

A built environment natural experiment: Exploring the influence of changes to the built environment on walking behavior within a university campus

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Host supervisor: Dr. Nicolas Oreskovic

Dr. Wendy Guan



Outline

- Background
 - Built environment and walking behavior
- My PhD thesis
 - Research questions, experimental design and preliminary studies
- Working here...
 - Changes analysis, statistical analysis consulting, a manuscript

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Why study walking?

- Studies in urban planning
 - By shaping the built environment, planners aim to encourage walking while reducing motorized movement
 - Planning reform movements: New urbanism, smart growth, transit-oriented development (Handy 2005, Ewing, Meakins et al. 2011), “Pedestrian-oriented” neighborhood (Cervero and Kockelman 1997).
- Studies in public health
 - An important form of moderate-intensity physical activity
 - A practical health improvement method for general public (Owen, Humpel et al. 2004)

Built environment and walking behavior

- **Built environment**
 - Land use pattern, transportation, urban design (Handy 2005; Saelens and Handy 2008)
 - It provides spatial, temporal and social contexts for human behavior.
- **Walking behavior** (Saelens, Sallis et al. 2003)
 - Walking for transport: a modal choice
 - Walking for leisure
- **The title**
 - *For public health:* A built environment natural experiment: Exploring the influence of changes to the built environment on walking behavior within a university campus.
 - *For urban planning:* Evaluating the impact of land-use and transportation: How changes in the built environment affect walking behavior in Hong Kong.
 - *For GIS:* Using GIS to explore the influence of changes to the built environment on walking behavior within a university campus in Hong Kong.

Outline

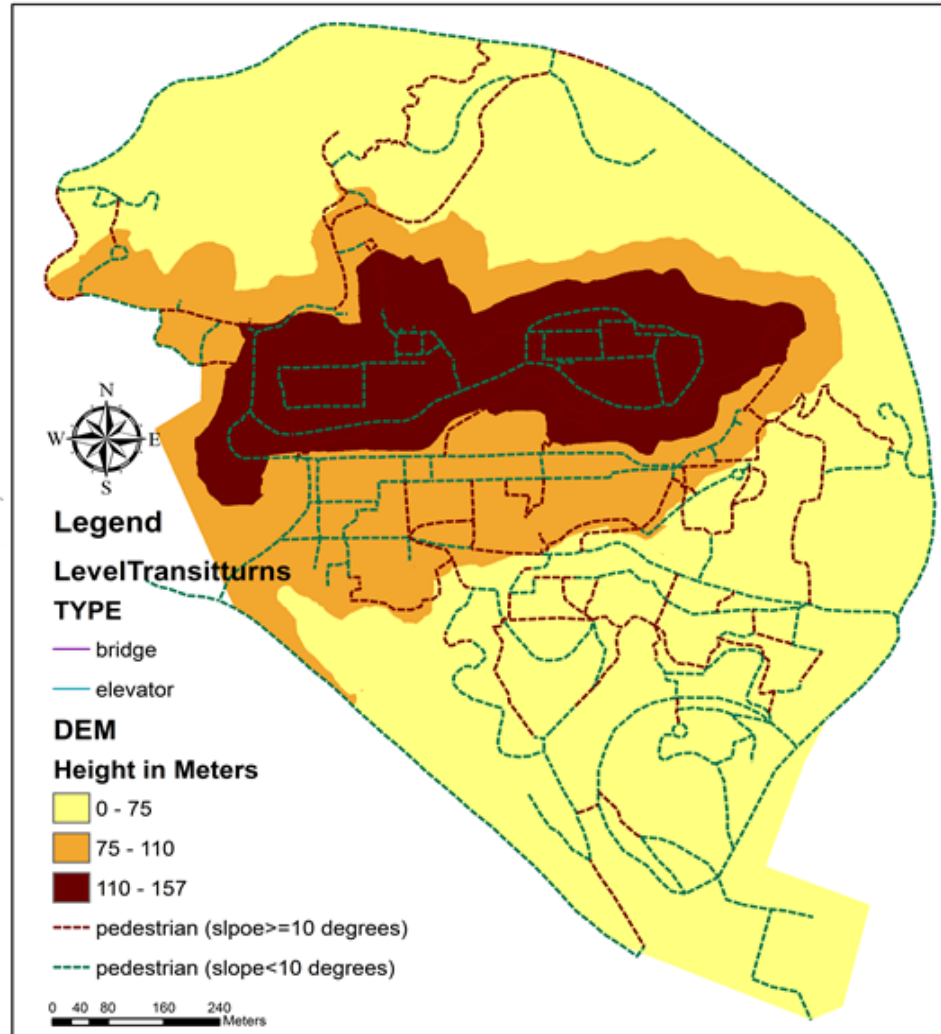
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Research questions

