

Annotated Bibliography on Youth Tobacco Cessation Strategies

Background

Although conventional cigarette use has declined among youth in the United States, youth tobacco use via electronic nicotine delivery systems (ENDS) is rapidly increasing. ENDS include e-cigarettes and, most commonly, JUUL devices¹. It is often referred to as vaping. According to the National Youth Tobacco Survey (NYTS), from 2011 to 2018, ENDS use increased from 1.5 percent to almost 21 percent among high school seniors.² Preliminary data from the 2019 NYTS indicates 27.5 percent of high school students reporting using ENDS.³ By contrast, in 2018, 8.1 percent of high school students used conventional cigarettes.⁴ From 2017 to 2018 the prevalence of e-cigarette use increased 77.8 percent among high school students and 48.5 percent among middle school students. The one-year increase in the prevalence of nicotine vaping translates into approximately 1.3 million additional adolescents who vaped in 2018, as compared with 2017.⁵

Among studies of dual users, current e-cigarette use was negatively associated with an intention to quit cigarette smoking for good and with attempts to quit cigarette smoking in the past 12 months. Current e-cigarette users were less likely than those who only smoked cigarettes to have ever abstained from cigarette smoking for six months and to have used any kind of aid for smoking cessation.⁶

In December 2018, U.S. Surgeon General Jerome Adams issued an advisory declaring e-cigarette use among youth an epidemic in the United States.⁷ The surgeon general called on parents, teachers, health professionals, states, communities, tribes, and territories to play a role in addressing this epidemic.

To address a growing demand for resources and support, a literature review of both peer reviewed journals and grey literature on cessation strategies directed specifically at youth was written.

Methodology

The analysis started with the United States Preventive Services Task Force (USPSTF) Draft Recommendation Statement *Prevention and Cessation of Tobacco Use in Children and Adolescents: Primary Care Interventions* issued in June 2019. The articles cited in the Supporting Evidence and Reference sections were filtered for cessation components and re-reviewed. Because the USPSTF research focused specifically on Primary Care Interventions, these resources were supplemented with an additional search with broader terms and articles published since the conclusion of the USPSTF review in September 2018.

- Time period: September 2012 – June 2019
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- Terms:
 - Smoking, tobacco use, nicotine
 - ENDS, JUUL, e-cigarettes, vaping, smokeless tobacco, chew, cigarettes, hookah, pipes
 - Tobacco use disorder, nicotine addiction
 - Tobacco cessation, smoking cessation, quitting
 - Youth, children, adolescents
 - Treatment terms: screening, advised, readiness to quit, counseling, brief counseling, 5 A's, quitline (one word or two), social media (texting, Facebook, Snapchat, apps)
 - Pharmacotherapy: Chantix, Wellbutrin, bupropion, nicotine replacement therapy
 - Target of intervention: People 18 and under: Children, youth, adolescents, young adults, parents

This yielded additional sources, including a number from grey literature, some presentations at academic conferences and surveys. In addition, bibliographies from reviewed studies were searched to identify additional sources. The updated search provided information on interventions using a range of non-primary care based methodologies including several forms of social media and in multiple locations (e.g., schools, dental clinics).

In total 63 articles were reviewed.

- 29 articles were summarized.
- 23 articles were reviewed, nine of which were briefly summarized, that did not have a specific intervention.
- Eight articles were reviewed that were not specific to tobacco cessation in adolescents.

Issues Identified

Many of the studies identified common barriers to efforts to assess youth cessation strategies. Recruitment was a challenge for many with several studies not able to generate the power originally anticipated. Another barrier was retention with many of the studies finding it difficult to maintain a sufficient cohort for the duration of the study to yield valid results. Finally, compliance with the intervention was very inconsistent, particularly for the pharmacotherapy studies. Several noted that although these are often barriers in research studies, it was markedly more pronounced in youth and adolescent studies than adult studies.

Summary of Findings

The literature review is divided into four sections:

1. Cessation: Counseling
 - a. Telephone or in-person counseling
 - b. Digital
2. Cessation: Pharmacotherapy
 - a. Nicotine Replacement Therapy (Gum, Patch, Lozenge, Nasal spray, Oral inhaler)

- b. Bupropion
- c. Varenicline
- 3. Prevention and Brief Intervention
- 4. Interventions not Focused on Counseling or Pharmacotherapy

In many instances an intervention covered more than one of the approaches identified above. In those cases, the findings and summary are listed under the main intervention and tagged with additional key words. What follows is a summary of the United States Preventive Services Task Force (USPSTF) Draft Recommendation Statement *Prevention and Cessation of Tobacco Use in Children and Adolescents: Primary Care Interventions* as well as a high-level overview of each of the four sections of the literature review. A summary of each of the final reviewed articles follows the overview, including information on the presence of a control group, demographics, nature of intervention, duration of intervention, setting and documented outcomes.

USPSTF Draft Conclusions with Respect to Primary-Care Based Cessation Interventions

The USPSTF was not able to identify behavioral counseling interventions that had a statistically significant impact on youth cessation rates. Nor did it find any harm associated with behavioral counseling interventions.

The medication trials that the USPSTF assessed did not demonstrate that medications improve cessation rates. The USPSTF found the evidence on harms from medications for tobacco cessation in youth to be inadequate. Issues were reported but no serious harms were identified.

Counseling Interventions

Traditional Counseling (in-person or telephonic)

Four studies assessed the impact of counseling on smoking cessation or reduction in smoking levels. One showed a small impact of motivational interviewing in reducing smoking levels (Colby et al., 2012). Another demonstrated no impact on cessation or the number of cigarettes used (Robling et al., 2016). A third showed a reduction in number of cigarettes at 3-months but no impact at 12-months (Pbert et al., 2011). A fourth showed a high rate of short-term abstinence at seven-days but no differences at one-month or three-month follow up appointments (Krishnan-Sarin et al., 2013).

Digital Interventions

Five studies assessed texting for counseling-type interventions. The impact of digital interventions showed no consistently positive outcomes but did demonstrate some positive outcomes upon which to build. A population-based intervention with no control group demonstrated reduced use with stronger point prevalence abstinence at 7-days than 30-days (Graham et al., 2019). Two different digital programs that did have a control showed no significant impact on cessation but demonstrated statistically lower cigarette consumption (Haug et al., 2013 and Mason et al., 2015). Showing more positive results, a study differentiating between youth who opted to participate in text messaging, thereby receiving tailored messages, demonstrated higher abstinence than those receiving general text messages (Skov-Ettrup et al., 2014). Likewise, a more multi-dimensional text-based study found the treatment group had reduced odds of smoking at all time points in the study, including 6-months post intervention and that the texting was able to mitigate the influence of high tobacco density in an urban neighborhood (Mason et al., 2016).

A tailored transtheoretical model intervention using an interactive multi-media computer delivered expert system showed no impact on prevention or cessation (Redding et al., 2015). But a study assessing the impact of a brief computer-assisted intervention demonstrated an increase in cessation rates (Hollis et al., 2005).

A randomized controlled trial assessing a Facebook group with tailored interventions did not demonstrate improved abstinence compared to referral to a smoking cessation website over one year but did demonstrate increased abstinence at the end of the treatment period (Ramo et al., 2018).

Pharmacotherapy Interventions

Nicotine Replacement Therapy (NRT)

All four of the studies demonstrated a statistically significant impact on abstinence in the short-term but none were able to maintain a significant impact over a longer period of time.

- Scherphof et al., 2014 (one article on six-month abstinence and one on 12-month): positive impact at two weeks i none at six months or 12 months. Highly compliant participants showed significant increases in abstinence at six months but not at 12 months.
- Swanson et al., 2013: Showed an ongoing impact in lower reported number of cigarettes smoked compared to baseline.

