

# Examining the role of the physical environment in supporting older adults' health behavior + some additional stuff

Urban Experience 2021

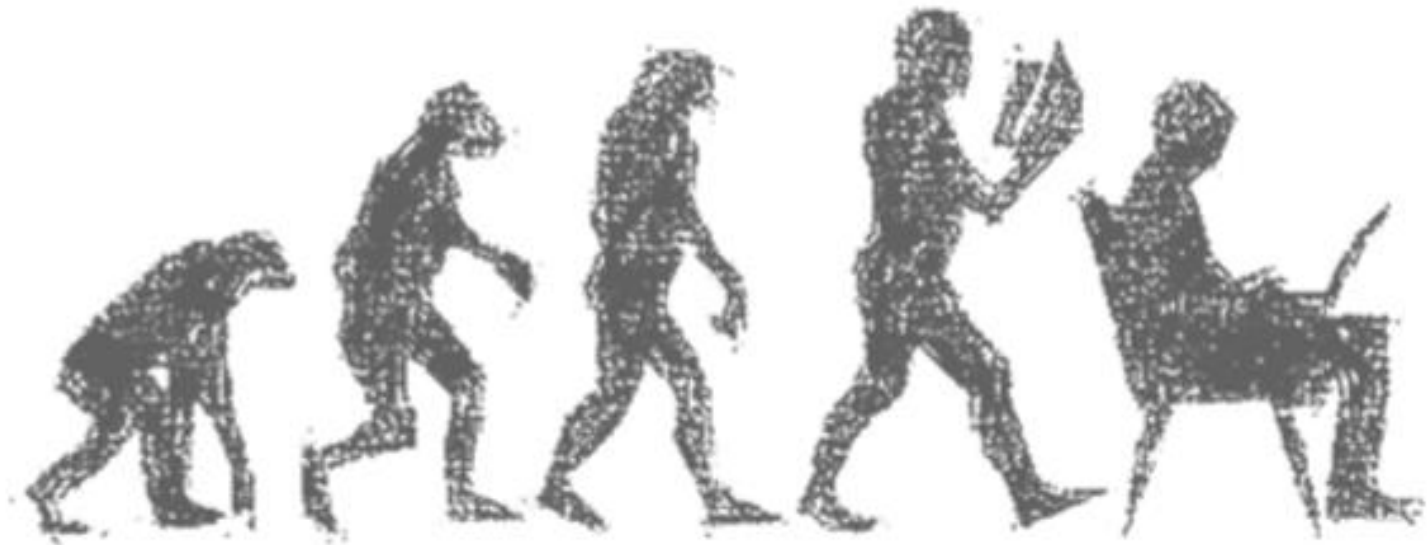
Tiina Rinne

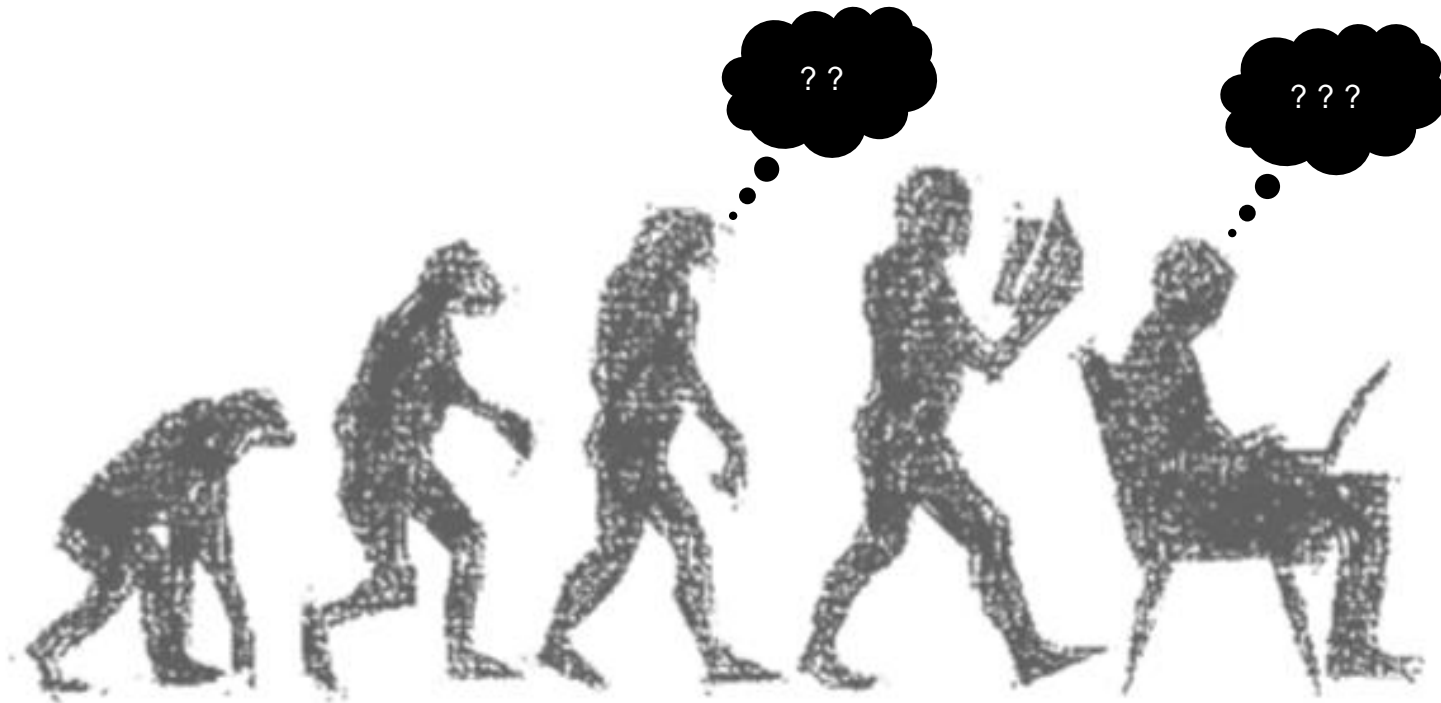
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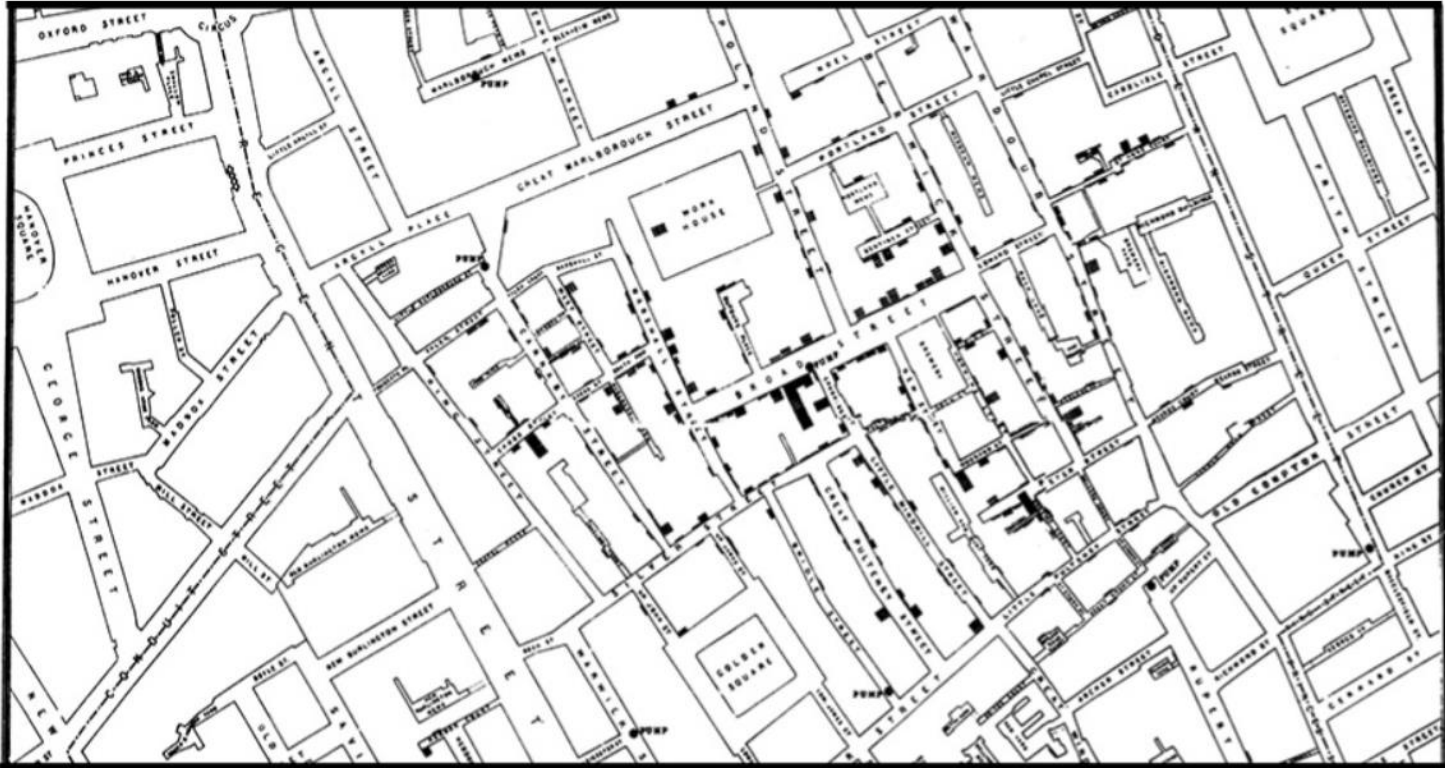


