

Cognitive and psychological effects of climate change on older adults

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Outline

- Background
- Relevant Theories/Perspectives
- Data highlights (leveraging existing data) focused on urban flooding
- Data needs/ideas

Background

How can climate change effect cognitive and psychological health?

Stress → Cognitive Decline/Health

Stress → Poor Mental Health → Cognitive Decline/Health

How stressful?

- Extreme Heat → increased risk of illness, hospitalizations, and death; especially among those with chronic conditions
 - Increased vulnerability among those with limited access to AC
- Poor air quality worsens respiratory conditions common in older adults such as asthma and chronic obstructive pulmonary disorder
- Flood-related fatalities: Almost half of deaths from Hurricane Katrina were people over age 75; Superstorm Sandy almost half were over age 65.
 - Increased vulnerability In cases of evacuation
 - Power interruptions needed for medical equipment and medications

Theories/Perspectives

- Climate change and population aging - two developing and converging trends
- Competing theories - Cumulative Advantage/Disadvantage OR Age as leveler
 - Q: Will effects of climate change on older adults exacerbate life course inequalities and other (e.g., racial/ethnic, SES) disparities?
OR will the effects be experienced by all older adults similarly
(I expect/hypothesize the first)
- Risk, resilience or both?
- Climate change as opportunity for older adults
 - Designing interventions optimized for older adults (data example)
 - Opportunities for engagement/volunteering (e.g., work of Karl Pillemer and others on environmental volunteerism
Volunteering → better mental and cognitive health)

Localized/Urban Flooding as example

- Climate change, coupled with urban development and aging infrastructure driving greater flood risks in many cities in the U.S. and around the world
- 2019 National Academies report – ‘Flooding is the natural hazard with the greatest economic and social impact in the United States, and these impacts are becoming more severe over time’
- Not just hurricanes and coastal areas - knowledge of less catastrophic but more frequent localized flooding is highly limited and incomplete (National Academies of Sciences & Medicine, 2019)
- ‘hundred-year’ storms happening more frequently
 - amount of precipitation falling in shorter time frames
- These rain events cause stormwater systems to become overwhelmed, leading to street flooding and basement backups

Data highlight #1

Project: Overcoming Social and Technical Barriers for the Broad Adoption of Smart Stormwater Systems

*Funded by the National Science foundation

https://www.nsf.gov/awardsearch/showAward?AWD_ID=1737432

Investigators

Branko Kerkez, University of Michigan (Principal Investigator)

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Lisa Mason, University of Denver (Co-Principal Investigator)

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Data highlight #1

- Random samples of residents living in Ann Arbor, Knoxville, and South Bend
- Mail survey administered in fall of 2019
- Over 24% response rate (n=977)
- Sample with complete data on age n=863
42.9% (370) Age 60+
- Income: 45.9% (396) live in census block group with median income below city median

Data highlight #1: Flood worry

Survey Question: When you notice standing water caused by water from rain or melting snow in locations nearby your property, how much do you worry about potential damage to your home or property? (1=do not worry at all; 4=worry a lot)

- Mean = 2.1 (SD=1.0)
- Median = 2 (worry a little)
- 36.2% (307) worry some to a lot

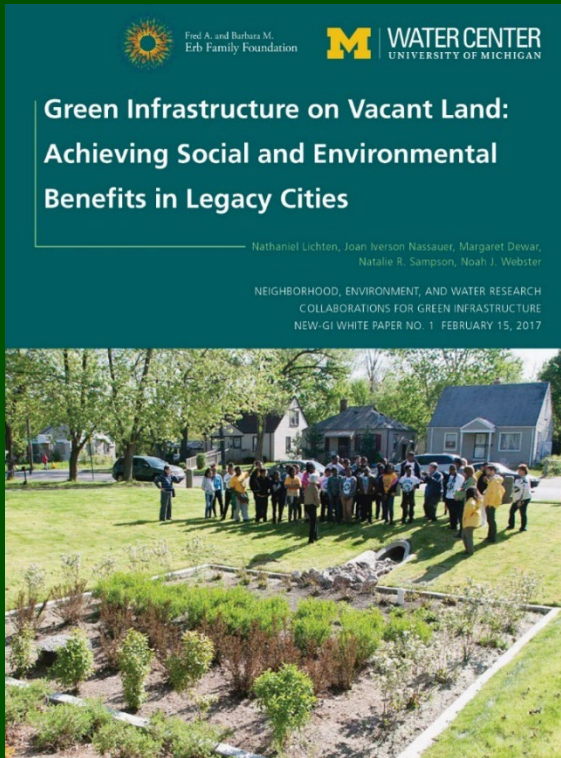
Data highlight #1: Worry some to a lot about flooding by age