Bupropion

Similar to NRT, four studies on the impact of bupropion were able to demonstrate a short-term impact on cessation but not a long-term impact. Bupropion doses of 150 mg/day were less impactful than 300mg/day and bupropion in addition to NRT patch had no impact on abstinence.

- Muramoto et al., 2007: higher abstinence at 6 weeks (end of treatment), but not sustained after treatment ended.
- Killen et al., 2004: participants who abstained with a combination of NRT and bupropion returned to smoking more quickly than adults at Week 26.

Varenicline

Two studies on the impact of varenicline on abstinence rates both indicate that varenicline did not perform better than placebo among adolescents.

Prevention and Brief Intervention for Cessation

Four studies addressed both prevention and cessation. Consistent with prior USPSTF findings and the current USPSTF Recommendation, several studies demonstrated a positive impact on prevention of tobacco use, but none demonstrated a long-term impact on cessation. Like the cessation-only studies, cessation showed a significant short-term impact but not long-term.

Two studies using dental visits to promote prevention and cessation found no short term or long-term impact on either prevention or cessation (Kentala et al., 1999 and Saari et al., 2012).

A study assessing the impact of a brief computer-assisted intervention demonstrated no impact on prevention but did increase the cessation rate (Hollis et al., 2005).

Interventions not Focused on Counseling or Pharmacotherapy

A study assessing the impact of a social branding and media campaign found that tobacco use dropped after one year; among those who understood the smokefree message, the highest level of campaign exposure was significantly associated with 37 percent to 48 percent lower odds for current smoking (Fallin et al., 2015).

Three studies used longitudinal data sets to document the strength of the e-cigarettes niche with youth users as desired product rather than as a tool for cessation.

- Cantrell et al., 2019: Based on youth behavior when prices of cigarettes and e-cigarettes are raised, e-cigarettes may be a substitute for cigarettes, but cigarettes do not appear to be a substitute for e-cigarettes.
- Lippert et al., 2015: Adolescents do not use e-cigarettes as a cessation aid, but rather use them in conjunction with cigarettes.
- Seo et al., 2016: E-cigarette use among U.S. youth is associated with intention to smoke but not with intention to quit smoking.

Articles summarized

Counseling Interventions

Traditional Counseling (in-person or telephonic)

1. Colby, S. M., Nargiso, J., Tevyaw, T. O., Barnett, N. P., Metrik, J., Lewander, W., ... Monti, P. M. (2012). Enhanced motivational interviewing versus brief advice for adolescent smoking cessation: results from a randomized clinical trial. *Addictive Behaviors*, 37(7), 817–823.

<https://doi.org/10.1016/j.addbeh.2012.03.011>

- **Presence of control group** – Yes; patients randomly assigned to receive one session of motivational interviewing or standardized brief advice to quit smoking.
- **Demographics** – Recruitment took place in an emergency department (ED) and an adolescent outpatient clinic at an urban hospital in the Northeast. Patients were eligible if they were 12-19 years old and reported daily smoking for the prior 30 days. Patients were not seeking treatment for smoking. Patients who did not speak English, reported suicidal/homicidal ideation, or suffered serious traumatic injury were excluded.
- **Nature of intervention (e.g., phone, print, text)** – After recruitment, patients were informed via telephone and a consent form was sent. Baseline appointments were required within two weeks of the clinic or ED visit. Patients completed questionnaires for 30 minutes and were randomly assigned motivational interviewing (MI) or brief advice (BA). BA was administered in about five minutes and MI in 35 minutes. Patients received a \$10 retail gift certificate for completion.
 - Brief advice was consistent with guidelines, included a pamphlet on quitting and a list of local treatment referrals. These patients received a call after one week to remind them of the follow up appointment.
 - Motivational interviewing explored the pros and cons of smoking, quitting, personalized information on health effects, dependence level and financial costs, and formulated an action plan and strategies for coping with withdrawal. These patients received a phone call after one week that lasted 15-20 minutes, and reinforced progress, coping and problem-solving.
 - One, three and six month follow ups for both groups were in person and included gift certificates.
 - Parents of minors received a telephone assessment at one-, three- and six months.
- **Duration of intervention** – Follow up assessments were conducted at one-, three- and six-months post-intervention.
- **Setting (e.g., primary care physician, school)** – Recruitment was in an emergency department and adolescent outpatient clinic.
- **Documented outcomes** – Self-reported data indicated that seven-day abstinence rates at six-month follow up were significantly higher in the MI group than the BA group, but this difference was not confirmed biochemically. Self-reported smoking rate (average cigarettes per day) was significantly lower at one-, three- and six months follow up than it was at baseline. Cotinine levels indicated reduced smoking

- for both groups at six months, but not at one-month. At three-month follow up, only those in MI showed cotinine levels that were significantly reduced compared to baseline. Findings offer some support for MI for smoking reduction among non-treatment seeking adolescents, but overall changes in smoking were small.
- **Tags** – Brief Advice, Emergency Department, Motivational Interviewing, Outpatient Clinic.
2. Krishnan-Sarin, S., Cavallo, D. A., Cooney, J. L., Schepis, T. S., Kong, G., Liss, T. B., ... Carroll, K. M. (2013). An exploratory randomized controlled trial of a novel high-school-based smoking cessation intervention for adolescent smokers using abstinence-contingent incentives and cognitive behavioral therapy. *Drug and Alcohol Dependence*, 132(1-2), 346-351. <https://doi.org/10.1016/j.drugalcdep.2013.03.002>
- **Presence of control group** – Randomized controlled trial.
 - **Demographics** – 106 adolescents, ages 14-18, who were regular smokers and had no other substance use or medical condition or suicidal/homicidal risk.
 - **Nature of intervention** – All adolescents scheduled a quit date and received a 45 minute “preparation to quit” session four to seven days prior. They were randomly assigned to:
 - Cognitive Behavioral Therapy (CBT) alone – participants had weekly 30-minute CBT sessions starting on their quit day and continuous weekly for the remaining treatment period
 - Contingency Management (CM) alone – Appointments to monitor and reinforce abstinence initiated on the quit day and once daily in the first two weeks then once every other day in the third and fourth week. Appointments were ten minutes and included payment for assessments that demonstrated abstinence.
 - CBT+CM – both sessions included.
 - **Duration of intervention** – Four weeks of treatment with three month follow up during academic years 2008-2009 and 2009-2010.
 - **Setting** – High school in CT.
 - **Documented outcomes** – Incentive-based smoking cessation interventions produce high rates of short-term abstinence among adolescent smokers. Rates on seven-day point prevalence abstinence were higher for CM+CBT (36.7 percent) and CM (43 percent) compared with CBT (0 percent). No significant differences were seen at one month and three month follow up appointments.
 - **Tags** – High school, Cognitive Behavioral Therapy, Contingency Management, Incentives.
3. Pbert, L., Druker, S., DiFranza, J. R., Gorak, D., Reed, G., Magner, R., ... Osganian, S. (2011). Effectiveness of a school nurse-delivered smoking-cessation intervention for adolescents. *Pediatrics*, 128(5), 926-936. <https://doi.org/10.1542/peds.2011-0520>
- **Presence of control group** – Randomized control trial.
 - **Demographics** – Male and female high school students from 35 public high schools in Massachusetts. Requirements included smoking within the past 30 days and reported interest in quitting in the next two weeks.

