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SPORT &  
RECREATION

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# Active Living through Citizen Science: a bottom up approach

AUT

TE WĀNANGA ARONUI  
O TĀMAKI MAKAU RAU

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Auckland University of Technology

**OUR VOICE** Global Citizen Science Research Network  
New Zealand Chapter



<http://ourvoice.stanford.edu>



# Aim of this Introduction for the TALEs Symposium

- a “*bottom up*” ***citizen science engagement*** approach aimed at local changes in built & social environments
- **Goal:** to unleash the “pent up” power of *residents* to activate local environmental changes that can foster/support PA and health
- **Decade of research on effects of Built environment on PA**
  - **Define Citizen Science (CS)**
    - **Process**
    - **Framework**
    - **Concepts/Tools**
      - **Network**
  - **Current International Projects**
    - **NZ Projects**
  - **Conclusion/Future Directions**



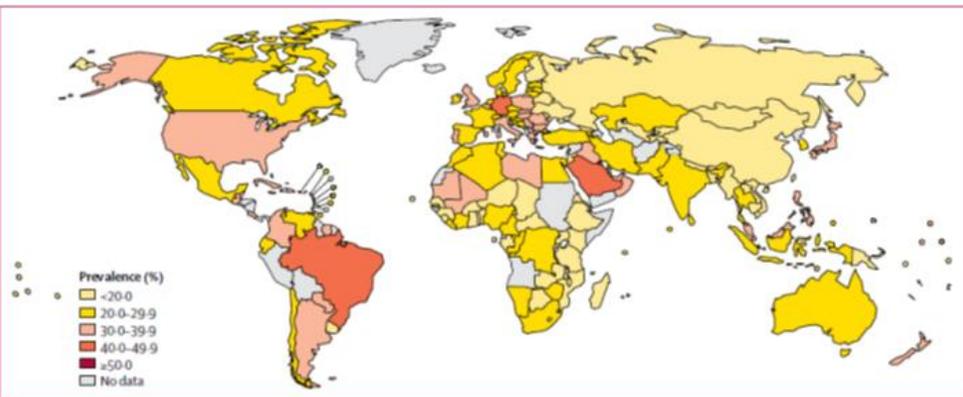


Figure 4: Country prevalence of insufficient physical activity in men in 2016

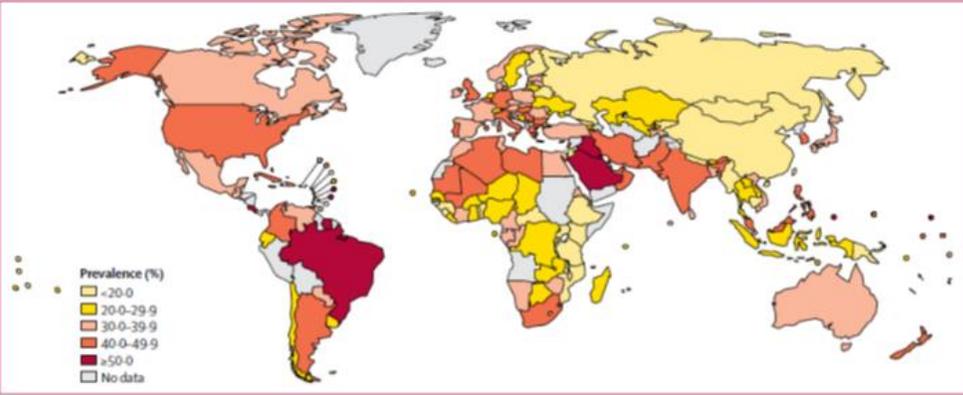


Figure 5: Country prevalence of insufficient physical activity in women in 2016



## Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1.9 million participants

Regina Guthold, Gretchen A Stevens, Leanne M Riley, Fiona C Bull

**Summary**  
**Background** Insufficient physical activity is a leading risk factor for non-communicable diseases, and has a negative effect on mental health and quality of life. We describe levels of insufficient physical activity across countries, and estimate global and regional trends.

**Methods** We pooled data from population-based surveys reporting the prevalence of insufficient physical activity, which included physical activity at work, at home, for transport, and during leisure time (ie, not doing at least 150 min of moderate-intensity, or 75 min of vigorous-intensity physical activity per week, or any equivalent combination of the two). We used regression models to adjust survey data to a standard definition and age groups. We estimated time trends using multilevel mixed-effects modelling.