	60+ (n=370)	<60 (n=493)	% difference	Chi- square test
Full sample (n=863) %	30.6	40.5	9.9	**
Lower income (n=396) %	26.4	37.8	11.4	*
Higher income (n=467) %	33.5	43.1	9.6	*

* $p < .05$; ** $p < .01$

- Older adults more resilient (less worry) generally, and even more so among those living in lower income neighborhoods

Data highlight #2: Neighborhood, Environment, and Water Collaborations for Green Infrastructure (NEW-GI)



Whitepapers available at: <https://www.joan-nassauer.com/new-gi>

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OUR TRANSDISCIPLINARY TEAM

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Aims of NEW-GI

PHASE ONE (2014-2015):

- Develop garden designs & construct pilot sites
- Conduct initial survey in Detroit's Warrdendale neighborhood (located in 'Upper Rouge Tributary' (URT))
- Studied GI governance in Baltimore, Buffalo, Cleveland, Detroit, Gary, Milwaukee, New Orleans, Philadelphia, Washington D.C.,

PHASE TWO (2016-2018):

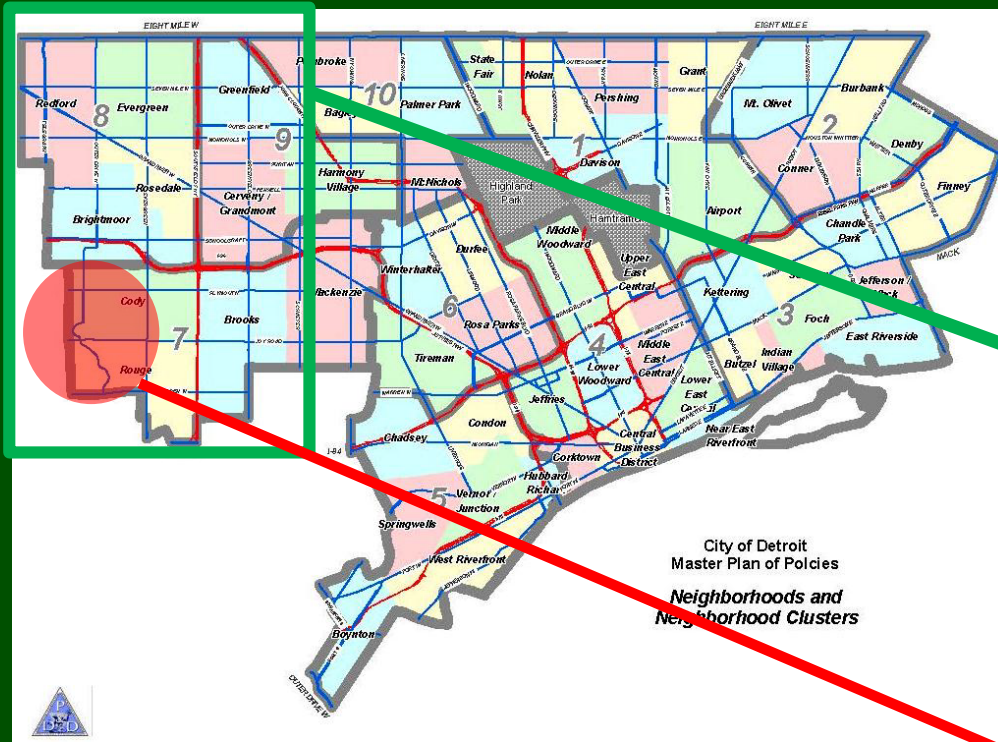
- Review & synthesize scholarly GI literature
- Assess pilot gardens' performance: operationally & socially
- Bring design concepts to scale across CSO watershed (URT)
- Review GI-related governance of vacant properties in other legacy cities
- Produce guidance documents/whitepapers for local GI stakeholders