Aalto-yliopisto  
Aalto-universitetet  
Aalto University



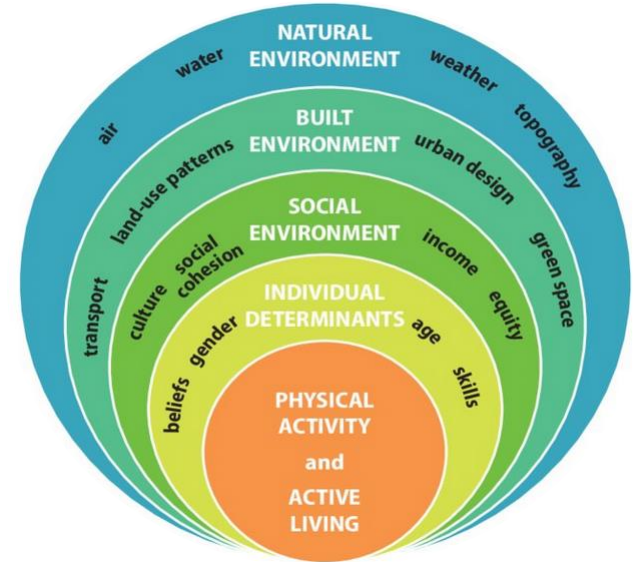
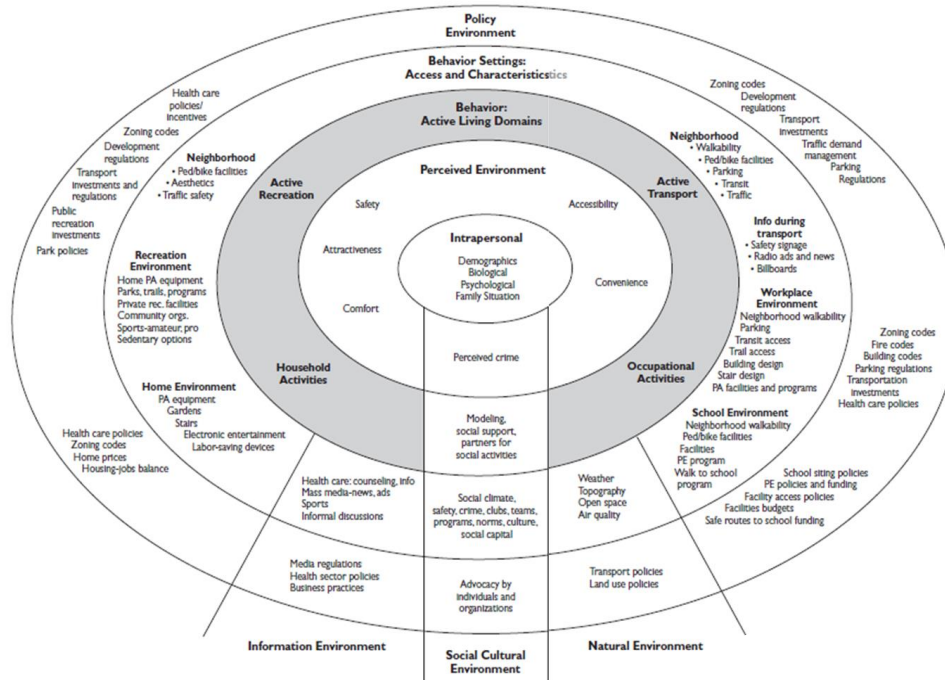