- **Nature of intervention** – School nurse administered one of two interventions: half received four counseling visits with the five A's and cognitive behavioral techniques. Half received four visits with informational material and questions regarding smoking status and efforts at quitting.
 - **Duration of intervention** – Intervention lasted one month, with assessments at three months and 12 months.
 - **Setting** – School.
 - **Documented outcomes** – Results were significant for reductions in the number of cigarettes and the number of days smoked in the previous seven days at three months. No intervention effect on the number of cigarettes and the number of days smoked at 12 months. Intervention effect driven entirely by male participants, who were three times more likely to be abstinent at three months than female participants.
 - **Tags** – Cognitive Behavioral Therapy, Five As, School nurse.
4. Robling, M., Bekkers, M. J., Bell, K., Butler, C. C., Cannings-John, R., Channon, S., ... Torgerson, D. (2016). Effectiveness of a nurse-led intensive home-visitation programme for first-time teenage mothers (Building Blocks): a pragmatic randomised controlled trial. *Lancet (London, England)*, 387(10014), 146–155. [https://doi.org/10.1016/S0140-6736\(15\)00392-X](https://doi.org/10.1016/S0140-6736(15)00392-X)
- **Presence of control group** – Randomized control trial.
 - **Demographics** – English pregnant females aged 19 years or younger, less than 25 weeks' gestation, nulliparous.
 - **Nature of intervention** – Participants received the Family Nurse Partnership (FNP) intervention plus usual care (universally offered screening, education, immunization, and support from birth to the child's second birthday) or just usual care. FNP involves up to 64 structured home visits by family nurses. FNP was adapted under license for delivery in England from early pregnancy until children were two years old. FNP aims to affect risks and protective factors within prenatal health-related behaviors, sensitive and competent caregiving, and early parental life course. Core specialist training for nurses includes motivational interviewing and the adoption of a guiding autonomy-supportive communication style with clients.
 - **Duration of intervention** – All follow-up data were collected over several timepoints: six-, 12-, 18-, and 24 months.
 - **Setting** – Community midwifery settings in England.
 - **Documented outcomes** – FNP provided no additional reduction in smoking at late pregnancy. Reported number of cigarettes smoked per day at late pregnancy did not differ.
 - **Tags** – England, Family Nurse Partnership (FNP), Pregnant.

Counseling - Digital Interventions

5. Graham, A. L., Jacobs, M. A., & Amato, M. S. (2019). Engagement and 3-month outcomes from a digital e-cigarette cessation program in a cohort of 27,000 teens and young adults. *Nicotine & Tobacco Research*. <https://doi.org/10.1093/ntr/ntz097>
- **Presence of control group** – Population based assessment of intervention, no control-group.

- **Demographics** – One version structured for teens (ages 13-17) and one for young adults (ages 18-24).
 - **Nature of intervention** – Intervention assessed engagement and initial outcomes for a digital, free quit vaping program. Texting interventions developed in accordance with the Mayo Clinic 5-E Model of Wellness Coaching, national cessation treatment guidelines and qualitative research and social media observations of youth e-cigarette users.
 - **Duration of intervention** – Varied; teens set quit date and received texts for 30 additional days.
 - **Setting** – Program promoted through earned media and organic social media.
 - **Documented outcomes** – Results include: 36.9 percent response rate at 14-days; 21.0 percent at 90-days. 60.8 percent of respondents indicated reduced or quit use of e-cigarettes. At 90-days, seven-day point prevalence abstinence (ppa) was 24.7 percent and 30-day ppa was 15.5 percent.
 - **Tags** – Digital, Text-based, Vaping.
6. Haug, S., Schaub, M. P., Venzin, V., Meyer, C., & John, U. (2013). Efficacy of a text message-based smoking cessation intervention for young people: a cluster randomized controlled trial. *Journal of Medical Internet Research*, 15(8), e171. <https://doi.org/10.2196/jmir.2636>
- **Presence of control group** – Two-arm cluster randomized controlled trial using school class as the randomization unit.
 - **Demographics** – 2,638 students in 178 vocational school classes in Switzerland participated in the online screening; 1,012 met inclusion criteria and 755 participated. Inclusion criteria were daily or occasional cigarette smoking (at least four cigarettes in the preceding month and at least one cigarette the preceding week) and ownership of a mobile phone.
 - **Nature of intervention** – Text messages tailored to demographics and smoking-related variables were sent to participants in the intervention group at least three times per week. Participants were reimbursed for responding to weekly text message assessments and at the six-month follow up.
 - **Duration of intervention** – Text messages were sent over a period of three months. A follow up assessment was performed six months later.
 - **Setting** – Recruitment took place in vocational schools.
 - **Documented outcomes** – The seven-day smoking abstinence at follow up was 12.5 percent in the intervention group and 9.5 percent in the control group (no significant intervention effect). No difference between the study groups was observed in four-week point prevalence abstinence rates. The intervention did not have statistically significant short-term effects on smoking cessation; however, it resulted in statistically significant lower cigarette consumption.
 - **Tags** – Switzerland, Text-based, Vocational school.
7. Mason, M. J., Campbell, L., Way, T., Keyser-Marcus, L., Benotsch, E., Mennis, J., ... Stemberge, D. R. (2015). Development and Outcomes of a Text Messaging Tobacco Cessation Intervention with Urban Adolescents. *Substance Abuse*, 36(4), 500–506. <https://doi.org/10.1080/08897077.2014.987946>

- **Presence of control group** – Randomized, controlled trial.
- **Demographics** – 72 tobacco dependent adolescents ranging from 14 to 18 years old (mean age 16.4); over two thirds reported living with a current smoker.
- **Nature of intervention** – Automated computer-texting (five-day texting protocol) delivering 30 motivational interviewing and social network counseling-based personalized messages or delivering messages on general non-smoking related health habits. All teens were provided smartphones for the study.
- **Duration of intervention** – Five days of texting plus one, three, and six-month follow up.
- **Setting** – Community substance abuse facility.
- **Documented outcomes** – At six months, the texting protocol decreased the number of cigarettes smoked in the past 30 days, increased intention not to smoke in the future and increased peer social support compared with controls.
- **Tags** – Mobile health, Mobile technology, Motivational Interviewing, Social Network, Substance abuse, Text, Urban.

8. Mason, M. J., Mennis, J., Zaharakis, N. M., & Way, T. (2016). The Dynamic Role of Urban Neighborhood Effects in a Text-Messaging Adolescent Smoking Intervention. *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, 18(5), 1039–1045. <https://doi.org/10.1093/ntr/ntv254>

- **Presence of control group** – Randomized controlled trial.
- **Demographics** – 197 primarily African Americans (90.5 percent) aged 14-18.
- **Nature of intervention** – Participants randomized into an automated texting intervention that 1) provided 30 personalized motivational-interviewing-based peer network counseling messages or 2) provided control intervention text messages covering general, nonsmoking related, health habits. Participants received Ecological Momentary Assessment (EMA) surveys every month for six months. Thursday – Sunday, and three EMAs per day for a total of 12/month or up to 72 over six months.
- **Duration of intervention** – Intervention lasted five days. Assessment at baseline, one, three, and six months post intervention. Participants received smartphone with unlimited access for the duration of the study.
- **Setting** – Richmond, Virginia.
- **Documented outcomes:**
 - The treatment group had reduced odds of smoking at all time points in the study.
 - The influence of high tobacco density on smoking is mitigated by the text-based intervention.
 - The text-based intervention reduced the association between smoking and perceived safety for approximately 50 percent of the time points relative to the control group.
 - The study demonstrated the feasibility of incorporating neighborhood effects into randomized control trials and considering time variance as a factor in cessation interventions.