**Findings** We included data from 358 surveys across 168 countries, including 1.9 million participants. Global age-standardised prevalence of insufficient physical activity was 27.5% (95% uncertainty interval 25.0–32.2) in 2016, with a difference between sexes of more than 8 percentage points (23.4%, 21.1–30.7, in men vs 31.7%, 28.6–39.0,



*Lancet Glob Health* 2018  
 Published Online  
 September 4, 2018  
[http://dx.doi.org/10.1016/S2214-109X\(18\)30357-7](http://dx.doi.org/10.1016/S2214-109X(18)30357-7)  
 See Online/Comment  
[http://dx.doi.org/10.1016/S2214-109X\(18\)30381-4](http://dx.doi.org/10.1016/S2214-109X(18)30381-4)  
 Department for Prevention of Noncommunicable Diseases, WHO, Geneva, Switzerland (R Guthold PhD, L M Riley MSc, Prof F C Bull PhD); Department for Information, Evidence and Research, WHO, Geneva,

# Physical Inactivity



New Zealand  
New Zealand

New Zealand  
New Zealand

New Zealand  
New Zealand

## Physical Activity Country Card: New Zealand

Capital ..... Wellington  
Inhabitants (2013) ..... 4,470,800  
Life expectancy (2012) ..... 81  
GINI inequality index (1997) ..... 0.32  
Human Development Index (2013) ..... 0.910  
Literacy rate (2003) ..... 99%  
Deaths by non-communicable ..... 82%  
diseases



### Deaths related to physical inactivity

» 12.7% of all deaths in New Zealand are due to inactivity.



### Surveillance and policy status

#### Physical activity plan

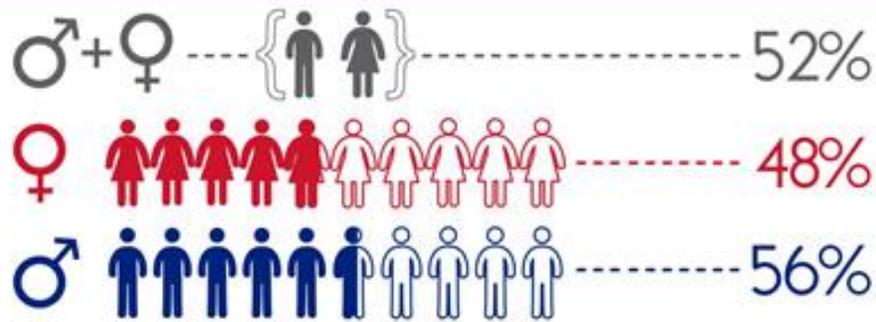
Yes  No

» Name:  
Food and nutrition guidelines and Sport NZ strategic plan 2012-15

#### National survey

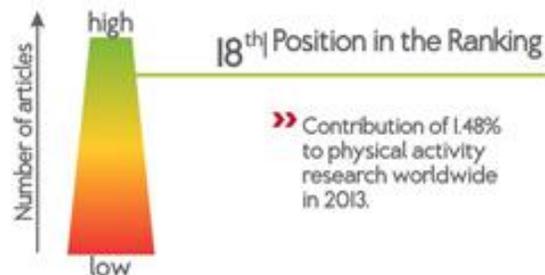
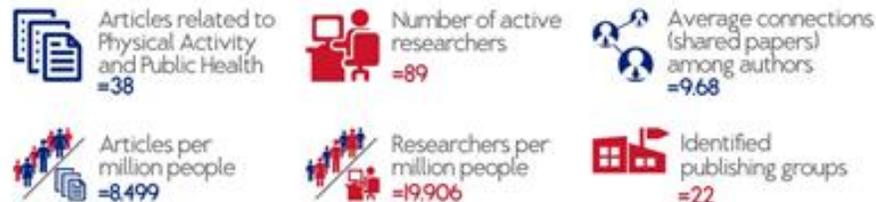
Yes  
 First survey: 2011-2012  
 Most recent survey  
 Next survey  
 No

### Prevalence of Physical Activity | Age 18+ years\*



\*New Zealand Health Survey: Annual update of key findings 2012/13

### Research metrics (PubMed search in 2013)



For description of the indicators and data sources:  
[www.globalphysicalactivityobservatory.com/appendix](http://www.globalphysicalactivityobservatory.com/appendix)

#### Contact information

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Faculty of Health and Environmental Sciences, AUT University, Auckland, New Zealand



#### New global report card shows Kiwis are couch potatoes, not sports stars

JOEL MAXWELL  
Last updated 2013, December 4 2013



Wellington woman Rebecca Stone works hard to make sure exercise remains part of her weekly routine. Pictured here with five month old son Tommy Stone.

A global study on physical activity has "labeled" its New Zealand researcher with findings that show Kiwis are less active than Americans, and on par with those for regular exercise.  
AUT professor of physical activity, Erika Hindson said news New Zealand ranked 18th out of 110 nations for physical activity was a surprise even to her.  
"I was hoping we would be further up the list."  
The data from the Global Observatory for Physical Activity, revealed New Zealand women came in even lower than men when it came to meeting 150 minutes a week of moderate to vigorous physical activity.  
The study shows there are more deaths due to physical inactivity in New Zealand than the global average.  
"It means that non-communicable diseases are rising in New Zealand, like type 2 diabetes, obesity, cardiovascular disease in adults and children as well."  
Hindson said New Zealand needed to pay attention to the data and "incubate" its response through more large-scale interventions for all age groups by the government.  
"And not just a focus on sports, because it's not just sports – you don't have to be in a structured, organized event."



# New Zealand's 2018 Report Card on Physical Activity for Children and Youth

	Nationally representative survey data	Grade
Behaviours	Overall Physical Activity	D-
	Organized Sport Participation	B
	Active Play	C+
	Active Transportation	C-
	Sedentary Behaviours	F
	Physical Fitness	INC
Settings and Sources of influence	Family and Peers	C
	School	B -
	Community and Environment	B
Strategies and Investments	Government Initiatives	B +

Has anything improved since 2008?

