HOW TECHNOLOGY MAY REVOLUTIONIZE HEALTH BEHAVIOR CHANGE

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Objectives

- To learn about how mobile technology and social media may increase the impact of health behavior change interventions
- To learn how to use mobile technology and social media in your health behavior research
- To learn ways mobile technology and social media has been used in health behavior research
Technology and health

- eHealth
- mHealth
- Social Media
eHealth

eHealth is the use of information and communication technology, such as computers, mobile phones, communications satellite, patient monitors, etc., for health services and information.
mHealth

The practice of medicine and public health, supported by mobile devices.

The use of mobile devices in collecting community and clinical health data, delivery of healthcare information to practitioners, researchers, and patients, real-time monitoring of patient vital signs, and direct provision of care.
Why mobile?

285 million wireless subscribers

68% of adults worldwide use cellphones

Has a greater capacity to be interactive than web-based interventions

(Riley et al. 2011)
Why mobile?

mHealth market estimated to hit $23B in revenues by 2018

Top 5 fitness/weight loss apps have a combined 10M users

Dissemination potential is enormous
mHealth Research Directions

1. Evaluating commercial (post-market) apps

2. Developing and evaluating novel apps
Commercial apps

- Evaluate information and functions of commercial mobile apps relative to a standard

- Evaluate usability

- Evaluate efficacy
  - RCT
  - Adaptive designs
  - Small n designs
A systematic review of weight loss mobile apps in top 100 health apps on iPhone and Android platforms (N=30)

- App must include at very least a self-monitoring function for diet, physical activity and weight

Coded for the presence of 20 evidence-based behavioral weight loss strategies.

Pagoto et al 2013, American Journal of Preventive Medicine
Results

90% - 100% do tracking with visual feedback and goal setting

0-20% included the other 17 strategies commonly used in behavioral weight loss interventions
Challenges

Apps are constantly updated

Some apps are connected to coaching programs, websites, multimedia content that are more difficult/time consuming to evaluate.

Some apps have time dependent strategies.

We don’t know how many strategies an app should have to be effective
Developing novel apps via research

Requires team science

- Engineering
- Computer science
- Behavioral science
- Design

NSF vs NIH

Lack of commercial involvement may present challenges to dissemination
Smart Coach

A mobile app that addresses barriers to weight loss might be helpful for people who aren’t consistent trackers.

**Problem solving** is a key strategy reflected in every behavioral counseling visit. This is what counselors do!

**Tool:** Smart Coach has an avatar-facilitated, idiographic problem solving feature that processes information intelligently to help patients identify solutions to their weight loss problems.

**Study:** Developmental and feasibility pilot study

R21DK098556
What is social media?

Interaction among people in which they create, share, and/or exchange information, and ideas in virtual networks.
As of May 2013, 72% of online adults use social networking sites.
Social Media in Behavioral Research

Social media can be used to:

- **Recruit** participants
- **Disseminate** innovations
- **Study** online social behavior
- **Deliver** behavioral interventions
Facebook Recruitment

Facebook ads

Geographical targeting via zip code

Use keywords to hone in on a population

Pay per click, pay per 1000 views
Facebook Recruitment

Incentivize participants to post your study link “electronic word of mouth”

Have pages/groups of local patient communities to share the link

Create a research participation page that advertises many studies
Diabetes Support Community

Diabetes Support Community
1,297 likes · 49 talking about this

About people who live with diabetes and support each other.
Twitter Recruitment

Need to build a following of your constituency including “hub” users that also have access to your constituency and/or

Identify “hub” users who you can pay (or ask nicely) to tweet your ads

Asking for RTs dramatically increases RTs

Use hashtags to get your ads into communities (e.g., #bcsm) – Symplur.com
Patient Communities

#bcsm -- breast cancer social media is a community of breast cancer patients and docs on Twitter
Disseminate innovations
Social contagion

Obesity is “socially contagious” such that people are significantly more likely to be obese when they have an obese spouse and/or friends (Christakis and Fowler, 2007)

Healthy habits are also shared in social circles

Online social networks expand our social circles
“Peer to peer healthcare”

34% of internet users have read about someone else’s experience with a health condition on the internet (Pew Internet Survey 2012)

25% of internet users with a chronic health condition have sought out others with that condition on the internet (Pew Internet Survey 2012)
Health hashtags on Twitter

What is a hashtag?
A hashtag is when a # is used in front of a phrase or word in an online social network to tag it as a searchable term.

How are they used?
To find conversations on a topic, or people who have a shared interest, i.e., build a community.
The #PlankADay Story

We (unintentionally) launched a health challenge on Twitter that entailed completing an abdominal exercise and using a hashtag (#PlankADay) to report completion.

Pagoto, Schneider, Smith & Bauman, 2014, Journal of Physical Activity and Health
Accountability can be fun...