- **Tags** – Ecological Momentary Assessment (EMA) methods, Text, Time Varying Effect Modeling (TVEM).
9. Ramo, D., Thrul, J., Delucchi, K., Hall, S., Ling, P., Belohlavek, A., & Prochaska, J. (2018). A Randomized Controlled Evaluation of the Tobacco Status Project, a Facebook Intervention for Young Adults. *Addiction*, 113. <https://doi.org/10.1111/add.14245>
- **Presence of control group** – Two-group randomized controlled trial comparing Tobacco Status Project (TSP) Facebook smoking cessation intervention with an online control.
 - **Demographics** – Young adult cigarette smokers (mean age 21 years).
 - **Nature of intervention** – TSP provided Facebook groups tailored to stages of change to quit smoking, daily contacts, weekly live counseling sessions, and for those ready to quit, six cognitive behavioral therapy sessions. Some TSP groups were assigned randomly to receive a monetary incentive for engagement.
 - **Duration of intervention** – Follow up at 12 months.
 - **Setting** – Online throughout the United States.
 - **Documented outcomes** – Compared with referral to a smoking cessation website, TSP did not improve abstinence from smoking over one year, but increased abstinence at the end of the treatment period.
 - **Tags** – Cognitive Behavioral Therapy Facebook, Online, Website.
10. Redding, C. A., Prochaska, J. O., Armstrong, K., Rossi, J. S., Hoeppe, B. B., Sun, X., ... Velicer, W. F. (2015). Randomized trial outcomes of a TTM-tailored condom use and smoking intervention in urban adolescent females. *Health Education Research*, 30(1), 162–178. <https://doi.org/10.1093/her/cyu015>
- **Presence of control group** – Randomized control trial.
 - **Demographics** – Females 14-17 years and nonpregnant who used an urban publicly funded family planning clinic in Philadelphia.
 - **Nature of intervention** – Participants received either a transtheoretical model (TTM) tailored intervention package coupled with stage-targeted in-person counseling to increase condom use and decrease smoking or standard care education and advice. TTM was delivered using an interactive multi-media computer delivered expert system.
 - **Duration of intervention** – Intervention occurred over nine months with the opportunity to return every three months (total of four possible sessions).
 - **Setting** – Family planning clinic.
 - **Documented outcomes** – There were no significant effects for smoking prevention or cessation.
 - **Tags** – Computer-based, Digital, Family planning clinic, Pregnant, Transtheoretical Model (TTM).
11. Skov-Ettrup, L. S., Ringgaard, L. W., Dalum, P., Flensburg-Madsen, T., Thygesen, L. C., & Tolstrup, J. S. (2014). Comparing tailored and untailored text messages for smoking cessation: a randomized controlled trial among adolescent and young adult smokers. *Health Education Research*, 29(2), 195–205. <https://doi.org/10.1093/her/cyt112>

- **Presence of control group** – Two-arm randomized controlled trial comparing two versions of xhale.dk, a cessation website targeting youth tobacco users.
- **Demographics** – Newly registered users of xhale.dk from February 2007 to August 2009 who were daily smokers, aged 15-25 years, had valid email address or mobile phone number and a self-chosen quit date between February 14, 2007 and August 1, 2009.
- **Nature of intervention** – xhale.dk provides facts about disadvantages of smoking and advantages of smoking cessation targeted at young smokers. Website includes tests, exercises, videos and a chat room, and participants can choose a weekly email informing them about program features and cessation information.
 - Users receiving untailed messages received texts once daily for five weeks beginning five days before chosen quit date. Included information about benefits of cessation in relation to health, well-being, economic impact of cessation, or tips to overcome difficult situations. Language and content carefully targeted to a young audience.
 - Participants receiving tailored messages got messages up to four weeks before their quit date and a daily message one to three days before the quit date. Then they received two tailored messages per day for four weeks. For the following four weeks, frequency declined to four to five messages per week. There were three types of tailored messages based on self-efficacy, beliefs about smoking and themes chosen by the user.
- **Duration of intervention** – Varied; teens set quit date and received texts for up to four weeks prior and four weeks after. Follow up was 12 months after quit date.
- **Setting** – Website users.
- **Documented outcomes** – No statistically significant differences in 30-day point abstinence. When restricting the analysis to participants who opted into text messages, there was higher abstinence in the group receiving tailored messages. In addition, routine self-efficacy predicted abstinence. There was high loss to follow up.
- **Tags** – Digital, Text-based, Website.

Pharmacotherapy

Nicotine Replacement Therapy

12. Jaszyna-Gasior, M., Schroeder, J. R., & Moolchan, E. T. (2007). Alcohol use and tobacco abstinence among adolescents in cessation treatment: preliminary findings. *Addictive Behaviors*, 32(3), 617–621. <https://doi.org/10.1016/j.addbeh.2006.05.009>

- **Presence of control group** – Randomized
- **Demographics** – Adolescent smokers age 13-17 interested in quitting, physically healthy with no untreated psychiatric problems (including dependence on alcohol or drugs other than nicotine). Sample was predominately female and Caucasian.
- **Nature of intervention** – All participants attended a 45-min cognitive behavioral group therapy session led by a trained social worker during each treatment visit. Participants were randomly assigned to:
 - i. Active gum/placebo patch
 - ii. Active patch/placebo gum
 - iii. Placebo patch/placebo gum

- **Duration of intervention** – 26 weeks.
- **Setting** – Study visits were held at an outpatient research facility.
- **Documented outcomes** – Alcohol use since previous visit was associated with lower tobacco abstinence.
- **Tags** – Alcohol use, Cognitive Behavioral Therapy, Outpatient clinic

13. Scherphof, C. S., van den Eijnden, R. J. J. M., Engels, R. C. M. E., & Vollebergh, W. A. M. (2014b). Short-term efficacy of nicotine replacement therapy for smoking cessation in adolescents: a randomized controlled trial. *Journal of Substance Abuse Treatment*, 46(2), 120–127. <https://doi.org/10.1016/j.jsat.2013.08.008>

- **Presence of control group** – Randomized double-blind placebo-controlled clinical trial to measure efficacy and safety of NRT in promoting end-of-treatment abstinence among adolescents and measure the impact of medication compliance on outcomes.
- **Demographics** – Participants, age 12-18, attended public secondary schools in the Netherlands. They smoked at least seven cigarettes a day and were motivated to quit.
- **Nature of intervention** – Intervention provided a six- or nine-week treatment of NRT or placebo patch.
- **Duration of intervention** – Duration was six or nine weeks based on baseline number of cigarettes smoked daily. Impact assessed at two weeks and six months post quit.
- **Documented outcomes** – Results included:
 - Two-week abstinence is positively impacted by NRT but not at end-of-treatment.
 - Highly compliant participants showed significant increases in end-of-treatment abstinence
 - No serious adverse events
- **Tags** – High School, Medication compliance, the Netherlands.

14. Scherphof, C. S., van den Eijnden, R. J. J. M., Engels, R. C. M. E., & Vollebergh, W. A. M. (2014a). Long-term efficacy of nicotine replacement therapy for smoking cessation in adolescents: a randomized controlled trial. *Drug and Alcohol Dependence*, 140, 217–220. <https://doi.org/10.1016/j.drugalcdep.2014.04.007>

- Same study as above – Results for long-term abstinence were similar to the short-term assessment in terms of no significant differences in abstinence at 12 months. The correlation between highly compliant participants and abstinence at 12 months was no longer present.

15. Swanson, A.-N., Shoptaw, S., Heinzerling, K. G., Wade, A. C., Worley, M., McCracken, J., ... London, E. D. (2013). Up in smoke? A preliminary open-label trial of nicotine replacement therapy and cognitive behavioral motivational enhancement for smoking cessation among youth in Los Angeles. *Substance Use & Misuse*, 48(14), 1553–1562. <https://doi.org/10.3109/10826084.2013.808218>

- **Presence of control group** – No.

