



Digital Interventions for Tobacco Cessation: Innovation & Impact

Amanda L. Graham, PhD

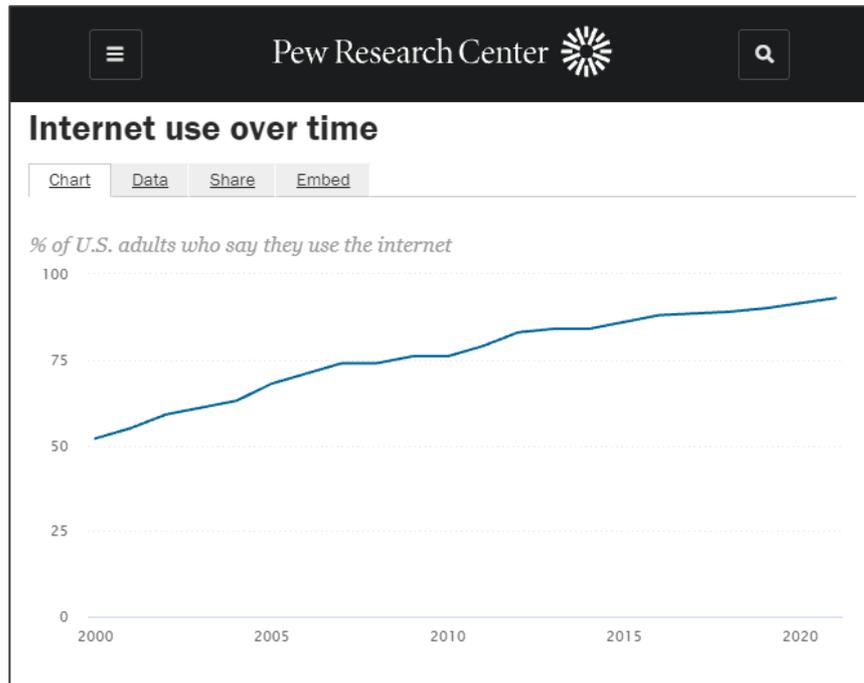
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Disclosures

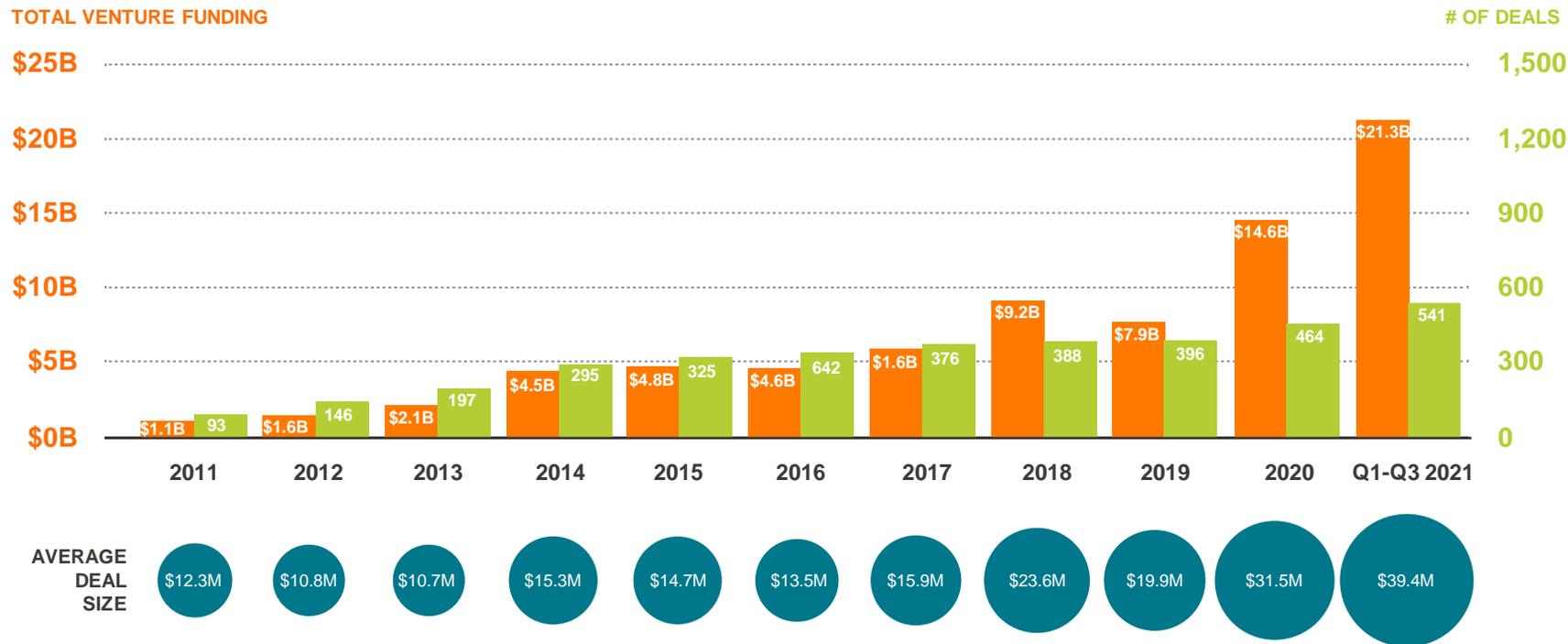
Truth Initiative is a non-profit public health foundation which runs free digital tobacco cessation programs as part of its mission.