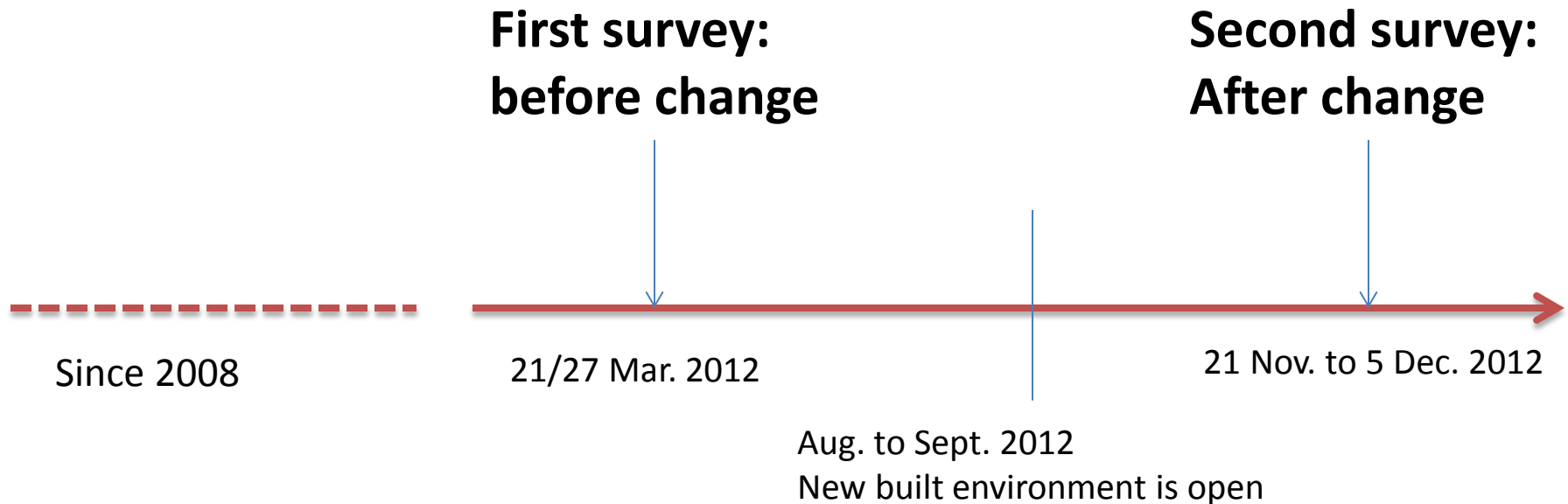
- Will changes to built environment lead to changes to walking behavior?
 - How to measure the changes to walking behavior?
 - Walking diary and GPS
 - How to measure the changes to built environment?
 - GIS and questionnaire in theory of planned behavior

