *The Health Consequences of Smoking: 50 Years of Progress: A Report of the Surgeon General*. US 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; 2014.
2. Key Substance Use and Mental Health Indicators in the United States. Results from the 2018 National Survey on Drug Use and Health. Substance Abuse and Mental Health Services Administration. Published 2019. Accessed March 17, 2020. <https://www.samhsa.gov/data/sites/default/files/cbhsq-reports/NSDUHNationalFindingsReport2018/NSDUHNationalFindingsReport2018.pdf>
3. Singh T, Arrazola RA, Corey CG, et al. Tobacco use among middle and high school students—United States, 2011–2015. *MMWR Morb Mortal Wkly Rep*. 2016;65(14):361–367. doi:10.15585/mmwr.mm6514a1
4. National Center for HIV/AIDS. Vital Hepatitis, STD, and TB. Trends in the prevalence of tobacco use: national YRBS: 1991–2017. Centers for Disease Control and Prevention. Accessed June 5, 2019. https://www.cdc.gov/healthyouth/data/yrebs/pdf/trends/2017_tobacco_trend_yrebs.pdf
5. US Department of Health and Human Services. *E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General*. Office of the Surgeon General; 2016.
6. Cullen KA, Ambrose BK, Gentzke AS, Apelberg BJ, Jamal A, King BA. Notes from the field: use of electronic cigarettes and any tobacco product among middle and high school students—United States, 2011–2018. *MMWR Morb Mortal Wkly Rep*. 2018;67(45):1276–1277. doi:10.15585/mmwr.mm6745a5

7. Wang TW, Gentzke AS, Creamer MR, et al. Tobacco product use and associated factors among middle and high school students—United States, 2019. *MMWR Surveill Summ*. 2019;68(12):1–22. doi:10.15585/mmwr.ss6812a1
8. Marynak KL, Gammon DG, Rogers T, Coats EM, Singh T, King BA. Sales of nicotine-containing electronic cigarette products: United States, 2015. *Am J Public Health*. 2017;107(5):702–705. doi:10.2105/AJPH.2017.303660
9. National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Population Health and Public Health Practice; Committee on the Review of the Health Effects of Electronic Nicotine Delivery Systems. *Public Health Consequences of E-Cigarettes*. National Academies Press; 2018.
10. Goriounova NA, Mansvelder HD. Short- and long-term consequences of nicotine exposure during adolescence for prefrontal cortex neuronal network function. *Cold Spring Harb Perspect Med*. 2012;2(12):a012120. doi:10.1101/cshperspect.a012120
11. Musso F, Bettermann F, Vucurevic G, Stoeter P, Konrad A, Winterer G. Smoking impacts on prefrontal attentional network function in young adult brains. *Psychopharmacology (Berl)*. 2007;191(1):159–169. doi:10.1007/s00213-006-0499-8
12. Outbreak of lung injury associated with the use of e-cigarette, or vaping, products. Centers for Disease Control and Prevention. Updated February 25, 2020. Accessed March 17, 2020. https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html?_cid=osh-stu-home-spotlight-006#cdc-recommends
13. US Preventive Services Task Force. Procedure Manual. Published 2018. Accessed March 17, 2020. <https://www.uspreventiveservicestaskforce.org/Page/Name/procedure-manual>
14. Selph S, Patnode C, Bailey S, et al *Primary Care Relevant Interventions for Tobacco and Nicotine Use Prevention and Cessation in Children and Adolescents: A Systematic Review for the U.S. Preventive Services Task Force: Evidence Synthesis No. 185*. Agency for Healthcare Research and Quality; 2020. AHRQ publication 19-05254-EF-1.
15. Selph S, Patnode C, Bailey SR, Pappas M, Stoner R, Chou R. Primary care-relevant interventions for tobacco and nicotine use prevention and cessation in children and adolescents: updated evidence report and systematic review for the US Preventive Services Task Force. *JAMA*. Published April 28, 2020. doi:10.1001/jama.2020.3332
16. Siu AL; US Preventive Services Task Force. Behavioral and pharmacotherapy interventions for tobacco smoking cessation in adults, including pregnant women: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2015;163(8):622–634. doi:10.7326/M15-2023
17. Recreational vaping 101: what is vaping? Center on Addiction. Published October 2018. Accessed June 5, 2019. <https://www.centeronaddiction.org/e-cigarettes/recreational-vaping/what-vaping>
18. Johnston LD, Miech RA, O'Malley PM, Bachman JG, Schulenberg JE, Patrick ME. *Monitoring the*