Enterprise versions of these programs generate revenue to support Truth Initiative's mission-driven work.



Digital health has exploded

2011-Q3 2021



Population impact of digital interventions

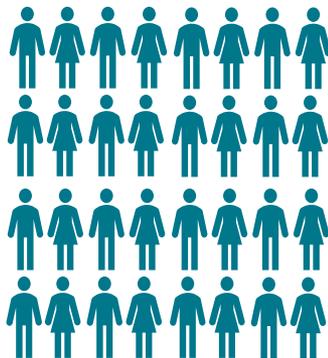
Reach
(# participating)



Effectiveness
(quit rate)

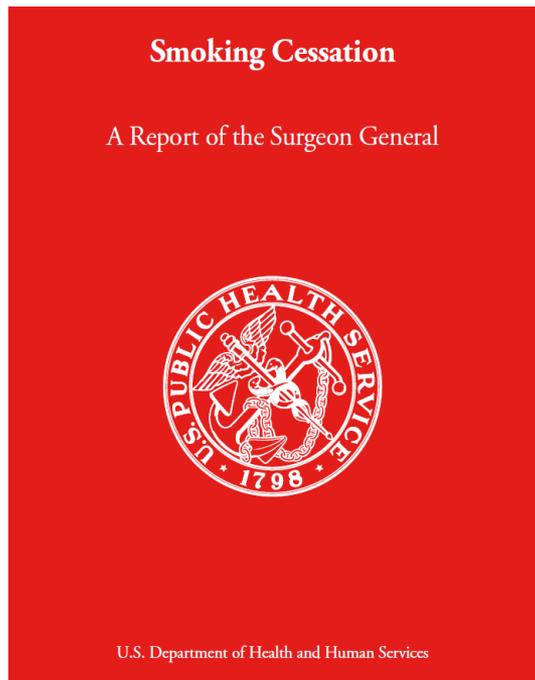


Impact
(# quitters)



