Research to Action: Leveraging Information Technologies for Population-Wide Physical Activity Promotion

Abby C. King, PhD

Stanford Healthy Aging Research & Technology Solutions Lab
Stanford Prevention Research Center
Stanford University School of Medicine

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(Disclosures: Amway/Nutrilite; Google; Gen-9)
Presentation Objectives

- Discuss some current trends in information technology (IT) of particular promise for physical activity promotion
- Highlight some *future directions* in the field

(Disclosures: Google, Gen-9, Amway/Nutrilite)
The **CHALLENGE**

- **Technology** = major “driver” of many of society’s comforts, conveniences & advances

- **But**, has engineered regular movement & activity out of our daily lives

- How can we harness technology for **“good”** in PA area?
Technology as a **Solution**?

**It Offers:**

- Real-time Information capture
- Delivery of personalized, contextually relevant messages & information
- Population Reach (& impact)
For example—

**EXPLOSION of Cellphones around the world**

- About as many mobile phone subscriptions as *people* in the world

- 91 countries have *more* cell phones than people (2011)

- Mobile phone growth *regardless of economic development*

BUT . . .

• While IT potential is vast...

• “Wild West”, little evaluation of efficacy

• Traditional Science too slow, not agile enough to capture current trends, innovations
What’s Needed – one possibility

**Community-Engaged ‘Citizen Science’**

that brings together:

- Researchers
- Organizations
- Residents


to harness potential of IT/mobile devices to solve ‘big hairy PA promotion challenge’
Can Apply this approach to different IT Domains, including:

- Me
- We
“ME” domain

Quantified Self (mobile & wireless devices)

• Large # of “N-of-1 individual experiments” occurring across the population at large, involving . . .

• Personalized “just-in-time” sensing & data collection by a growing number of individuals

• ‘Data hubs’ in public & private sectors are emerging to combine & make sense of all these data

• Significant opportunities in PA & other arenas through partnering with industry
“ME” - continued

In addition to quantification & assessment,

- Personalized “IT Advisors” for physical activity promotion (intervention)
Individually-Adapted IT Interventions: EXAMPLES

- *Tele-health*

- ‘*Virtual*’ Advisors

- *Smartphone App platforms*
Fortunately, *Evidence-based* Behavioral Strategies that work *across Communication Channels*

- Realistic outcome expectations
- Increased awareness (mindfulness)
- Exploring personal benefits & costs
- Personal goal-setting
- Self-monitoring
- Regular feedback
- Social support
Tele-Health by Computer

Can Automated systems replace Human instructors in promoting regular physical activity?

(think phone-based airline reservations “agent”)
Estimated Energy Expenditure in MVPA (7-day PAR)

*Intervention > control, $p \leq .01$; †Intervention > control, $p = .05$

King AC et al., Health Psychol, 2007; 218 inactive adults 55 yrs+

(CHAT)

Human Phone Advice

Automated Phone Advice

Control

current WHISH TRIAL
(~20,000 older women)
Another side to Personalized Technology: Preventing Widening of Health Disparities Gap ("digital divide")

- Language issues
- Reading levels
- Computer access/skills/comfort levels
- & Health literacy

‘Virtual Advisors’
- Provide tailored interactions via both simple verbal & nonverbal communication
Hola Carmen!

Hola Carmen, qué gusto verte

Hola Carmen, parece que las cosas no van bien

¿Cómo ha dicho?
Participant “talking” with Carmen
COMPASS – RESULTS

4-month Change in Minutes of Walking/Week
(N = 40; low-income Latino Older Adults with low computer literacy)

King, Bickmore et al., J Health Communication, 2013
**COMPASS Study**

4-month Change in Daily Steps

(Omron Pedometer)

Intervention Participants (n = 20)

* Slope analysis: $p = .002$, King et al., 2013
At 4-month Post-test, *Intervention participants indicated that*. . .

- ‘Carmen’ *cared* about them (mean rating = 6.2 out of 7)
- *Felt close* to ‘Carmen’ (mean = 6 out of 7)
- *Trusted* ‘Carmen’ (mean = 6 out of 7)
- Were interested in *continuing to work with* ‘Carmen’
  
  (& did so *over next 5 months* after research ended)

*(from Working Alliance Inventory)*

King, Bickmore et al., *J Health Communication*, 2013
Next Steps for Virtual Advisor

• Testing Carmen in more community settings to evaluate longer-term effectiveness, vs. humans, in inactive, Latino aging adults [NIH R01HL11644802]

• **Examples of Other Potential Settings:**
  - Clinics; pharmacies
  - Libraries
  - Worksites
  - Recreational centers
  - Schools
  - Shopping Malls
Smartphone applications –
*Increasingly popular & ubiquitous channel*

