The living environment and frailty among elderly

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Outline

- The built environment and health
  - Understanding relationships
  - Translating evidence into policy recommendations
- The built environment and frailty among elderly

Background

- The number of people between 65 and 80 years of age is expected to increase by about 40% between 2010 and 2030

- The number of people expected to live more than 80 years is predicted to double between 2010 and 2050

- Healthy aging, and “aging in place” important for individual elderly and for society

Is the built environment important for healthy aging?

Determinants of healthy aging

- Individual
  - Biological
  - Lifestyle, particularly physical activity
  - Psychological
  - Socio-economic
  - Personality characteristics
- Environment
- Social
  - Built environment:
    - Participation, meeting others
    - Shopping
    - Recreational physical activity

Focus op zelfredzaamheid (Dutch Health Council)

- Environmental determinants
  - Facilities in walkable distances
  - Public transport
  - Street lights
  - Public Green
  - Quality of streets

- "… but unknown which factors exactly"

Woonvisie 2010 – 2020 Gemeente Spijkenisse Compleet Wonen

- ***“ Het uitgangspunt voor het beleid voor wonen met welzijn en zorg is dat inwoners van Spijkenisse zo lang mogelijk zelfredzaam kunnen zijn in hun eigen omgeving.”***

Environmental determinants and physical activity: conclusions from systematic reviews

1. Humpel et al. (2002): *"Physical environment factors have consistent associations with physical activity behavior".*

2. Owen et al. (2004): "*While few studies have examined specific environment-walking relationships, early evidence is promising".*

3. Trost et al. (2002): "*There remains a need to better understand environmental influences and the factors that influence different types of PA".*

4. *Saelens et al. (2003): "Environmental variables appear to add to variance accounted for beyond sociodemographic predictors of walking/cycling for transport"*

5. Cunningham et al. (2004) *This area of research is in its infancy, and inconsistent findings reflect difficulties in measurement of the built environment.*

6. Wendel-Vos et al. 2007: *"Supportive evidence was found for only very few presumed environmental determinants"*

Health Council Report “Beweegredenen

- ***Beweegredenen. De invloed van de gebouwde omgeving op ons beweeggedrag (2010):***
  - **“Only little strong good evidence, but promising chances for a relationship**
  - **“According to the opinion of the commision, only few associations based on rigorous scientific evidence”.**

Recreation walking (Van Cauwenberghe et al., 2011)

- Walkability (0,0)
- Population density (0, +)
- Land mix use (+)
- Street connectivity (0,0)
- Access to facilities (0,+)
- Access to shops (0,+, +)
- Public transport (0)
- Access to recreational facilities (0,0,0,0,0,+,+,+)
- Walking facilities (0,0,0,0)
- Social security (0,0,0,0, +)
- Traffic safety (0,0)
- Aesthetics (0,0,+)

Weak and inconsistent associations?

- Weak associations?
  - Often argued that individual factors are more important
  - What is the research question?

- Inconsistent associations?
  - International context
  - Methodological issues
    - Measuring exposure in particular:
      - How to measure the environment
      - Neighbourhoods or buffers?

Research question:
Is the physical environment important for physical activity?

- Different opinions, intensive debates
  - Perhaps, but individual considerations more important
    - Is social cohesion a determinant of frailty among elderly
  - Yes, changes in population health are the sole result of changes in the environment.
    - E.g. “bowling alone”, the decline in social cohesion (Putnam)

The first type of questions is often answered and ignores the context

What is the research question?

- What is the role of the physical environment for physical activity and frailty among elderly within a certain context
  - …Eindhoven
  - …Paris
  - …Tokyo

- …in which environmental variation is restricted to that particular city

- …with the consequence that variation in physical activity must be mainly based on individual considerations

What is the research question?

- There is a need to distinguish environmental determinants of change in population health from environmental determinants of individual behaviour

- International research focused on environmental determinants of individual behaviour.

- Inconsistent findings of most international research is due to difference in variation, in context. If places differ, associations between place characteristics and health may differ.

Is the built environment related physical activity in the Dutch context?