Web-based interventions

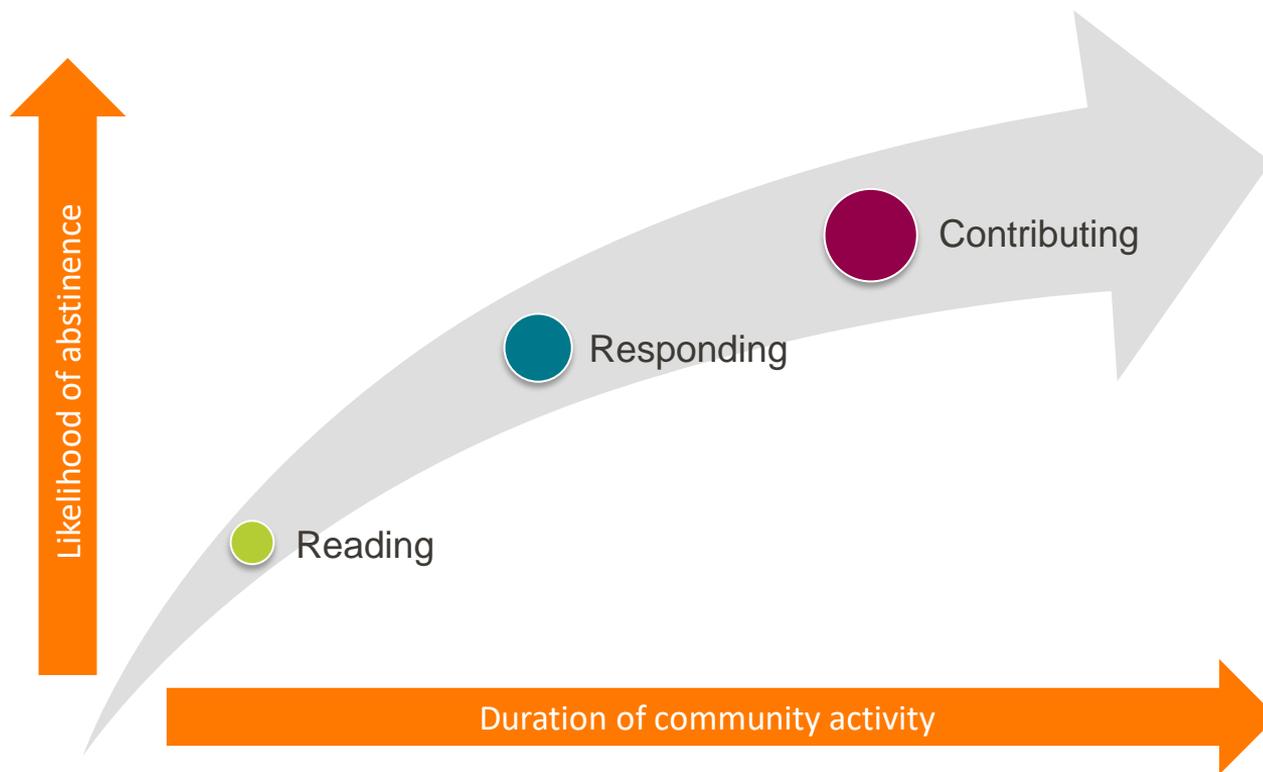
Web interventions are recommended



The evidence is sufficient to infer that web or Internet-based interventions increase smoking cessation and can be more effective when they contain behavior change techniques and interactive components.

U.S. Department of Health and Human Services. *Smoking Cessation. A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2020.

Online community use prospectively predicts abstinence

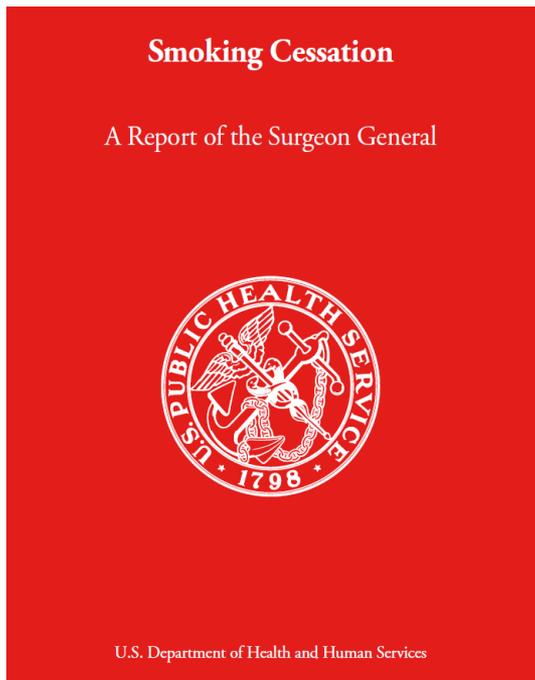


>1/3 of U.S. smokers look for help online

	2005	2017
% of smokers who searched online for quit-smoking information	16.5%	35.9%
Number of smokers who searched online for quit-smoking information	7,880,000	12,430,000

Text messaging

SMS interventions are recommended

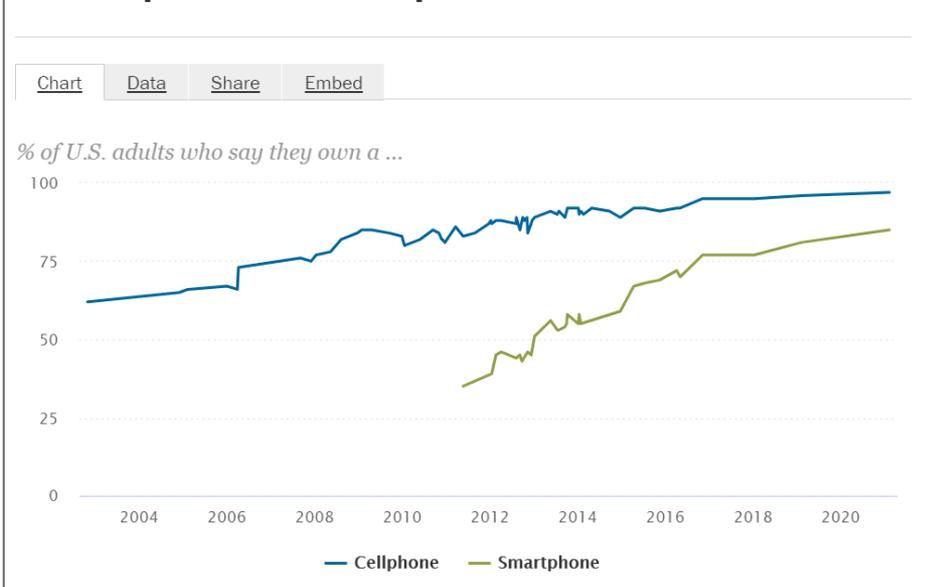


The evidence is sufficient to infer that short text message services about cessation are independently effective in increasing smoking cessation, particularly if they are interactive or tailored to individual text responses.