- **Demographics** – 34 youths in Los Angeles, age 15-21 years, smoked at least five cigarettes daily, smoked for at least six months, score of 35 or more on the Cigarette Dependence Scale (CDS-12).
- **Nature of intervention** – Six weeks of once-weekly (~40 minutes) Cognitive Behavioral Motivational Enhancement (CBME) supplemented with four weeks of optional, open-label NRT. NRT provided in two-week batches. Biologic assessment of carbon monoxide levels.
- **Duration of intervention** – Six-week intervention with tracking at 12-, 16-, and 24-months after initiation of the study.
- **Setting** – Three outpatient clinics in the Los Angeles area (Santa Monica, Hollywood, and Westwood).
- **Documented outcomes** – Consistent with other studies in which impact declines significantly over time.
 - 76 percent opted for NRT. Statistically significant factor influencing NRT is quit attempt in last 30 days (less likely to accept NRT).
 - Retention in the intervention strongly associated with acceptance of NRT.
 - Week six, seven-day cessation rate was 31 percent with number of CBME sessions attended a significant predictor. Week 12 cessation rate of 24 percent; week 16, 17 percent; and week 24, nine percent.
 - Lower reported number of cigarettes smoked at all study points compared to baseline.
- **Tags** – Cognitive Behavioral Motivational Enhancement (CBME) therapy, Outpatient clinic.

Bupropion

16. Gray, K. M., Carpenter, M. J., Baker, N. L., Hartwell, K. J., Lewis, A. L., Hiott, D. W., ... Upadhyaya, H. P. (2011). Bupropion SR and contingency management for adolescent smoking cessation. *Journal of Substance Abuse Treatment*, 40(1), 77–86.
<https://doi.org/10.1016/j.jsat.2010.08.010>

- **Presence of control group** – Double-blind, placebo-controlled design.
- **Demographics** – Eligibility included 134 smokers 12-21 years old who smoked at least five cigarettes a day and were interested in quitting with a baseline urine cotinine. Also required:
 - Non-pregnant and using birth control
 - Lacked substance use disorders other than nicotine
 - No history of serious psychiatric or medical illness
 - No suicide attempts in the past year or suicide ideation in the last month
 - No history of seizures or eating disorders
 - Not taking pharmacotherapy currently for smoking cessation
- **Nature of intervention** – Intervention was a six-week course of bupropion and contingency management.
 - Contingency management (CM) included an escalating schedule of cash payments with resets upon abstinence, assessed twice weekly starting one week after medication initiation for a total of 11 payments (\$275 max) over six weeks.

- The pharmacotherapy was a six-week course and the final follow up was at 12 weeks.
- **Setting** – Recruitment took place at in person and via flyers at secondary schools, colleges, and universities, as well as via community media. Subjects were seen at the University Research Clinic or the high school health clinic.
- **Documented outcomes** – Primary outcome was 7-day cotinine verified point prevalence abstinence that was significantly superior to a placebo with CM or bupropion with non-CM behavioral therapy. In the short term, the combination therapy tripled the odds of abstinence during treatment.
- **Tags** – Contingency Management (CM), Research clinic, School clinic.

17. Killen, J. D., Robinson, T. N., Ammerman, S., Hayward, C., Rogers, J., Stone, C., ... Schatzberg, A. F. (2004). Randomized clinical trial of the efficacy of bupropion combined with nicotine patch in the treatment of adolescent smokers. *Journal of Consulting and Clinical Psychology, 72*(4), 729–735. <https://doi.org/10.1037/0022-006X.72.4.729>

- **Presence of control group** – Randomized clinical trial.
- **Demographics** – Male and female adolescents, age 14-17 years, from nine high schools in San Francisco Bay area, smoked more than ten cigarettes/day, smoked for at least six months, at least one previous quit attempt, and a score of ten or more on a modified version of the Fagerström Tolerance Questionnaire. Completion of a comprehensive history and physical exam, including assessment of past and current depression and current drug use, was required.
- **Nature of intervention** – All participants met weekly in group counseling sessions and all received a nicotine patch (NP) for eight weeks.
- **Duration of intervention** – Those taking bupropion 150 mg/day were provided nine weeks (one week prior to quit date through eight-week intervention).
- **Setting** – Participants were recruited from San Francisco area continuation high schools. Weekly group sessions were in unspecified location.
- **Documented outcomes** – Compliance was mixed with 29 percent using NP over at least five treatment weeks but 41 percent using all patches on only two treatment weeks or less. For bupropion group, 22 percent of participants used all pills on at least six treatment weeks and 44 percent used all pills on two treatment weeks or less.
 - The addition of bupropion to NP did not improve abstinence rates.
 - Attendance at sessions was not associated with reduced smoking but higher attendance plus use of more NP increased likelihood of abstinence. Those participants on bupropion who reported more patch use reported significantly lower levels of smoking during treatment.
 - Those who reported abstinence returned more quickly to smoking than adults at Week 26.
- **Tags** – Group counseling, High school, Nicotine patch.

18. Muramoto, M. L., Leischow, S. J., Sherrill, D., Matthews, E., & Strayer, L. J. (2007). Randomized, double-blind, placebo-controlled trial of 2 dosages of sustained-release bupropion for adolescent smoking cessation. *Archives of Pediatrics & Adolescent Medicine, 161*(11), 1068–1074. <https://doi.org/10.1001/archpedi.161.11.1068>

- **Presence of control group** – Randomized double-blind placebo-controlled trial.
- **Demographics** – Male and female adolescents in Tucson or Phoenix Arizona, age 14-17 years, smoked more than six cigarettes/day, had an exhaled carbon monoxide level of ten ppm or greater, at least two previous quit attempts, no current major psychiatric diagnosis.
- **Nature of intervention** – Sustained release bupropion of 150 mg/day or 300 mg/day or placebo for six weeks plus weekly brief individual counseling.
- **Duration of intervention** – Intervention lasted for seven weeks (six weeks of treatment, one-week post-treatment). Follow-up assessment at 12 weeks and 26 weeks after the target quit date.
- **Setting** – Not tied to provider location – recruited via TV and radio and flyers at bus stops, schools, shopping malls, music clubs and physician offices.
- **Documented outcomes** – No significant impact of 150 mg/day compared to placebo. Significantly higher quit rates for 300 mg/day at all times during treatment except weeks two and four. Significantly higher abstinence at end of treatment (week six) for 300 mg/day but no significant differences after week six. Cotinine-confirmed abstinence rates were more reliable than exhaled CO.
- **Tags** – Brief individual counseling, Cotinine-confirmed abstinence.

19. U.S. Food and Drug Administration (2017). WELLBUTRIN (bupropion hydrochloride) tablets. https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/018644s053lbl.pdf.

- **Presence of control group** – Placebo-controlled trials.
- **Demographics** – Children, adolescents and young adults (ages 18-24) with Major Depressive Disorder (MDD) and other psychiatric disorders.
- **Nature of intervention** – Use of antidepressant drugs.
- **Duration of intervention** – Short term.
- **Setting** – Not defined.
- **Documented outcomes** – Results indicate these drugs increase the risk of suicidal thinking and behavior in study population.
- **Tags** – Antidepressant, Major Depressive Disorder, Psychiatric disorder.

Varenicline

20. CHANTIX® (varenicline tartrate). Prescribing information.

<https://www.pfizermedicalinformation.com/en-us/chantix>.

- **Presence of control group** – Randomized, double-blind, placebo-controlled.
- **Demographics** – 312 patients aged 12-17 years who smoked an average of at least five cigarettes per day during the 30 days prior to recruitment, had a score of at least four on the Fagerström Test for Nicotine Dependence scale and at least one failed quit attempt.
- **Nature of intervention** – Randomized to one of two doses of varenicline, adjusted by weight to provide plasma levels in the efficacious range (based on adult study) and placebo, along with age appropriate counseling.
- **Duration of intervention** – Treatment for 12 weeks, followed by a non-treatment period of 40 weeks.
- **Setting (e.g., primary care physician, school)** – Not defined.

- **Documented outcomes** – Results from this study showed that varenicline, at either dose studied, did not improve continuous abstinence rates at weeks nine through 12 of treatment compared with placebo in subjects 12-19 years of age. The varenicline safety profile in the study was consistent with that observed in adult studies.
- **Tags** – Counseling, Dose response.