- How far are people prepared to walk, cycle?
- Which characteristics vary within the radius of that distance?
- How can changes in such characteristics facilitate physical activity?

The role of the physical environment for (frail) elderly

ELANE study (Elderly And their NEighborhood)

- Obtain insight of the impact of the physical (“built”) living environment on physical activity, independent living, and the quality of life of (frail) elderly.
- Formulating recommendations for adjusting and renovating existing or new residential areas aimed at supporting (frail) elderly to be physically active, to live independently and have a good/better quality of life.

Sample

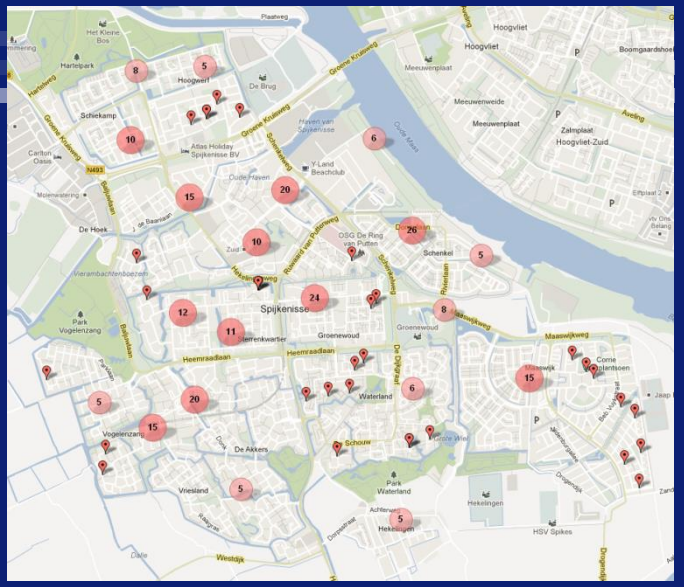
Population admitted to hospital

≥ 48 hours in hospital
3 months after hospital discharge
N= 407, 265 residing in Spijkenisse

Random sample

N=414, of which
N=162 with GPS and accelerometry

Both samples
65+ years



Methods: associations

- Questionnaires:
  - physical activity, frailty
  - perceived environmental factors,
- GIS
- Environmental audit
- Accelerometry
- GPS
- Diary

Methods

- Translating evidence into policy recommendations:
  - Results and urban architectural principles
  - Focus-groups with elderly
  - Discussion in City Council