U.S. Department of Health and Human Services. *Smoking Cessation. A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2020.

Text messaging is nearly universal

Mobile phone ownership over time



Most used form of communication for US adults under 50.

Texts have a 99% open rate

95% of texts are read within 3 min

Average response time is 90 sec

Average response rate is 45%

Perceived value of SMS (short message service)

Reminder about goals and initial commitment

Feel supported even though they know it's an automated program

- Feel less alone
- Someone in my corner
- Someone checking in on me

Practical information

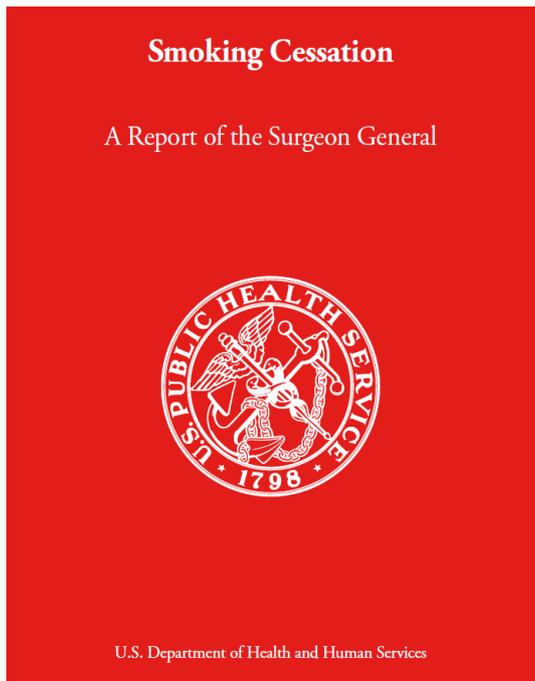
Useful tips and strategies

Available on-demand



Smartphone apps

Smartphone apps are not (yet) recommended



The evidence is inadequate to infer that smartphone apps for smoking cessation are independently effective in increasing smoking cessation.

U.S. Department of Health and Human Services. *Smoking Cessation. A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2020.

A Content Analysis of Popular Smartphone Apps for Smoking Cessation

Lorien C. Abrams, ScD, J. Lee Westmaas, PhD, Jeuneviette Bontemps-Jones, MPH, CHES, Rathna Ramani, MPH, Jenelle Mellerson, MPH

Apps could be improved by better integration with the Clinical Practice Guidelines and other evidence-based practices.



How Smart are Smartphone Apps for Smoking Cessation? A Content Analysis

Bettina B. Hoepfner PhD¹, Susanne S. Hoepfner PhD¹,
Lourah Seaboyer MA^{1,2}, Melissa R. Schick BA¹, Gwyneth W. Y. Wu MA^{1,3},
Brandon G. Bergman PhD¹, John F. Kelly PhD¹

Nicotine & Tobacco Research, 2016, 1025–1031
doi:10.1093/ntr/ntv117
Original investigation
Advance Access publication June 4, 2015

Publicly available smartphone smoking cessation apps are not particularly “smart”: they commonly fall short of providing tailored feedback, despite users’ preference for these features.

TBM

SYSTEMATIC REVIEWS

A systematic review of smartphone applications for smoking cessation

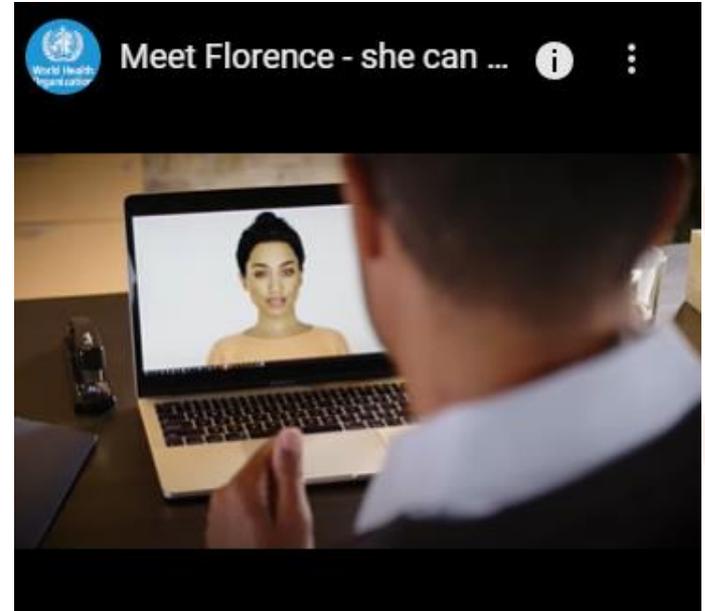
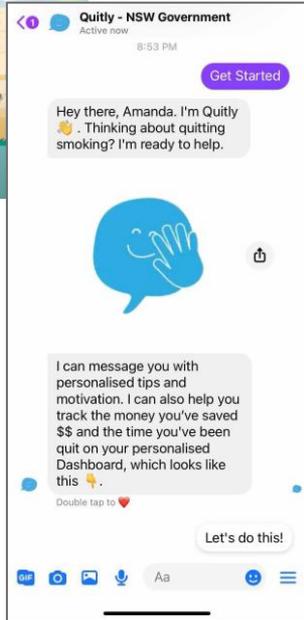
Brianna L. Haskins, MS,¹ Donna Lesperance, MA, MPH,¹ Patric Gibbons, MS⁴,¹ Edwin D. Boudreaux, PhD²