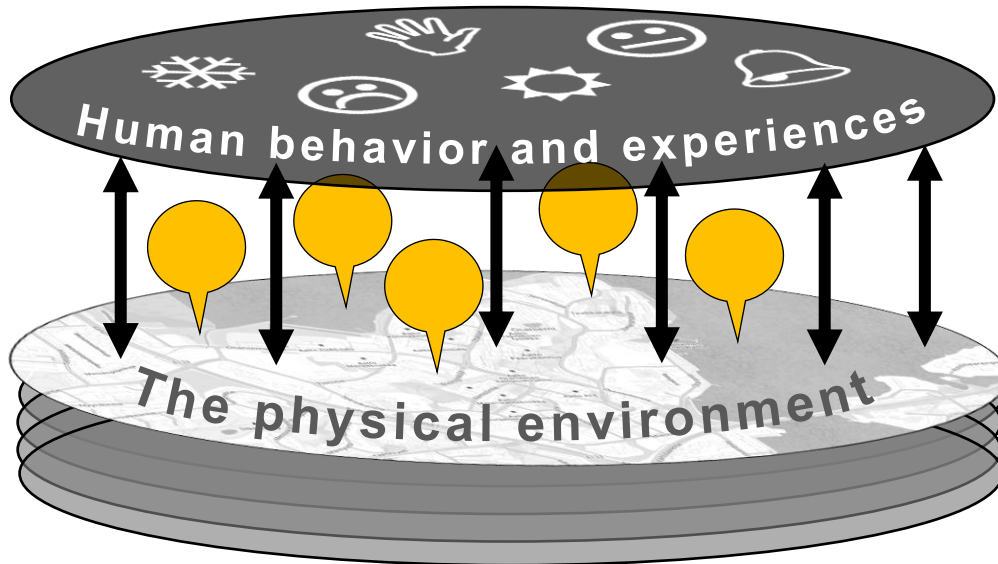
Map of cholera cases in Soho, London, 1854. Source: Wikimedia Commons.

# Ecological models of health behavior



# The localization of human experiences

The “soft” GIS



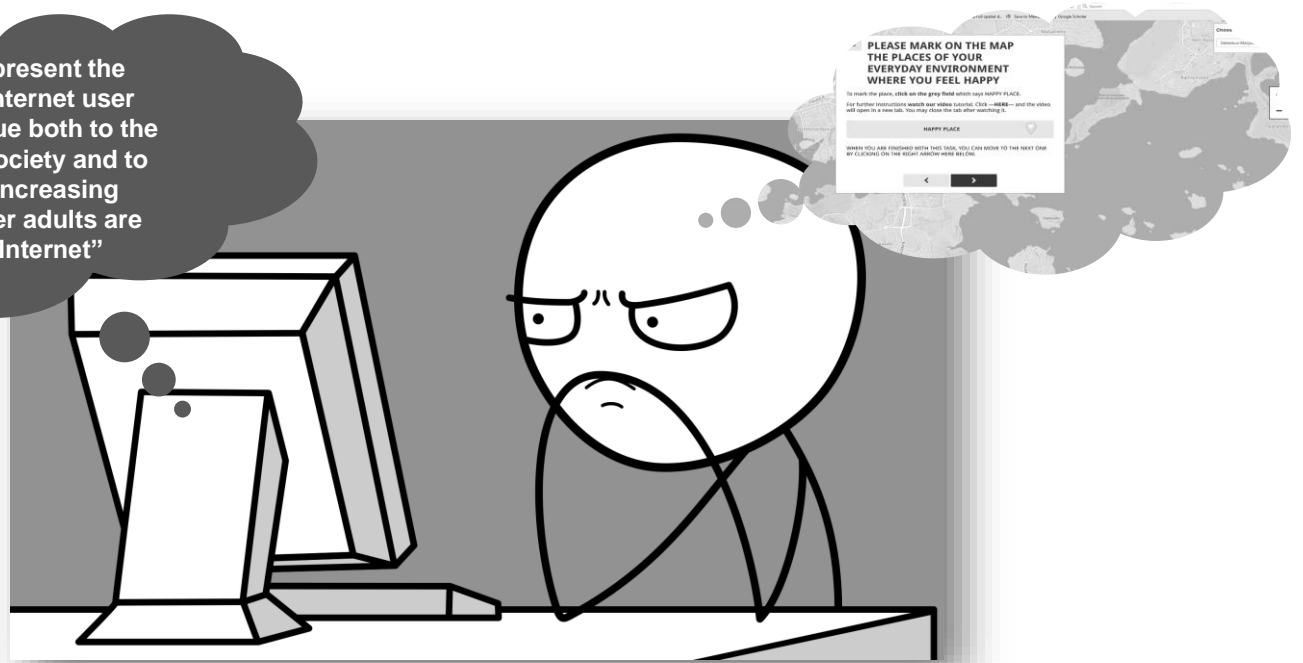
The “hard” GIS

# We all perceive varying opportunities and restrictions for different actions in a given environment



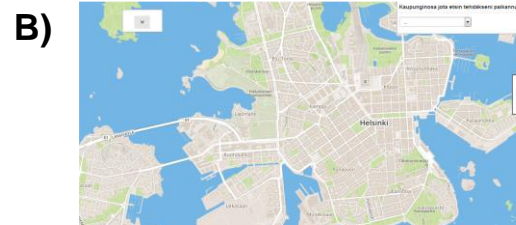
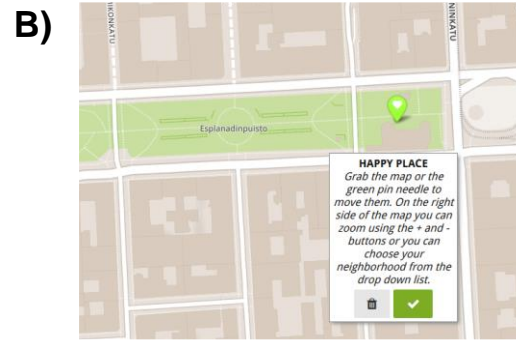
# ”But can older adults even use it?”

