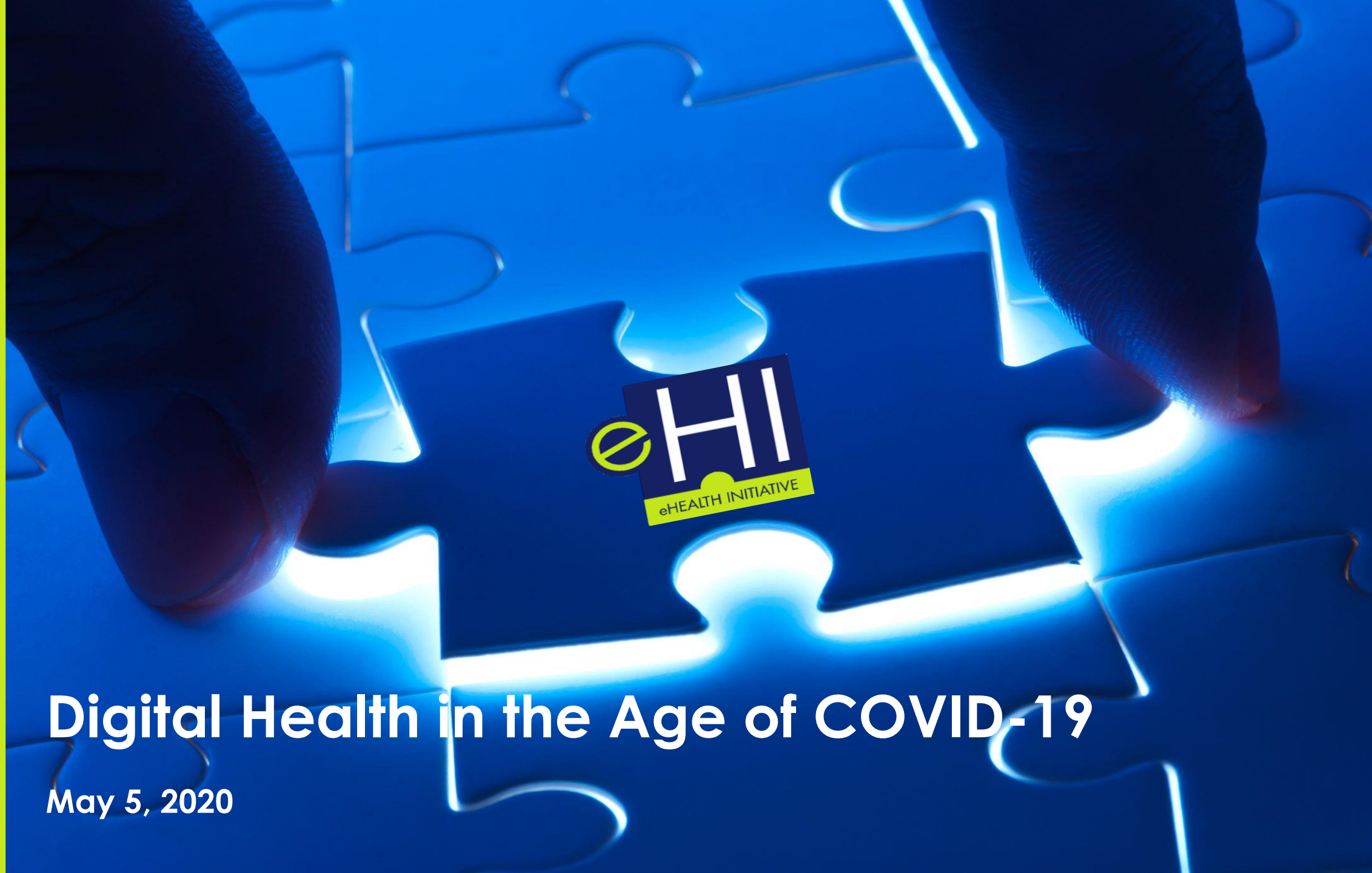
eHEALTH INITIATIVE



Digital Health in the Age of COVID-19

May 5, 2020

Agenda

Welcome and Introductions

- Jennifer Covich Bordenick, Chief Executive Officer, eHealth Initiative and Foundation

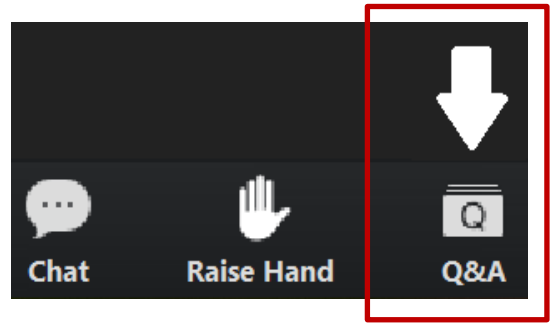
Presentation

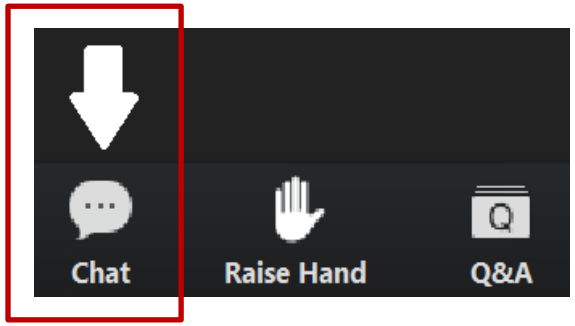
- John Moore, MD, Medical Director, Fitbit

- Jennifer Radin, PhD, Epidemiologist, Scripps Research

Housekeeping

- **All participants are muted**
- **To ask a question to be answered by speakers:**
  - Use the “Q&A” box found on the bottom of your screen
  - We will address as many as possible after the presentations
- **For help with technical difficulties and non-speaker questions:**
  - Use the “chat” box and we will respond as soon as possible
- Slides and a recording of today’s presentation will be available for download on eHI’s Resource page: **www.ehidc.org/resources**





Our Mission

Convene executives who are transforming healthcare through technology and innovation.

Our Leadership

Areas of Focus

- **TRANSPARENCY**
  - Cost Transparency
  - Prior Authorization
- **INTEROPERABILITY**
  - FHIR in Plain English
  - Information Blocking
- **PRIVACY**
  - Non-HIPAA Data
  - Cybersecurity Med Devices
  - Health Data & National Security
- **ANALYTICS**
  - Social Determinants of Health
  - Artificial Intelligence, Predictive Analytics (Biosurveillance, Epidemics, Genomics)

UPCOMING PROGRAMS (See eHI Event Page):

- **May 7** – COVID-19 and Beyond: Telepsychiatry Best Practices and Regulatory Priorities
- **May 12 –** eHI Executive Insights: Lisa Ide, MD, Chief Medical Officer, Zipnosis
- **May 21 –** eHI Executive Insights: Len Lechtenfeld, MD, American Cancer Society

nterested in sponsoring a COVID-19 program? Email Amy@ehidc.org

Thank you to our members!