21. Pfizer Inc. (2012). Clinical Protocol: A Twelve-week, Randomized, Double-blind, Placebo-controlled, Parallel-group, Dose-ranging Study with Follow-up Evaluating the Safety and Efficacy of Varenicline for Smoking Cessation in Healthy Adolescent Smokers. *U.S. National Library of Medicine, ClinicalTrials.gov*.

https://clinicaltrials.gov/ProvidedDocs/09/NCT01312909/Prot_000.pdf.

- **Presence of control group** – Twelve-week randomized double-blind placebo-controlled dose-ranging study to assess safety and efficacy of varenicline.
- **Demographics** – Target is healthy adolescent smokers ages 12-19 who smoke at least five cigarettes a day and are motivated to stop smoking, with one failed attempt, and have a total score of four or higher on the Fagerström Test for Nicotine Dependence. Pregnant women and individuals with a history of suicidality or clinically significant psychiatric disease were excluded.
- **Nature of intervention** – Intervention included either 0.5 mg of varenicline twice a day (BID) or 0.5 mg once a day (QD) plus weekly age appropriate cessation counseling (ten min.) for 12 weeks. Intermittent in-person and telephone counseling also provided during follow up for weeks 12-52. Follow up provided for approximately nine months. Endpoints include
 - Continuous quit rate (CQR) from Week 9 to 12 of treatment
 - Seven-day point prevalence at regular intervals through Week 52
 - Reduction in number of cigarettes smoked through Week 52
 - Continuous abstinence from Week 9 to 26 and Week 9 to 52
- **Setting** – Intervention occurred during weekly clinic visits – additional medications plus in-person counseling.
- **Documented outcomes** – Although full results have not yet been published, top line results released by Pfizer indicate that varenicline did not perform better than the placebo among adolescents. Adverse events were similar to those seen in adults.
- **Tags** – In-person counseling, Telephone counseling.

Prevention and Brief Intervention

22. Hollis, J. F., Polen, M. R., Whitlock, E. P., Lichtenstein, E., Mullooly, J. P., Velicer, W. F., & Redding, C. A. (2005). Teen reach: outcomes from a randomized, controlled trial of a tobacco reduction program for teens seen in primary medical care. *Pediatrics*, 115(4), 981–989.

<https://doi.org/10.1542/peds.2004-0981>

- **Presence of control group** – Randomized, controlled two-arm trial (tobacco intervention or brief dietary advice).
- **Demographics** – 2,526 smoking and nonsmoking teens 14-17 years of age being seen for routine visits were eligible. Study sample was largely white (78 percent).

- **Nature of intervention** – The tobacco intervention was individually tailored on the basis of smoking status and stage of change including a 30-second clinician advice message, a ten-minute interactive computer program, a five-minute motivational interview and up to two ten-minute telephone or in-person booster sessions. Follow up was at one- and two-years post intervention.
- **Setting** – Staff members recruited teens in waiting rooms of seven large pediatric and family practice departments within a group health maintenance organization.
- **Documented outcomes** – Brief, computer-assisted tobacco intervention during routine medical care increased the smoking cessation rate among self-described smokers but was less effective in preventing smoking onset. The two-year quit rate was 24 percent among self-defined smokers.
- **Tags** – Computer-Based, Primary care.

23. Kentala, J., Utriainen, P., Pakkala, K., & Mattila, K. (1999). Can brief intervention through community dental care have an effect on adolescent smoking? *Preventive Medicine*, 29(2), 107–111. <https://doi.org/10.1006/pmed.1999.0512>

- **Presence of control group** – Random assignment based on birth date to usual care (control) or intervention group.
- **Demographics** – 2,586 12-year olds in four cities in Finland.
- **Nature of intervention** – Intervention was annual inquiry about smoking, showing photographs of harmful effects of smoking on teeth, allowing participants to examine their own mouth with a mirror, and counseling in accordance with their answers to questions about smoking habits.
- **Duration of intervention** – Intervention was at 13-, 14-, 15- and 16 years old.
- **Setting** – Dental office.
- **Documented outcomes** – No statistically significant differences between the groups were found, prevalence of smoking at end of two year follow up was 18.1 percent for intervention group and 20.8 percent of control group.
- **Tags** – Dentist, Finland, Photographs.

24. Pbert, L., Flint, A. J., Fletcher, K. E., Young, M. H., Druker, S., & DiFranza, J. R. (2008). Effect of a pediatric practice-based smoking prevention and cessation intervention for adolescents: a randomized, controlled trial. *Pediatrics*, 121(4), e738-747. <https://doi.org/10.1542/peds.2007-1029>

- **Presence of control group** – Randomized control trial to assess impact of pediatric and peer-delivered counseling on prevention of smoking initiation and cessation for participants already smoking.
- **Demographics** – Participants were adolescents ages 13 to 17.
- **Nature of intervention** – Intervention included a provider-delivered interaction modeled on the Five A's. Peer counseling was subsequently provided both in-person and telephonically by female college students ages 21-25.

- **Duration of intervention** – Patients completed surveys at baseline and at six- and 12-month follow-up.
- **Setting** – Participants were recruited during a visit to one of eight central Massachusetts pediatric clinics.
- **Documented outcomes** – Nonsmokers who received the intervention were significantly more likely to report having remained abstinent at six- and 12-months follow-up.
 - Peer smoking predicted smoking initiation
 - Confidence in ability to refrain increased likelihood of ongoing abstinence
 - Smokers were more likely to have quit at six-months but not at 12-months.
 - Retention rates were very high: 99.6 percent at six-months and 99.2 percent at 12-months.
- **Tags** – Pediatric clinic, Peer counseling, Telephone counseling.

25. Saari, A. J., Kentala, J., & Mattila, K. J. (2012). Long-term effectiveness of adolescent brief tobacco intervention: a follow-up study. *BMC Research Notes*, 5, 101.
<https://doi.org/10.1186/1756-0500-5-101>

- **Presence of control group** – Trial of two groups – assigned by date of birth (odd-even).
- **Nature of intervention** – To assess the long-term effectiveness of brief intervention at dental checkups; primary aim was to reduce initiation of smoking, but cessation also assessed. Half received up to four brief (two to three minutes) tobacco interventions during annual school dental check-ups at ages 13-15. Intervention focused on cosmetic effect of smoking and provided positive feedback to non-smokers.
- **Duration of intervention** – Initial follow-up was at 14 years of age, long-term follow up at 29 years of age.
- **Setting** – Brief tobacco intervention given in school-based dental healthcare check-ups.
- **Documented outcomes** – During adolescent years there was not a statistically significant difference in the number of smokers. Long term follow-up also demonstrated no statistical difference in smoking prevalence. There was no difference in the number of ex-smokers or never smokers, nor any difference in mean duration of smoking.
- **Tags** – Dentist, School-based.

Interventions not Focused on Counseling or Pharmacotherapy

26. Cantrell, J., Huang, J., Greenberg, M. S., Xiao, H., Hair, E. C., & Vallone, D. (2019). Impact of e-cigarette and cigarette prices on youth and young adult e-cigarette and cigarette behaviour: evidence from a national longitudinal cohort. *Tobacco Control*.
<https://doi.org/10.1136/tobaccocontrol-2018-054764>

- **Presence of control group** – No
- **Demographics** – Probability sample from Truth Longitudinal Cohort, youth aged 15-21. Data used for participants who participated in at least two waves of surveys and

- for whom Nielsen price data was available. Diverse range of gender, ethnicity, and state regulations.
- **Nature of intervention** – Statistical analysis of impact of e-cigarette and cigarette prices on current e-cigarette and cigarette use among youth and young adults.
 - **Duration of intervention** – First sample collected April-July 2014, with four additional waves at six-month intervals (through July-October 2016).
 - **Setting** – United States.
 - **Documented outcomes** – e-cigarettes may be a substitute for cigarettes, but cigarettes do not appear to be a substitute for e-cigarettes.
 - Higher cigarette prices were associated with increased past 30-day e-cigarette use, indicating e-cigarettes may serve as a substitute for cigarettes.
 - A 10 percent increase in cigarette prices leads to a 5.8 percent to 9.4 percent increase in past 30-day e-cigarette use.
 - Higher e-cigarette prices had no statistical relationship with past 30-day e-cigarette use or past 30-day cigarette use.
 - State-level e-cigarette minimum legal purchase age laws were found to reduce the likelihood of e-cigarette use among young people.
 - Nielsen data only includes retail shops, but previous data indicate that twice as many youth purchase e-cigarettes in vape shops than in retail shops.
 - **Tags** – Truth Longitudinal Cohort, e-cigarettes, Price impact on tobacco use.