While half of the scientifically vetted apps remain available to consumers, they are difficult to find among the many apps that are identified through app store searches.



Chat bots

aka conversational agents
aka relational agents
aka artificial intelligence



Source: <https://www.who.int/news-room/spotlight/using-ai-to-quit-tobacco>

A word about “bling”

“In the quest to discover the next high-technology solution, proven established technologies are often overlooked in favor of more “technologically advanced” systems...

...the drive of “innovation” tends to move academic groups because fashions are difficult to resist.”

“Text messaging works but it’s not shiny enough. We need an app.”

“We want to spend money on something more impressive...like a robot.”

Development of a vaping cessation program



Theory-based & grounded in best practices

- Build self-efficacy
- Establish/reinforce social norms & social support
- Support observational learning, grow behavioral capability



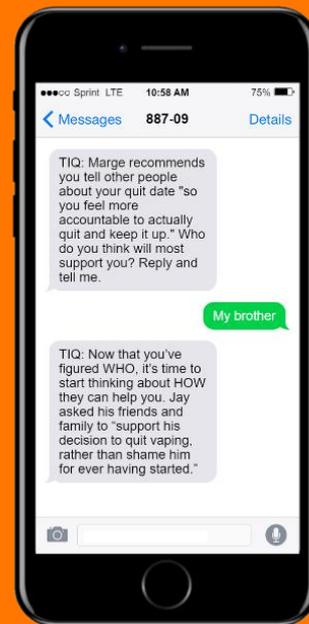
Individually tailored

- Age (13-17 vs. 18-24)
- Product use (e.g., JUUL, Puff Bar)
- Quit date



Empathic and supportive

- Delivered entirely via SMS, fully automated
- Available 24/7
- Interactive (structured & open-ended)
- Messages from other users



Program launch



Letter

Engagement and 3-Month Outcomes From a Digital E-Cigarette Cessation Program in a Cohort of 27 000 Teens and Young Adults

Amanda L. Graham PhD¹, Megan A. Jacobs MPH, Michael S. Amato PhD

Innovations Center, Truth Initiative, Washington, DC

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The 2018 National Youth Tobacco Survey showed e-cigarette use among middle and high schoolers increased 48% and 78%, respectively, in just 1 year.¹ This coincided with rapid increases in market share of JUUL, the e-cigarette product used most by young people.² More than 3.6 million youth currently use e-cigarettes, with 28% of high school e-cigarette users vaping on 20 days or more in the past month.³ Exposure to nicotine in young people can affect learning, memory, and attention, and lead to increased impulsivity, mood disorders, and addiction to other drugs.⁴ Many young people begin using e-cigarettes because of their popularity among peers and their appealing flavors, not recognizing they contain nicotine and risk addiction and other adverse impacts.⁵

Truth Initiative is a nonprofit public health foundation dedicated to tobacco control in the United States. In fall 2018, we began seeing posts across social media sites (e.g., Twitter, Reddit) from young people asking for help quitting e-cigarettes. Given the increases in e-cigarette use, apparent desire for cessation support, and the lack of available resources, we identified a urgent need to develop an easily accessible, scalable program to help young people quit vaping. On January 18, 2019, we launched a first-of-its-kind, freely available quit vaping program.

The program is grounded in theory-driven and empirically validated tobacco cessation treatment strategies for young people,⁶ national cessation treatment guidelines,⁷ the Mayo Clinic 5-E Model of Wellness Coaching,⁸ and our qualitative research and social media observations of young e-cigarette users. To engage youth, we positioned the program as a supportive, nonjudgmental friend, with messages written in the first person or as quotes from other users. Quitting e-cigarettes can be isolating for young people, reinforcing that peers are quitting fosters connectedness and normativity. The program explores why someone is quitting (e.g., “Abigail says ‘Giving yourself a reason to quit is a good motivator.’ Reply why you’re thinking about quitting.”). To envision life after quitting, enrollees are instructed “Close your eyes. Envision what your life is like without JUUL. What’s better or different about it? What do you feel like? Reply and tell me.” The program recommends specific, concrete actions and encourages enrollees to experiment with

quitting strategies in small steps. To help young people evolve and create lasting change, the program supports sustained use and multiple quit attempts.