fitbit.
HEALTH SOLUTIONS

DIGITAL HEALTH
IN THE ERA OF COVID-19

TODAY'S PRESENTERS

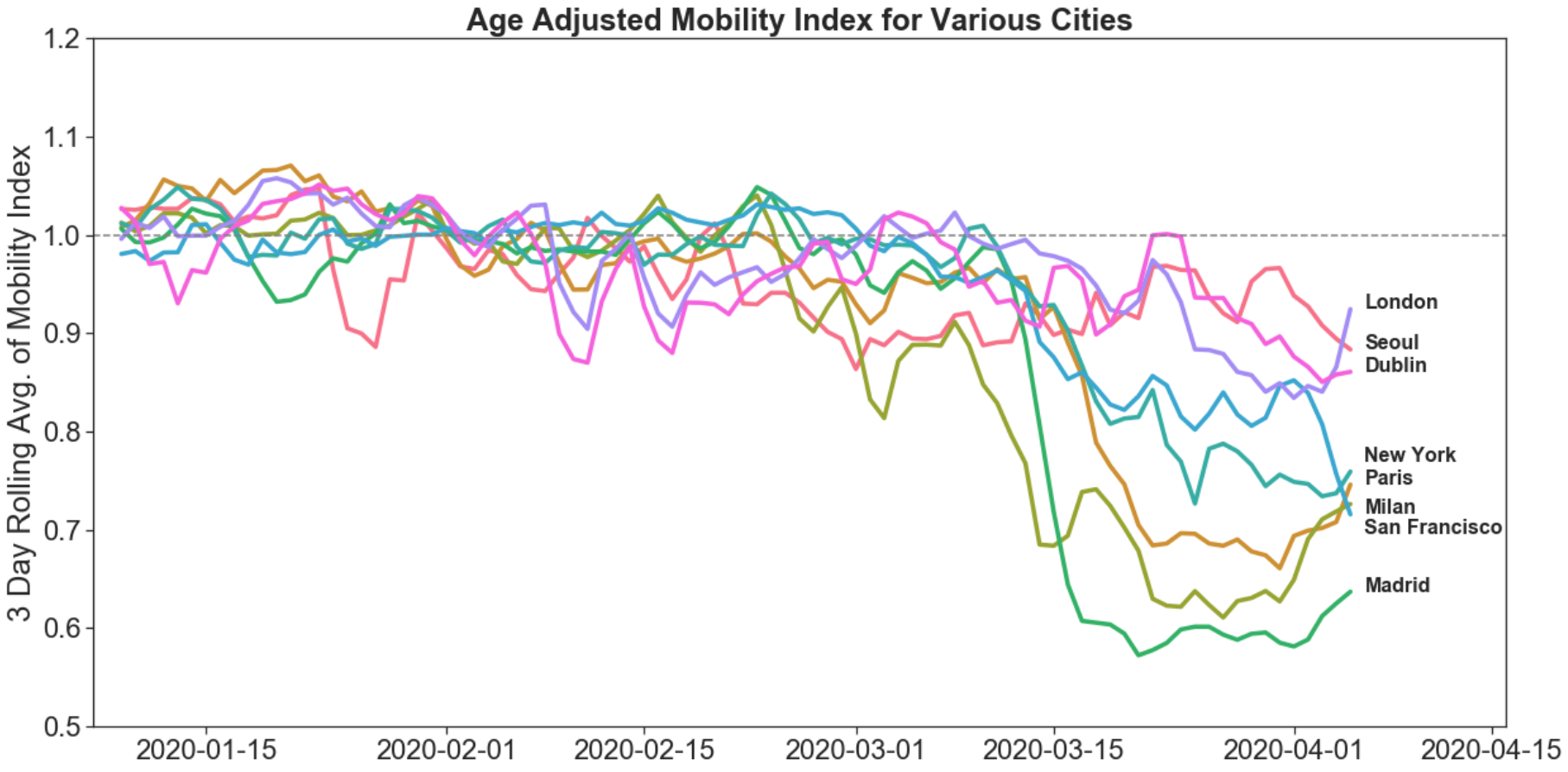
DR. JOHN MOORE
Medical Director
Fitbit

JENNIFER RADIN
Epidemiologist
Scripps Research

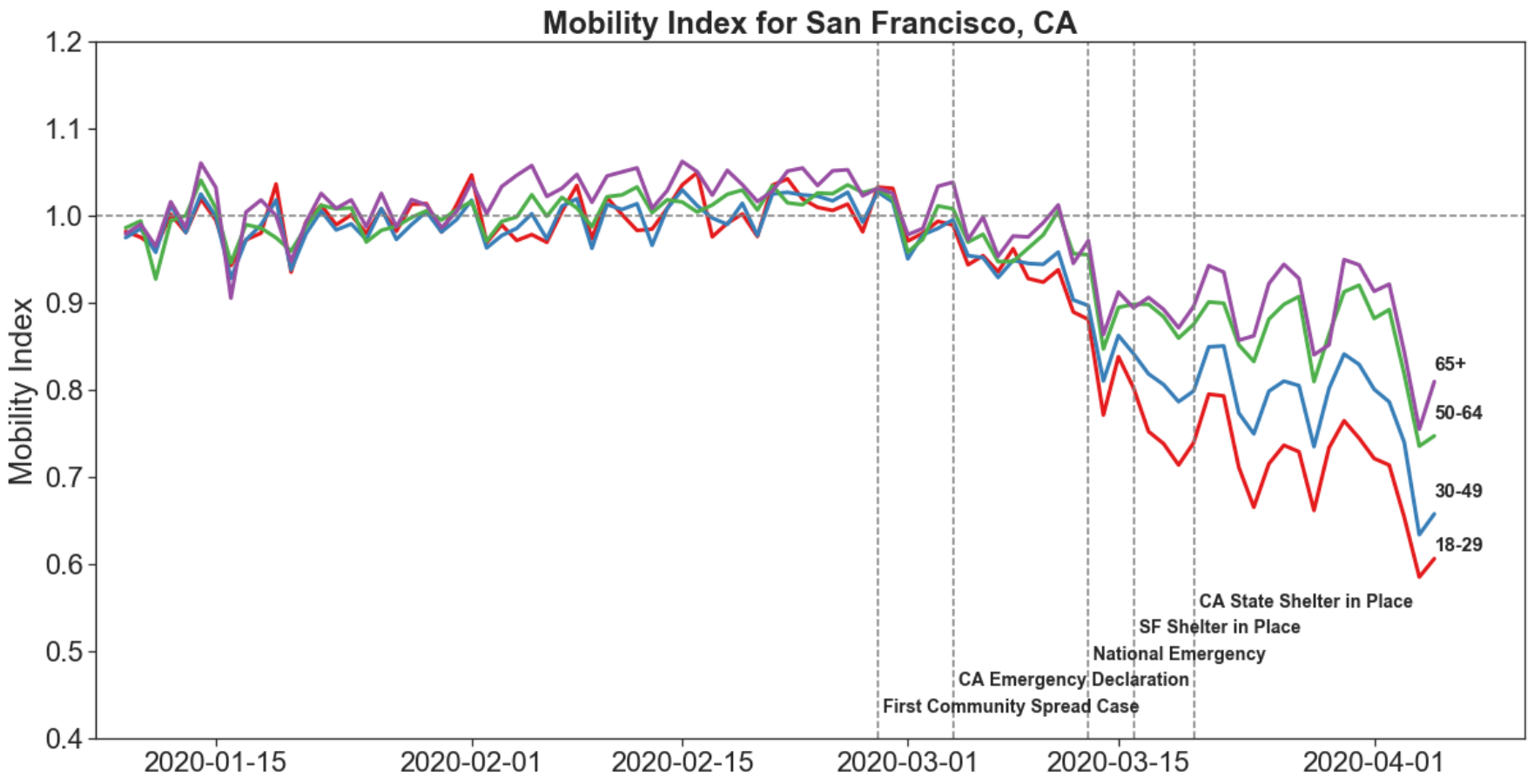
TODAY'S AGENDA

1. The effects of COVID-19 on user activity, sleep, and resting heart rate
2. How Fitbit is supporting users during this difficult time
3. Influenza-like Illness Surveillance in the US
4. The DETECT Study
5. Panel Discussion

PEOPLE ARE STAYING AT HOME



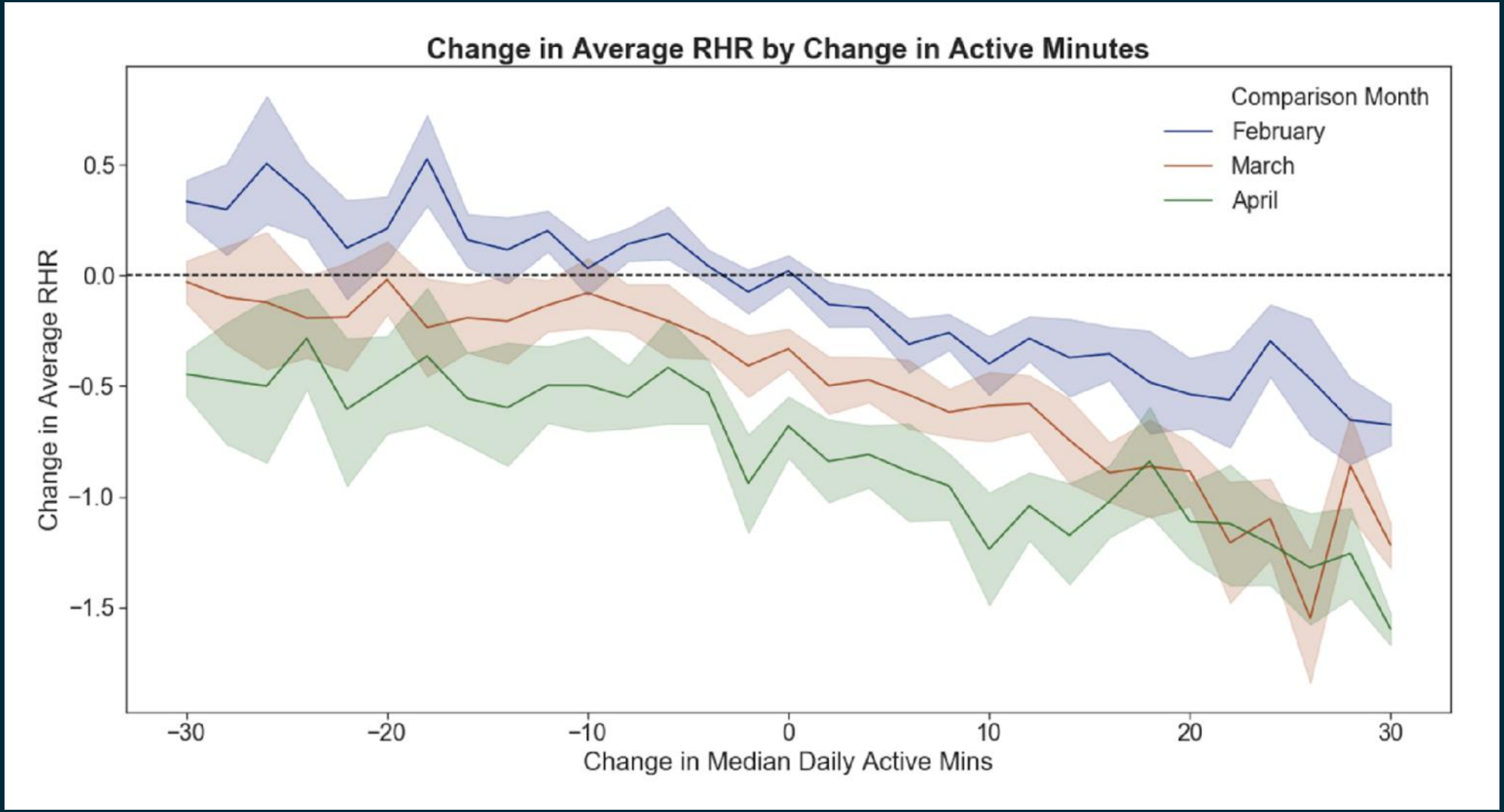
YOUNGER PEOPLE ARE MAKING THE BIGGEST CHANGES



