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STANFORD PREVENTION RESEARCH CENTER
the science of healthy living

Advancing Health Equity through Leveraging Citizen Science Methods & Digital Tools

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Healthy Aging Research & Technology Solutions Lab

Our Voice Global Citizen Science Research Initiative & Network

Stanford University School of Medicine

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'It Takes a (global) Village' – Collaborating Organizations

***U.S. Collaborators** include:*

- Stanford University ***(organizing institution)***
- Arizona State U.
- CA Peace Partnership
- City of Seattle, Human Services Dept.
- Cornell
- East San Jose,
- GirlTrek, USA
- LeadingAge, USA
- Place Labs, San Francisco, CA
- San Francisco State U., CA
- TransForm/Green Trip
- U Alaska, Anchorage
- U California, Irvine
- San Mateo Co. CA Public Health Dept.
- Santa Clara Co. CA Public Health Dept.; Somos Mayfair
- Solano Co. CA Public Health Dept.
- Tulane U. School of Public Health & Tropical Medicine, LA
- Washington University at St. Louis, MO
- Youth Leadership Institute

***International Collaborators** include:*

- Aukland Univ of Tech, New Zealand
- FA Univ of Erlangen-Nuremberg, Germany
- Federal U. of Santa Maria, Brazil
- Glasgow Caledonian U, Scotland
- Instituto Nacional de Salud Pública, Mexico
- ITRI-Taiwan; Kaohsiung Medical U., Taiwan
- JDC Israel Eshel • University of Haifa, Israel
- Mälardalen University, Västerås, Sweden
- Pontific Catholic U. of Paraná, Curitiba, Brazil
- Public Health Foundation of India
- Univ. de los Andes, Bogotá, Colombia
- Univ. of Birmingham, UK
- Univ. of Cape Town, S. Africa
- Universidad de la Frontera, Temuco, Chile
- Univ. of Kwa-Zulu-Natal, S. Africa
- Univ. of Manitoba, Canada
- Université Nice Sophia Antipolis, France
- Univ. of Queensland, Australia

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Background

- Compelling evidence that individual & community health shaped by ***environmental contexts,*** but “top-down” policy approaches take time & can be less accessible to underserved communities

- A *complementary*, ***“bottom up” citizen science approach*** for promoting health-enhancing environments through *micro-environmental data capture & applications* (especially in underserved populations)

What is “Citizen Science”?

(King AC, Winter S, Chrisinger B, et al. Prev Med, 2019, 119:44-47)

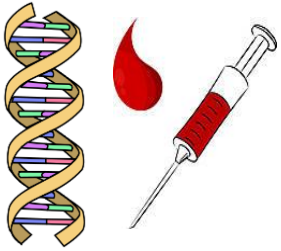
- A centuries old tradition of resident engagement

Today, at least 3 general types:

For the people:

- Donation of biological specimens

(biomedical research)



With the people:

- Active systematic data collection

(natural phenomena or built environments)

By the people:

- Participate in setting objectives;
- Collect & help interpret data;
- Solution building

An Example: *The "**OUR VOICE**" Citizen Science Research Initiative*

Empowers residents to *assess & activate environmental changes* for healthier neighborhoods & communities

(in partnership with local decision-makers)

***Facilitators** of this process can be researchers, community organizations, govt. or business groups, or residents themselves*

Buman M, et al. *Translat Behav Med*, 2012; *AJPM,* 2013; Winter S, et al., *Translat Behav Med,* 2014; King AC, et al., *TJACSM,* 2016; Rosas GR, et al., *J Urban Health,* 2016; Sheats J, et al., *J Urban Health,* 2017; Hinckson E, et al., *IJBNPA,* 2017; King AC, et al., *Prev Med*, 2019

How does the ***Our Voice*** **Citizen Science Method** *work*?

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Facilitated **4-step process** to engage residents in data capture, analysis & application:

Discover

Discuss & Prioritize

Share & Activate

Change

8 languages

Users aged 9-90

Walking maps

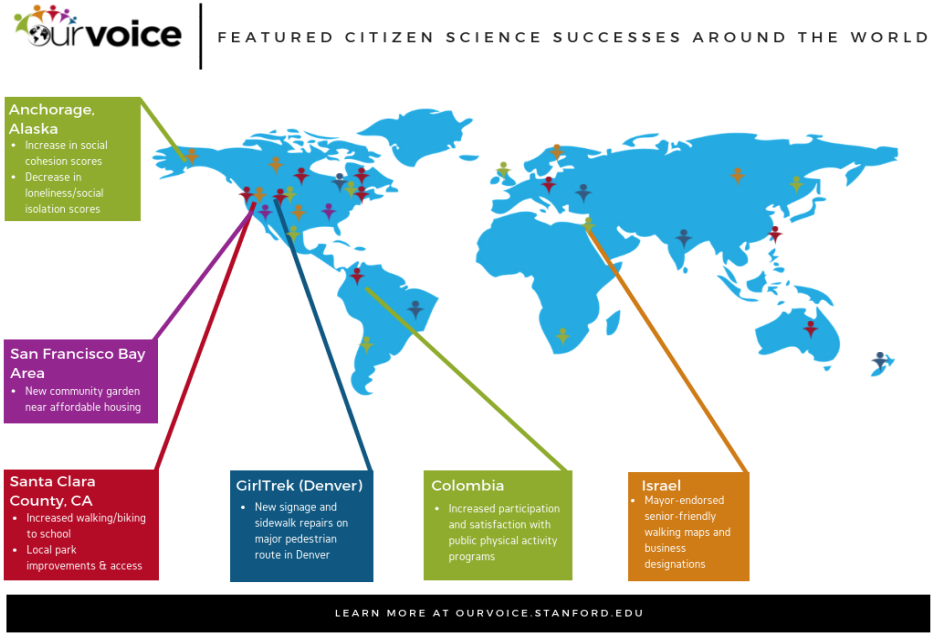
Geo-tagged photos & narratives

King AC, *Prev Med,* 2019; Chrisinger B, *Frontiers Pub Health,* 2018; King AC, *TJACSM,* 2016; Buman M, *Am J Prev Med*, 2013

Ultimate Goal

- Build an *online, interactive world map* of citizen science data & results for use by scientists, non-academic orgs., & residents to build health-enhancing communities

- Could be *linked with other data platforms* to provide contextually relevant, micro-scale information



King AC, et al., *Prev Med,* 2018; Hinckson E, et al., *IJBNPA,* 2017; King AC, et al., *TJACSM,* 2016

Our **Citizen Science Multi-level Research Model**

(King AC, *Inter J Behav Nutr & Phys Act,* 2015)

Starts with *4-step* ***Our Voice Intervention***

Residents collect data & learn how to activate environment changes in their community

leads to ***Proximal Effects:***

Changes in relevant neighborhood structures, policies, social activities

goal of more ***Distal Outcomes:***

- Individual-level health behavs./outcomes
- Neighborhood-level health behaviors/ outcomes
  (e.g., physical activity, wt. gain prevent.)

creates changes in ***Mediators*** (e.g.)**:**

- Neighborhood cohesion, trust
- Self-efficacy to create envir. change
- Neighborhood social networks
- Communication/advocacy skills

Multi-dimensional *data linkage possibilities include*

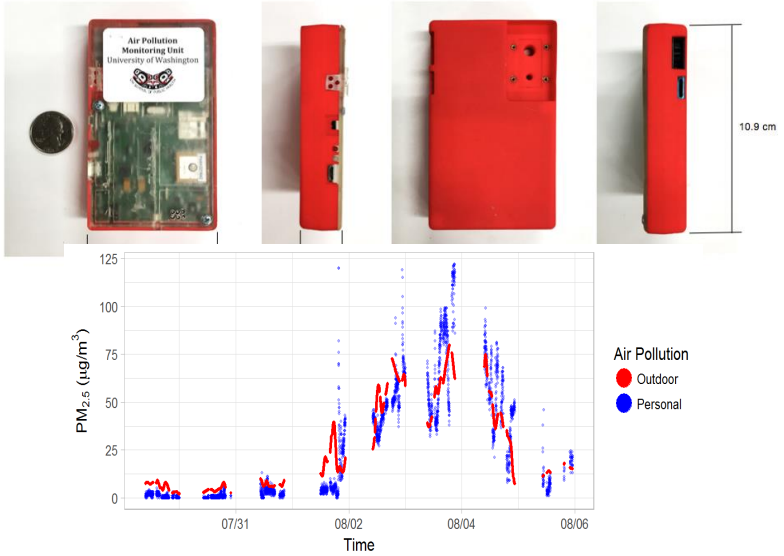
- Other types of qualitative measures
- Geospatial info.
- Quantitative data
- Observational info/audit tools (e.g., # people walking)
- Biol. & environmental sensors

Combining Discovery Tool with ***Sensors*** to expand understanding **of effects of environment on health**

- *Example:* Use **Air Quality Monitors** to capture local air quality along different walking routes

Community Air Quality Monitor (neighborhood-level)