Future: National Survey Results on Drug Use 1975-2018: 2018 Overview: Key Findings on Adolescent Drug Use. Institute for Social Research, University of Michigan; 2019. doi:10.3998/2027.42/150621

19. Office of Adolescent Health. Adolescents and tobacco: risk and protective factors. US Department of Health and Human Services. Published April 8, 2019. Accessed June 5, 2019. <https://www.hhs.gov/ash/oah/adolescent-development/substance-use/drugs/tobacco/risk-and-protective-factors/index.html>
20. Hovell MF, Slymen DJ, Jones JA, et al. An adolescent tobacco-use prevention trial in orthodontic offices. *Am J Public Health*. 1996;86(12):1760-1766. doi:10.2105/AJPH.86.12.1760
21. Hollis JF, Polen MR, Whitlock EP, et al. Teen reach: outcomes from a randomized, controlled trial of a tobacco reduction program for teens seen in primary medical care. *Pediatrics*. 2005;115(4):981-989. doi:10.1542/peds.2004-0981
22. Bauman KE, Foshee VA, Ennett ST, et al. The influence of a family program on adolescent tobacco and alcohol use. *Am J Public Health*. 2001;91(4):604-610. doi:10.2105/AJPH.91.4.604
23. Ausems M, Mesters I, van Breukelen G, De Vries H. Short-term effects of a randomized computer-based out-of-school smoking prevention trial aimed at elementary schoolchildren. *Prev Med*. 2002;34(6):581-589. doi:10.1006/pmed.2002.1021
24. Curry SJ, Hollis J, Bush T, et al. A randomized trial of a family-based smoking prevention intervention in managed care. *Prev Med*. 2003;37(6, pt 1):617-626. doi:10.1016/j.jpmed.2003.09.015
25. Fidler W, Lambert TW. A prescription for health: a primary care based intervention to maintain the non-smoking status of young people. *Tob Control*. 2001;10(1):23-26. doi:10.1136/tc.10.1.23
26. Hiemstra M, Ringlever L, Otten R, van Schayck OC, Jackson C, Engels RC. Long-term effects of a home-based smoking prevention program on smoking initiation: a cluster randomized controlled trial. *Prev Med*. 2014;60:65-70. doi:10.1016/j.jpmed.2013.12.012
27. Jackson C, Dickinson D. Enabling parents who smoke to prevent their children from initiating smoking: results from a 3-year intervention evaluation. *Arch Pediatr Adolesc Med*. 2006;160(1):56-62. doi:10.1001/archpedi.160.1.56
28. Schuck K, Otten R, Kleinjan M, Bricker JB, Engels RC. Promoting smoking cessation among parents: effects on smoking-related cognitions and smoking initiation in children. *Addict Behav*. 2015;40:66-72. doi:10.1016/j.addbeh.2014.09.002
29. Pbert L, Flint AJ, Fletcher KE, Young MH, Druker S, DiFranza JR. Effect of a pediatric practice-based smoking prevention and cessation intervention for adolescents: a randomized, controlled trial. *Pediatrics*. 2008;121(4):e738-e747. doi:10.1542/peds.2007-1029
30. Lando HA, Hennrikus D, Boyle R, Lazovich D, Stafne E, Rindal B. Promoting tobacco abstinence among older adolescents in dental clinics. *J Smok Cessat*. 2007;2(1):23-30. doi:10.1375/jsc.2.1.23