GPS and accelerometry

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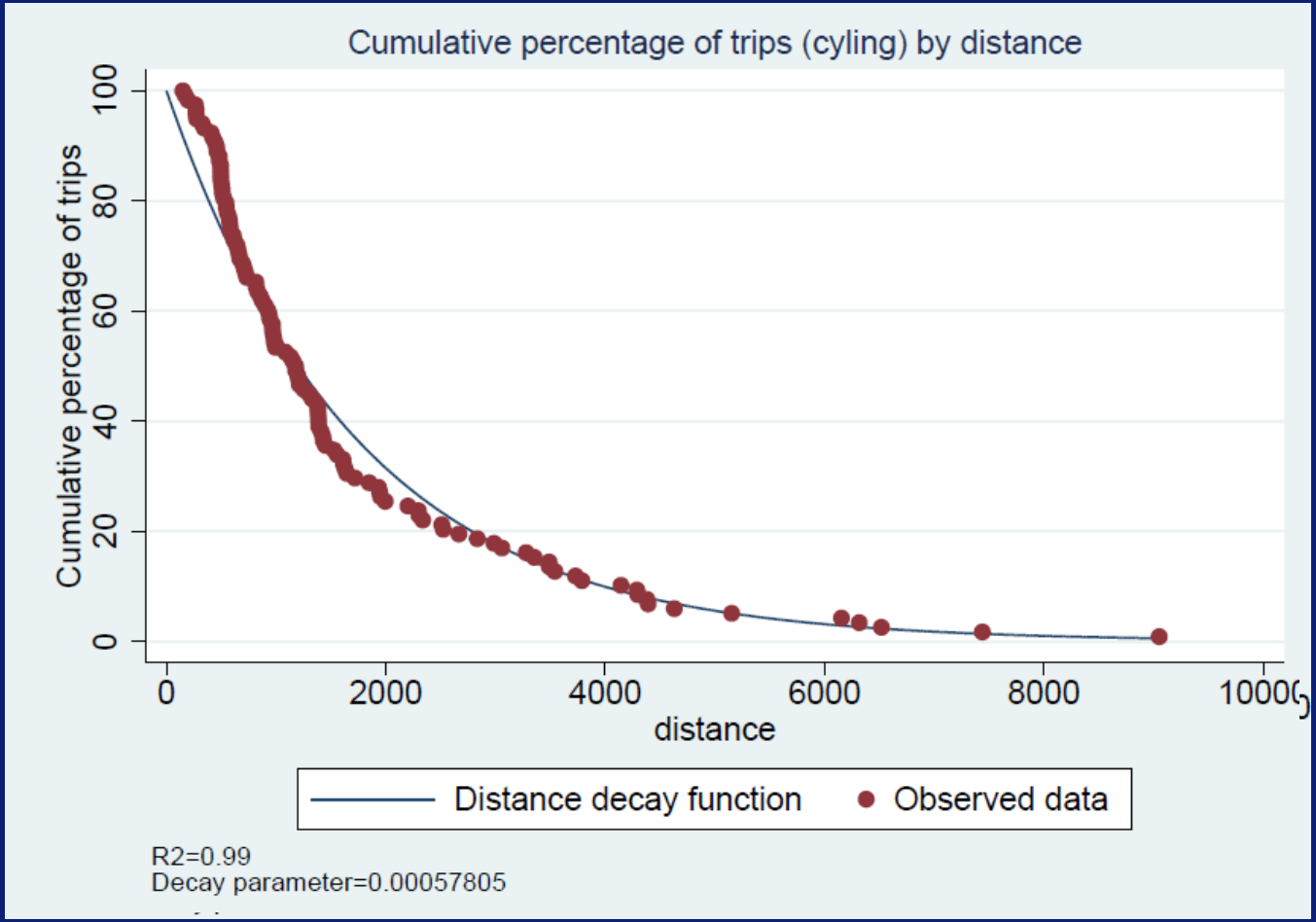
Measurement of

- Location
- Trip
- Pace
- Distance

TNO innovation for life

How far do elderly travel: distance decay curves

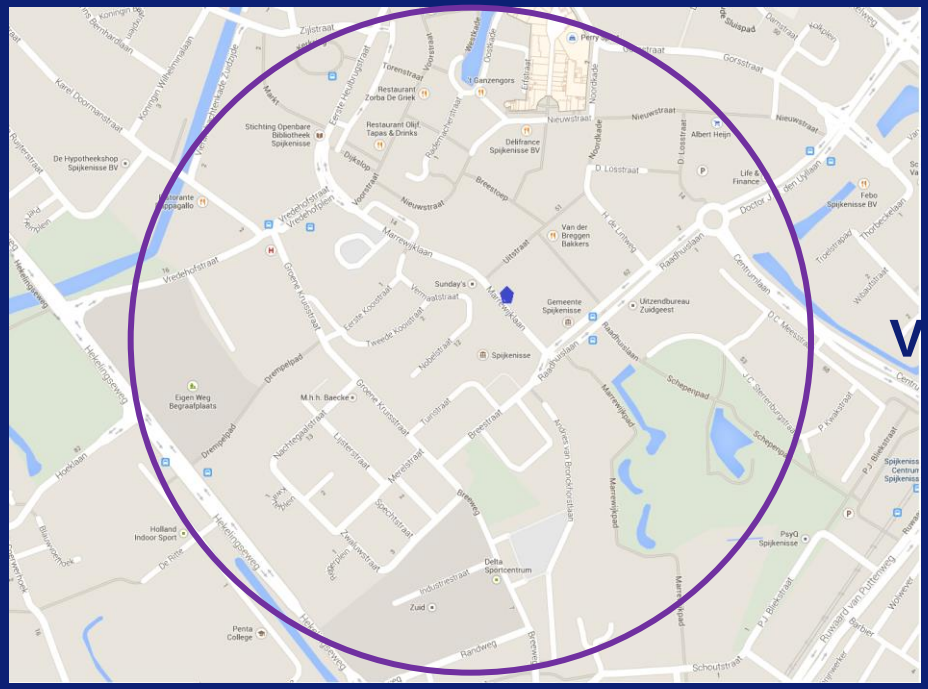


(Prins et al., submitted)