Most efforts to improve PA and  
reduce SB have resulted in  
limited success

What are we missing?





1

2

# Urban Sprawl

Car dependent communities

Expansive, rapid, growth away from the cities

Commercial, residential, and industrial areas are separated from one another

# Technological Advancement

Easy & Comfortable

we Socialise in a very different way

# Environment

Our Environment has changed and the way we approach/utilize our environment has changed

#1 People's choices and freedoms to live functional lives without the use of the car are greatly reduced.

#2 The modern urban environment is limiting people from living active and healthy lives

# Traditional older neighbourhoods were walkable

- High population density
- Good mixture of land use
- High connectivity
- Streets were calm, narrow, visually interesting, continuous foodpaths

**Environmental Correlates of Walking and Cycling:  
Findings From the Transportation, Urban Design, and Planning Literatures**

**Brian E. Saelens, Ph.D.**  
University of Cincinnati College of Medicine and Cincinnati Children's Hospital Medical Center

**James F. Sallis, Ph.D.**  
San Diego State University

**Lawrence D. Frank, Ph.D.**  
Georgia Institute of Technology

**Must reshape our environment to allow us to be Active and Healthy, making walking, cycling and wheeling the easy and attractive choice...Active...**

**“A NZ where it is easy to be active every day”**

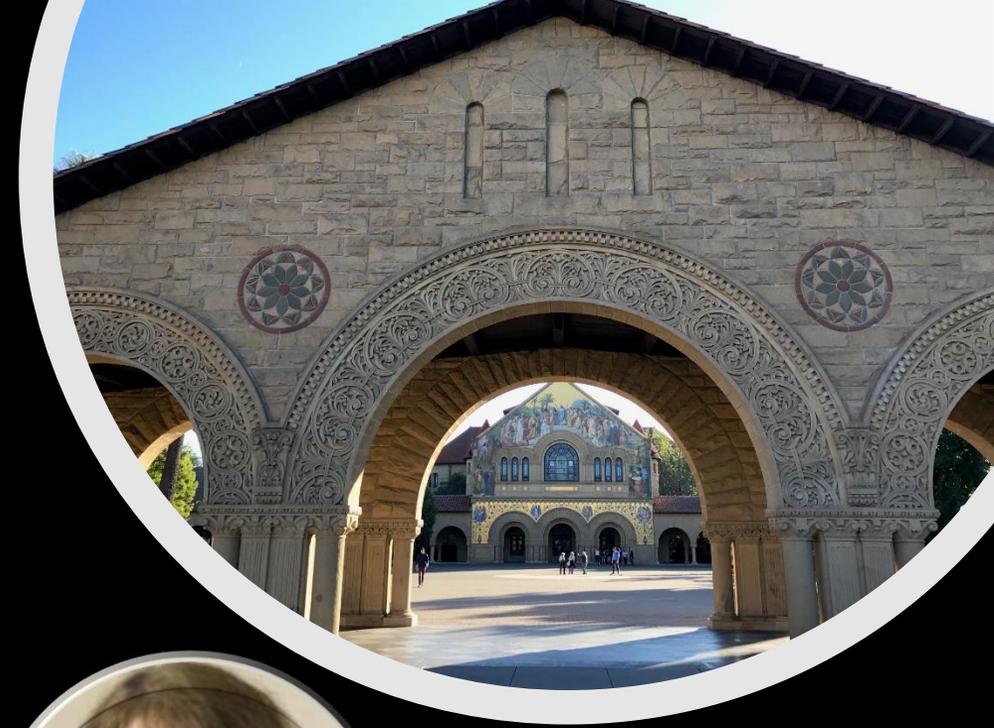
**Vision statement for MoH**

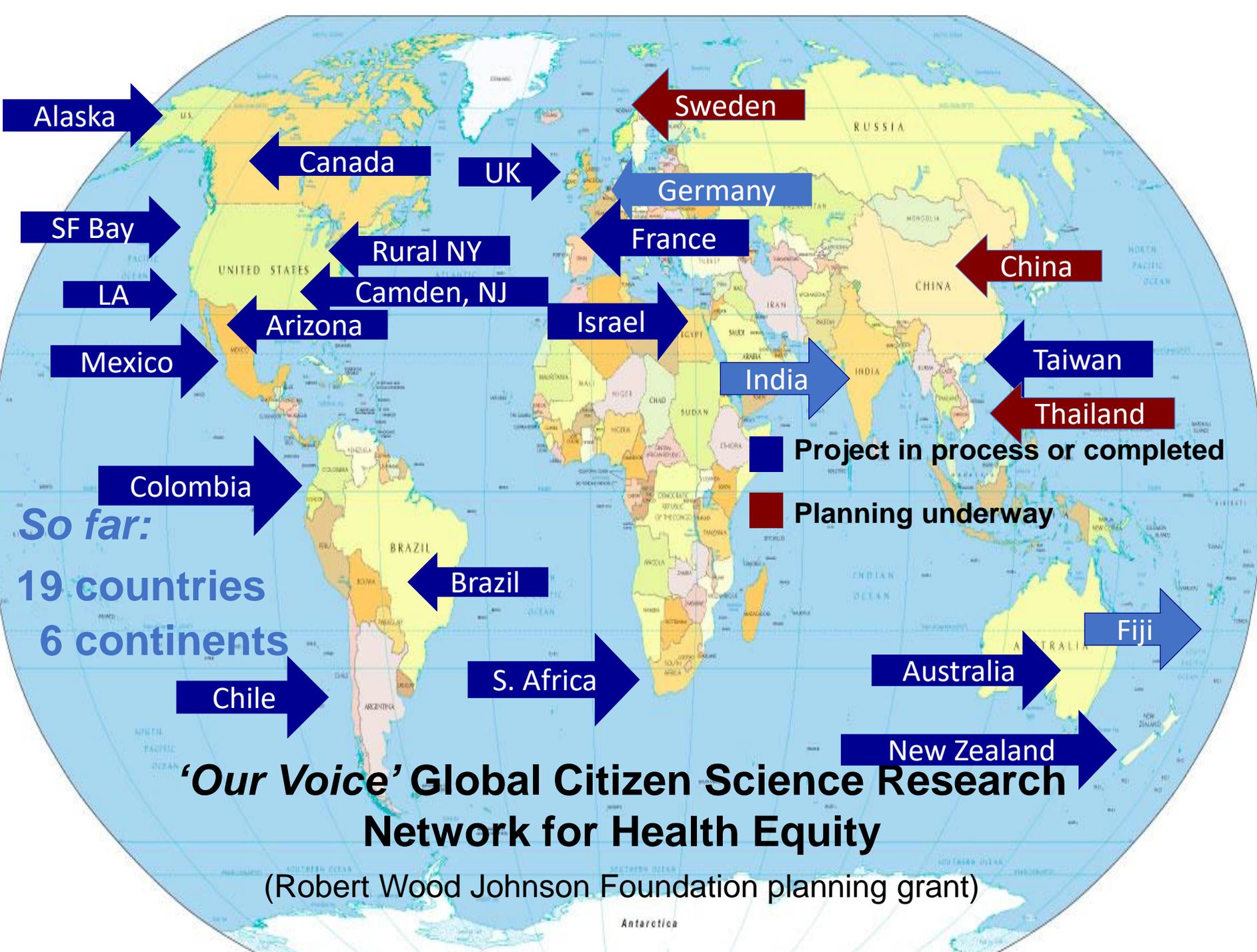
**“Physical Activity is the side effect of life”**

**PVC Prof Richard Barker**

# Global Citizen Science Research Network (Abby King)

- The ***Our Voice Global Research Network*** was formed in 2016 with support from the Robert Wood Johnson Foundation.