27. Fallin, A., Neilands, T. B., Jordan, J. W., & Ling, P. M. (2015). Social Branding to Decrease Lesbian, Gay, Bisexual, and Transgender Young Adult Smoking. *Nicotine & Tobacco Research*, 17(8), 983–989. <https://doi.org/10.1093/ntr/ntu265>

- **Presence of control group** – Cross-sectional surveys one-year apart for those who were exposed to the campaign.
- **Demographics** – LGBTQ young adults (21-30) in Las Vegas, NV.
- **Nature of intervention** – Social branding campaign called CRUSH, included an aspirational brand, social events, and targeted media to discourage smoking.
- **Duration of intervention** – Surveys conducted at two time points, one year apart. Degree of exposure to campaign messaging varied based on bar attendance.
- **Setting** – Surveys conducted in LGBT bars.
- **Documented outcomes** – For those involved in the cross-sectional survey, tobacco use dropped from 47 percent to 39.6 percent after one year. Among those who understood the CRUSH smokefree message, the highest level of campaign exposure was significantly associated with 37-48 percent lower odds for current smoking.
- **Tags** – CRUSH social branding, LGBTQ, Marketing campaign.

28. Lippert, A. M. (2015). Do Adolescent Smokers Use E-Cigarettes to Help Them Quit? The Sociodemographic Correlates and Cessation Motivations of U.S. Adolescent E-Cigarette Use. *American Journal of Health Promotion: AJHP*, 29(6), 374–379. <https://doi.org/10.4278/ajhp.131120-QUAN-595>

- **Presence of control group** – No.

- **Demographics** – Probability sample from 2011 National Youth Tobacco Survey (NYTS) of 15,264 adolescents in grades six through 12. All education levels, all income levels, all races/ethnicities, all U.S. locations.
- **Nature of intervention** – Analysis of e-cigarette use among 1) all adolescents and 2) conventional cigarette smokers as a function of quit desire and attempts.
- **Duration of intervention** – Not a timed intervention.
- **Setting** – United States.
- **Documented outcomes** – Adolescents do not use e-cigarettes as a cessation aid, but rather use them in conjunction with cigarettes.
 - E-cigarette users appear more likely to be male, non-Hispanic white, have more than \$50/month in discretionary personal income, live with a smoker, have a friend who is a smoker, and have tried either conventional cigarettes or are active smokers.
 - Controlling for the respondent's smoking reduces to non-significance age, disposable income, and living with a smoker. It increases the significance of being friends with a smoker. Having tried cigarettes is positively associated with e-cigarette use.
- **Tags** – E-cigarettes, National Youth Tobacco Survey.

29. Park, J.-Y., Seo, D.-C., & Lin, H.-C. (2016). E-Cigarette Use and Intention to Initiate or Quit Smoking Among US Youths. *American Journal of Public Health, 106*(4), 672–678.
<https://doi.org/10.2105/AJPH.2016.302994>

- **Presence of control group** – Youth who have never tried e-cigarettes served as the control group among the data sample's three groupings (nonsmoking youth, youth experimenters, current cigarette smokers).
- **Demographics** – Probability sample from 2012 National Youth Tobacco Survey (NYTS) of 20,193 adolescents in grades six through 12. All education levels, all income levels, all races/ethnicities, all U.S. locations.
- **Nature of intervention** – Propensity score matching (PSM) analysis of whether e-cigarette use is associated with 1) intention to smoke cigarettes among never-smoking youth and youth experimenters, and 2) intention to quit smoking among current youth smokers.
- **Duration of intervention** – 2012 National Youth Tobacco Survey (not a timed intervention).
- **Setting** – United States.
- **Documented outcomes** – E-cigarette use among U.S. youth is associated with intention to smoke but not with intention to quit smoking.
 - E-cigarette users who had never smoked cigarettes and who had experimented with cigarettes had elevated intention to smoke cigarettes compared to control group who had never used e-cigarettes.
 - No significant association between e-cigarette use and intention to quit smoking among current youth smokers.
- **Tags** – National Youth Tobacco Survey (NYTS), Propensity score matching (PSM), e-Cigarettes.

Articles Reviewed With No Intervention

1. Bailey, S. R., Crew, E. E., Riske, E. C., Ammerman, S., Robinson, T. N., & Killen, J. D. (2012). Efficacy and Tolerability of Pharmacotherapies to Aid Smoking Cessation in Adolescents. *Paediatric Drugs*, 14(2), 91–108. <https://doi.org/10.2165/11594370-000000000-00000>
2. Baskerville, N. B., Dash, D., Shuh, A., Wong, K., Abramowicz, A., Yessis, J., & Kennedy, R. D. (2017). Tobacco use cessation interventions for lesbian, gay, bisexual, transgender and queer youth and young adults: A scoping review. *Preventive Medicine Reports*, 6, 53–62. <https://doi.org/10.1016/j.pmedr.2017.02.004>
Conclusion:
Scoping review for English language studies published between January 2000 and February 2016. Goal was to assess the current state of smoking prevention and cessation intervention research for LGBTQ+ youth and young adults, identify and describe these interventions and their effectiveness, and identify gaps in both practice and research. 21 articles were identified: 11 from peer reviewed journals and 10 from grey literature. Of those only one targeted young adults (ages 18-29) and one smoking prevention.
3. Blankers, M., Smit, E. S., van der Pol, P., de Vries, H., Hoving, C., & van Laar, M. (2016). The Missing=Smoking Assumption: A Fallacy in Internet-Based Smoking Cessation Trials? *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, 18(1), 25–33. <https://doi.org/10.1093/ntr/ntv055>
4. Collins, L., Smiley, S. L., Moore, R. A., Graham, A. L., & Villanti, A. C. (2017). Physician tobacco screening and advice to quit among U.S. adolescents – National Survey on Drug Use and Health, 2013. *Tobacco Induced Diseases*, 15. <https://doi.org/10.1186/s12971-016-0107-6>
5. Fanshawe, T. R., Halliwell, W., Lindson, N., Aveyard, P., Livingstone-Banks, J., & Hartmann-Boyce, J. (2017). Tobacco cessation interventions for young people. *The Cochrane Database of Systematic Reviews*, 2017(11). <https://doi.org/10.1002/14651858.CD003289.pub6>
Conclusions:
There is limited evidence that either behavioral support or smoking cessation medication increases the proportion of young people that stop smoking in the long-term. Findings are most promising for group-based behavioral interventions, but evidence remains limited for all intervention types. There continues to be a need for well-designed, adequately powered, randomized controlled trials of intervention for this population of smokers.
6. Farber, H. J., Walley, S. C., Groner, J. A., Nelson, K. E., & Section on Tobacco Control. (2015). Clinical Practice Policy to Protect Children From Tobacco, Nicotine, and Tobacco Smoke. *Pediatrics*, 136(5), 1008–1017. <https://doi.org/10.1542/peds.2015-3108>
7. Harvey, J., & Chadi, N. (2016). Strategies to promote smoking cessation among adolescents. *Paediatrics & Child Health*, 21(4), 201–204. <https://doi.org/10.1093/pch/21.4.201>
Conclusions:
Using the “5 A’s” method provides a practical framework for identifying and assisting adolescents who smoke. Important gaps in the research literature remain, however, and there are many questions still to answer around smoking cessation in youth.

