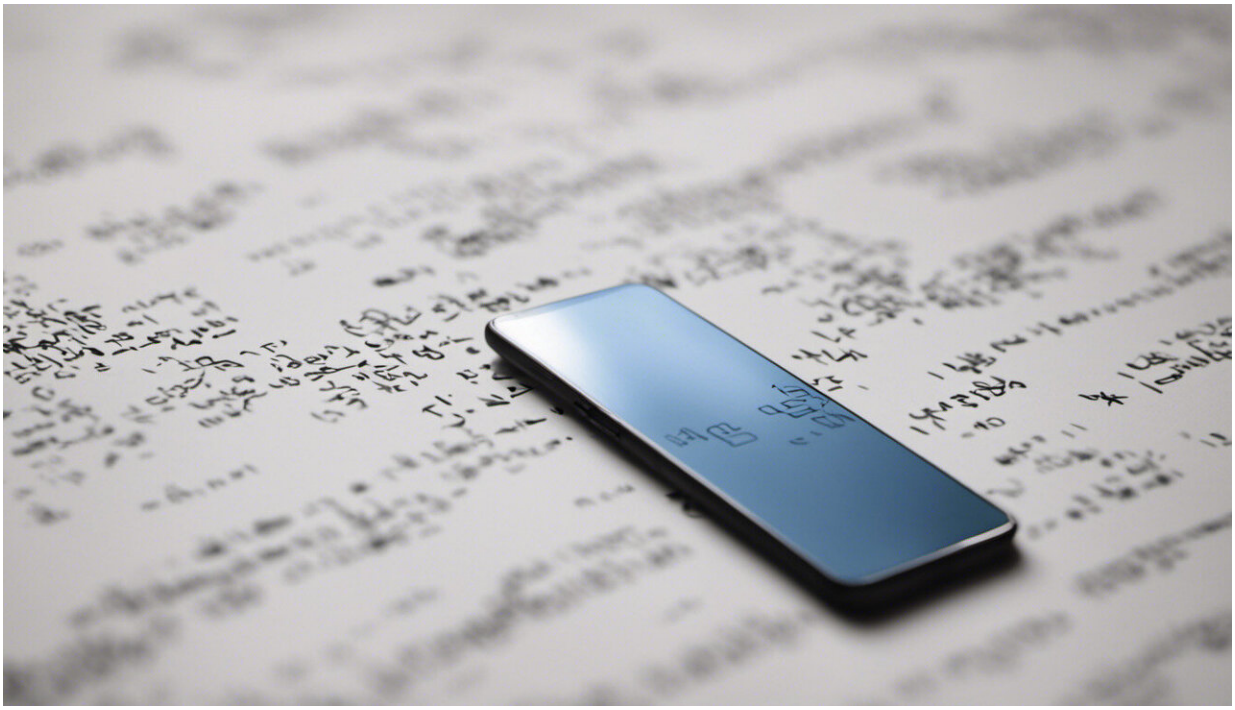
A scientific smartphone tool for personalized health

July 27 2015, by Aaron Dubrow



Credit: AI-generated image (disclaimer)

Adults frequently report that they enjoy the outdoors, including recreational sports, walking in nature, and spending time outside with loved ones. But surveys from the National Recreation and Park Association indicate that 30 percent of adults spend minimal time outdoors—and those who do venture outside daily typically spend less

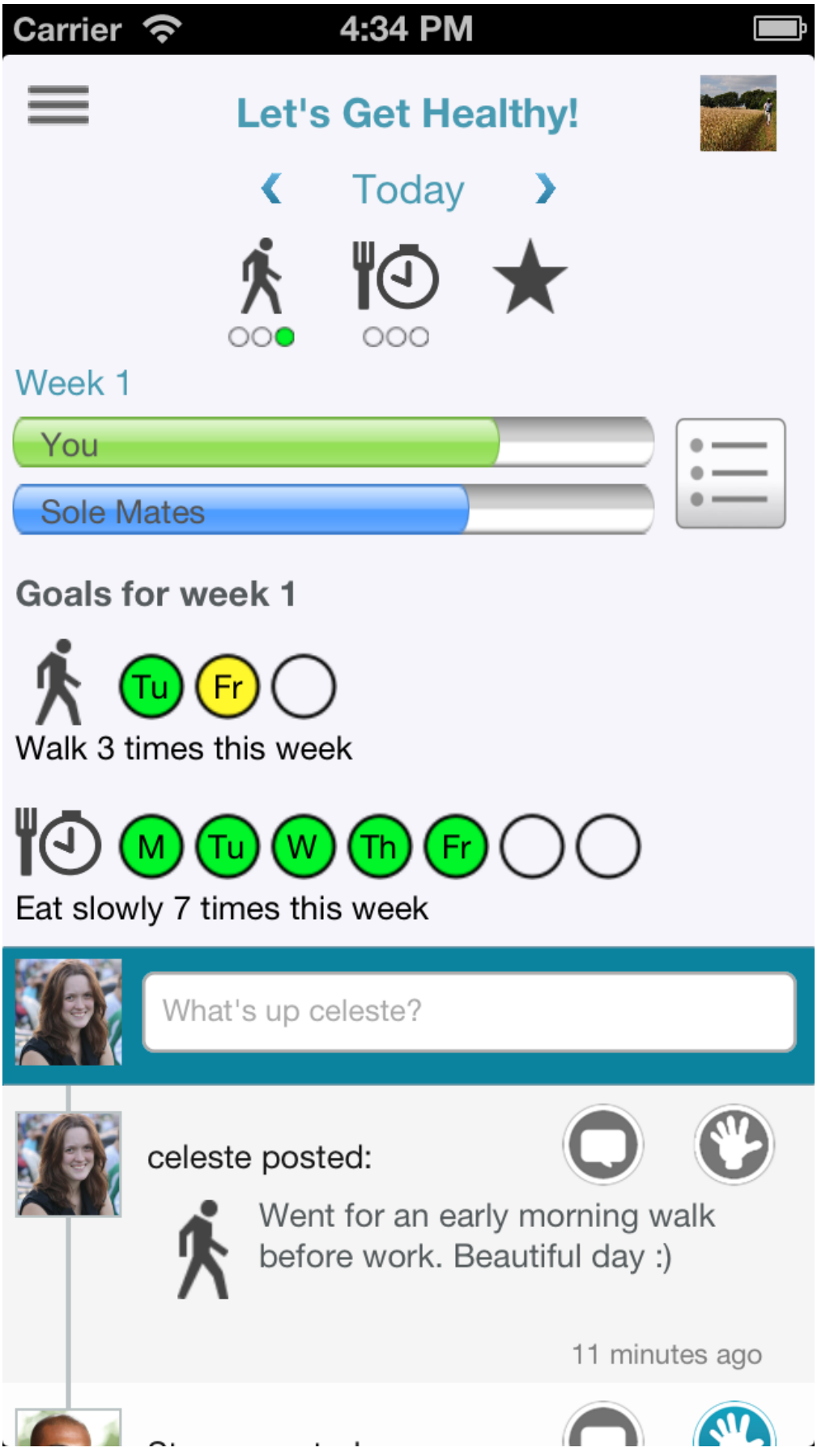
than 30 minutes being active. Computer science and predictive models can offer tools to support desired behaviors and better foster this connection.