- The *Our Voice Initiative* aims to increase **health equity** among people of all socioeconomic backgrounds and in diverse parts of the world.
- In the ***Our Voice*** approach, community members — **Citizen Scientists** — gather and analyse community data, then share their findings with decision makers to advocate for changes in the local environment.





Alaska

Canada

UK

Sweden

Germany

SF Bay

Rural NY

France

LA

Camden, NJ

Israel

China

Mexico

Arizona

India

Taiwan

Thailand

Colombia

Project in process or completed

Planning underway

Brazil

So far:  
19 countries  
6 continents

S. Africa

Australia

Fiji

Chile

New Zealand

# 'Our Voice' Global Citizen Science Research Network for Health Equity

(Robert Wood Johnson Foundation planning grant)



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

## **U.S. Collaborators:** (selected)

- Stanford University (**organizing institution**)
- Arizona State U.
- Cornell
- GirlTrek, USA
- LeadingAge, USA
- Place Labs, San Francisco, CA
- San Francisco State U., CA
- 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, Missouri

## **International Collaborators:** (selected)

- Auckland 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
- 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, Chile
- Univ. of Kwa-Zulu-Natal, S. Africa
- Univ. of Manitoba, Canada
- Université Nice Sophia Antipolis, France
- Univ. of Queensland, Australia

**Funding:** Robert Wood Johnson Foundation, US National Cancer Institute, US, Nutrilite Health Institute Wellness Fund, Stanford Discovery Innovation Fund, ITRI Taiwan, Silicon Valley Community Foundation, CA.



