Beyond the Telephone… Enhancing and Measuring Engagement in Technology-Based Services

Amanda L. Graham, PhD

Director, Research Development
Schroeder Institute for Tobacco Research & Policy Studies, Legacy
Professor of Oncology
Georgetown University Medical Center
Disclosures

- Employed by the American Legacy Foundation which runs BecomeAnEX.org, a web-based smoking cessation program

- Sources of funding:
  - 1R01DA038139-01A1, *Optimizing Text Messaging to Improve Adherence to Web-Based Cessation Treatment*
  - 5R01CA104836-06, *Internet and Telephone Treatment for Smoking Cessation*
  - Internally funded pilot research
Overview

How can technologies be used to deliver cessation services and maximize engagement?

Optimizing the effectiveness of web-based interventions
- Text messaging
- Online social networks

Evaluation strategies/issue
- Analytic methods

Practical implications for quitlines

Social Media
- Facebook-like applications
- Twitter
- Instagram

Smartphone applications
Strategies to improve mobile health (mHealth) interventions
Web-Based Cessation Programs: Effectiveness

- Reviewed 28 studies with over 45,000 participants
- Tailored & interactive Internet programs yield higher quit rates than usual care or written self help at 6 months or longer.
- Quit rates range from 14%-18% at 6 months.

The Challenge of Website Engagement

Which Intervention Characteristics are Related to More Exposure to Internet-Delivered Healthy Lifestyle Promotion Interventions? A Systematic Review

Wendy Brouwer, MSc; Willemieke Kroeze, PhD; Rik Crutzen, PhD; Jascha de Nooijer, PhD; Nanne K de Vries, PhD; Johannes Brug, PhD; Anke Oenema, PhD

The Effect of Program Design on Engagement With an Internet-Based Smoking Intervention: Randomized Factorial Trial

Jennifer B McClure, PhD; Susan M Shortreed, PhD; Andy Bogart, MS; Holly Derry, MPH; Karin Riggs, MSW; Jackie St John, BS; Vijay Nair, PhD; Larry An, MD

A Systematic Review of the Impact of Adherence on the Effectiveness of e-Therapies

Liesje Donkin, BSc, MSc; Helen Christensen, PhD; Sharon L Naismith, BA(Hons), Dpsych(Neuro); Bruce Neaf, MB ChB, PhD; Ian B Hickie, MD, FRANZCP; Nick Glozier, MBBS, FRANZCP, PhD

The Law of Attrition

Gunther Eysenbach, MD, MPH

Persuasive System Design Does Matter: A Systematic Review of Adherence to Web-Based Interventions

Saskia M Kelders, PhD; Robin N Kok, MSc; Hans C Ossebaard, PhD; Julia EWC Van Gemert-Pijnen, PhD
Research Question:
Can text messaging increase engagement with a web-based cessation intervention?
Text Messaging: Reach

**Broad Reach**
- >90% US adults own mobile phone
- 80% mobile phone owners use text
- High among groups at disproportionate risk for smoking

**Intensive Use**
Adults text users send/receive an average of 42 texts/day

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### Texting

<table>
<thead>
<tr>
<th>% of cell phone owners who use their phone to send or receive text messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>All cell phone owners (n=2,581)</td>
</tr>
<tr>
<td>Men (n=1,163)</td>
</tr>
<tr>
<td>Women (n=1,418)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
</tr>
<tr>
<td>18-29 (n=451)</td>
</tr>
<tr>
<td>30-49 (n=770)</td>
</tr>
<tr>
<td>50-64 (n=710)</td>
</tr>
<tr>
<td>65+ (n=599)</td>
</tr>
<tr>
<td><strong>Race/ethnicity</strong></td>
</tr>
<tr>
<td>White, Non-Hispanic (n=1,586)</td>
</tr>
<tr>
<td>Black, Non-Hispanic (n=434)</td>
</tr>
<tr>
<td>Hispanic (n=351)</td>
</tr>
<tr>
<td><strong>Annual household income</strong></td>
</tr>
<tr>
<td>Less than $30,000/yr (n=690)</td>
</tr>
<tr>
<td>$30,000-$49,999 (n=456)</td>
</tr>
<tr>
<td>$50,000-$74,999 (n=345)</td>
</tr>
<tr>
<td>$75,000+ (n=646)</td>
</tr>
<tr>
<td><strong>Education level</strong></td>
</tr>
<tr>
<td>No high school diploma (n=187)</td>
</tr>
<tr>
<td>High school grad (n=681)</td>
</tr>
<tr>
<td>Some College (n=679)</td>
</tr>
<tr>
<td>College + (n=1,020)</td>
</tr>
</tbody>
</table>

Source: Pew Research Center’s Internet & American Life Project, Summer Tracking Survey, August 7-September 6, 2012. N=2,581 cell phone owning adults ages 18 and
Mobile phone-based interventions for smoking cessation
(Review)

Whittaker R, McRobbie H, Bullen C, Borland R, Rodgers A, Gu Y

Task Force Finding
The Community Preventive Services Task Force recommends mobile phone-based interventions for tobacco cessation based on sufficient evidence of effectiveness in increasing tobacco use abstinence among people interested in quitting. Evidence was considered sufficient based on findings from six studies in which mobile phone-based interventions were implemented alone or in combination with Internet-based interventions.