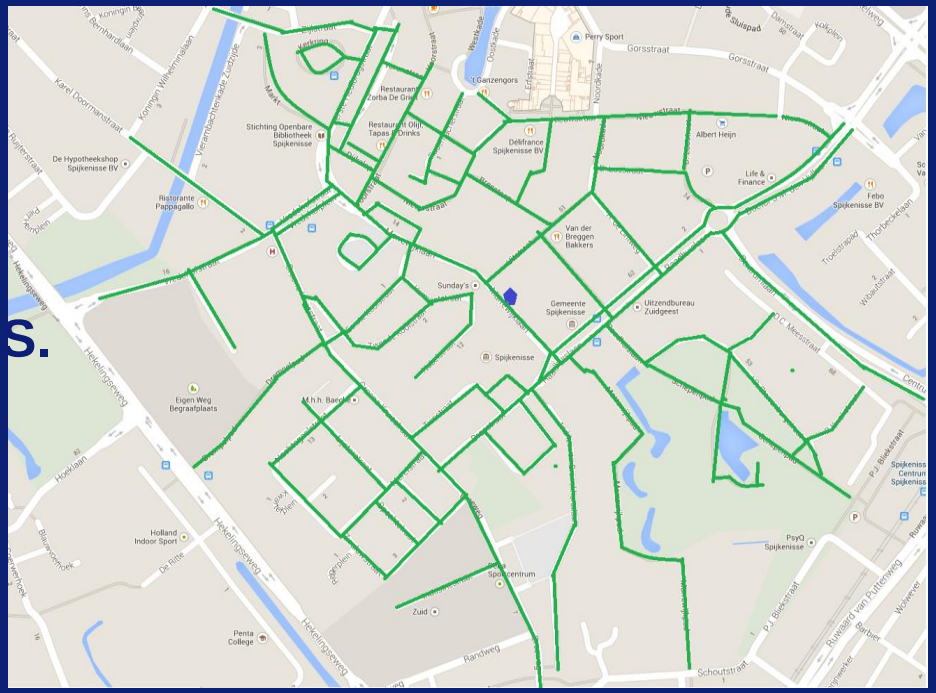
Results

- The majority of trips are larger than often used buffer sizes
- Differences with regard to functional limitations important to consider
  - Those with limitations travel shorter distances

Buffer sizes



vs.



Circular buffer

Network buffer

Associations by buffer size

- Variation in environmental characteristics differs: buffer sizes for different characteristics?

- Frail elderly more bound to smaller areas?

Study aim:

- Investigating association between neighborhood characteristics and transportational walking
  - Depending on buffer size?
  - Depending on frailty level of elderly?

Street audits

918 streets (88.8% of total)

579 segments, walking paths, parks

Sumscores for

Aesthetics: dog waste, graffiti, litter, trees, water, maintenance etc.

Functional features: sidewalks 2m or more, flat curbs, benches etc.

Safety: crossings, lightning, supervision (presence of houses), bicycle lanes etc.

Destinations: supermarket, shops, pharmacy, busstop etc.