“Older adults represent the fastest growing Internet user age group that is due both to the ageing nature of society and to the fact that an increasing percentage of older adults are now using the Internet”

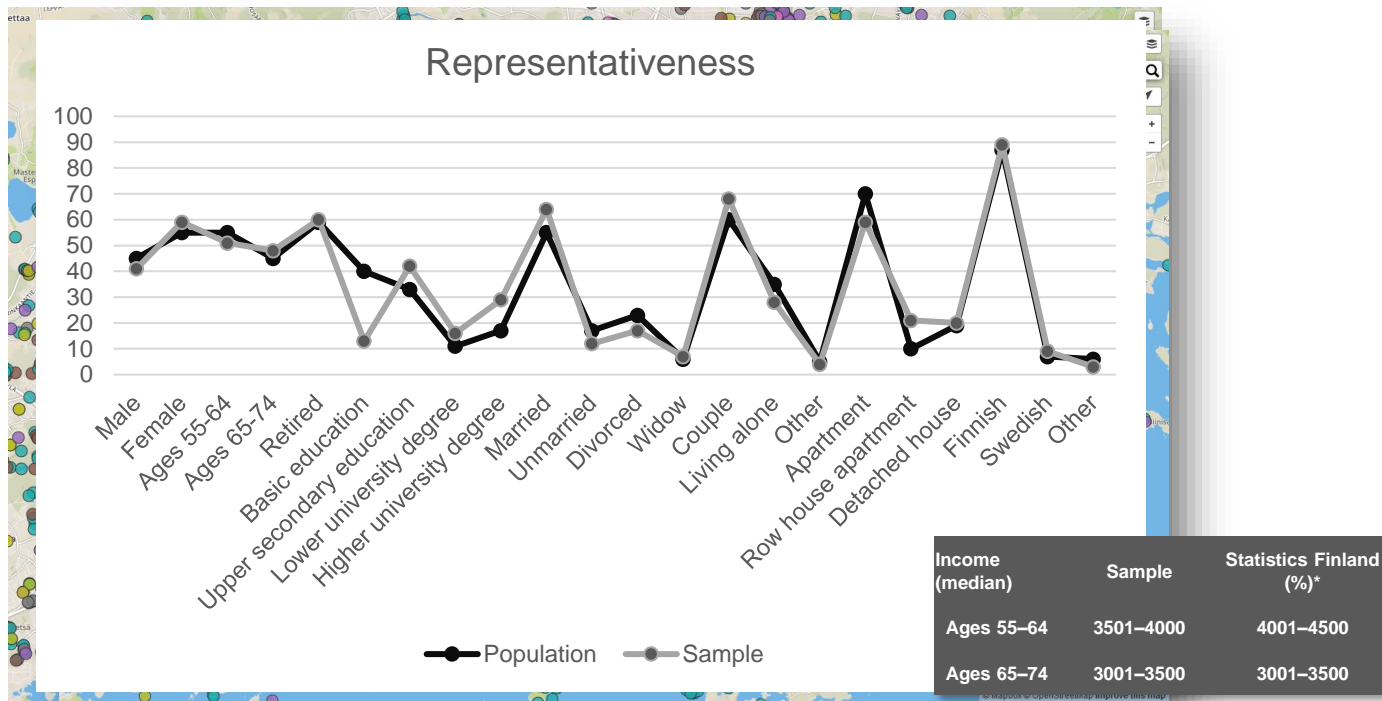




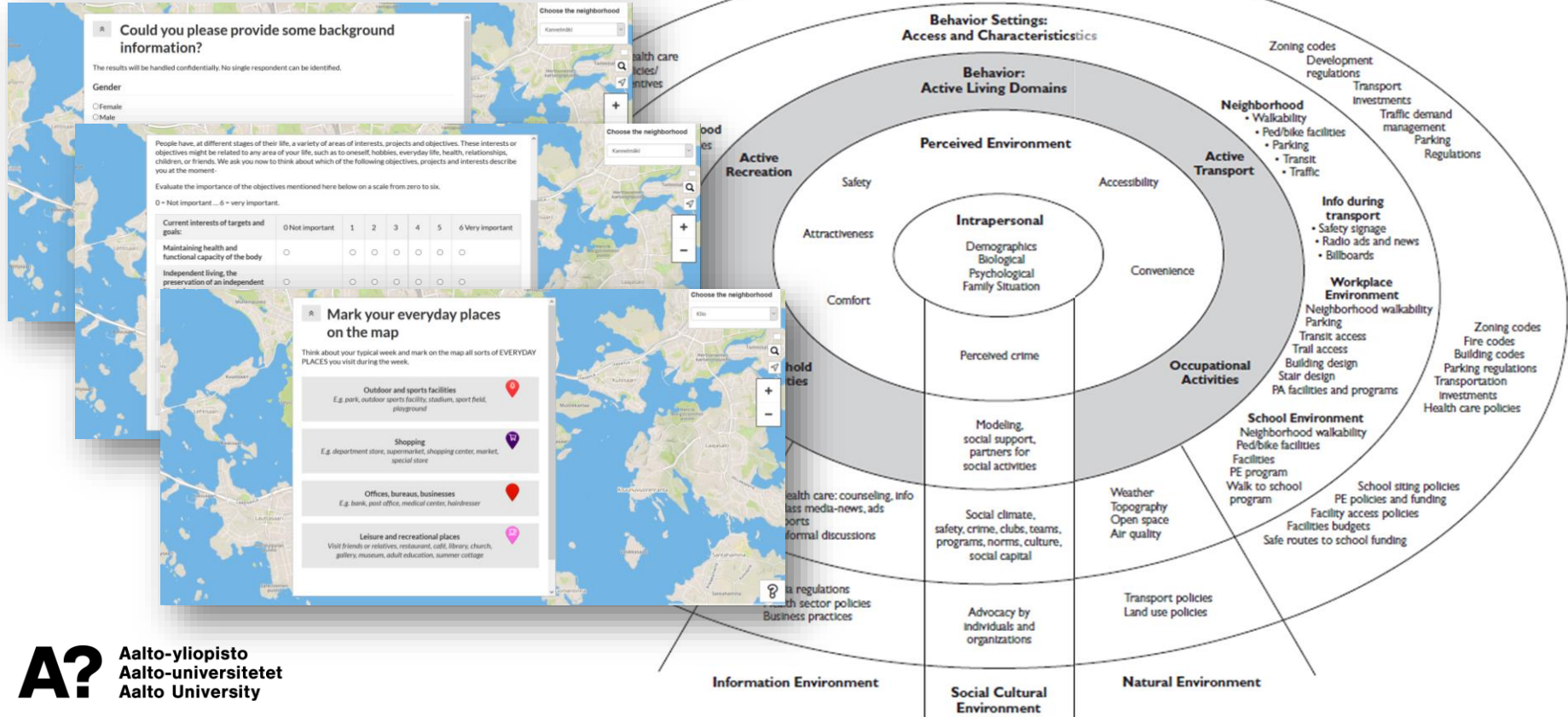
# Usability of PPGIS among older adults



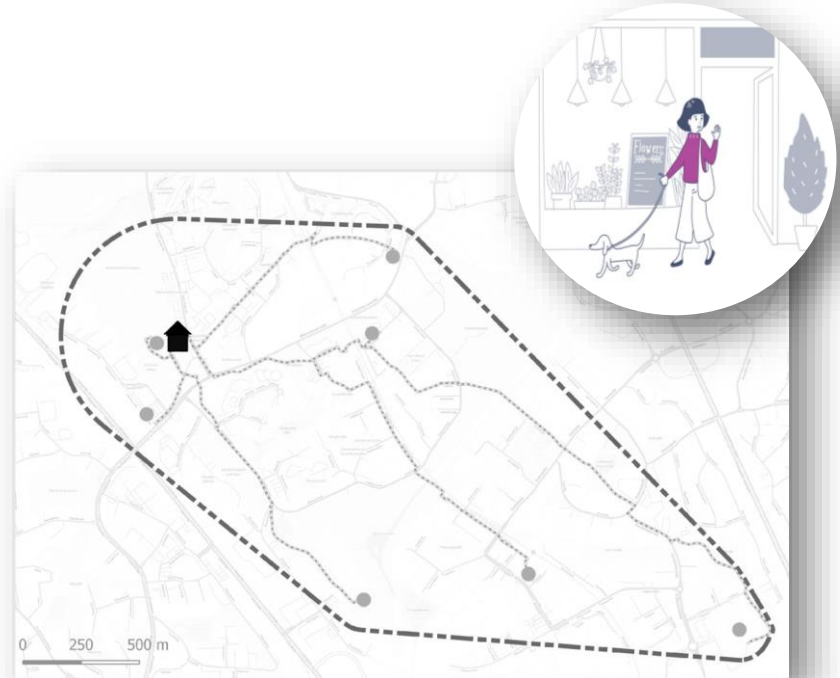
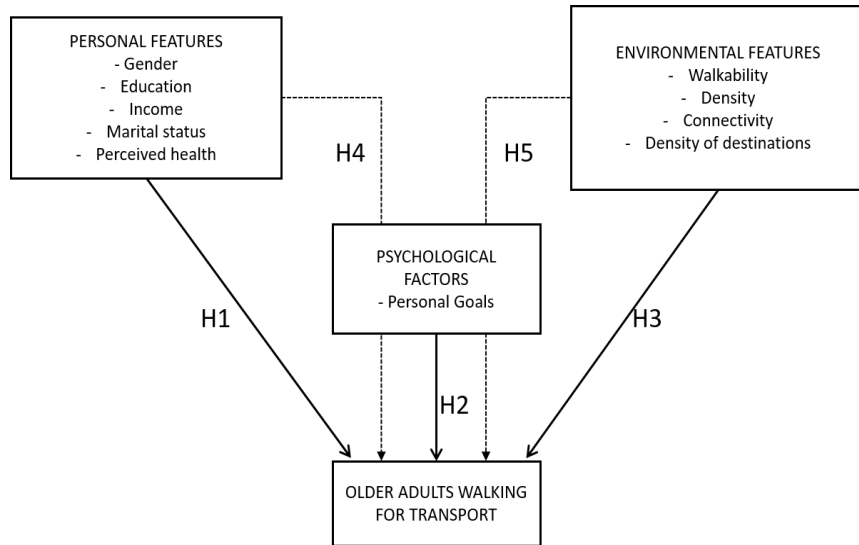
# Is it usable?



# What really moves older adults?



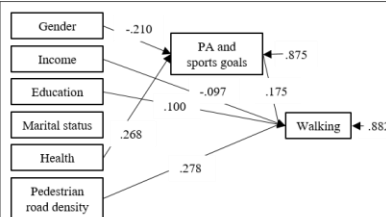
# How personal, psychological and environmental features are associated with walking behavior in older adults?



# How personal, psychological and environmental features were associated with walking behavior in older adults?

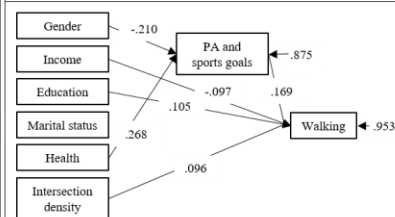