Previous Findings & Hypotheses Relative to Design

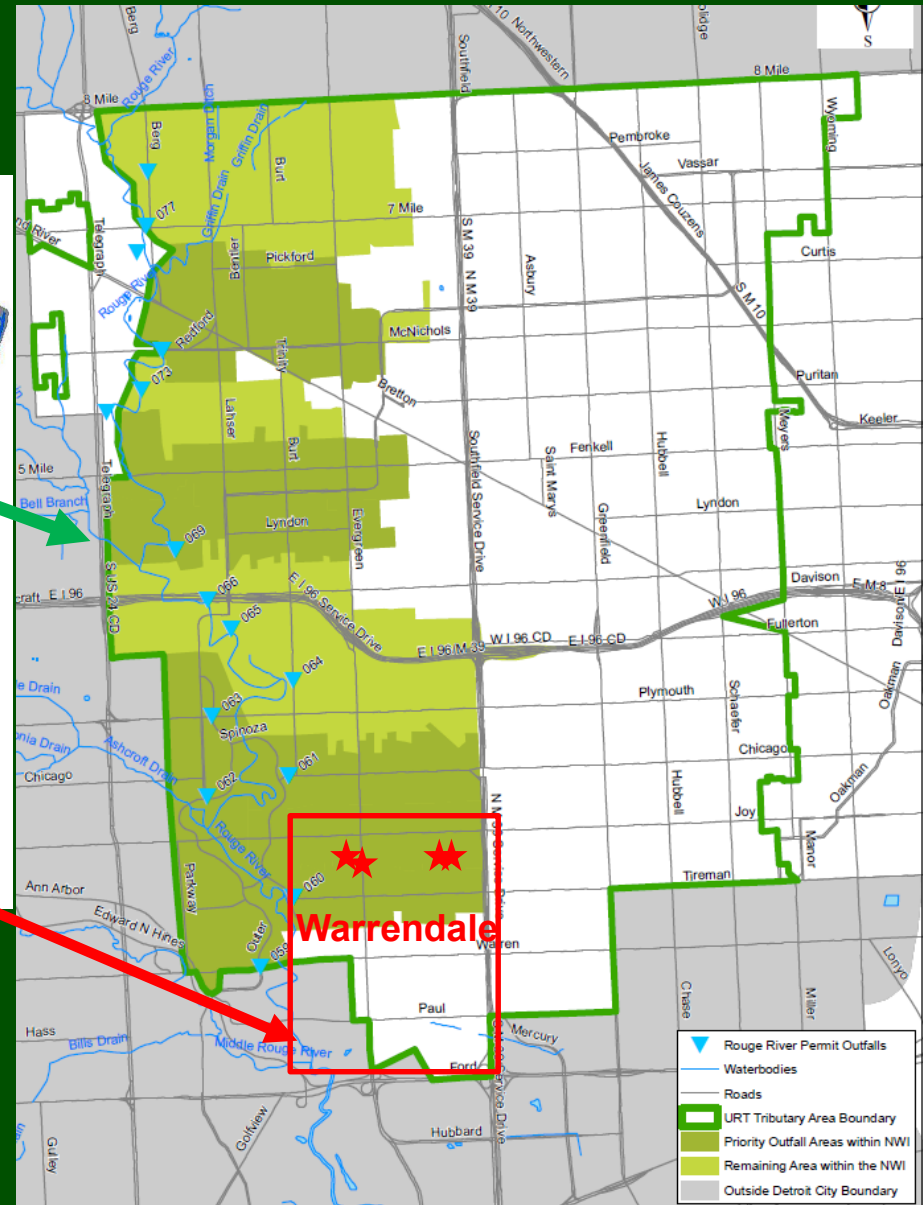
- Distinct from other forms of greening in design & function:
manage stormwater in legacy cities
- Potential 'co-benefits':
 - New opportunities for physical activity, stress reduction & coping, social interaction
 - Reduced crime
 - Reduced heat island effect; air pollution mitigation