Discussion

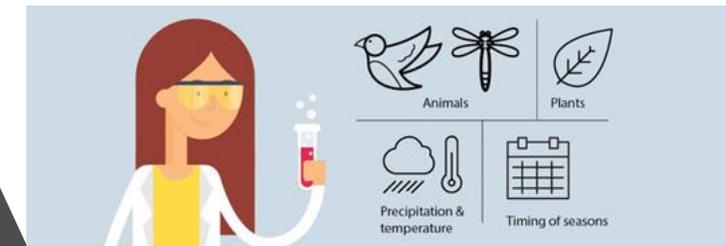
Maximizing the promise of citizen science to advance health and prevent disease



Abby C. King<sup>a,b,\*</sup>, Sandra J. Winter<sup>b</sup>, Benjamin W. Chrisinger<sup>b</sup>, Jenna Hua<sup>b</sup>, Ann W. Banchoff<sup>b</sup>

<sup>a</sup> Division of Epidemiology, Department of Health Research & Policy, Stanford University School of Medicine, Stanford, CA 94305, United States of America

<sup>b</sup> Stanford Prevention Research Center, Department of Medicine, Stanford University School of Medicine, Stanford, CA 94305, United States of America

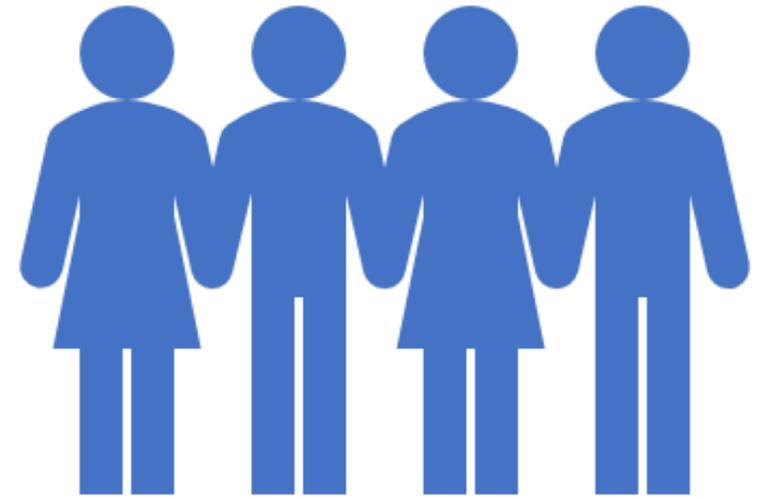


# What do we mean by CITIZEN SCIENCE?

- A centuries old tradition of resident engagement
  - **FOR** the people
    - Donation of biological specimens (biomedical research)
    - “big” data for free-living, population-level surveillance of health behaviors or disease outcomes
  - **WITH** the people
    - Active data collection (natural phenomena or built environments)
  - **BY** the people
    - Participate in setting objectives; Collect & help interpret data; Solution building

# Citizen Science **BY** the People

- Incorporates strengths of *two perspectives*:
  - **Community-based Participatory Research**: residents participate in problem identification, input, and local community applications
  - **Citizen Science**: brings systematic, scalable methods to resident-based “real-world” data collection



Beginning with neighbourhood walks using the Discovery Tool, Citizen Scientists engage in a four-step process to build healthier communities.

Discover

Discuss

Advocate

Change

# The “**OUR VOICE**” Citizen Science Research Initiative

- **Facilitators** of this process can be researchers, community organizations, govt. groups, or local opinion leaders or residents themselves

- Buman et al. *Translat Behav Med*, 2012; *AJPM*, 2013; Winter et al., *Translat Behav Med*, 2014; King et al., *TJACSM*, 2016; Goldman et al., *J Urban Health*, 2016; Sheats et al., *J Urban Health*, 2017; Hinckson et al., *IJBNPA*, 2017



# *It starts with an easy-to-use mobile app:* **Stanford Healthy Neighborhood Discovery Tool**

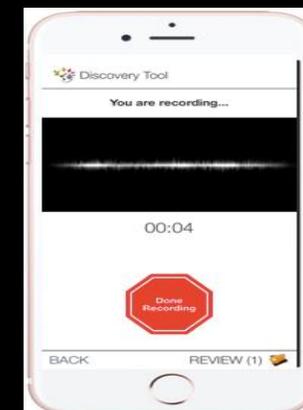
Buman et al. *Am J Prev Med*, 2013



Used by residents, *irrespective of ‘tech literacy’ or language*, to assess community features that *promote or hinder* healthy living or daily well-being



Collect neighborhood info via **GPS Route tracking/ Geo-coded Photos & Audio narratives**; as few as 8-10 residents needed to get “saturation” around top barriers & enablers of healthy living



# *Next*, in a facilitated process, Residents:

- *share* their photos & “stories” collected on their walks with other residents
- *build consensus* around high-priority yet realistic areas for change
- share their data with *key decision makers* & develop possible solutions
- *formulate action steps to activate local changes* (e.g., a safe, age-friendly walking route for Israeli seniors, with support of local businesses)



# The Citizen Science-engaged Multi-level Research Model

starts with *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 impacting *Distal Outcomes:*

- Individual-level health outcomes
- Neighborhood-level health outcomes (e.g., physical activity, food access)

*creates changes in Mediators*

(e.g.):

- Neighborhood cohesion & trust
- Self-efficacy to effect environ. change
- Neighborhood social networks
- Advocacy skills & local information

*uses multi-dimensional Outcome Measures*

(e.g.):

- Qualitative measures
- Geospatial info.
- Quantitative assessment
- Observational info. (e.g., # people walking)

# Citizen Science Activities in East Palo Alto, CA

- Tested initially with **low-income, ethnically diverse older adults** in East Palo Alto, CA (USA)
- Older low-income Residents were able to use Discovery tool to *identify neighborhood barriers* to physical activity/healthy food choices, & *advocate for change*
- Helped in activating **City planning committee & City Council** to make a number of changes & investments to enhance community infrastructure for active living