Young people enroll by texting “QUIT” to a dedicated phone number and responding to an initial age query. Terms of Service and Privacy Policy are provided via text message. Users receive one age-appropriate message per day tailored to their enrollment date or quit date, which can be set and reset via text message. Those not ready to quit receive 2 weeks of messages focused on building skills and confidence. Users who set a quit date receive messages for a week preceding it and 30 days afterward that include encouragement and support, skill- and self-efficacy building exercises, coping strategies, and information about the risks of vaping, benefits of quitting, and cutting down to quit. Keywords “CRAVE,” “STRESS,” or “SLIP” provide on-demand support. Users can unsubscribe anytime by texting “STOP.”⁹ The teen version of the program (ages 13–17) refers to e-cigarettes as JUUL/JUULing, whereas the young adult version (YA, ages 18–24) uses several terms (e.g., “vaping, e-cigarette”).

E-cigarette use and abstinence were assessed via text message at 14 and 90 days following an enrollee’s quit date or enrollment date. At 14 days, enrollees were asked, “Have you cut down how much you JUUL in the past 2 weeks? Respond whether: A=I still JUUL the same amount, B=I JUUL less, C=I don’t JUUL at all anymore.” At 90 days, enrollees were asked, “When was the last time you JUULed, even a puff of someone else’s? Respond w/ letter: A= in the past 7 days, B= 8–30 days ago, C= More than 30 days ago.” Program satisfaction was assessed at 14 days with the question, “This program was 30 days. Should it be a different length? Reply LONGER, SHORTER, or SAME if you think this length is good.”

To date, the program has been promoted entirely through earned media and organic social media. Its launch was announced on a major network morning broadcast show¹⁰ and has since been featured in over 500 news stories. The vast majority of young people that have enrolled to date joined within hours after the program was featured on Mashable’s Snapchat Discover channel on January 30, 2019.¹⁰ Since then, the program has seen 100–150

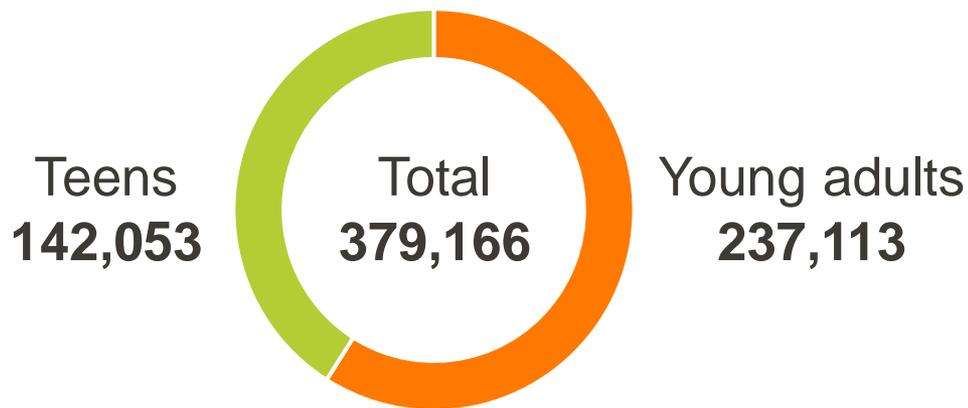


**THIS IS
QUITTING**

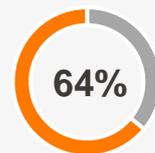
Uptake and engagement

Enrollment

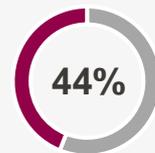
Jan 18, 2019 – Oct 5, 2021



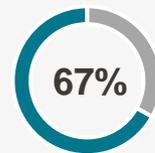
Engagement



Set quit date



Use extra support keywords



Complete full program

User feedback

“Ik you can’t really respond to this cause you a computerized program but this helps a lot and I just flushed my JUUL down the toilet! One step closer. If the producer of this app sees this I want to thank you so much for your support.”

“Love you. Thanks so much for all of the help! I’m feeling confident already.”

“This is amazing. Never gotten this much support right off the bat.”

“I’m on the 2nd day of quitting and this absolutely sucks. Thank you robot, it’s nice to have someone to discuss the horrible realities of nicotine withdrawal with.”