Pilot and Survey Sites in Detroit, MI

PHASE TWO



PHASE ONE



Data highlight #2



- Face to face interviews conducted in Detroit's Upper Rouge Tributary 2017-18 (n=308)
- Questions asked about basement flooding and also perceived impact of new neighborhood rain gardens
- Age 60+ - 27.3% (n=84)

Source: Nassauer, J. I., Webster, N. J., Sampson, N., & Li, J. (2021). Care and safety in neighborhood preferences for vacant lot greenspace in legacy cities. *Landscape and Urban Planning*, 214, 104156.

Data highlight #2: Flood freq by age

Survey Question: In the last year, how many times has your household had problems with flooding or standing water in your basement? Would you say never, 1-2 times in the last year, 3-5 times, OR more than 5 times?

Full Sample (n=308)

Any flooding experienced in last year - 36.1% (n=104)

60+ (84)

28.7% (n=23)

<60 (224)

38.9% (n=81)

*Chi-square test – no significant difference (p<.05) in flood experience by age

Data highlight #2: Flood impact by age

Survey Question: If you had experienced flooding (n=104), how have you been affected?

	Full sample (n=104)	60+ (n=23)	<60 (n=81)
Monetary loss due to repairs? (% , n)	49.0 (51)	52.2 (12)	48.1 (39)
Monetary loss due to loss of valuables? (% , n)	58.7 (61)	52.2 (12)	60.5 (49)
Causes stress? (% , n)	64.4 (67)	60.9 (14)	65.4 (53)

*Chi-square tests – no significant differences (p<.05) by age

- Data suggests less exposure among older adults compared to younger
- Older adults descriptively more resilient when exposed to flooding compared to younger adults

Data highlight #2:

Flood freq & Depressive symptoms by age

Depressive Symptoms - 20-item CES-D (0 to 3) averaged

Flood frequency in last year (1=never; 4=5+times)

Full Sample (n=308)

Flooding frequency (M=1.5) → Depressive Symptoms (0.6) ($r=.15^*$)

Age 60+ (n=84)

Flooding frequency (M=1.4) → Depressive Symptoms (0.6) ($r=.09$)

Age <60 (n=224)

Flooding frequency (M=1.6) → Depressive Symptoms (0.5) ($r=.17^*$)

* $p<.05$

Data highlight #2: Co-Benefits

Survey Questions: how much do you think having the garden nearby has had an impact on:

- 1) Your mental or emotional health (1=worsen a lot; 5=improve a lot);
- 2) Amount that you see/interact with neighbors (1=decrease a lot; 5=increase a lot)

Impact of garden nearby on...	Full sample (n=134)	60+ (n=33)	<60 (n=101)	Sig difference (p<.05)
Mental/emotional health (Mean, SD)	3.7 (0.7)	3.8 (0.7)	3.6 (0.7)	NS
Amount interact with neighbors (Mean, SD)	3.6 (0.7)	3.8 (0.6)	3.5 (0.7)	*

- New neighborhood rain gardens with a primary purpose to manage urban stormwater can have social co-benefits – median 4 (increase some)
- Older adults benefited significantly more in terms of interactions with neighbors.

Data needs/ideas

- Leverage existing data not explicitly focused on older adults, but have age as a variable
 - e.g., follow-up with older adults in these studies
- Add climate change experience/distress modules to ongoing population-level studies (e.g., Health and Retirement Study)
 - Encourage use of standardized measures
- Need larger samples to focus on within group (among older adults) heterogeneity to understand intersections with other factors (e.g., race, SES)
- New studies/primary data collections focused explicitly on older adults and climate change experiences and impacts – broad range of impact events, flooding, fire
- Ecological momentary assessments as flood events happen

Thank you
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