Associations between neighbourhood characteristics and transportational walking in four buffer zones (N=408)

	400 meters			800 meters			1200 meters			1600 meters		
Characteristic[a]	B	(95% CI)	p	B	(95% CI)	p	B	(95% CI)	p	B	(95% CI)	p
Aesthetics	1.24	(0.84-1.85)	0.277	2.36	(1.14-4.90)	0.019	2.89	(1.07-7.32)	0.026	2.16	(0.54-8.51)	0.267
Functional features	0.72	(0.57-0.91)	0.005	0.68	(0.44-1.03)	0.071	0.55	(0.30-1.06)	0.068	0.80	(0.29-1.74)	0.444
Safety	1.18	(0.84-1.67)	0.333	0.70	(0.39-1.26)	0.268	0.82	(0.40-1.76)	0.613	0.80	(0.31-2.02)	0.638
Destinations	1.05	(1.02-1.08)	0.001	1.03	(1.01-1.04)	0.005	1.00	(0.99-1.02)	0.513	1.00	(0.99-1.01)	0.772

Etman et al., submitted

Results

- Better functional and aesthetic features, and more destinations were associated with more transportational walking of community-dwelling older persons.

- The importance of neighborhood characteristics for transportational walking differed by size of the environmental area, but not by frailty level.

- Increasing functional features and the number of destinations within the close by neighborhood (up to 400 and 800 meters respectively), and improving the aesthetics of a larger area up to 1200 meters in the neighbourhood of the elderly, may increase levels of transportational walking among community-dwelling elderly.

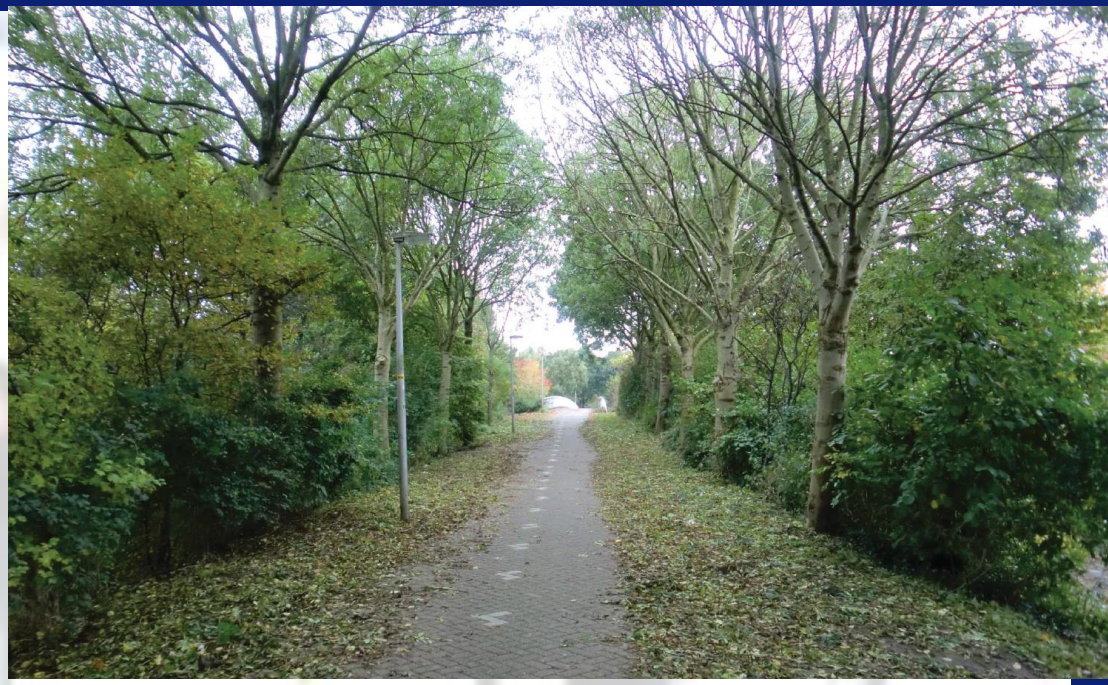
Towards policy recommendations

Focus groups with elderly

- Find out to what extend elderly recognize the results
- Search for underlying mechanisms and extra information
- Suggestions to improve the (built) environment for increasing physical activity

Urban architecture

Replace green



Next steps

- Interviews with local policy makers

- Presentation city council

In conclusion

- Confusion about results associations built environment and health depends on a) the research questions asked, b) the international context, and c) methodology
- For research within cities, the angels are in the details.
- The ELANE study provides evidence for associations between the built environment and walking among elderly
- “Aging in place” important for public health policy