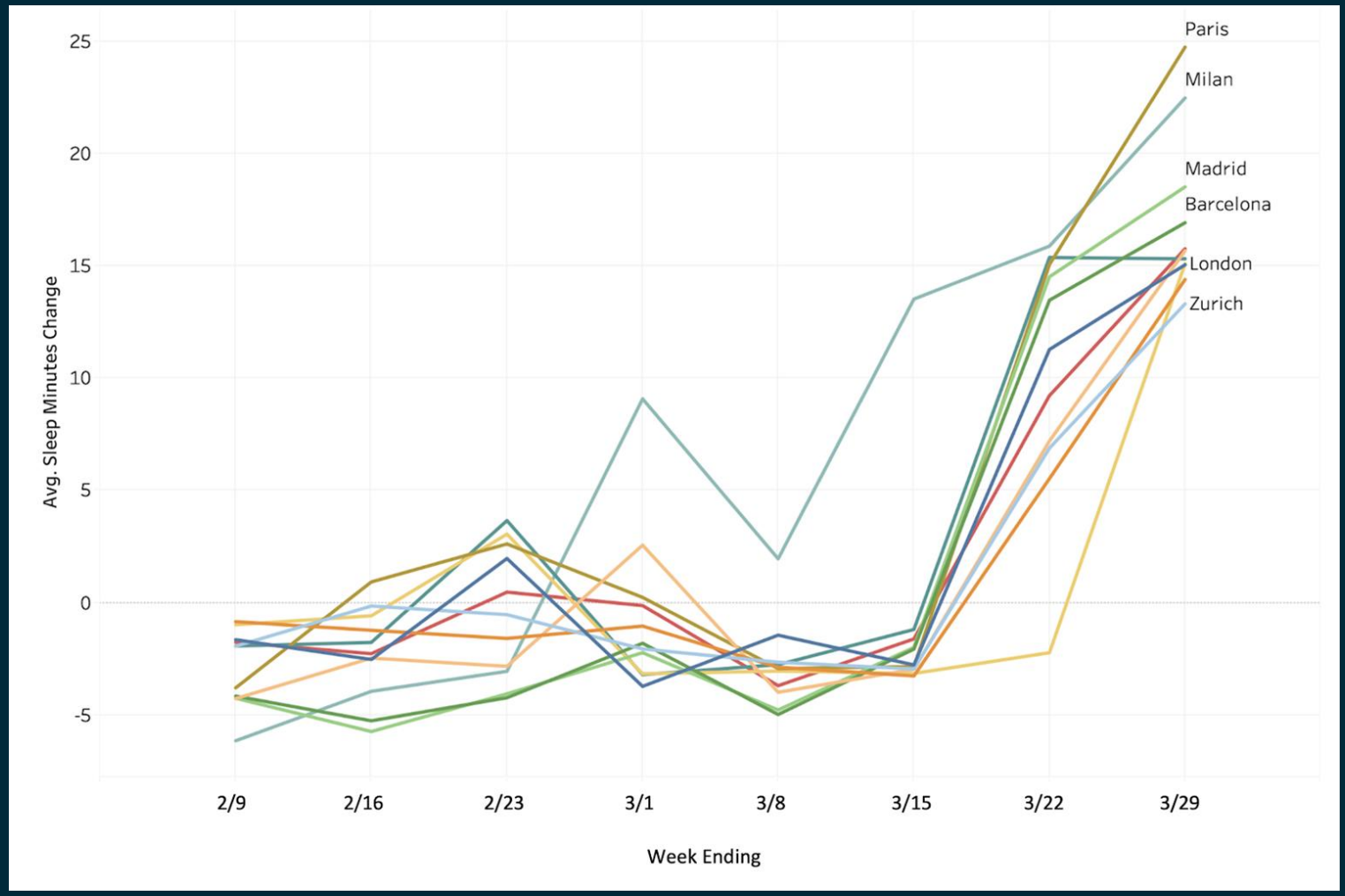
INDIVIDUALS ARE FEELING:

- HEIGHTENED SENSE OF ANXIETY
- LOSS OF CONTROL
- PRESSURE OF “I SHOULD BE DOING MORE”
- STRUGGLING WITH DEMANDS ON TIME
- MORE FREQUENT CHANGES IN MOOD
- JUST TRYING TO GET BY

BUT RESTING HEART RATE HAS IMPROVED



AND PEOPLE ARE SLEEPING MORE



DELIVERING ON OUR MISSION TO

MAKE THE WORLD HEALTHIER

- safe
- active & healthy
- connected
- supported
- informed

SAFE

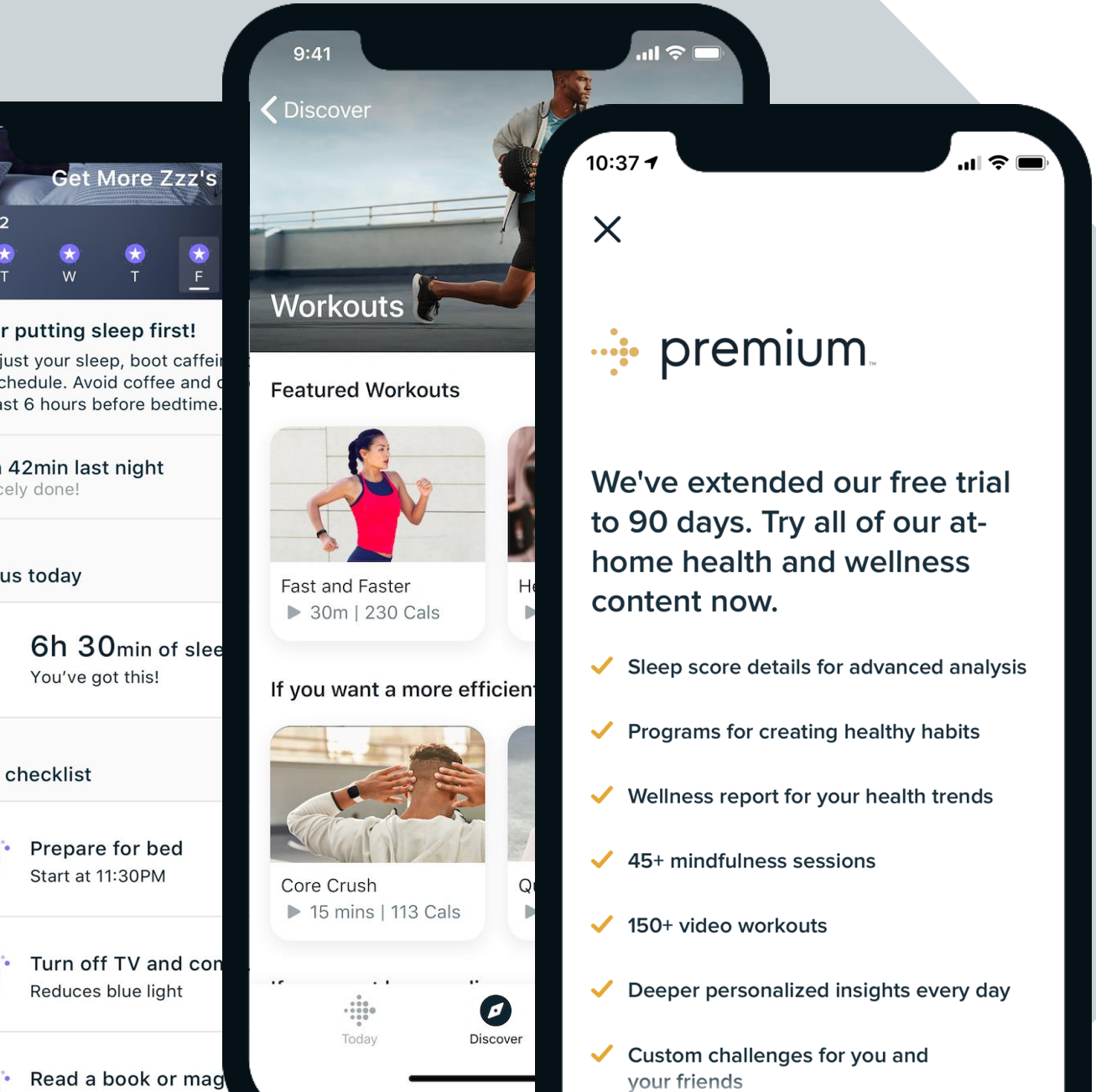
CLEAN CUES

New Clock face* for hand washing

- 60 minute countdown to remind users to wash their hands
- 20-second timer while washing
- Buzz every 5 minutes if users don’t wash
- Free

