Digital Interventions for Tobacco Cessation: Innovation & Impact

Amanda L. Graham, PhD
Chief of Innovations, Truth Initiative
Professor of Medicine (adjunct), Mayo Clinic College of Medicine and Science
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.
The Virus Changed the Way We Internet

By Ella Kooze and Nathaniel Popper  April 7, 2020

Column: The pandemic makes clear it’s time to treat the internet as a utility

Like power and water, the internet has been shown by the pandemic to be a necessity for households. It’s time for it to be regulated as a utility. (Los Angeles Times)

Internet use over time

% of U.S. adults who say they use the internet

Chart  Data  Share  Embed


0  25  50  75  100
Digital health has exploded

2011-Q3 2021

TOTAL VENTURE FUNDING

$25B
$20B
$15B
$10B
$5B
$0B

# OF DEALS
1,500
1,200
900
600
300
0

TOTAL VENTURE FUNDING

2011: $1.1B, 93 deals
2012: $1.6B, 146 deals
2013: $2.1B, 197 deals
2014: $4.5B, 295 deals
2015: $4.8B, 325 deals
2016: $4.6B, 642 deals
2017: $1.6B, 376 deals
2018: $9.2B, 388 deals
2019: $7.9B, 396 deals
2020: $14.6B, 464 deals
Q1-Q3 2021: $21.3B, 541 deals

AVERAGE DEAL SIZE

$12.3M
$10.8M
$10.7M
$15.3M
$14.7M
$13.5M
$15.9M
$23.6M
$19.9M
$31.5M
$39.4M

Rock Health, Q3 2021 digital health funding report. www.rockhealth.com
Population impact of digital interventions

<table>
<thead>
<tr>
<th>Reach (# participating)</th>
<th>Effectiveness (quit rate)</th>
<th>Impact (# quitters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%</td>
<td>25%</td>
<td></td>
</tr>
</tbody>
</table>

McCrabb et al. Internet-based programs incorporating behavior change techniques are associated with increased smoking cessation in the general population: a systematic review and meta-analysis. Annals Behav Med, 2019.
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.

Online community use prospectively predicts abstinence

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

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of smokers who searched online</td>
<td>16.5%</td>
<td>35.9%</td>
</tr>
<tr>
<td>for quit-smoking information</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of smokers who searched</td>
<td>7,880,000</td>
<td>12,430,000</td>
</tr>
<tr>
<td>online for quit-smoking information</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

Text messaging is nearly universal

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.
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.

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

Apps could be improved by better integration with the Clinical Practice Guidelines and other evidence-based practices.
Chat bots
aka conversational agents
aka relational agents
aka artificial intelligence
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

22,000 subscribers within 24 hours of launch in 2019

Uptake and engagement

Enrollment
Jan 18, 2019 – Oct 5, 2021

- Teens: 142,053
- Young adults: 237,113
- Total: 379,166

Engagement

- Set quit date: 64%
- Use extra support keywords: 44%
- Complete full program: 67%

Enrollment Jan 18, 2019 – Oct 5, 2021

Total: 379,166
- Teens: 142,053
- Young adults: 237,113
User feedback

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

“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)

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

“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.”
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

Graham et al. JMIR Res Protoc. 2020. PMC7229526.
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

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

18.6%

This is Quitting

24.1%
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