We tested separate OLS regression models for each of the five density measures and the indirect effects of personal as well as environmental variables on walking via PA and sport goal factor was examined using structural equation modeling.

**THE PEDESTRIAN AND BICYCLE ROAD DENSITY MODEL**



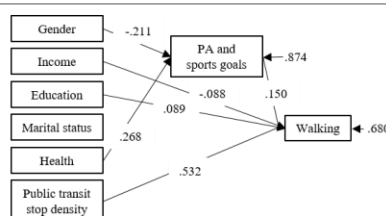
Total effect of ped. road density on walking  $\beta=0.277$ ,  $p<0.0001$ . The total indirect effect of gender on walking via goal factor  $\beta=0.037$ ,  $p<0.0001$ , and of perceived health on walking via goal factor  $\beta=0.047$ ,  $p<0.0001$

**THE INTERSECTION DENSITY MODEL**



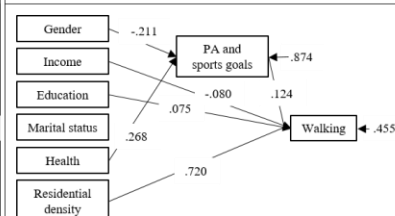
Total effect of intersection density on walking  $\beta=0.092$ ,  $p<0.05$ . The total indirect effect of gender on walking via goal factor  $\beta=0.035$ ,  $p<0.001$ , and of perceived health on walking via goal factor  $\beta=0.0475$ ,  $p<0.0001$