Personalizing health and fitness is profoundly important as one's fitness levels, wellness goals and access to resources can be highly variable. Gym environments, for example, do not represent universally enjoyable exercise and not all individuals have access to gyms. National parks and recreation facilities, coupled with personalized mobile tools expand the opportunities for Americans to engage in sustainable, healthy practices.

With support from the National Science Foundation's (NSF) Smart and Connected Health program, researchers Bob Kraut and Mengshoel Ole from Carnegie Mellon University and Michael Youngblood and Peter Pirolli from the Palo Alto Research Center (PARC) are using artificial intelligence and predictive models to develop mobile health tools to maximize engagement in personalized, healthy lifestyles.

"We really need a science that gives us much more fine-grained theories and predictive algorithms that allow us to fine-tune interactions with people and personalize those interactions in ways that really support people," Pirolli said.

The mobile platform the researchers have developed, called Fittle, integrates sensor technology, cognitive tutoring, and evidence-based social design for interventions that promote health.


Carrier
4:34 PM
Let's Get Healthy!
Today
Week 1
You
Sole Mates
Goals for week 1
Tu
Fr
Walk 3 times this week
M
Tu
W
Th
Fr
Eat slowly 7 times this week
What's up celeste?
celeste posted:
Went for an early morning walk before work. Beautiful day :)
11 minutes ago

Fittle, a mobile platform created by researchers at Carnegie Mellon University and PARC, integrates sensor technology, cognitive tutoring, and evidence-based social design for momentary interventions that promote health. Credit: Fittle

Studying behaviors

In order to optimally prompt and support physical activity, the researchers generated a computational model that paired a theory of behavioral change with a software simulation system of the brain that highlights dynamically produced behavior.

The computational neurocognitive models created for this project integrate novel types of data sets, such as an individual's prior history of performing physical exercise and achieving behavioral goals, as well as levels of readiness and intent to perform a behavior. Machine-learning algorithms use the data from sensors on smartphones to identify the type and amount of exercise an individual has actually done during the day.

Predictive analytics offer insights into characteristics that improve the likelihood of changing behavior and help Fittle's users to select appropriate exercise goals. The team integrated an individual's successes in past activities, his or her level of engagement in desired activities, the support he or she received from other members of an exercise group, and one's ability to adapt to different levels of difficulty into the mobile platform to create the personalized physical activity management tool.

"Our research goal with Fittle is to provide a personalized wellness journey tailored to the individual through theoretically-based techniques in a social team setting delivered on a mobile platform," said Michael

Youngblood. "Users achieve wellness goals in collaboration with the system intelligence while sharing the adventure with a goal-aligned, supportive group of friends."

Personalized wellness

Individual characteristics were integrated into a model exploring a person's interaction history, sensor data, and preferences. Artificial intelligence methods combine this data with continuously updated data to provide individualized coaching and online peer support.

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and predictive models can offer tools to support desired behaviors and better foster this connection. Credit: Fittle

Fittle engages users by setting a goal, calling upon data from previous events, blending participant histories of success in various activities with information on local resources to create a comprehensive kit to guide individuals in achieving personal goals.

For example, an individual with a positive association with past hiking experiences who successfully hiked 3 miles a day will have this information integrated to generate visual content and messaging. The content might include motivational messages to adjust difficulty to a 3.5-mile hike or communication from teammates identifying local trails with hikes at the appropriate difficulty.

"This project harnesses analytics for personalized physical activity models," said Wendy Nilsen, Smart and Connected Health program director at NSF. "A tailored system incentivizes activities meaningful to a specific individual. This could be walking, hiking, biking, or swimming, and is not confined to conventional fitness settings. It encourages people to embrace environments and activities that are fulfilling."

The research team has conducted multiple studies with over 1000 users participating in activity challenges. Elements of that research are now in the process of commercialization.

"With scientifically developed tools such as Fittle to personalize fitness experiences and priorities, and with behavior change embedded in a team environment, individuals who seek natural environments for exercise, emotional well-being, social interaction, and overall health can

be empowered to achieve their goals," said Carnegie Mellon's Kraut.

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