Already thousands of downloads

*Offered by reno via Fitbit App and Clock face gallery



STAY WELL AT HOME WITH FITBIT PREMIUM™

Fitbit Premium **Free Trial** until **July 1st** for any new clients

Personalized guidance, insights and 200+ workouts

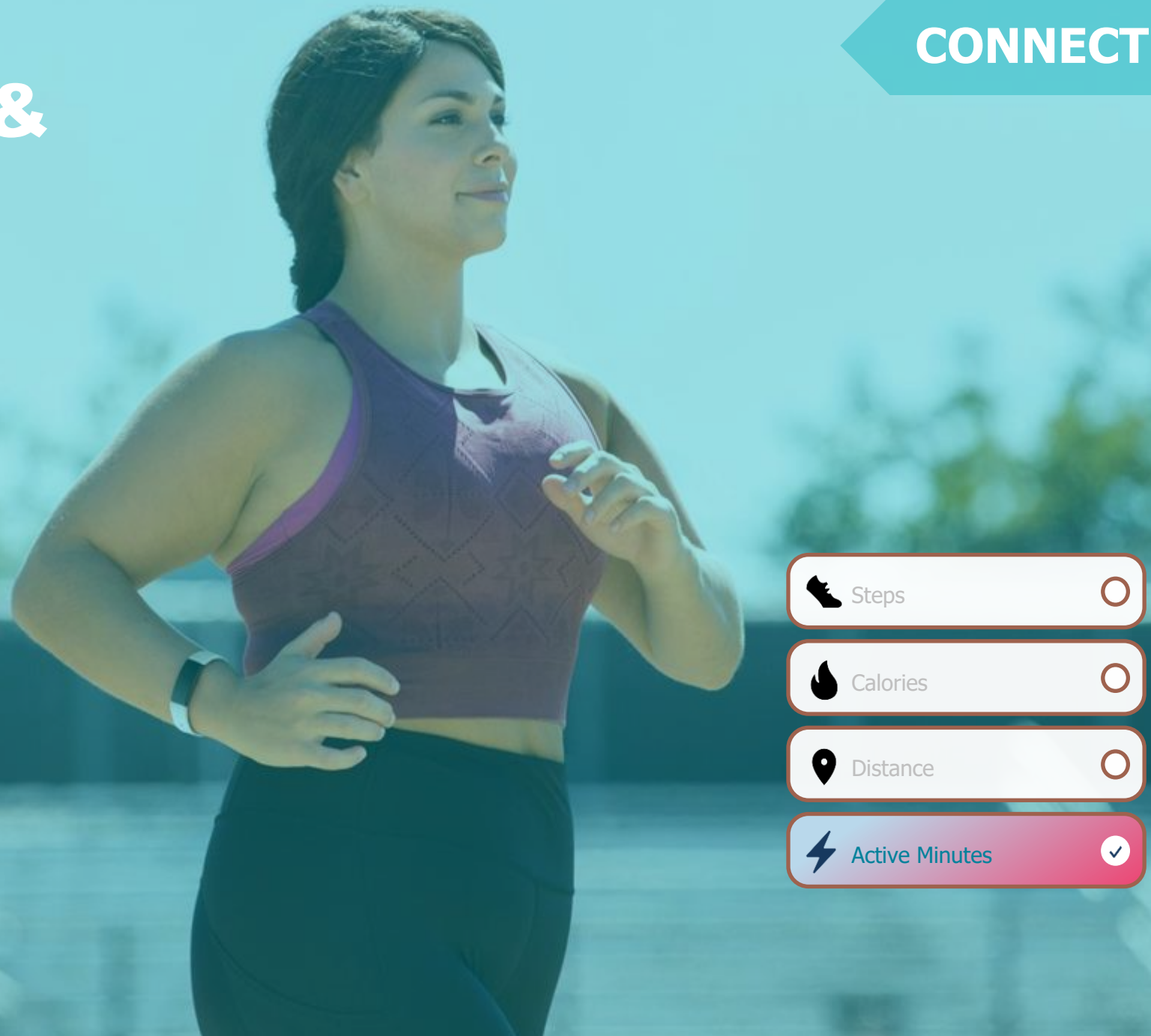
40+ premium items made available to all Fitbit users

CHALLENGES & GAMES

Premium challenges & games allow people to stay connected and motivated while having fun:

- All for One
- Custom Challenges
- Get Fit Bingo

Fitbit Care team challenges allow employers to keep remote workforces connected across the country.



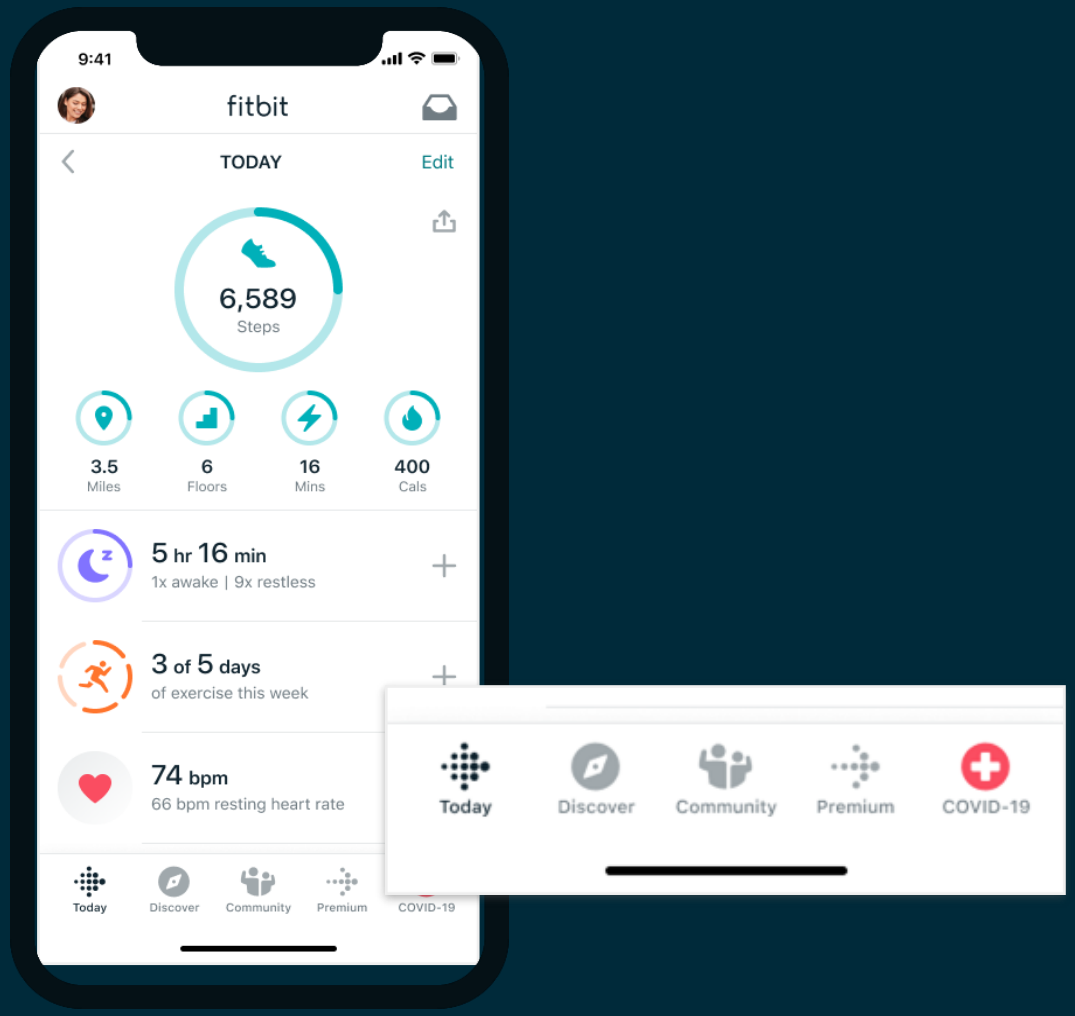
SUPPORTED

COACHES ARE SUPPORTING PARTICIPANTS

- PROVIDING A SAFE SPACE, VALIDATING FEELINGS
- IDENTIFYING THINGS WITHIN THEIR CONTROL, WAYS TO TAKE CONTROL
- ASSURANCE THAT IT'S OK, THAT WE'RE IN SURVIVAL MODE, NO NEED TO BE HIGHLY PRODUCTIVE
- TIPS FOR FAMILY ACTIVITIES, WAYS TO CARVE OUT SOLO TIME
- MINDFULNESS PROGRAMS, YOGA, GUIDED BREATHING
- MEETING THEM WHERE THEY ARE, ADJUSTING OR PAUSING GOALS