31. Redding CA, Prochaska JO, Armstrong K, et al. Randomized trial outcomes of a TTM-tailored condom use and smoking intervention in urban adolescent females. *Health Educ Res*. 2015;30(1):162-178. doi:10.1093/her/cyu015
32. Haggerty KP, Skinner ML, MacKenzie EP, Catalano RF. A randomized trial of Parents Who Care: effects on key outcomes at 24-month follow-up. *Prev Sci*. 2007;8(4):249-260. doi:10.1007/s11211-007-0077-2
33. Cremers HP, Mercken L, Candel M, de Vries H, Oenema A. A Web-based, computer-tailored smoking prevention program to prevent children from starting to smoke after transferring to secondary school: randomized controlled trial. *J Med Internet Res*. 2015;17(3):e59. doi:10.2196/jmir.3794
34. Hoffmann TC, Glasziou PP, Boutron I, et al. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. *BMJ*. 2014;348:g1687. doi:10.1136/bmj.g1687
35. Moyer VA; US Preventive Services Task Force. Primary care behavioral interventions to reduce illicit drug and nonmedical pharmaceutical use in children and adolescents: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2014;160(9):634-639. doi:10.7326/M14-0334
36. US Department of Health and Human Services. *Preventing Tobacco Use Among Youth and Young Adults: A Report of the Surgeon General*. Centers for Disease Control and Prevention; 2012.
37. CHANTIX (varenicline tartrate) prescribing information. Pfizer. Published 2018. Accessed June 5, 2019. <https://www.pfizermedicalinformation.com/en-us/chantix>
38. Scherphof CS, van den Eijnden RJ, Engels RC, Vollebergh WA. Short-term efficacy of nicotine replacement therapy for smoking cessation in adolescents: a randomized controlled trial. *J Subst Abuse Treat*. 2014;46(2):120-127. doi:10.1016/j.jsat.2013.08.008
39. WELLBUTRIN (bupropion hydrochloride) prescribing information. US Food and Drug Administration. Published 2017. Accessed June 5, 2019. https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/018644s053lbl.pdf
40. Collins L, Smiley SL, Moore RA, Graham AL, Villanti AC. Physician tobacco screening and advice to quit among U.S. adolescents—National Survey on Drug Use and Health, 2013. *Tob Induc Dis*. 2017;15:2. doi:10.1186/s12971-016-0107-6
41. Dai H, Clements M. Trends in healthcare provider advice on youth tobacco use, 2011-2015. *Am J Prev Med*. 2018;55(2):222-230. doi:10.1016/j.amepre.2018.04.015
42. Moyer VA; US Preventive Services Task Force. Primary care interventions to prevent tobacco use in children and adolescents: U.S. Preventive Services Task Force recommendation statement. *Pediatrics*. 2013;132(3):560-565. doi:10.1542/peds.2013-2079
43. Colby SM, Monti PM, O'Leary Tevyaw T, et al. Brief motivational intervention for adolescent

- smokers in medical settings. *Addict Behav*. 2005;30(5):865-874. doi:10.1016/j.addbeh.2004.10.001
44. Killen JD, Robinson TN, Ammerman S, et al. Randomized clinical trial of the efficacy of bupropion combined with nicotine patch in the treatment of adolescent smokers. *J Consult Clin Psychol*. 2004;72(4):729-735. doi:10.1037/0022-006X.72.4.729
45. Muramoto ML, Leischow SJ, Sherrill D, Matthews E, Strayer LJ. Randomized, double-blind, placebo-controlled trial of 2 dosages of sustained-release bupropion for adolescent smoking cessation. *Arch Pediatr Adolesc Med*. 2007;161(11):1068-1074. doi:10.1001/archpedi.161.11.1068
46. Scherphof CS, van den Eijnden RJ, Engels RC, Vollebergh WA. Long-term efficacy of nicotine replacement therapy for smoking cessation in adolescents: a randomized controlled trial. *Drug Alcohol Depend*. 2014;140:217-220. doi:10.1016/j.drugalcdep.2014.04.007
47. Gray KM, Baker NL, McClure EA, et al. Efficacy and safety of varenicline for adolescent smoking cessation: a randomized clinical trial. *JAMA Pediatr*. Published online October 14, 2019. doi:10.1001/jamapediatrics.2019.3553
48. Pfizer. Smoking cessation study in healthy adolescent smokers [NCT01312909]. ClinicalTrials.gov. Accessed March 20, 2020. <https://clinicaltrials.gov/ct2/show/NCT01312909>
49. Pfizer reports top-line results from a study of Chantix®/Champix® (varenicline) in adolescent smokers [press release]. Pfizer. Published March 23, 2018. Accessed June 5, 2019. <https://www.pfizer.com/news/press-release/press-release-detail/pfizer-reports-top-line-results-from-a-study-of-chantix-champix-varenicline-in-adolescent-smokers>
50. Gray KM, Carpenter MJ, Baker NL, et al. Bupropion SR and contingency management for adolescent smoking cessation. *J Subst Abuse Treat*. 2011;40(1):77-86. doi:10.1016/j.jsat.2010.08.010
51. Farber HJ, Walley SC, Groner JA, Nelson KE; Section on Tobacco Control. Clinical practice policy to protect children from tobacco, nicotine, and tobacco smoke. *Pediatrics*. 2015;136(5):1008-1017. doi:10.1542/peds.2015-3110
52. Walley SC, Jensen BP; Section on Tobacco Control. Electronic nicotine delivery systems. *Pediatrics*. 2015;136(5):1018-1026. doi:10.1542/peds.2015-3222
53. US Department of Health and Human Services. *Smoking Cessation: A Report of the Surgeon General*. US 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; 2020.
54. Clinical preventive service recommendation: tobacco use in children and adolescents. American Academy of Family Physicians. Accessed June 5, 2019. <https://www.aafp.org/patient-care/clinical-recommendations/all/tobacco-use-children.html>