**THE PUBLIC TRANSIT STOP DENSITY MODEL**



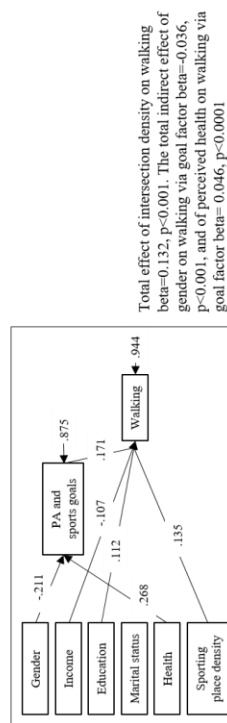
Total effect of transit stop density on walking  $\beta=0.535$ ,  $p<0.0001$ . The total indirect effect of gender on walking via goal factor  $\beta=0.032$ ,  $p<0.001$ , and of perceived health on walking via goal factor  $\beta=0.040$ ,  $p<0.0001$

**THE RESIDENTIAL DENSITY MODEL**



Total effect of intersection density on walking  $\beta=0.722$ ,  $p<0.0001$ . The total indirect effect of gender on walking via goal factor  $\beta=0.026$ ,  $p<0.001$ , and of perceived health on walking via goal factor  $\beta=0.033$ ,  $p<0.0001$

**THE SPORT PLACES DENSITY MODEL**



Total effect of intersection density on walking  $\beta=0.132$ ,  $p<0.001$ . The total indirect effect of gender on walking via goal factor  $\beta=0.036$ ,  $p<0.0001$ , and of perceived health on walking via goal factor  $\beta=0.046$ ,  $p<0.0001$

# How personal, psychological and environmental features are associated with walking?

## PERSONAL FEATURES

## ENVIRONMENTAL FEATURES

### Personal background features

#### Income

1. -0.097\* / 2. -0.097\* / 3. -0.080\* /  
4. -0.088\* / 5. -0.107\*

#### Education

1. 0.100\* / 2. 0.105\*\* / 3. 0.075\* / 4.  
0.089\* / 5. 0.112\*\*

Gender 1-5 between -0.026 and -0.037\*\*\*

Perceived health 1-5 between 0.033 and 0.0475\*\*\*

### Physical activity and sports related personal goals

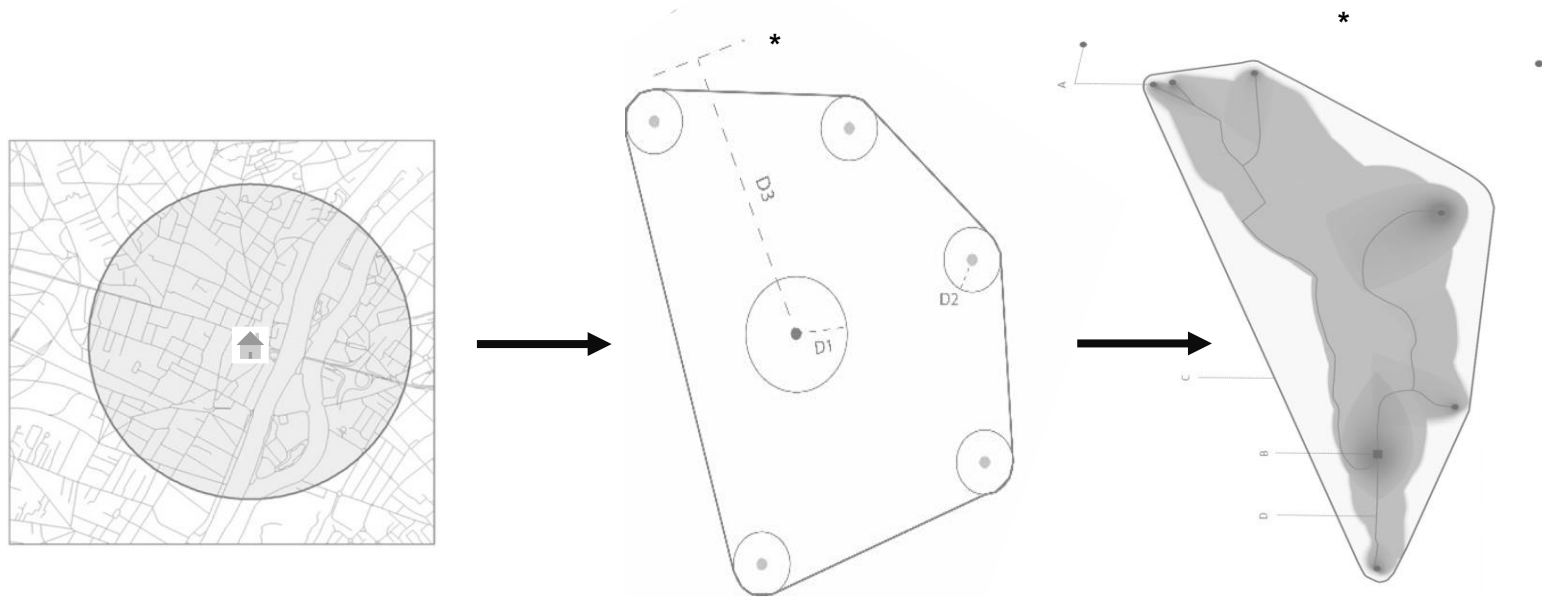
1. 0.175\*\*\* / 2. 0.169\*\*\* / 3. 0.124\*\*\* / 4. 0.150\*\*\* /  
5. 0.171\*\*\*

### Physical environment features

1. Pedestrian street density 0.278\*\*\*
2. Residential density 0.720\*\*\*
3. Public transportation stop density 0.532\*\*\*
4. Intersection density 0.092\*
5. Sport & rec. places density 0.135\*\*