NEW! In-App COVID-19 Resource Tab

INFORMED

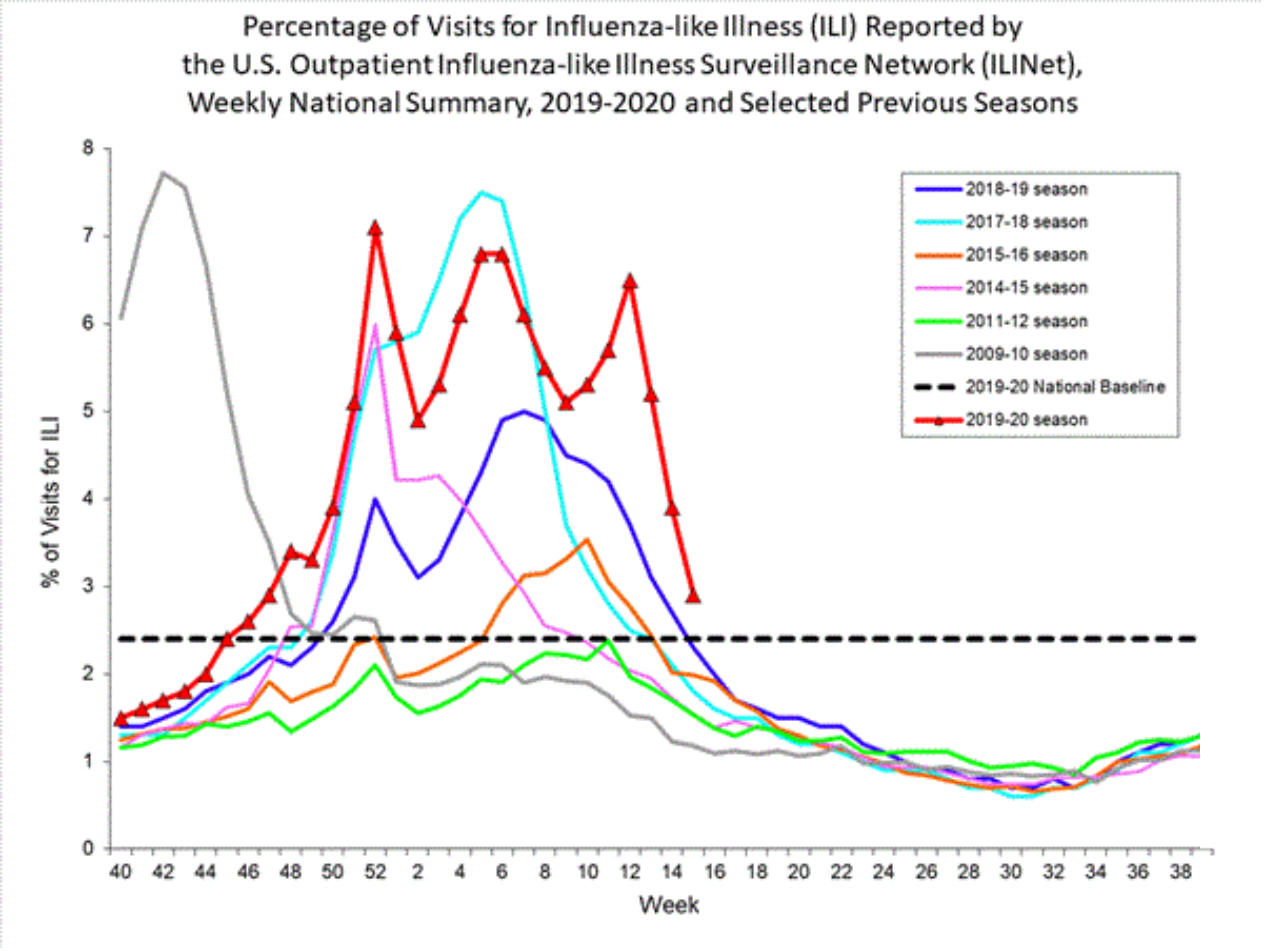


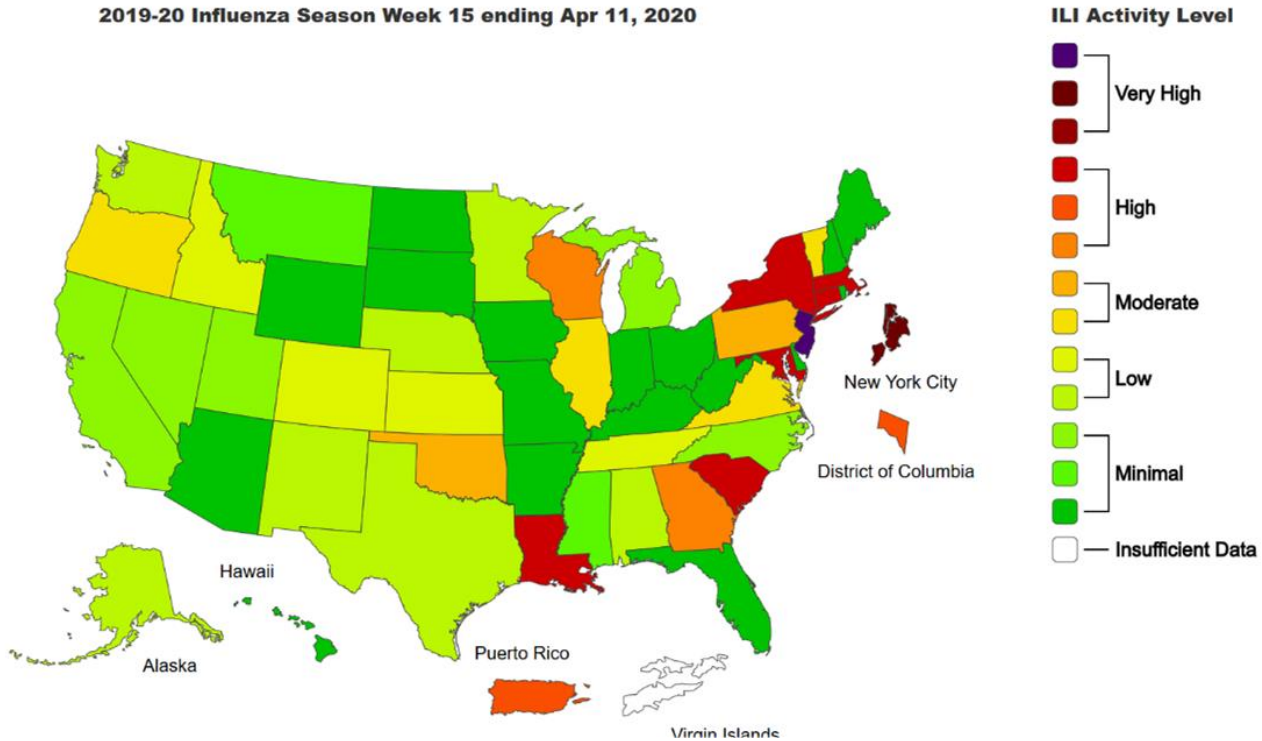
New tab added to core Fitbit app with COVID-19 information and resources.

Features include:

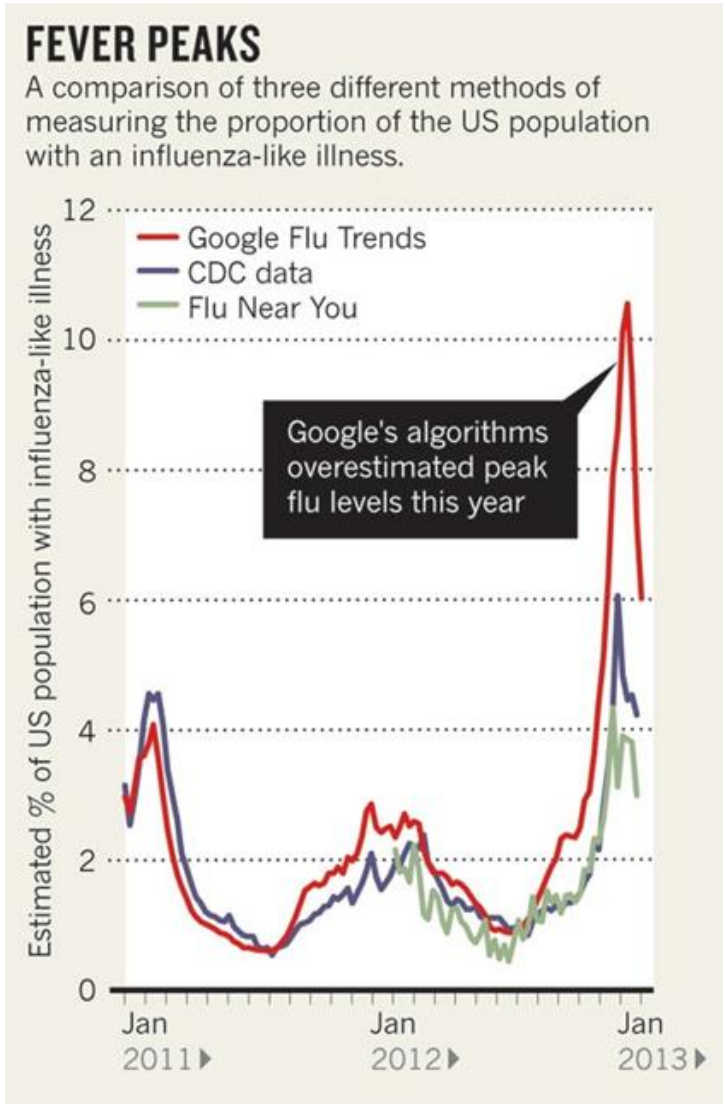
- Up-to-date Covid-19 information from WHO
- Easy access to the DETECT Study to help Scripps Research more quickly detect illnesses like COVID-19 with aggregate wearable data
- Resources on how to stay healthy at home

Influenza-like Illness Surveillance in the US

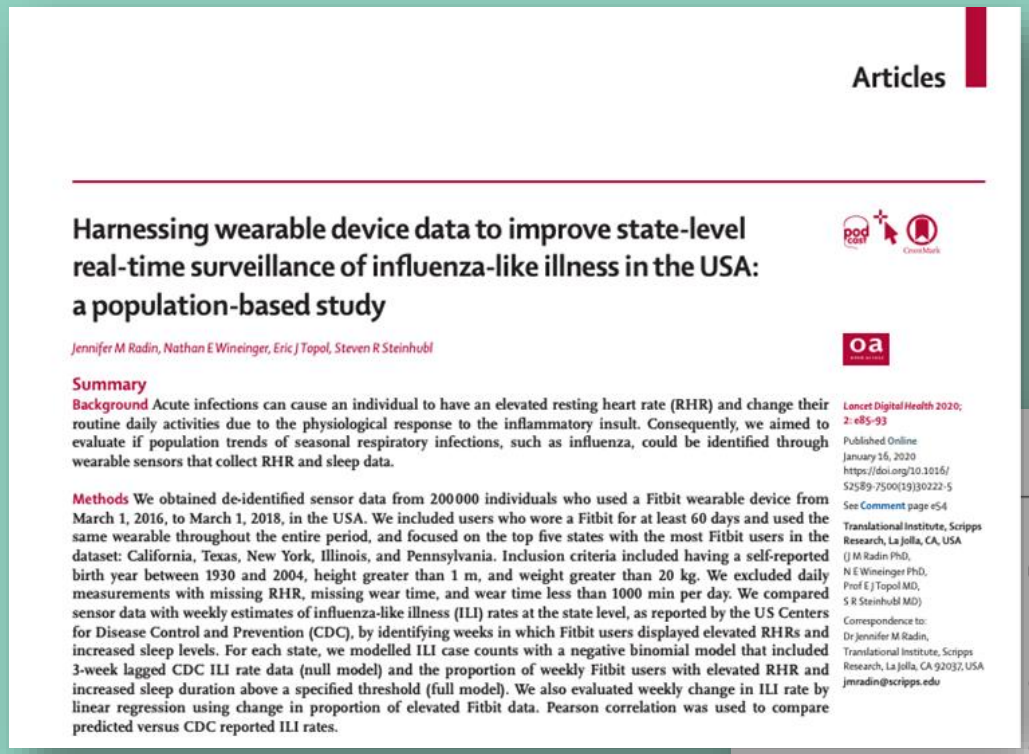




Prior Digital Methods of Tracking ILI



Our Prior Work:
Passively Collected Data From Fitness Trackers May Help Predict Onset of Viral Infections



Articles

Harnessing wearable device data to improve state-level real-time surveillance of influenza-like illness in the USA: a population-based study

Jennifer M Radin, Nathan E Wineinger, Eric J Topol, Steven R Steinhubl

Summary

Background Acute infections can cause an individual to have an elevated resting heart rate (RHR) and change their routine daily activities due to the physiological response to the inflammatory insult. Consequently, we aimed to evaluate if population trends of seasonal respiratory infections, such as influenza, could be identified through wearable sensors that collect RHR and sleep data.