Text Messaging: Effectiveness for Adherence
Text Message Enrollment on BecomeAnEX

Re-Learn Life Without Cigarettes
With Our Free Quit Smoking Plan

Get Started!
To get your free plan, start by answering this quick question:
How often do you smoke?:
Select
Get Your Plan

Three Steps, One Goal: Quit Smoking

The EX Plan is based on scientific research and practical advice from ex-smokers. It's not just about quitting smoking, it's about "re-learning life without cigarettes."

It doesn't matter if it's your first try or your tenth, EX can help you quit and stay quit. Research shows that the more times people come to the EX site, the more likely they are to quit smoking. The three steps in the EX Quit Plan can help you.

Get More Out of EX

Yes! Send me emails to help me quit and stay quit.

Yes! Send me text messages to help me quit and stay quit.

Please provide your mobile number

There may be potential charges from your mobile provider if you pay for mobile or text messages. You can opt out anytime by texting back the word STOP.
Text Message Features

- 10 week program
  - Multiple messages/day
  - Tailored around quit date (mm/dd)
- Personalized using participant info
- Interactive
  - True/False, Yes/No, MORE
- Customizable keywords
  - CRAVE, MOOD, SLIP
- Messages reference/hyperlink to BecomeAnEX.org
BecomeAnEX + TXT: Results

- N=2,773 BecomeAnEX users fully enrolled
  - 65.2% (n=1809) set a quit date
  - Quit dates set soon after enrolling (1.6 ± 4.4 days)
  - 30% (n=851) unenrolled from the program (“STOP”)
  - Average # days in program ~ 3 weeks
BecomeAnEX + TXT: Results

Text message **enrollment** as a predictor of 3 month website use

Model controlled for age, gender, race, ethnicity, education
BecomeAnEX + TXT: Results

Text message **engagement** as a predictor of 3 month website use

Model controlled for age, gender, race, ethnicity, education
BecomeAnEX + TXT: 5-year NIH grant
Implications for Quitlines

1. Offering text messaging *alongside* an Internet cessation program may increase website engagement.

2. Optimizing and further *integrating* Internet and text message smoking cessation programs may enhance their impact.

3. Research Questions: Can text messaging increase adherence to quitline counseling?
   - Fully integrated with quitlines or offered alongside?
   - What is most cost effective approach?

4. Quitlines are ideally situated to advance this science.
Research Question:
Does use of an online community promote abstinence among smokers also receiving phone counseling?
Online Social Networks & Abstinence

Odds of Abstinence at 6 months by Community Use

Richardson, Graham et al. JMIR. 2013.  Covariates: Many.
Online Social Networks & Abstinence: Causal?

- Engagement in online social networks for cessation appears to be **associated** with abstinence…

- **Causality?**

- Randomized trials may be mismatch for studying online social networks

- Cannot “fix” problem of self-selection
Propensity Score Matching

- NO community use
- Community use

Paired matching variables

Propensity Score

Matched Sample
Online Community Use & Abstinence

Graham et al. A Randomized Trial of Internet and Telephone Treatment for Smoking Cessation. Archives of Internal Medicine, 2011. PMC3319451.
Online Community Use: Metrics & Definitions

**Passive community use ("lurking"):**
- # private messages received
- # forum posts read
- # club posts read
- # testimonials viewed

**Active community use ("posting"):**
- # private messages sent
- # forum posts created
- # uses chat
- # testimonials written

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![Venn diagram showing categories of community use: None, Passive, Both.](image)
Online Community Use & Abstinence: Results

30-day abstinence rates (ITT) at 3 months by Community Use

Papandonatos GD, Erar B, Stanton CA, Graham AL. (under review).
Online Community Use & Abstinence: Conclusions

1. “Lurking” in online communities doubles abstinence rates among Internet/phone users
   - No pharmacotherapy… ITT quit rates ~ 25%
   - Little additional benefit for active use
     ➢ Encourage users to visit/read/lurk community

2. Important to evaluate among quitline callers
   - Study participants were Internet users first and foremost
Final Thoughts

- Technology-based services have the potential to increase treatment adherence... and quit rates

- Research design and analytic methods need to fit questions being asked

- Quitlines are uniquely positioned to benefit from – and help test – the integration of quitlines with innovative technologies
QUESTIONS?