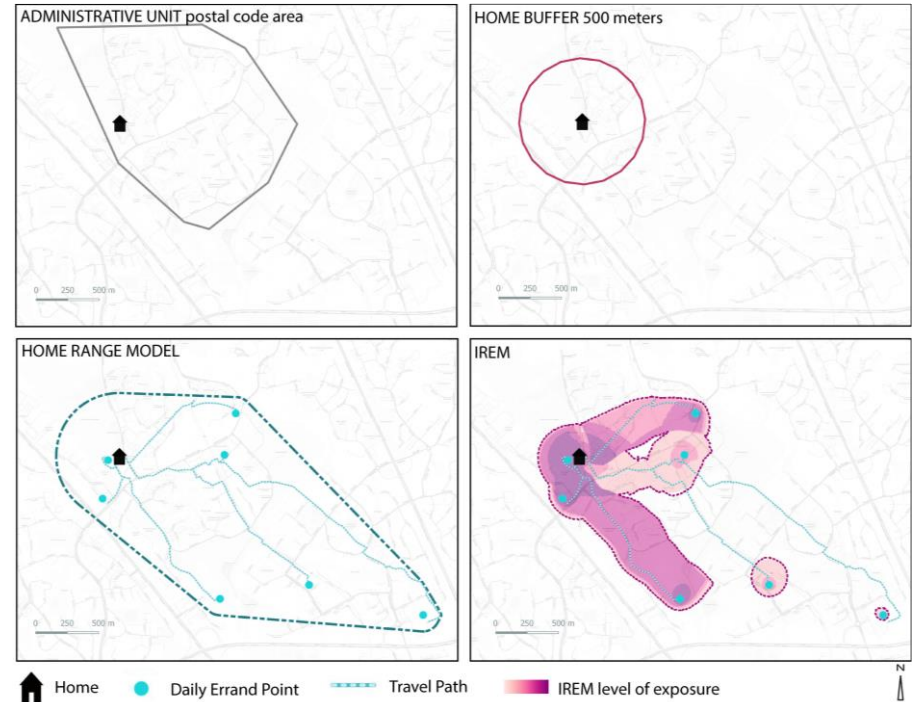
## OLDER ADULTS WALKING

# Static spatial perspective to built environment excludes the human behavior



# Capturing exposure in environmental health research

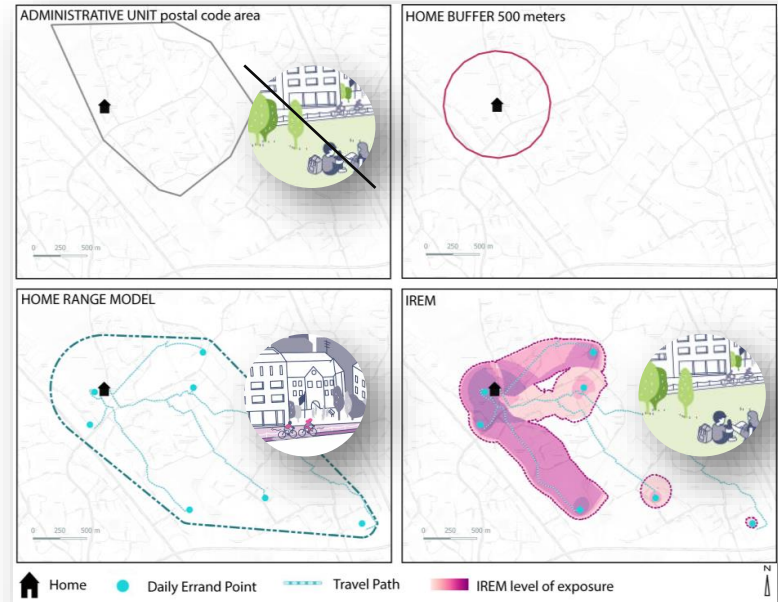
- Does different residential and activity space units of analysis yield distinct results regarding the association between the built environment and older adults' perceived health?
- What are the challenges and opportunities of the different spatial units of analysis for environmental health-related research?



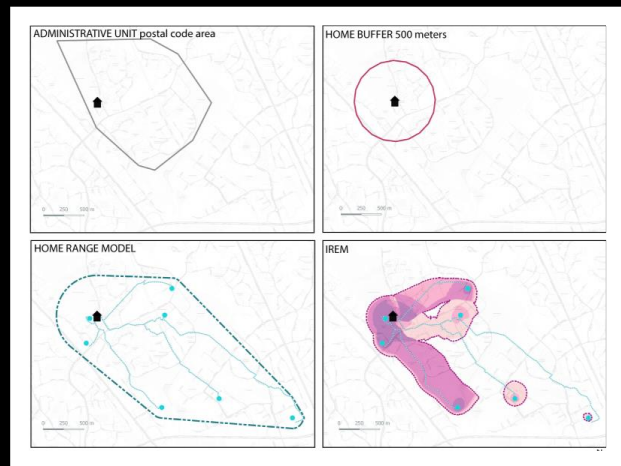


# Capturing exposure and the association between the built environment and health

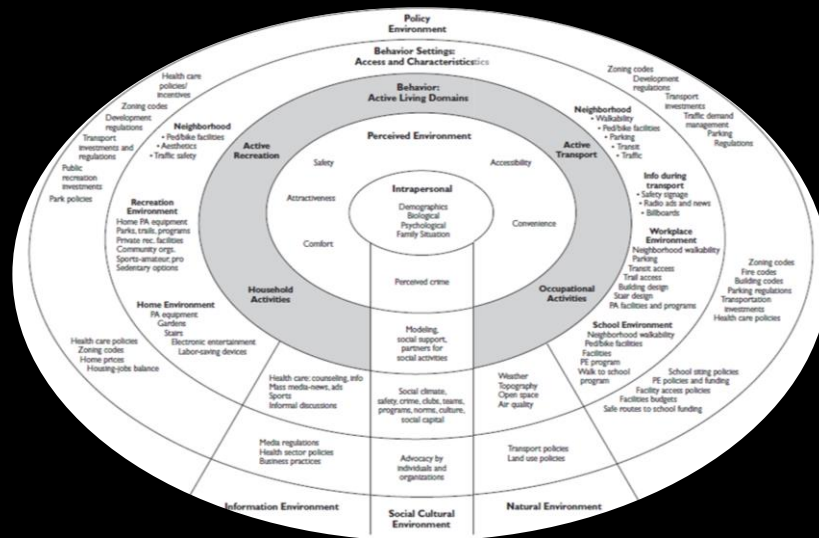
- All four models yield distinct results: different models result in considerably different measurements of built environment
- Different spatial units seem to considerably affect the associations between environment characteristics and wellbeing measures



# How are the conceptual and methodological aspects of capturing the spatial context taken into account in physical activity research?