8. Hoepfner, B. B., Hoepfner, S. S., Seaboyer, L., Schick, M. R., Wu, G. W., Bergman, B. G., & Kelly, J. F. (2016). How Smart are Smartphone Apps for Smoking Cessation? A Content Analysis. *Nicotine & Tobacco Research*, 18(5), 1025–1031. <https://doi.org/10.1093/ntr/ntv117>
Conclusions:
Very few apps meet the standard of 5A's. Those that do typically receive more star ratings from users. Not specific to youth, as well as no intervention.
9. Hu, M.-C., Griesler, P., Schaffran, C., & Kandel, D. (2011). Risk and Protective Factors for Nicotine Dependence in Adolescence. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 52(10), 1063–1072. <https://doi.org/10.1111/j.1469-7610.2010.02362.x>
10. Huang, L.-L. (2016). Electronic Cigarette Use Among High School Students and Its Association With Cigarette Use And Smoking Cessation, North Carolina Youth Tobacco Surveys, 2011 and 2013. *Preventing Chronic Disease*, 13. <https://doi.org/10.5888/pcd13.150564>
11. Karpinski, J. P., Timpe, E. M., & Lubsch, L. (2010). Smoking Cessation Treatment for Adolescents. *The Journal of Pediatric Pharmacology and Therapeutics: JPPT*, 15(4), 249–263.
12. Kong, G., Ells, D. M., Camenga, D. R., & Krishnan-Sarin, S. (2014). Text messaging-based smoking cessation intervention: a narrative review. *Addictive Behaviors*, 39(5), 907–917. <https://doi.org/10.1016/j.addbeh.2013.11.024>
Conclusions:
The proliferation of text messaging in recent years suggests that text messaging interventions may have the potential to improve smoking cessation rates. A detailed summary of the interventions suggests areas for future research and clinical application. More rigorous studies are needed to identify components of the interventions that can enhance their acceptability, feasibility and efficacy.
13. Office of Adolescent Health. (2016b, September 23). Adolescents and Tobacco: Trends. <https://www.hhs.gov/ash/oah/adolescent-development/substance-use/drugs/tobacco/trends/index.html>.
14. Office of Adolescent Health. (2016a, July 27). Adolescents and tobacco: risk and protective factors. <https://www.hhs.gov/ash/oah/adolescent-development/substance-use/drugs/tobacco/risk-and-protective-factors/index>.
15. Patnode, C. D., O'Connor, E., Whitlock, E. P., Perdue, L. A., Soh, C., & Hollis, J. (2013). Primary care-relevant interventions for tobacco use prevention and cessation in children and adolescents: a systematic evidence review for the U.S. Preventive Services Task Force. *Annals of Internal Medicine*, 158(4), 253–260. <https://doi.org/10.7326/0003-4819-158-4-201302190-00580>
Conclusions:
A meta-analysis reviewing the literature on primary care-relevant tobacco use prevention and cessation in children and adolescents from 1980 through September 2012. Analysis

conducted for the United States Preventive Services Task Force (USPSTF). Eighteen trials were identified plus an additional trial that assessed the harms of bupropion were included. Trials that assessed prevention interventions generally showed reduced smoking initiation in the intervention groups compared with the control groups. Similar to more recent analyses, the effect was reduced at one year and no longer statistically significant at two years.

16. Schauer, G. L., Agaku, I. T., King, B. A., & Malarcher, A. M. (2014). Health care provider advice for adolescent tobacco use: results from the 2011 National Youth Tobacco Survey. *Pediatrics*, 134(3), 446–455. <https://doi.org/10.1542/peds.2014-0458>

Conclusions:

In summary, there is evidence to support the short-term efficacy of psychosocial interventions for smoking cessation among adolescents, especially those that contain cognitive behavioral elements. CM and MI have each shown some efficacy as standalone interventions. Additionally, interventions that include elements of TTM are a promising avenue. Evidence is beginning to support the efficacy of NRT, but there is insufficient evidence to determine the efficacy of pharmacological treatments such as bupropion and varenicline. Innovative delivery methods such as telephone, text messaging and computer/web-based methods have grown in popularity and are used most often with MI-focused interventions. The article proposes some areas which could be targeted for improving current smoking cessation interventions for adolescents.

17. Shackleton, N., Jamal, F., Viner, R. M., Dickson, K., Patton, G., & Bonell, C. (2016). School-Based Interventions Going Beyond Health Education to Promote Adolescent Health: Systematic Review of Reviews. *Journal of Adolescent Health*, 58(4), 382–396. <https://doi.org/10.1016/j.jadohealth.2015.12.017>

Conclusion:

Complex approaches show promise, with some persistence of abstinence (30 days point prevalence abstinence or continuous abstinence at six months), especially those incorporating elements sensitive to stages of change and motivational enhancement and CBT. Given the episodic nature of adolescent smoking, more data is needed on sustained quitting.

18. Simon, P., Kong, G., Cavallo, D. A., & Krishnan-Sarin, S. (2015). Update of Adolescent Smoking Cessation Interventions: 2009–2014. *Current Addiction Reports*, 2(1), 15–23. <https://doi.org/10.1007/s40429-015-0040-4>

19. Stanton, A., & Grimshaw, G. (2013). Tobacco cessation interventions for young people. *The Cochrane Database of Systematic Reviews*, (8), CD003289. <https://doi.org/10.1002/14651858.CD003289.pub5>

20. Struik, L. L., O'Loughlin, E. K., Dugas, E. N., Bottorff, J. L., & O'Loughlin, J. L. (2014). Gender Differences in Reasons to Quit Smoking Among Adolescents. *The Journal of School Nursing*, 30(4) 303-308. <https://doi.org/10.1177/1059840513497800>.

Conclusion:

Study analyzed data drawn from AdoQuest, a longitudinal cohort investigation of the natural course of the co-occurrence of health-compromising behaviors in children to determine if there are gender differences in reasons adolescents consider quitting smoking. Top reasons showed no gender differences:

1. Long-term concerns
2. Short-term consequences
3. Social disapproval

Girls ranked “I don’t want my parents to find out” and “I don’t want to be smoking when I’m older” as slightly more important than boys. Boys ranked “I walk upstairs and I’m out of breath” as slightly more important than girls.

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¹ Nielsen data: Juul captured 75.8% of sales at stores tracked by Nielsen in 2018.

² Cullen KA, Ambrose AB, 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.

³ <https://www.fda.gov/news-events/press-announcements/trump-administration-combating-epidemic-youth-e-cigarette-use-plan-clear-market-unauthorized-non>

⁴ Gentzke AS, Creamer M, Cullen KA, et al. Vital Signs: Tobacco Product Use Among Middle and High School Students—United States, 2011-2018. *MMWR Morb Mortal Wkly Rep*. 2019;68(6):157-164.

⁵ Miech R, Johnston L, O'Malley PM, Bachman JG, Patrick ME. Adolescent Vaping and Nicotine Use in 2017-2018 – U.S. National Estimates. *N Engl J Med* 2019; 380:192-193. <https://www.nejm.org/doi/full/10.1056/NEJMc1814130>.

⁶ Huang LL, Kowiss SD, Sutfin EL, Patel T, Ranney LM, Goldstein AO. Electronic Cigarette Use Among High School Students and Its Association with Cigarette Use And Smoking Cessation, North Carolina Youth Tobacco Surveys, 2011 and 2013. *Prev Chronic Dis* 2016; 13:150564. DOI: <http://dx.doi.org/10.5888?pcd13.150564>.

⁷ <https://e-cigarettes.surgeongeneral.gov/documents/surgeon-generals-advisory-on-e-cigarette-use-among-youth-2018.pdf>.