“They’re from real people” – Mars (18-24)

“Make it feel like someone is there with you helping”
– Robby (13-17)

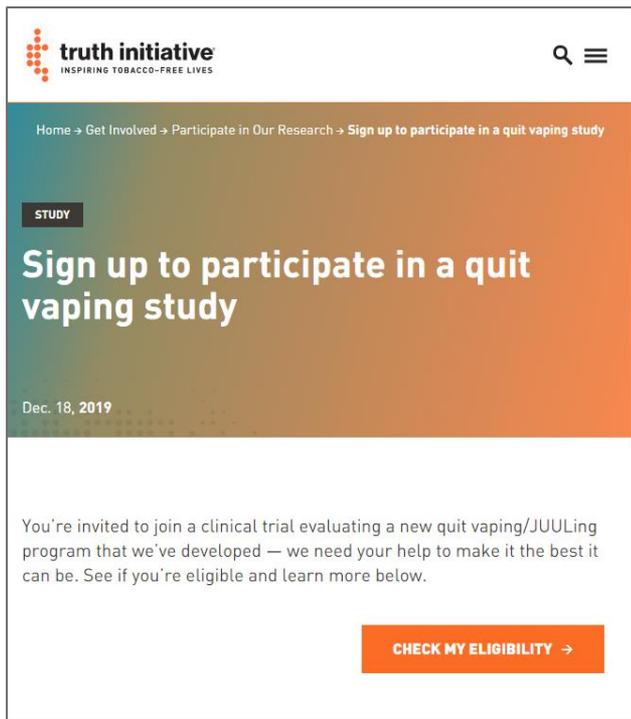
“They are a good reminder to not vape when vaping is a reflex”
– Elikek (18-24)

RCT to evaluate effectiveness among YA

- Supported by CVS Health Foundation
- NCT04251273
- 2-arm RCT:
 - This is Quitting
 - Assessment-only control
- Follow-ups at 1- and 7-months post-enrollment
- Primary outcome = 30-day ppa at 7mo



Study approach



The screenshot shows the Truth Initiative website. At the top left is the logo with the text "truth initiative" and "INSPIRING TOBACCO-FREE LIVES". To the right is a search icon and a menu icon. Below the logo is a breadcrumb trail: "Home → Get Involved → Participate in Our Research → Sign up to participate in a quit vaping study". The main heading is "Sign up to participate in a quit vaping study" with a "STUDY" tag above it. The date "Dec. 18, 2019" is displayed below the heading. The body text reads: "You're invited to join a clinical trial evaluating a new quit vaping/JUULing program that we've developed — we need your help to make it the best it can be. See if you're eligible and learn more below." At the bottom right is an orange button that says "CHECK MY ELIGIBILITY →".

Trial conducted fully online Dec 2019 to Nov 2020

Eligibility criteria:

- Age = 18 to 24 years
- Own a mobile phone w/ active text message plan
- Past 30-day e-cigarette use
- Interested in quitting vaping in the next 30 days
- U.S. resident

“White labeled” intervention to measure intervention effects without influence of truth brand

Sample characteristics (n=2,588)

Demographic characteristics

- 17% racial/ethnic minority
- 19% sexual minority
- 35% barely/not meeting basic expenses

Tobacco use

- 82% vape within 30 minutes of waking
- ~75% endorsement across HONC items
- 65% report 3+ attempts to quit vaping
- 33% report past 30-day smoking

Other substance use

- 59% report past 30-day MJ use
- 75% report past 30-day binge drinking

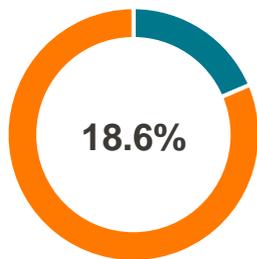
Mental health characteristics

- 35% scored 3 or higher on PHQ-2
- 44% scored 3 or higher on GAD-2

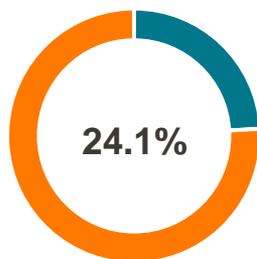
Cessation outcomes

Under ITT analysis, participants randomized to This is Quitting were **~40% more likely to be abstinent** at 7-months compared to participants randomized to control (odds ratio, 1.39; 95%CI, 1.15-1.68; $P < .001$).

Assessment-only control



This is Quitting



Effectiveness of a Vaping Cessation Text Message Program Among Young Adult e-Cigarette Users: A Randomized Clinical Trial

Amanda L. Graham, PhD, Michael S. Amato, PhD, Sarah Cha, MSFH, Megan A. Jacobs, MPH, Mia M. Botcher, George D. Papandonatos, PhD

-  Visual Abstract
-  Invited Commentary
-  Supplemental content

IMPORTANCE e-Cigarettes are the most commonly used tobacco product among young adults (YAs). Despite the harms of nicotine exposure among YAs, there are few, if any, empirically tested vaping cessation interventions available.