agraham@legacyforhealth.org

202-454-5938
Challenges for Quitline Sustainability

• Expanding reach
• Costs of expanding staff
• High dropout rates
  – Common across all treatment modalities
• Personalization of user experience at least within subsamples
• “Gaps” in communication between calls
• Increasing reliance on alternate forms of communication
Challenge of Early Dropout Rate

Adult Subscriber Opt Outs over Course of Treatment
September 2011 – October 2012
Possible Solution in mHealth

- Available communication technologies
- Strong uptake in target populations
- Platform functionality consistent with tx delivery
- User engagement in the technology matches tx needs
- Can be independent or integrated into quitline services
Mobile Uptake

• **US mobile**
  – 345 MILLION (110%)

• **Worldwide mobile**
  – 6.8 BILLION vs. 1.2 billion landlines
  – Unique subscribers ~4.5 Billion
  – 92% of world pop has cell signal access
  – 75% world pop has access to mobile phone

**Source:** International Telecommunications Union February 2013; Ericsson February 2014, GSMA 2014
mHealth Potential

• **Reach**
  – Large audiences
  – Underserved audiences

• **Reduces cost burden** on healthcare system

• **Engagement** with intervention platform
  – Increase access to intervention
  – Decrease barriers to participation (scheduling, transportation, etc)
  – Decrease space/time gap between treatment & behavior
  – Seamlessly integrate user interaction with treatment within their daily life
  – Interactive functionality → improved “dose”
mHealth Challenges

- Consistency of cell phone access
- Type of device
- Multiple users per device
- Fee structures and cost
- Country-specific platforms
- Populations with Low Literacy
- Role of mHealth interventions with in larger public health infrastructure
Tools vs. Toys

• Technology and Platforms are dynamic
• Platform’s functionality
  – What does it do?
• Platform limitations
  – What does it not do, or do poorly?
• How are people using it? Not using it?
  – Need users of platform on your team
• What is your goal for being on this platform?
  – Kinds of Information?
  – Kind of tasks?
  – Frequency?
  – Does goal match user behavior?
Examples of Specific Platforms

- Social Media
  - Facebook-like applications
  - Twitter
  - Instagram

- Smartphone Applications

- **New platforms constantly emerging**
General Social Media

• Basic fx is sharing of up-to-date social information

• Tx Use: Promote specific content on a website, calls to action (Call quitline), social support

• Reach requires followers, attracting followers is difficult

• Lurkers, as opposed to active, make up vast majority of followers

• Goal across all platforms is user engagement and user generated content
Facebook-Like Platforms

- Sharing information; text, photo, video
- Typically social updates to “Friends”
- High interaction from segment of users
  - Only specific types of interaction
- Tx Use: Social support for behavior change, motivation enhancement, point to resources
- Relatively high staff demands (3-4+/day), plus responding to users as needed
Twitter

• Brief social updates, commentary, tracking of information
• Broad audience beyond “Friends”
• Tx Use: Information/Facts, motivation, updates for events
• Keep tweets fresh, must stay active, multiple times/day
Instagram/Photo-Sharing

- Post photos, brief description
- Used both for broad audience (more common) and limited social group
- Tx Use: Novel way present information/Facts, increase engagement
- Cannot include web-links, hard to develop enough quality meaningful photo content, use by target population?
Smartphone Applications (apps)

- High functionality allows for extremely wide range of uses
- Can draw on a variety of data sources
  - External sensors
- Typical user has 40-60 apps on their phone
  - Use ~5 regularly
  - Frequently updated personally-relevant content
  - Reason to return frequently
Smartphone Apps (continued)

- Tx use: High functionality/High interactivity cessation intervention
- Incorporate many features and broad content
- Structured or highly personalized & user-driven
Smartphone Apps have not lived up to potential

- Not empirically-based
- Easy to ignore
- Functionality not appropriate leveraged
- Not designed to sustain engagement
Ways to address limitations

1) **Utilize the functionality**
   - A. GPS features
     - Geotagging & Geofencing
   - B. Delivery of messages
     - Message push features
     - Signal triggered events
     - Time, location, user input, sensor data
   - C. EMA/EMI to increase knowledge of user
     - Improve generic treatment
     - Allow for improved personalization of intervention
   - D. Multimedia to improve interactivity
     - Use of pictures, video, audio, etc

2) **Machine learning**
   - Use active and passive data to tailor the intervention and the intervention delivery
Ongoing Enhancements

• Focusing the Smokefree.gov team’s energy
  – **Integration** across web, SMS and Social Media
  – **Increase interaction** with specific resources to directly target multiple health behavior change
  – **HealthyYouTXT**: Deeper evaluation, Refinement of motivation-focused content, Increase in complexity
  – **Engagement/Reengagement**: Exploring multiple options to enhance and sustain behavior change
  – **Smartphone Apps**: Major overhaul of approach, Engagement, Meaningfulness/relevance to user, Exploiting device functionality
Thank you for your attention