Methods We obtained de-identified sensor data from 200 000 individuals who used a Fitbit wearable device from March 1, 2016, to March 1, 2018, in the USA. We included users who wore a Fitbit for at least 60 days and used the same wearable throughout the entire period, and focused on the top five states with the most Fitbit users in the dataset: California, Texas, New York, Illinois, and Pennsylvania. Inclusion criteria included having a self-reported birth year between 1930 and 2004, height greater than 1 m, and weight greater than 20 kg. We excluded daily measurements with missing RHR, missing wear time, and wear time less than 1000 min per day. We compared sensor data with weekly estimates of influenza-like illness (ILI) rates at the state level, as reported by the US Centers for Disease Control and Prevention (CDC), by identifying weeks in which Fitbit users displayed elevated RHRs and increased sleep levels. For each state, we modelled ILI case counts with a negative binomial model that included 3-week lagged CDC ILI rate data (null model) and the proportion of weekly Fitbit users with elevated RHR and increased sleep duration above a specified threshold (full model). We also evaluated weekly change in ILI rate by linear regression using change in proportion of elevated Fitbit data. Pearson correlation was used to compare predicted versus CDC reported ILI rates.

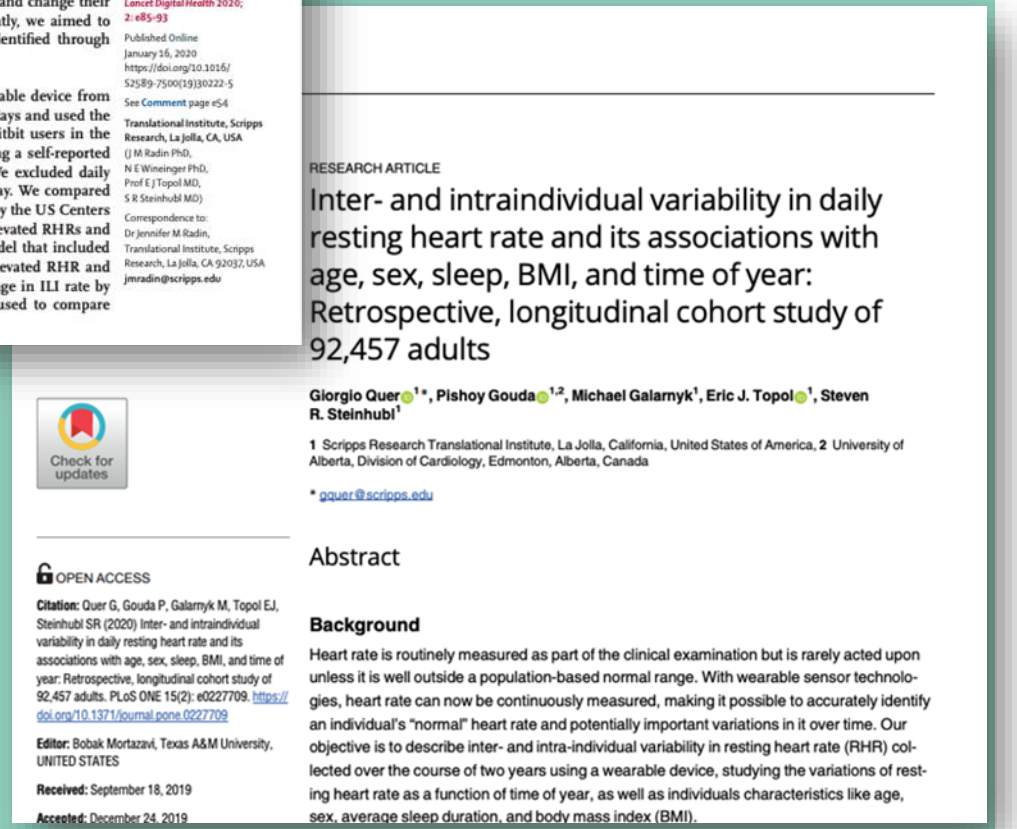
Lancet Digital Health 2020; 2: e85-93

Published Online January 16, 2020 https://doi.org/10.1016/S2589-7500(19)30222-5

See Comment page e54

Translational Institute, Scripps Research, La Jolla, CA, USA (J M Radin PhD, N E Wineinger PhD, Prof E J Topol MD, S R Steinhubl MD)

Correspondence to: Dr Jennifer M Radin, Translational Institute, Scripps Research, La Jolla, CA 92037, USA jmradin@scripps.edu



RESEARCH ARTICLE

Inter- and intraindividual variability in daily resting heart rate and its associations with age, sex, sleep, BMI, and time of year: Retrospective, longitudinal cohort study of 92,457 adults

Giorgio Quer[1]*, Pishoy Gouda[1,2], Michael Galarnyk[1], Eric J. Topol[1], Steven R. Steinhubl[1]

1 Scripps Research Translational Institute, La Jolla, California, United States of America, **2** University of Alberta, Division of Cardiology, Edmonton, Alberta, Canada

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Check for updates

OPEN ACCESS

Citation: Quer G, Gouda P, Galarnyk M, Topol EJ, Steinhubl SR (2020) Inter- and intraindividual variability in daily resting heart rate and its associations with age, sex, sleep, BMI, and time of year: Retrospective, longitudinal cohort study of 92,457 adults. PLoS ONE 15(2): e0227709. https://doi.org/10.1371/journal.pone.0227709

Editor: Bobak Mortazavi, Texas A&M University, UNITED STATES

Received: September 18, 2019

Accepted: December 24, 2019

Abstract

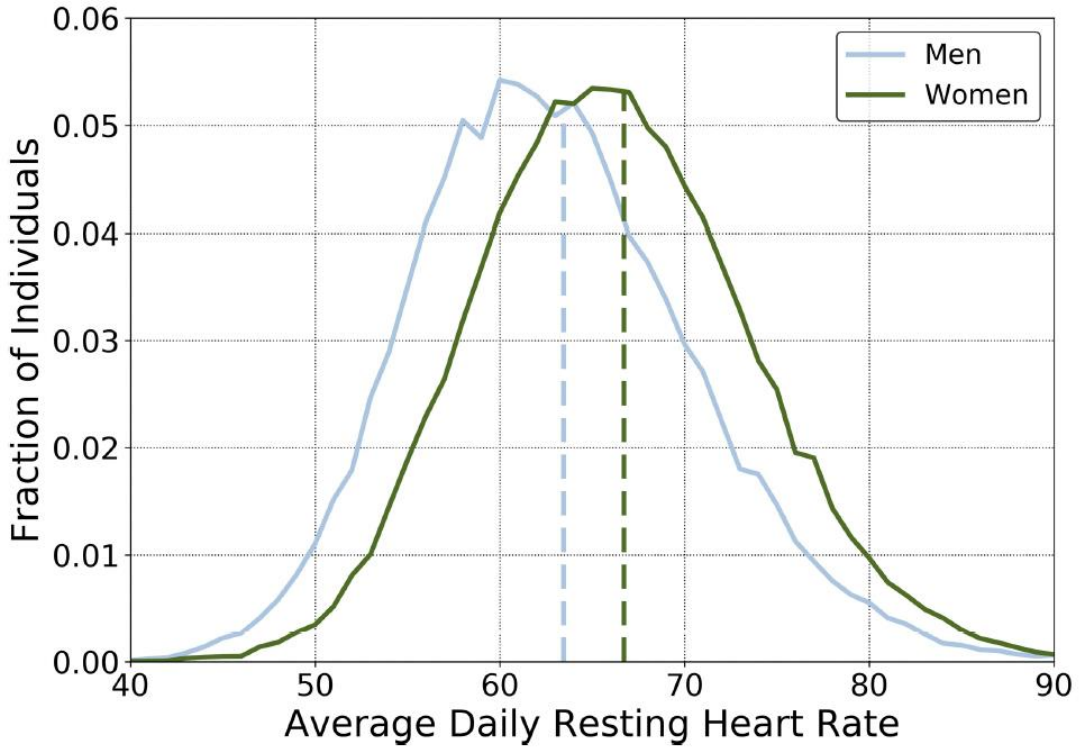
Background

Heart rate is routinely measured as part of the clinical examination but is rarely acted upon unless it is well outside a population-based normal range. With wearable sensor technologies, heart rate can now be continuously measured, making it possible to accurately identify an individual's "normal" heart rate and potentially important variations in it over time. Our objective is to describe inter- and intra-individual variability in resting heart rate (RHR) collected over the course of two years using a wearable device, studying the variations of resting heart rate as a function of time of year, as well as individuals characteristics like age, sex, average sleep duration, and body mass index (BMI).

In past studies, we have shown that daily changes in an individual's HR are a novel vital sign of the digital age that may help predict the onset of viral infection based on retrospective, de-identified data.

Scripps Research

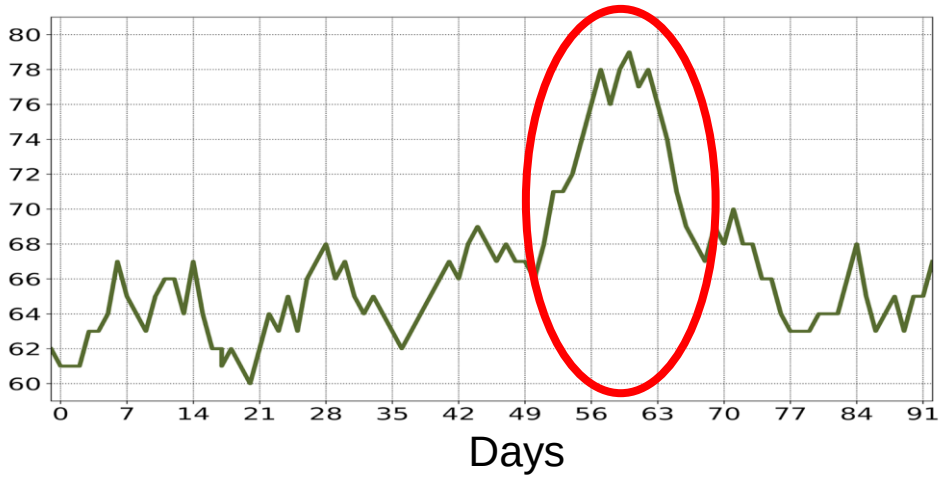
Change in Resting Heart Rate - A Novel Vital Sign of the Digital Age



The average daily RHR for 57,836 individual women (green line) and 34,621 men (blue line). The overall mean for each group is indicated by the dashed lines.