48 hours with no #plankaday earns you a reminder tweet from the @plankpolice:

Has your #PlankADay been ABducted by aliens?

Careful, don't go 3 days without #PlankADay!

ABracadABra! Your #PlankADay disappeared!
#PlankADay Study

- Programmed a database for surveillance of the hashtag

- Survey (participants in first 2 months)
  - Demographics
  - Length of participation
  - Degree people encouraged others to join (spread)
  - What they like about participating
Participants (n=100)

81% female

Mean age = 35.8 (SD = 7.9; range: 18-59)

86% Caucasian, 4% Black, 4% Asian, 4% Latino/Hispanic, and 2% of unknown ethnic origin

Mean BMI =24.87 (SD = 4.85), lean= 54% overweight= 34%, obese= 7%, NR=5%

57% reported to be trying to lose weight

Baseline ab exercise: 24% said several times/week, 19% said 1/week, 31% said 1-2 times/month, 14% said less than 1/month, and 12% said none
Engagement

The hashtag has been used by over 10,000 on 3 continents since June 2011 (with new adopters daily)
Length of Participation (max 8 weeks)
Did you encourage anyone else to join #plankaday?

68% yes
32% no

How?
46% Twitter
42% in person
12% Facebook
6% text/chat
5% email
How many people did you invite to participate?

- 7% 1 person
- 41% 2-4 people
- 9% 5-12 people
- 3% 50+ people
Healthy Hashtag Project

What type of health hashtags are there?

How often are health hashtags being used?

How are they being used?

What are the features of hashtags that seem to get the highest rates of use?
# Health Hashtags (n=30)

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior</td>
<td>Indicates the user performed a health behavior (e.g., #runstreak, #plankaday)</td>
</tr>
<tr>
<td>Generic healthy</td>
<td>Denotes the users support for a generic healthy concept (e.g., #lowcarb)</td>
</tr>
<tr>
<td>Commercial workout-specific</td>
<td>Initiated by a commercial exercise program (e.g., #trx)</td>
</tr>
<tr>
<td>Noncommercial community</td>
<td>Indicates inclusion in a noncommercial health/fitness community (e.g., #fitbloggin)</td>
</tr>
</tbody>
</table>
# Hashtag categories (cont)

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial community</td>
<td>Indicates inclusion in a commercial health/fitness community (e.g., #imagreatist)</td>
</tr>
<tr>
<td>Chats</td>
<td>Indicates engagement in a health/fitness chat (e.g., #wwchat)</td>
</tr>
<tr>
<td>Mobile app</td>
<td>Indicates use of a fitness/health mobile app (e.g., #myfitnesspal)</td>
</tr>
</tbody>
</table>
## Hashtag frequency by category

<table>
<thead>
<tr>
<th>Category</th>
<th>Mean Frequency</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mobile app</td>
<td>30,937</td>
<td>1,105 - 57,741</td>
</tr>
<tr>
<td>2. Commercial community</td>
<td>23,403</td>
<td>923 - 71,685</td>
</tr>
<tr>
<td>3. Generic Healthy</td>
<td>12,110</td>
<td>428 – 57,209</td>
</tr>
<tr>
<td>4. Commercial workout specific</td>
<td>10,429</td>
<td>10,429</td>
</tr>
<tr>
<td>5. Chats</td>
<td>6,120</td>
<td>3,574 – 9,324</td>
</tr>
<tr>
<td>6. Behavior</td>
<td>5,201</td>
<td>1,782 – 11,507</td>
</tr>
<tr>
<td>7. Noncommercial community</td>
<td>2,021</td>
<td>1,495 – 2,548</td>
</tr>
</tbody>
</table>
# Hashtag frequency in 50 days

<table>
<thead>
<tr>
<th>Hashtag</th>
<th>Total frequency</th>
<th>Frequency/Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. #girlsgonesporty*</td>
<td>71,685</td>
<td>1,433</td>
</tr>
<tr>
<td>2. #myfitnesspal*</td>
<td>57,741</td>
<td>1,155</td>
</tr>
<tr>
<td>3. #getfit</td>
<td>52,209</td>
<td>1,044</td>
</tr>
<tr>
<td>4. #fitfluentual*</td>
<td>50,031</td>
<td>1,001</td>
</tr>
<tr>
<td>5. #makeitcount (Nike)*</td>
<td>45,666</td>
<td>913</td>
</tr>
<tr>
<td>6. #c25k*</td>
<td>33,966</td>
<td>679</td>
</tr>
<tr>
<td>7. #livewithfire (Reebok)*</td>
<td>23,878</td>
<td>478</td>
</tr>
<tr>
<td>8. #sweatpink*</td>
<td>11,949</td>
<td>239</td>
</tr>
<tr>
<td>9. #plankaday</td>
<td>11,507</td>
<td>230</td>
</tr>
<tr>
<td>10. #tiuteam</td>
<td>10,462</td>
<td>209</td>
</tr>
</tbody>
</table>

*commercial
Discussion points

Health hashtags are ubiquitous on Twitter with 458,350 uses in 50 days across 30 hashtags.

