UNRAVELING ABSTINENCE AND RELAPSE

Smoking Cessation Reflected in Social Media

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Scott Counts
Motivation

Healthy Behavior Change & CHI
Smoking

- Leading cause of preventable death in U.S.
- 44 million smokers (1/5 of population)
- 68.8% want to quit
- Over 50% attempted cessation
- Relapse common
Cessation

• Clinical intervention
  – Group + individual therapy, physician care, tailored self-help programs
  – Access, affordability, tailoring, follow-ups
Cessation

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  – Group + individual therapy, physician care, tailored self-help programs
  – Access, affordability, tailoring, follow-ups

• Digital tools
  – Broad user base, personalized modeling, constant monitoring
Theory + Computation

• Transtheoretical Model (TTM)
  – Psychological state
  – Social support
  – Gradual progression through stages of change
Theory + Computation

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• Twitter (tweets and network data)
Theory + Computation

• Transtheoretical Model (TTM)
  – Psychological state
  – Social support
  – Gradual progression through stages of change

• Twitter (tweets and network data)
  – Linguistic analysis
  – Social medium
  – Longitudinal
Method

Data Collection & Analysis
The Cessation Event
The Cessation Event

Sample smokers trying to quit:

- Determine cessation-relevant topics
- Query Twitter firehose
- Verification with 3 Mechanical Turkers per tweet (Fleiss kappa = .7613)
- 733 unique smokers trying to quit

Just smoked my last cigarette ever!!! I officially quit!

Today I am going to quit smoking. Wish me luck

Last cigarette ever today. #promiseonmylife #bestfeelin
Data Collection

For each verified smoker:

• Twitter profile data
• Twitter network connections
• 2 years of tweets per user (1 year prior & 1 year after cessation-event)
• 5,309,510 tweets (median 3236 tweets per user)

✔ Sample aligns with CDC statistics
Data Collection

Sample aligns with CDC statistics

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDC</td>
<td>54%</td>
<td>46%</td>
</tr>
<tr>
<td>Twitter</td>
<td>59%</td>
<td>41%</td>
</tr>
</tbody>
</table>
Outcome

Survivors

• Congratulations to me, still smoke free :)  
• first few weeks were hard but I haven’t craved a cig in months

Relapsers

• Well, tried to quit smokin tobacco but..had a f**ked up day
• Day 26: Broke down and bought a pack of smokes last weekend. Smoked the last one today.
Measures

• Behavioral Markers
  – Activity
  – Sociality
  – Sentiment
  – TTM stage progression
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• Motives

• Treatments
Measures

• Behavioral Markers
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• Motives

• Treatments
Findings

Results & Implications for Design
Behavioral Signal: Sociality

- Friends
- Followers
- @mentions
Behavioral Signal: Sociality

Survivors have more connections
• ~1.5x more friends & followers (p<.0001)

Starting the patch today. Everyone please support me on the road to quitting smoking

Ok I started a really big challenge yesterday... I quit smoking! I may need some help from you guys in the upcoming days/weeks
Behavioral Signal: Sociality

Survivors gain while Relapsers lose connections

Day 2 of not smoking #bittersweet

I quit smoking yesterday and everyone is pissing me off!

Day 3 without a cig. Ooo I'm about to shoot someone
Behavioral Signal: Sociality

Relapsers repel relationships

Day 2 no smoking. I hate everyone

I need a cigarette to calm down... im about to punch something #nojokes
Behavioral Signal: Sociality

Reaching Out: @mentions

• *Survivors make 2x more @mentions across all tweets* ($p < .05$)
Behavioral Signal: Sociality

Reaching Out: @mentions
• Survivors make 2x more @mentions across all tweets ($p<.05$)

Selectivity
@username what is your opinion on vapor cigarettes? Do you think they make it easier to quit?

I quit smoking today! A promise I made to @username & I intend on keeping this promise
Cessation Motives

Survivors

Relapsers

Motivation  Method  Discussion
"When did cigarettes do this to my life? Ending the smoking and starting a new me."

Self-Reevaluation
“Today I quit smoking. My son came home with an ashtray he made in art class. FML”
“Quit smoking. Exercise. Eat healthier. Start a savings account. Spend less money on pointless shit. Vaycay to Vegas”
“So today is my last day drinking and smoking. Gotta get ma body right fa the summer time and college!”
## Cessation Motives

<table>
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<th>Survivors</th>
<th>Relapsers</th>
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<tbody>
<tr>
<td>• Sincere desires</td>
<td>• Casual impulses</td>
</tr>
<tr>
<td>• Permanent circumstances</td>
<td>• Fleeting whims</td>
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\[ \chi^2 = 21.67, \text{df}=1, \ p<.001 \]
Designing Intervention Technology
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• Likelihood of abstinence
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• Personalized treatment plans
Designing Intervention Technology

• Likelihood of abstinence
• Personalized treatment plans
• Adaptive intervention
Designing Intervention Technology

• Likelihood of abstinence
• Personalized treatment plans
• Adaptive intervention
• Automation & user input
  – Invisible behavior
  – Preferences
  – “Achievement”
Summary

• **Motivation**
  – Behavior Change
  – Smoking Cessation
  – Socio-Technical Systems

• **Methods & study**
  – Twitter profiles, connections, and tweets
  – Operationalizing variables
  – Survivors vs. Relapsers

• **Recommendations for technology design**
  – Diagnosis
  – Prediction
  – Intervention
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Thank You! Questions?

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