Buman et al. *Translat Behav Med*, 2012;  
Winter S, et al. *Translat Behav Med*, 2014

# Successes in E. Palo Alto, CA



City appropriated  
\$400,000 for  
environmental analysis

- Created a *safer walking environment* through revising and repairing streetscapes & sidewalks



- Improved *access* to local senior center



Helped seniors develop  
*a local community garden*

Local orgs. taught seniors  
how to *garden & cook vegetables*



Resident reports of *enhanced social cohesion*

# ***Education, Environment & Policy impacts of North Fair Oaks citizen scientists***



Alerting waste management authorities about *illegal dumping* of trash & other items (e.g., mattresses) from other neighborhoods



Helped form a *Community Advisory Board* to provide ongoing guidance on best practices to improve community health



Developed a *bilingual Community Resource Guide* that included contact details for local safety & service providers



Worked to involve staff from the *nearby Health Center* to encourage program sustainability

# Other Proximal Effects of Our Voice projects

King, *TJACSM*, 2016; Goldman Rosas, *J Urban Health*, 2016; Moran, *J Aging Phys Act*, 2017; Sheats, *J Urban Health*, 2017; Zieff, *J Urban Health*, in press; Hua, *Ann Behav Med*, 2018 [abstract]



• Safer, more user-friendly *city-wide 'open streets' recreational programs* (Colombia)



• Increased *age-friendly walking routes* to destinations (Israel)



• Identified *under-utilized spaces* for potential recreational use by seniors (Taiwan)



• Created safer ways to *walk/bike to school* (USA) & *healthier school environ.* (Colombia)



• Developed strategies for *improving control of stray/roaming dogs* (Mexico)



• Identified strategies for *healthier food access* in urban & rural areas (US, Colombia)



• *Enacting local park improvements* to increase community physical activity & greater park utilization (US, Colombia)

Now Testing  
*Distal Effects* of  
the *Our Voice*  
citizen science  
model --  
*Steps for  
Change Trial*  
(NIH  
R01CA211048)



**QUESTION OF INTEREST:**  
CAN CITIZEN SCIENCE  
ACTIVITIES HELP **AUGMENT  
& SUSTAIN** EFFECTS OF  
PHYSICAL ACTIVITY  
INTERVENTIONS IN UNDER-  
RESOURCED  
COMMUNITIES?



**OUTCOMES:** PA,  
HEALTH-RELATED  
OUTCOMES AT  
***INDIVIDUAL &  
NEIGHBORHOOD  
LEVELS***

# Additional Target Areas for Change being explored



Barriers to *cycling to work* in low-income workers [Temuco, Chile]

- Understanding living conditions of those who are *homeless* [Colombia]

- Teaching *civic engagement* among school children [South Africa]

- Tackling *gender-based violence* on U.S. college campuses

- Enriching **university campuses** for PA & healthy eating [New Zealand]

- Making urban environments safe for **frail older adults** [Australia]

- Solution-building around **affordable housing & public transit** [SF Bay area]



## Aim

- To **empower** the students
- To identify the main **barriers and facilitators** for healthy environments on campus
- To facilitate the **advocacy process**