OBJECTIVE To determine the effectiveness of a text message program for vaping cessation among YAs vs assessment-only control.

DESIGN, SETTING, AND PARTICIPANTS A parallel, 2-group, double-blind, individually randomized clinical trial was conducted from December 2019 to November 2020 among YA e-cigarette users. Eligible individuals were US residents aged 18 to 24 years who owned a mobile phone with an active text message plan, reported past 30-day e-cigarette use, and were interested in quitting in the next 30 days. Participants were recruited via social media ads, the intervention was delivered via text message, and assessments were completed via website or mobile phone. Follow-up was conducted at 1 and 7 months postrandomization; follow-up data collection began January 2020 and ended in November 2020. The study was prespecified in the trial protocol.

INTERVENTIONS All participants received monthly assessments via text message about e-cigarette use. The assessment-only control arm ($n = 1284$) received no additional intervention. The active intervention arm ($n = 1304$) also received This is Quitting, a fully automated text message program for vaping cessation that delivers social support and cognitive and behavioral coping skills training.

MAIN OUTCOMES AND MEASURES The primary outcome was self-reported 30-day point prevalence abstinence (ppa) at 7 months analyzed under intention-to-treat analysis, which counted nonresponders as vaping. Secondary outcomes were 7-day ppa under intention-to-treat analysis and retention weighted complete case analysis of 30-day and 7-day ppa.

RESULTS Of the 2588 YA e-cigarette users included in the trial, the mean (SD) age was 20.4 (1.7) years, 1253 (48.4%) were male, 2159 (83.4%) were White, 275 (10.6%) were Hispanic, and 493 (19.0%) were a sexual minority. Most participants ($n = 2129$; 82.3%) vaped within 30 minutes of waking. The 7-month follow-up rate was 76.0% ($n = 1967$), with no differential attrition. Abstinence rates were 24.1% (95% CI, 21.8%-26.5%) among intervention participants and 18.6% (95% CI, 16.7%-20.8%) among control participants (odds ratio, 1.39; 95% CI, 1.15-1.68; $P < .001$). No baseline variables moderated the treatment-outcome relationship, including nicotine dependence.

CONCLUSIONS AND RELEVANCE Results of this randomized clinical trial demonstrated that a tailored and interactive text message intervention was effective in promoting vaping cessation among YAs. These results establish a benchmark of intervention effectiveness.

TRIAL REGISTRATION ClinicalTrials.gov Identifier: NCT04251273

Author Affiliations: Innovations Center, Truth Initiative, Washington, DC (Graham, Amato, Cha, Jacobs, Botcher); Department of Medicine, Mayo Clinic, College of Medicine and Science, Rochester, Minnesota (Graham, Amato); Department of Oncology, Georgetown University Medical Center (Cancer Prevention and Control Program, Lombardi Comprehensive Cancer Center, Washington, DC (Graham); Center for Statistical Sciences, School of Public Health, Brown University, Providence, Rhode Island (Papandonatos).

Corresponding Author: Amanda L. Graham, PhD, Innovations Center, Truth Initiative, 900 G St NW, 4th Floor, Washington, DC 20001 (agraham@truthinitiative.org).

No moderator effects

This is Quitting outperformed Control in promoting abstinence across a range of demographic, tobacco use, substance use, and mental health characteristics

Demographic characteristics

- Age
- Gender
- Race
- Ethnicity
- Sexual minority
- Income
- Current student

Tobacco use

- Vaping frequency
- Past year attempt to quit vaping
- Motivation to quit vaping
- Confidence to quit vaping
- Nicotine dependence
- # closest friends that vape nicotine
- Live with e-cig (nicotine) user
- Live with tobacco user

Other substance use & mental health

- Past 30-day marijuana/cannabis use
- Past 30-day smoking
- Past 30-day binge drinking

- Screen positive for depression (PHQ-2)
- Screen positive for anxiety (GAD-2)

RCT among teens launched Oct 1

- NCT04919590
- Eligibility criteria
 - Age 13-17
 - Past 30-day e-cigarette use
 - Interest in quitting in next 30 days
 - US residence
- Recruiting through Facebook/Instagram
- DSMB assembled for trial oversight
- 7-item Decisional Capacity assessment as part of informed consent

n=196 randomized as of Oct 6



Final thoughts

- Technology will continue to play a key role in addressing tobacco use at a population level
- New technologies will continue to emerge
- Be intrigued by bling, but...
- Be deliberate and thoughtful in marrying interventions with technology to optimize their population impact



Covid-19 shows why internet access is a basic right. We must get everyone connected.

Web Foundation · April 15, 2020

Source: www.webfoundation.org

thank you

agraham@truthinitiative.org