Hashtags do not require commercial backing to spread (#girlsgonesporty company has 3900 followers, #myfitnesspal has 61,000)

We can leverage this in health behavior interventions/public health campaigns

Potential for spread is massive
Study online social behavior
Who is tweeting about their weight loss?

**Study:** The purpose is to describe adults who use Twitter during a weight loss attempt and to compare the positive and negative social influence they experience from their offline friends, online friends, and family members.
Methods

- PI tweeted the survey 58 times to get 100 complete responses for 1.72 surveys/tweet
- Tweet: “Do you tweet about your weight loss journey? Complete a brief survey!”
- Survey evaluated:
  - 5 areas of positive social influence (comfort, helpful, informative, supportive, fun)
  - 2 areas of negative social influence (embarrassment, judgmental)
Participants

100 surveys completed
82% female, mean age = 37.65 (range 21-58)
BMI = 32.0 (SD = 8.70); 23% were normal weight, 24% were overweight, and 53% were obese
Mean weight lost in current weight loss effort 43.72 lbs (SD=43.33; median= 28 lbs; range= 13-204 lbs)

A successful bunch of folks!
Items

I feel **comfortable** talking about weight loss, diet, and exercise with _____.
In general, I find ____ to be very **helpful** to me as I try to lose weight.
I get **support** from ____ about my weight.
I get useful **information** from ____ about weight loss, diet, and/or exercise.
Talking about weight loss, exercise, and diet with ____ is **fun**.

I have felt **embarrassed** about my weight when it comes to _____.
____ tend to be **judgmental** about my weight.
Positive Influence

Twitter: *p<.01
Negative influence

Feel Embarrassed About My Weight

<table>
<thead>
<tr>
<th></th>
<th>Twitter</th>
<th>Facebook</th>
<th>Family</th>
<th>Friends</th>
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<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>3</td>
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</table>

Judgmental

<table>
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</table>

*p<.01
Discussion points

Twitter connections based on similar goals

Anonymity may circumvent stigma/shame, disinhibits discomfort about talking freely

Social network is hand-crafted, negative forces are easier to eliminate than in-person connections
Behavioral Interventions
Intervention delivery modalities

- Facebook private groups
- Facebook apps
- Twitter
Facebook private group

- Invitation only
- Only members can view content
- Discussion strings, post links and videos, polls, can post documents
- Facilitate a group chat
Facebook app

An app that is accessible only via Facebook. When a user logs into their Facebook account they can access apps they have been “invited” to use.

Facebook apps allow functionality to be programmed that is not available in a typical Facebook page or group, such as gaming, message boards, self-tracking devices, leaderboards, and much more.
Twitter

- Using privacy settings you can create a private group.
- Discussion strings, group chats, post links/pics/videos
- 140 character limit to tweets!
Get Social Pilot Series

Proof of Concept: Can we deliver a lifestyle intervention entirely via Twitter?

3 conditions:
1. Group-based lifestyle intervention
2. Group-based lifestyle intervention + Twitter Coaching
3. Twitter Coaching

In symposium accepted for presentation at the 2014 Society of Behavioral Medicine
## Get Social Pilot Series

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>N</th>
<th>Mean %wt loss</th>
<th>Drop-outs</th>
<th>Mean total tweets</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 week group lifestyle</td>
<td>12</td>
<td>3.1%* (4.1)</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>12 week group lifestyle plus Twitter</td>
<td>11</td>
<td>3.1% (3.3)</td>
<td>2</td>
<td>124.18 (126.80)</td>
</tr>
<tr>
<td>12 week Twitter and My Fitness Pal, plus 1 group visit</td>
<td>12</td>
<td>3.8% (3.0)</td>
<td>0</td>
<td>129.45 (130.76)</td>
</tr>
</tbody>
</table>

* DPP achieved mean 6.9% (sd=4.5%) weight loss in 24 weeks
It is feasible to deliver a lifestyle coaching via Twitter.

Fully powered trial is need to establish efficacy.

May be lower cost alternative to group-based and web-based interventions.
Food for thought...

Social media platforms offer excellent user interface

Using social media platforms will inspire research ideas— you must understand functionality, users, how to engage, and how to facilitate engagement

Beware of learning curve---having participants use interfaces they aren’t used to requires some training
What can we gain from technology?

Technology provides greater opportunity for in-the-moment intervention that is based on real-time data

Dissemination potential high

Overcoming challenges to traditional approaches

Cost saving (e.g., e-visits)
Follow me on Twitter… @DrSherryPagoto