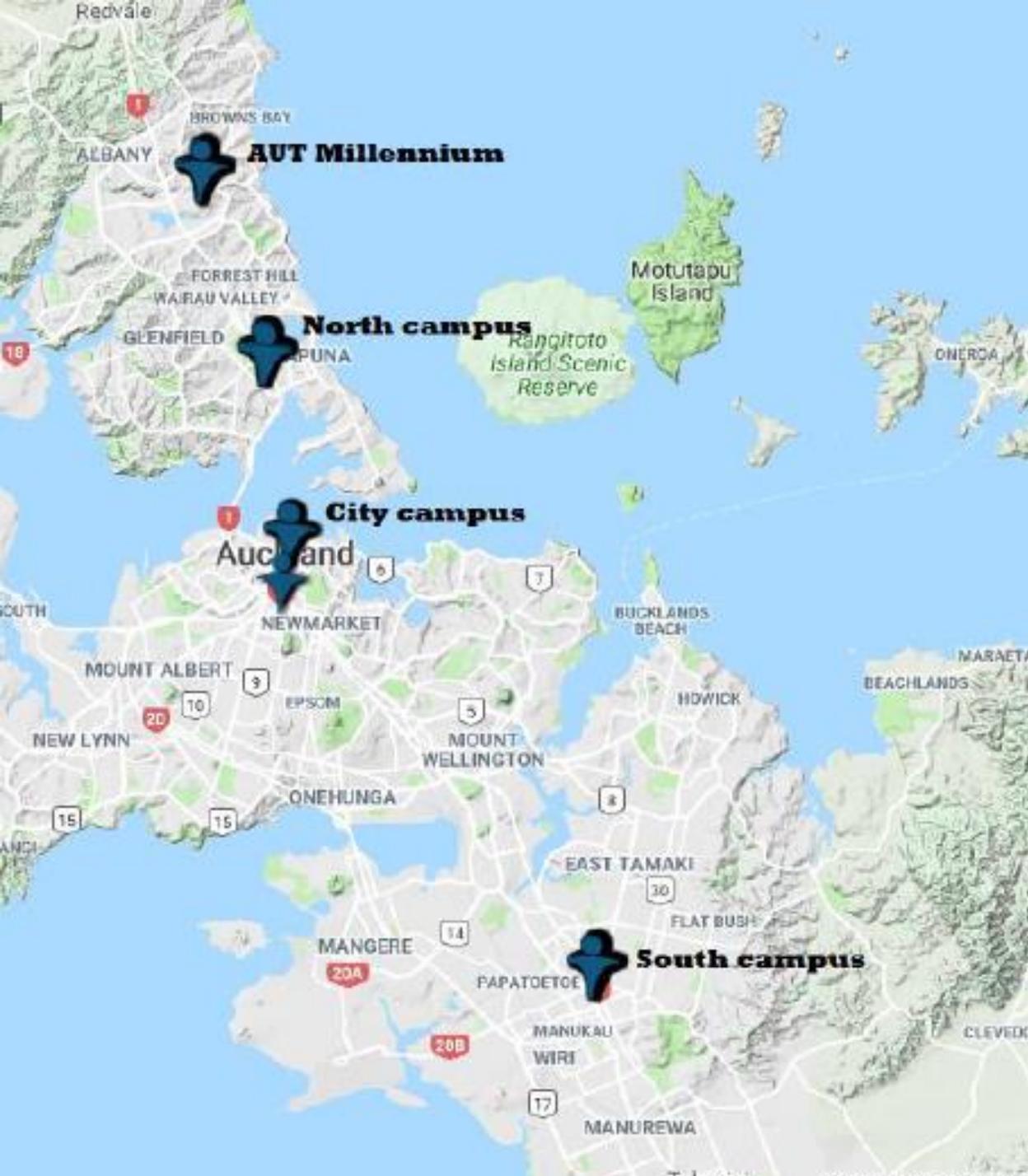


Discover

Discuss

Advocate

Change



# Auckland, New Zealand

- Urban areas
- University-Four campuses
- 61 participants
- 69% female
- 486 photographs and audios