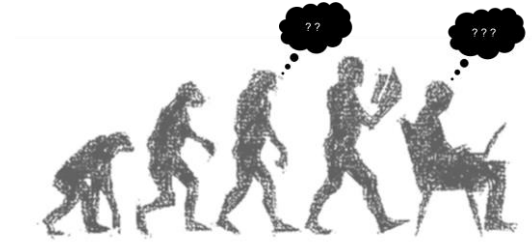


# How about different dimensions of the ecological models?



# Capturing the spatial context

Subjective approach	Perceived Neighborhood	276	67 %
Objective approach	Administrative Unit	118	29 %
	Single point location	11	3 %
	Single point buffered	40	10 %
	Multiple points	22	5 %
	Multiple point buffered	8	2 %
	Activity Space approach	10	2 %



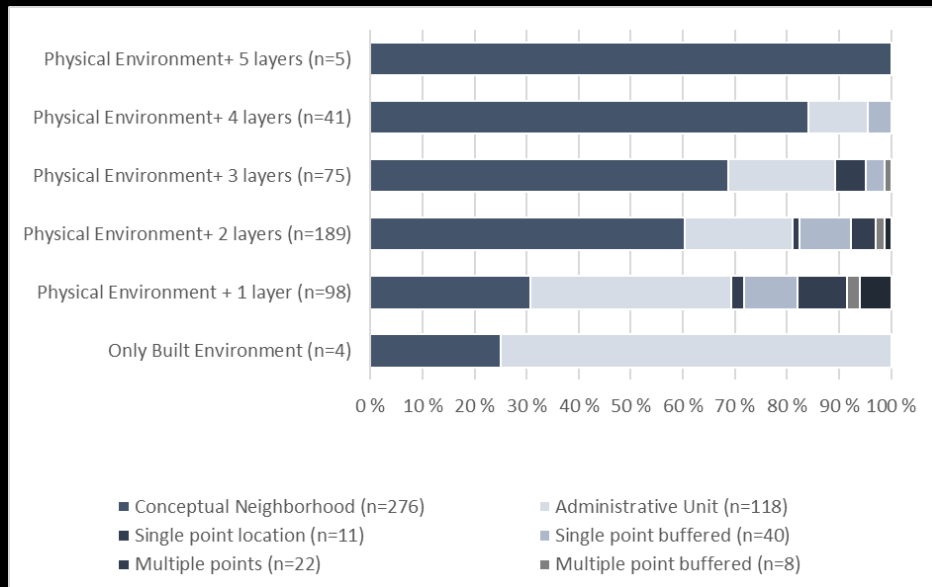
# Capturing different layers

## Which layers?

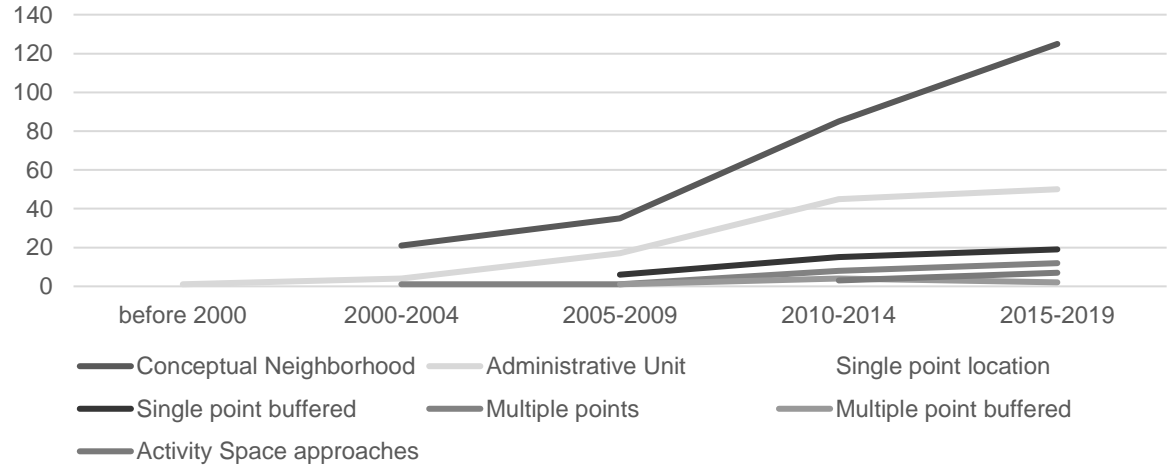
Only Physical Environment	4	1 %
<b>Physical Environment + 1 layer</b>	<b>98</b>	<b>24 %</b>
<b>Physical Environment+ 2 layers</b>	<b>189</b>	<b>46 %</b>
Physical Environment+ 3 layers	75	18 %
Physical Environment+ 4 layers	41	10 %
Physical Environment+ 5 layers	5	1 %

Physical Environment + 1 layer (n=98)	Intrapersonal	Socio-Cultural	Nature	Information	
	92	3	2	1	
	94 %	3 %	2 %	1 %	
Physical Environment+ 2 layers (n=189)	<b>Intrapersonal + Socio-Cultural</b>	Intrapersonal + Nature	Intrapersonal + Information	Intrapersonal + Policy	Socio-Cultural + Policy
	<b>172</b>	8	3	5	1
	<b>91 %</b>	4 %	2 %	3 %	1 %
Physical Environment+ 3 layers (n=75)	<b>Intrapersonal + Socio-Cultural + Nature</b>	Intrapersonal + Socio-Cultural + Information	<b>Intrapersonal + Socio-Cultural + Policy</b>	Intrapersonal + Information + Policy	Socio-Cultural + Information + Policy
	<b>36</b>	8	<b>25</b>	2	4
	<b>48 %</b>	11 %	<b>33 %</b>	3 %	5 %
Physical Environment+ 4 layers (n=41)	Intrapersonal + Socio-Cultural + Nature + Information	Intrapersonal + Socio-Cultural + Nature + Policy	<b>Intrapersonal + Socio-Cultural + Information + Policy</b>	Socio-Cultural + Nature + Information + Policy	
	7	14	<b>19</b>	1	
	17 %	34 %	<b>46 %</b>	2 %	

# Capturing the spatial context with different layers applied



# Periodic distribution



I would argue that we are still far from understanding the multiple level effects on human health behavior as suggested by the ecological models.

A throughout methodological and theoretical update is needed.