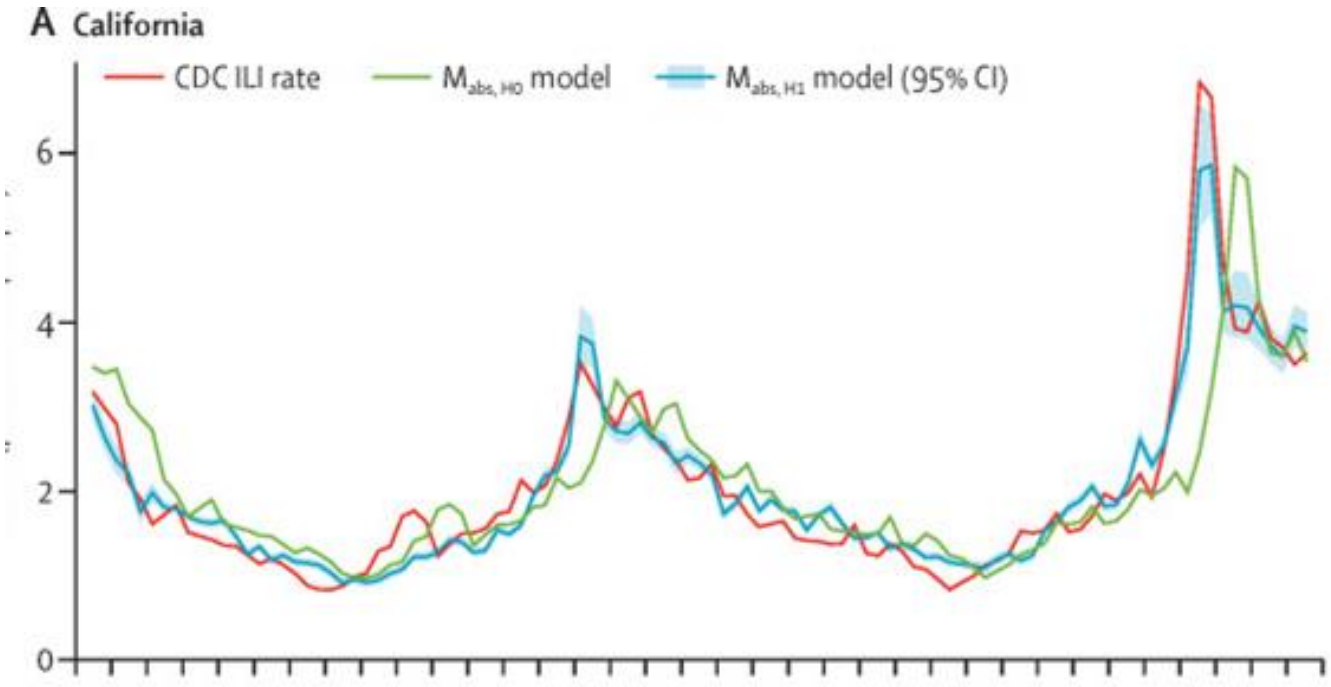
Scripps Research

- Everybody's resting heart rate (RHR) is relatively unique to them.
- Between different individuals, RHRs can differ by almost 70 BPM - from as low as 40 to over 100 BPM.
- For an individual, it varies very little over time, typically fluctuating no more than 3 BPM week-to-week.
- Unusual changes in an individual's resting heart rate may indicate a viral illness.



Using wearables to predict real-time ILI illness at the state-level

	Negative binomial model predicting ILI case counts			
	m_{naive}	$m_{abs,H0}$	$m_{abs,H1}$	p value*
Model 1 (lower RHR threshold)				
California	0·92	0·73	0·97	<0·0001
Texas	0·77	0·84	0·92	<0·0001
New York	0·33	0·79	0·84	<0·0001
Illinois	0·72	0·80	0·92	<0·0001
Pennsylvania	0·48	0·78	0·89	<0·0001



Industry Recognition of Scripps Leadership in Leveraging Smartphone and Fitness Trackers For Early Detection

Fitness wearables may improve real-time tracking of seasonal influenza outbreaks

By analyzing millions of data points from wearable devices, Scripps Research scientists were able to significantly improve statewide predictions of flu epidemics.

January 16, 2020

LA JOLLA, CA — Are wearable fitness-tracking devices so smart that they can help detect flu epidemics? A new study from the Scripps Research Translational Institute suggests that devices such as Fitbits may serve as valuable tools for population health, generating data that can alert health officials to emerging outbreaks in real time.

Every year, the United States experiences seasonal flu epidemics that affect up to tens of millions of

HEALTH TECH, SYN

Scripps study: Can your Fitbit track the flu?

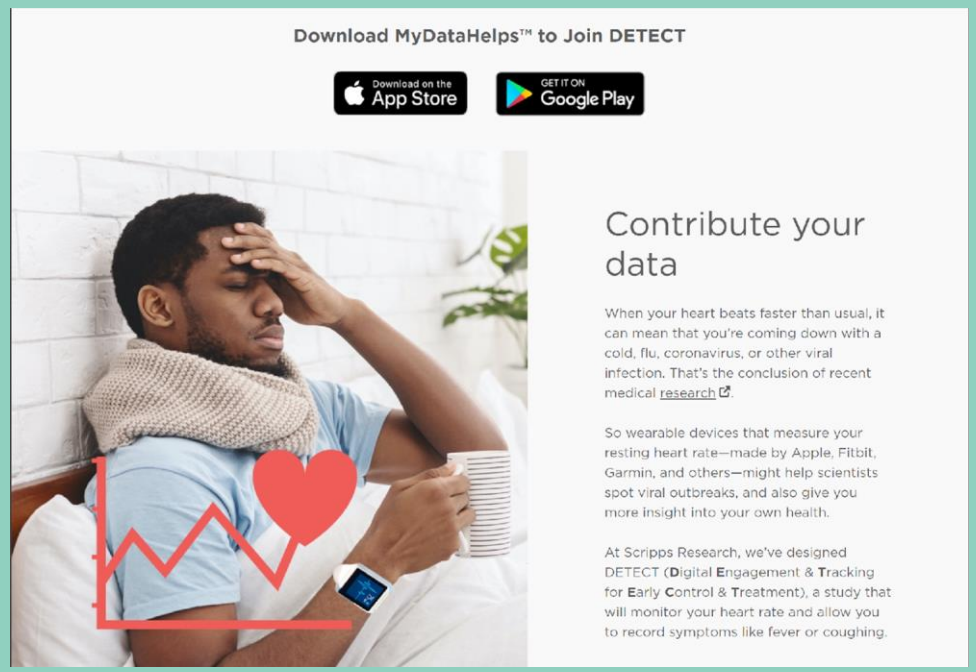
A new study by the Scripps Research Translational Institute suggests Fitbits could be used to detect the flu. By tracking resting heart rate and activity levels, researchers said Fitbits could improve detection of outbreaks at the state level.

By ELISE REUTER

Post a comment / Jan 17, 2020 at 6:10 PM

Scripps Researchers Use mHealth Wearables to Track Flu Outbreaks

The study used data from Fitbit users over two years to determine who was experiencing a flu-like illness. It shows that mHealth wearables could be used to identify and possibly even anticipate viral outbreaks.



DETECT

STUDY SUMMARY

We are all different. We have different heart rates, different temperatures, and different sleep and activity patterns. When we get a viral illness all of these things change, but in ways that might not be detectable unless it is possible to compare “sick you” to “healthy you.” Smartwatches and activity trackers make that possible.

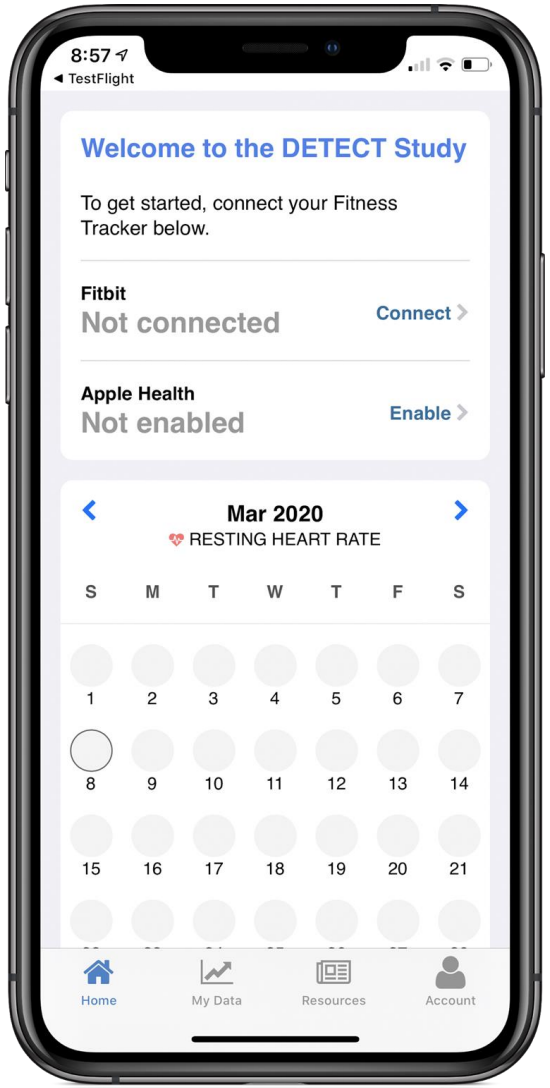
The DETECT study seeks to determine if tracking of changes in heart rate, activity and sleep, at the individual level, can provide an early indication of a viral illness. Wearable device users can enroll via the myDataHelps app which allows them to provide informed consent, sync their device, share physiological data, enter self-reported data, complete surveys and connect their electronic health record should they choose to do so.