- Huge # that passively assess **PA** via built-in sensors (i.e., accelerometer, GPS) & may provide just-in-time feedback for behavior change

- But few employ other theoretically- or empirically-based strategies to systematically enhance motivation & behavior over time

Smartphone Apps for *walking more & sitting less* (using different motivational frames)

**Analytic**

**Affect/Play**

**Social**

MILES study – *Increase in Daily Walking* (2 months)

(n = 68 adults ≥ 45 yrs, inactive, 1st contact with Smartphones)

King, Hekler, Grieco, et al., *PLOS One*, 2013
When tested in an Experiment
(2 months; with Calorific control app)

Using smartphone’s built-in accelerometer:

• MVPA: **Social** app did best \( (p<.05) \)
  - Other 2 apps = More variability in R; **(which app for whom?)**

• Sedentary time: **Analytic** app decreased **TV sitting time** relative to apps without explicit sedentary feedback
What does the Future hold?

Technology that informs/motivates but “gets out of the way” of Active Living

Experiencing the World through a Screen

(vs. “wearables”)
Going up a level:
“WE” domain

• Empowering ‘Citizen scientists’ to assess & advocate for healthier neighborhoods & communities

• Social environments & physical activity
‘Citizen Science’ healthy neighborhood projects aim to:

• Use simple technology to help Low-Income, underserved residents identify Neighborhood features that:
  - Help or hinder Active Living & Healthy Eating

• Residents prioritize issues (feasible, low-cost)

• learn how to Build community partnerships

• learn to Advocate for change with community decision-makers

residents use Stanford Healthy Neighborhood Discovery Tool
Captures Barriers to Walking/Food Access

(Tool collects neighborhood info via GPS Route tracking/ Geo-coded Photos & Audio narratives)

Stanford Healthy Neighborhood Tool

1. The purpose of this tool
2. What to do
3. What to look for

© Stanford
Goal: **Aggregated View for Policymakers**

(‘crowd-sourcing’ tool to empower residents)

Runnymede Gardens Senior Housing, East Palo Alto
Examples of barriers in E. Palo Alto: lack of **Safe Crossings & Paths to Public Transit**

*(Residents have worked with city & other organizations)*

**Traffic Calming**

**Improved Access to Public Transportation**
NEAAT Successes in East Palo Alto, CA

- Older low-income Residents were able to use Discovery tool to **identify neighborhood barriers** to PA/food & **advocate for changes**

- In response, City planning committee & City Council allocated ~$400,000 for needed city-wide sidewalk repairs & improvements (e.g., shade trees) to facilitate walking

Other Successes, using the “Citizen Science” model include:

- **N. San Mateo County, CA**—*Increasing Food Access*: 84% of low-income residents contacted local policy maker, or used a new community food service [Senior Advocacy Team formed]

- **N. Fair Oaks, CA**—*Intergenerational Solutions*: Latino teens & older adults have improved neighborhood for walking

- **Cuernavaca, Mexico**—*Improving Healthy Living*: Citizen coalition to increase neigh. cohesion & safety
Citizen Science Activities - continued

• Israel—*Multi-cultural cooperation for active living*: Israeli Arab & Jewish residents are generating collaborative solutions

• Bogotá, Colombia—*Evaluating city-wide recreational offerings* among diverse groups (including homeless)

• 4 Rural Counties in Upstate NY—*Catalyzing positive change in rural food & activity environments*
Community-Engaged Citizen Science
Network for Active Living & Healthy Eating
Another side to social environments:
Harnessing Social Networks for Change

Through processes like Homophily - Perceived similarity between people promotes identification, social modeling

Field is ripe for more research on “spread of Physical Activity” via Social Networks

In Summary –
Some Thoughts about What we Can Do

• Harness power of *Intersectoral* & *Intergenerational* teams to “push the envelope” in PA field & learn IT language/’culture’/opportunities

• Look for opportunities to partner with *private sector*, as well as *community organizations*

• Employ culturally informed technologies to extend program reach for *all groups* to address *health disparities*
Some Thoughts about What we Can Do - continued

- **Different communication channels** may work best for *different population segments* (‘whiches’ conundrum)

- Consider *stealth* interventions that tap into non-health values & motives (e.g., ‘exergames’/fun, social connections, family, environ. sustainability, well-being)

- Tackle issues of *privacy*, anonymity, informed consent
Some Thoughts about What we Can Do - continued

• Continue to proactively promote physical activity & dietary change as *complementary & synergistic partners* in population-wide behavioral health

• Tackle built environment challenges not only from top down (e.g., policies) but simultaneously from *bottom up* through *citizen science engagement*
In Closing,

Through challenging ourselves to expand beyond our usual ‘comfort zones’ in leveraging the potential of IT . . .

We will be better able to meet the Challenge of not only anticipating the future, but Creating it
Thank you!