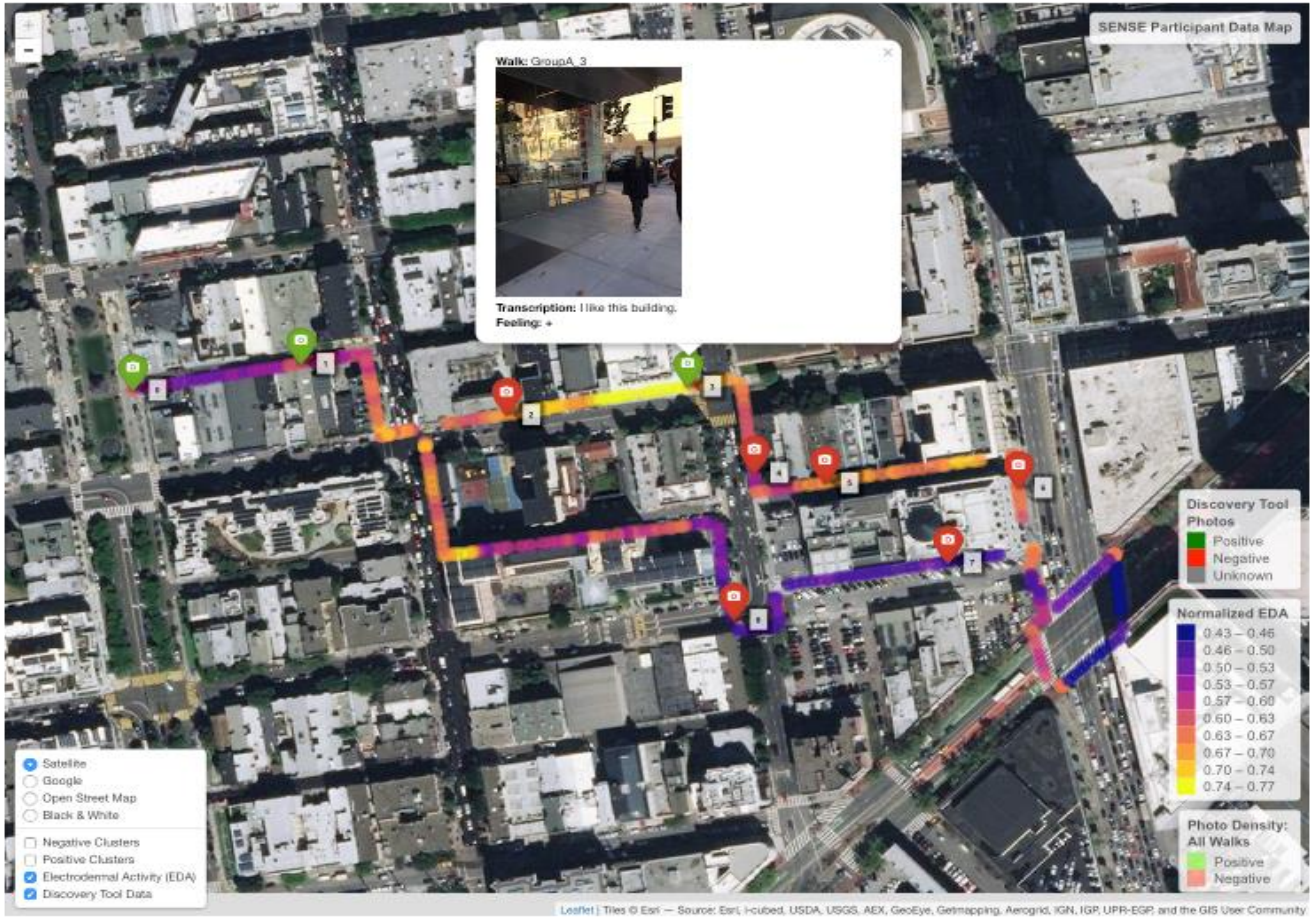
Portable Air Particle Monitor (Univ. of Washington)



Another Example:

- Use of wrist-worn sensor of electro-dermal & heart rate activity

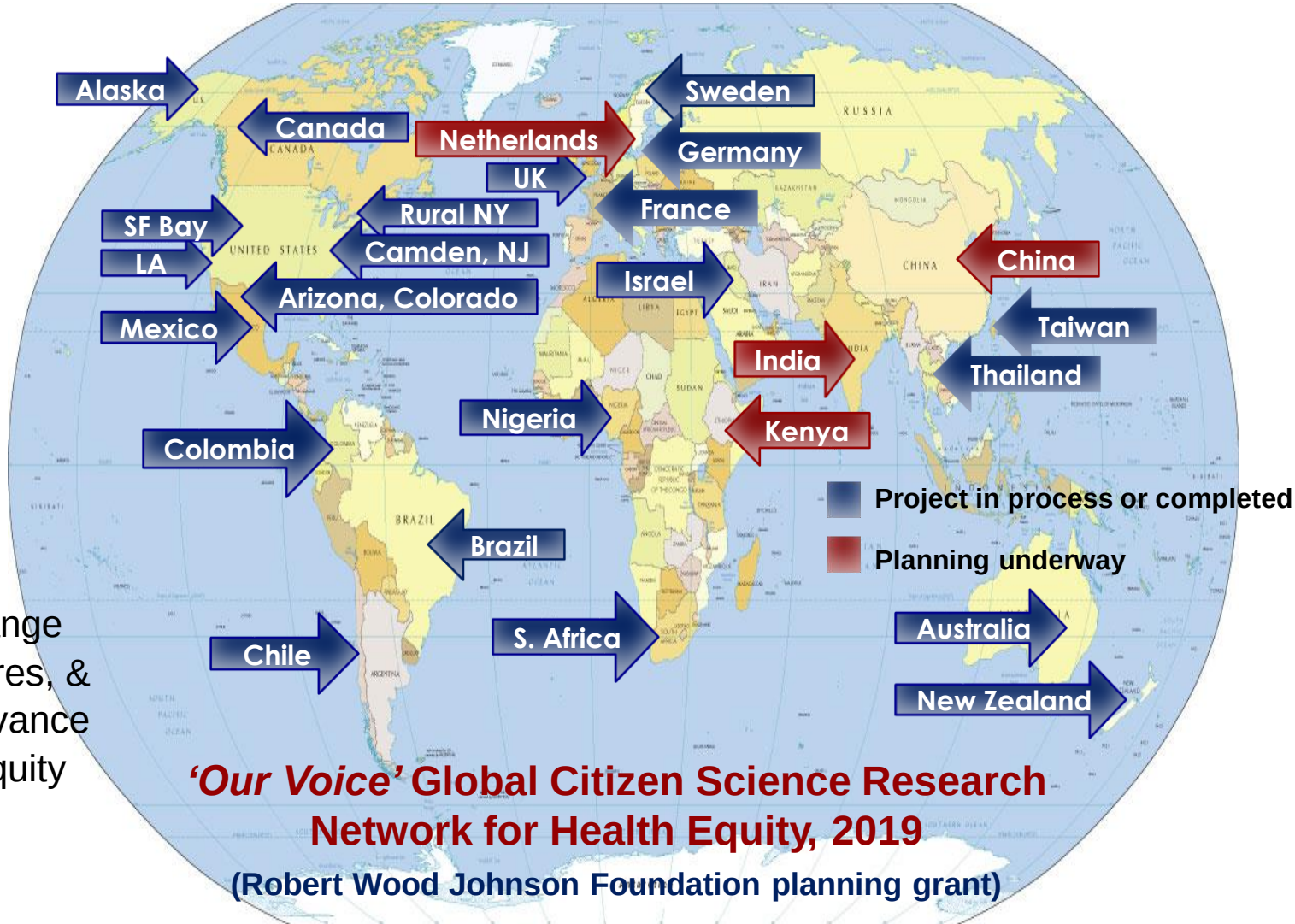
- ***Identifies locations along walking routes linked with increased arousal/stress***



Chrisinger B & AC King (International J Health Geography, 2018). Stress Experiences in Neighborhood and Social Environments (SENSE). (with Place Labs, SF [Empatica])

20+ countries, 6 continents

Major Goal:
Dynamic exchange of data, measures, & learnings to advance global health equity



'Our Voice' Global Citizen Science Research Network for Health Equity, 2019

(Robert Wood Johnson Foundation planning grant)

Successes of *Our Voice* projects to date include:

- Safer ***city-wide 'open streets' recreational*** *programs* (Colombia, USA)
- Increased ***age-friendly & safer walking routes*** (Israel, Chile, Australia, Canada, USA)
- Identification of ***accessible indoor recreational spaces*** for elderly (Taiwan)
- More ***walking/biking to school*** (US); ***activity-friendly schools*** (NZ, S.Africa, Colombia)
- Containing ***roaming dogs*** to promote neighborhood safety & walkability (Mexico)
- Developing ***healthier food access*** in urban & rural areas (Colombia, USA, S. Africa)
- ***Enacting local park improvements*** to increase community physical activity, greater park utilization, ***& more accessible transportation*** (Colombia, USA)
- Improved ***indoor environments in a geriatric rehabilitation unit*** to promote mobility among patients (Australia)

King A, *TJACSM,* 2016; Rosas LG, *J Urban Health,* 2016; Moran M, *J Aging Phys Act,* 2017; Sheats J, *J Urban Health,* 2017; Zieff S, *J Urban Health,* 2018; Hua, *Ann Behav Med,* 2018, Chrisinger, *Frontier Pub Health*, 2018; Rodriguez, *BMJ Pub Health,* 2019; King, *Prev Med,* 2019

In Summary:

Resident-centric data capture of local environments can enrich & contextualize data to advance precision population health

Thank you! http://ourvoice.stanford.edu