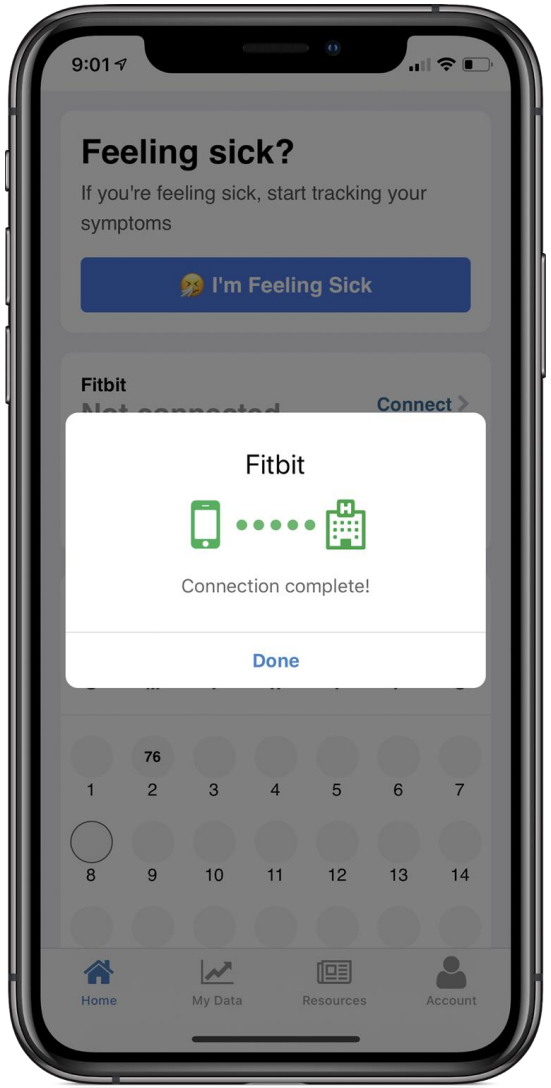
By collecting data from thousands of individuals, scientists hope to identify possible influenza-like illness in those individuals, and complement traditional outbreak response measures.

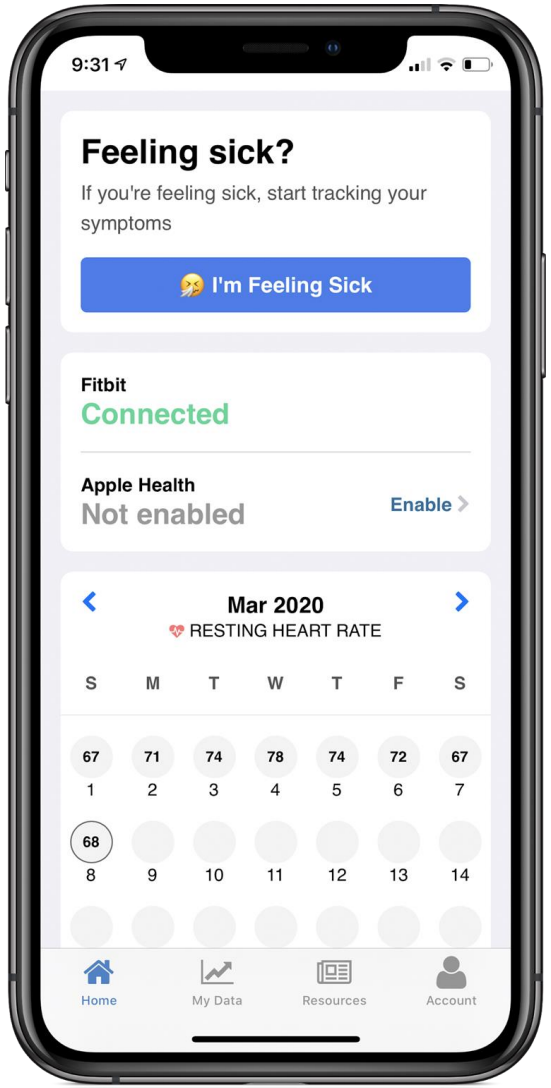
WWW.DETECTSTUDY.COM

CONNECTING A FITNESS TRACKER (FITBIT)

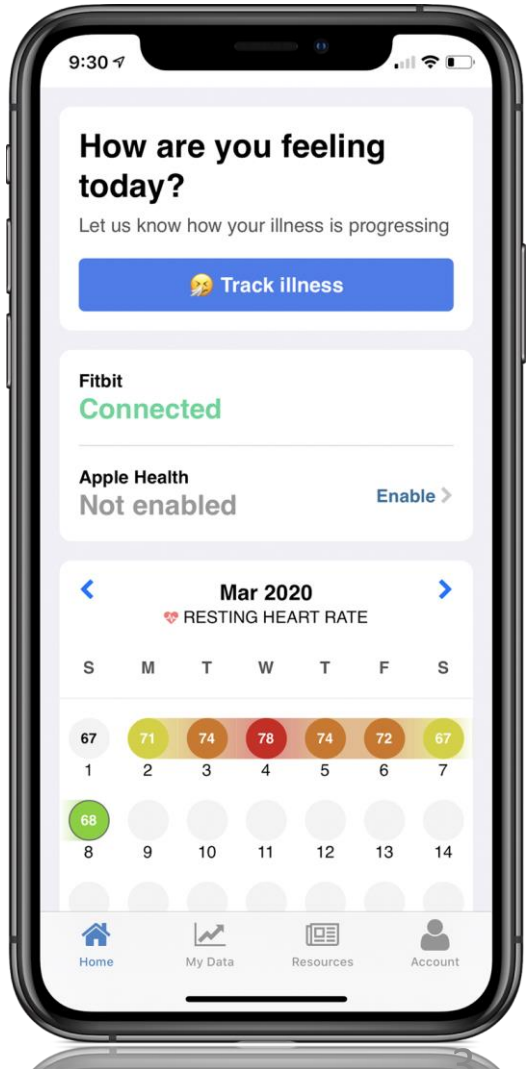
RHR Monthly Trend
Flu Symptom Diary



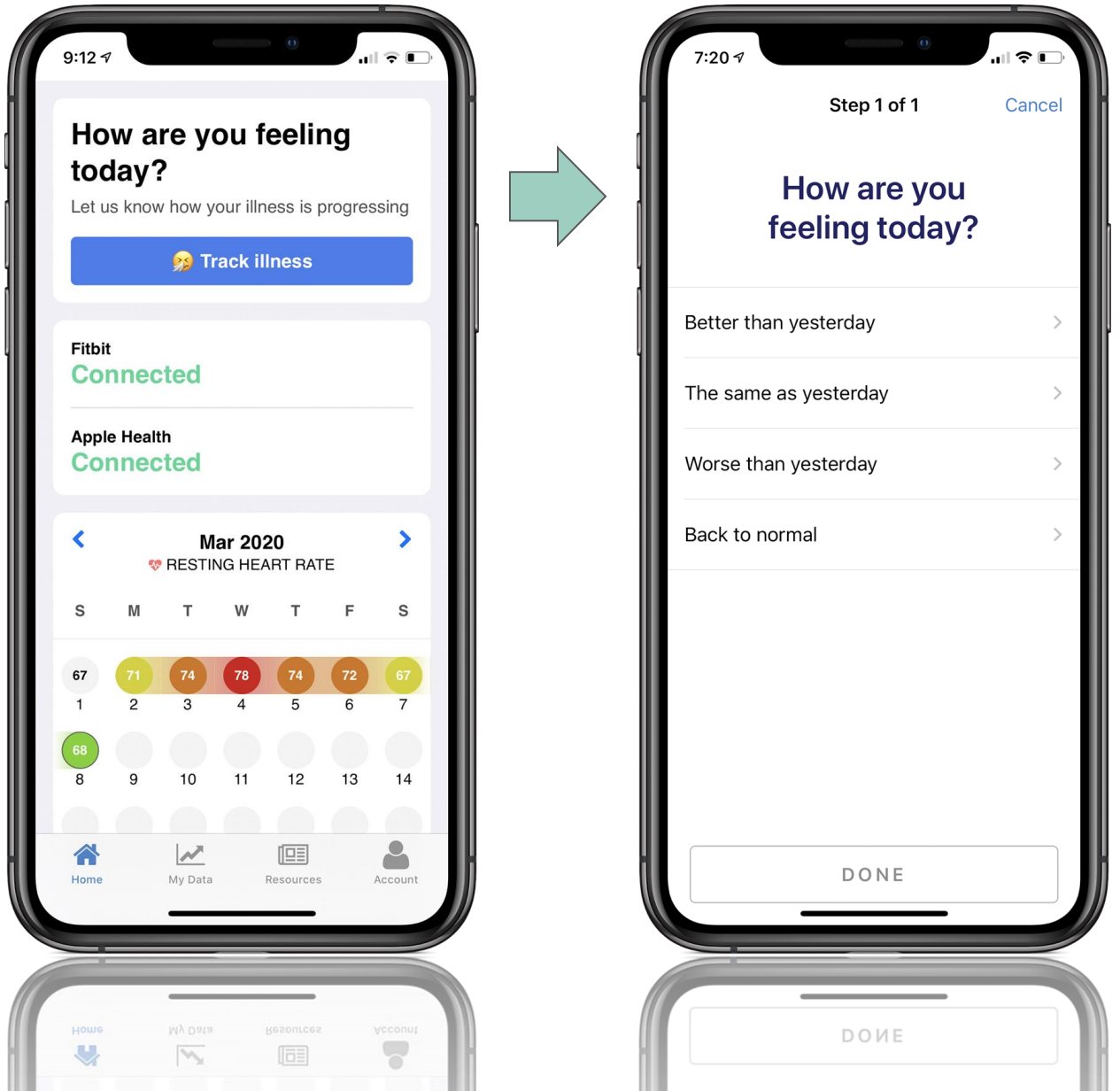




RETRIEVE DATA



DAILY DIARY DURING SICK PERIOD



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