# Enablers and Barriers to Healthy Environments around the world from the Youth perspective-New Zealand

Enablers

Importance of Aesthetics

Wide Spaces

Barriers

Access to buildings between classes

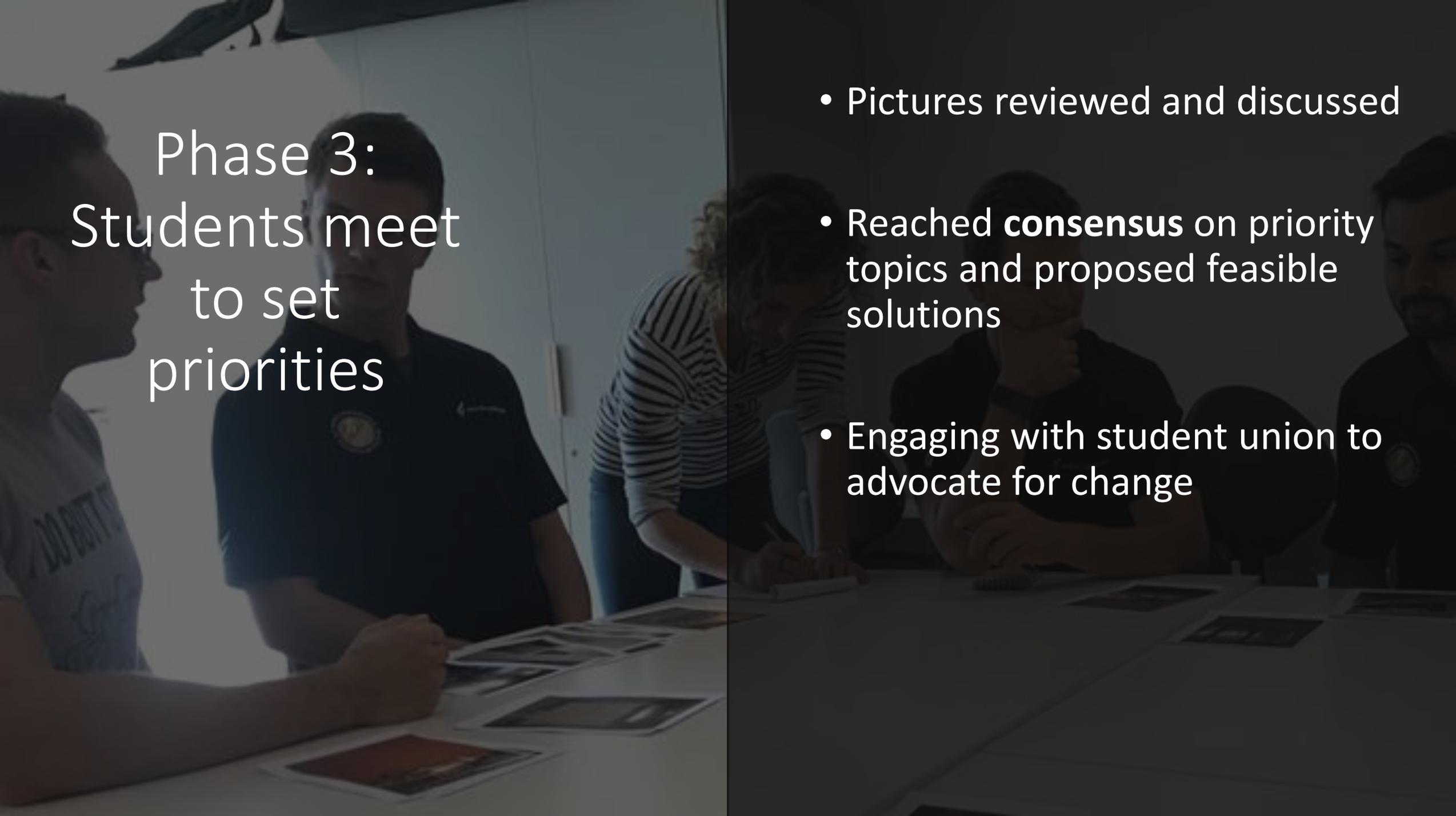
Wasted space on campus

“Maybe have some sort of hands on activities. Be on your way to class and maybe you just want to take a break and ‘I thought I would just play table tennis ...’”



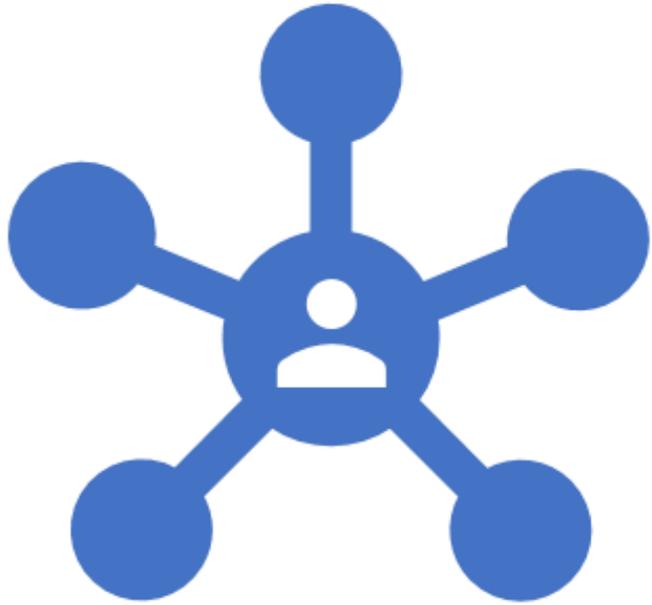
“I have to walk ... all the way round there, all the way past the education, all the way just to basically cross the field. It drives me nuts!”



A group of students are gathered around a table, looking at several photographs laid out on the surface. They appear to be in a collaborative meeting or workshop. The scene is dimly lit, with the primary light source coming from the left, creating a focused and serious atmosphere. The students are dressed in casual attire, and their attention is directed towards the images on the table.

## Phase 3: Students meet to set priorities

- Pictures reviewed and discussed
- Reached **consensus** on priority topics and proposed feasible solutions
- Engaging with student union to advocate for change



# Observations

- Meaningful and sensible process
- Empowerment and visibility of individuals and groups
- Portable, transferable and applied to any setting
- Engaging
- Ownership and having a voice
- Pictures are a thousand words
- Decision makers open to the idea

Together, this growing body of Research shows that:

Residents ages 9 to 90 from diverse backgrounds & circumstances, can:

- gather & analyze data around local community features that influence their health

- & successfully advocate for healthier neighborhoods & communities



- Their role as a ***“change agent”*** also can enhance personal & group efficacy, community engagement, & lead to future advocacy efforts

# Take home messages



**There is an added value of following a citizen science approach in promoting age and activity friendly environments**

Has provided an easy to follow framework that can be applied in any context, any population and in any country successfully



**How do you think citizen science could fit into your agenda/initiative?**

# Other planned projects

1. Active living through Citizen Science: A community-intergenerational approach
2. Future scientists and community leaders-Intermediate School
3. Mauriora and urban wellbeing: A holistic approach to neighbourhood transformation
4. Kaupapa Maori and Urban active living
5. Feasibility





## Our Mantra

- “Never doubt that a small group of thoughtful, committed citizens can change the world; indeed, it’s the only thing that ever has”.

*Margaret Mead*

**Our Website: <http://ourvoice.stanford.edu>**

<https://www.youtube.com/watch?v=sYcYXh51BI0>





# Thank you

**AUT**

TE WĀNANGA ARONUI  
O TĀMAKI MAKAU RAU

- Research Fellows
- Auckland University of Technology,  
New Zealand
- Our Voice-Citizen Science Global  
Research Network
- Team at Stanford University



# International Society of Behavioral Nutrition and Physical Activity

- We are hosting
- International conference in Auckland
- Expecting 500+ delegates
- June 24-26, 2020
- Abstract submissions later this year
- Policy and Environments stream



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