Research questions
 experimental design
 preliminary studies

A natural experiment

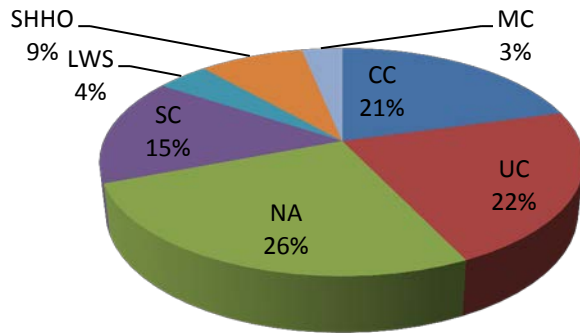


Timeline of experiment

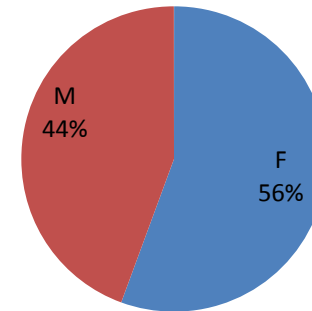
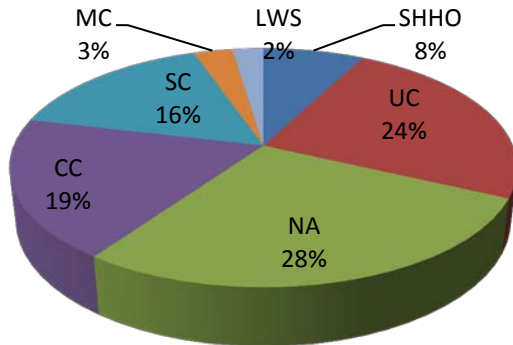
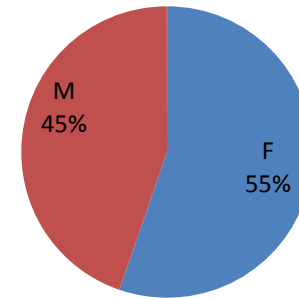


198/169 respondents

College distribution



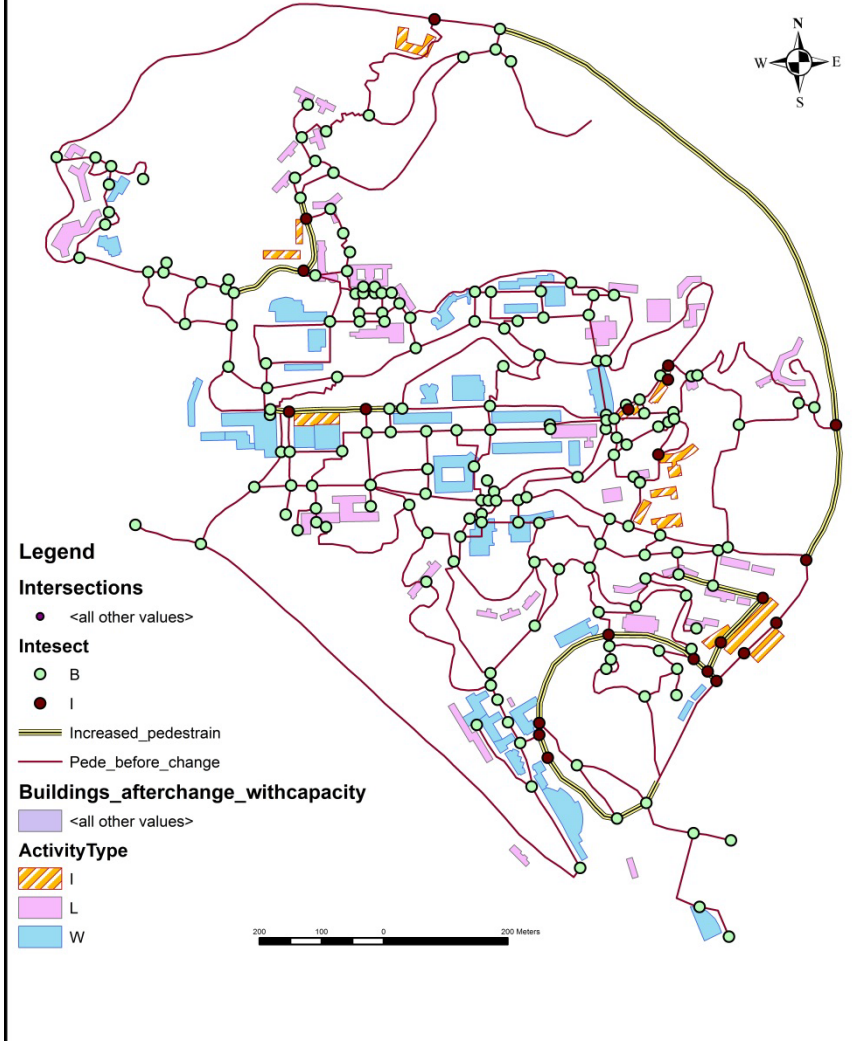
Gender distribution



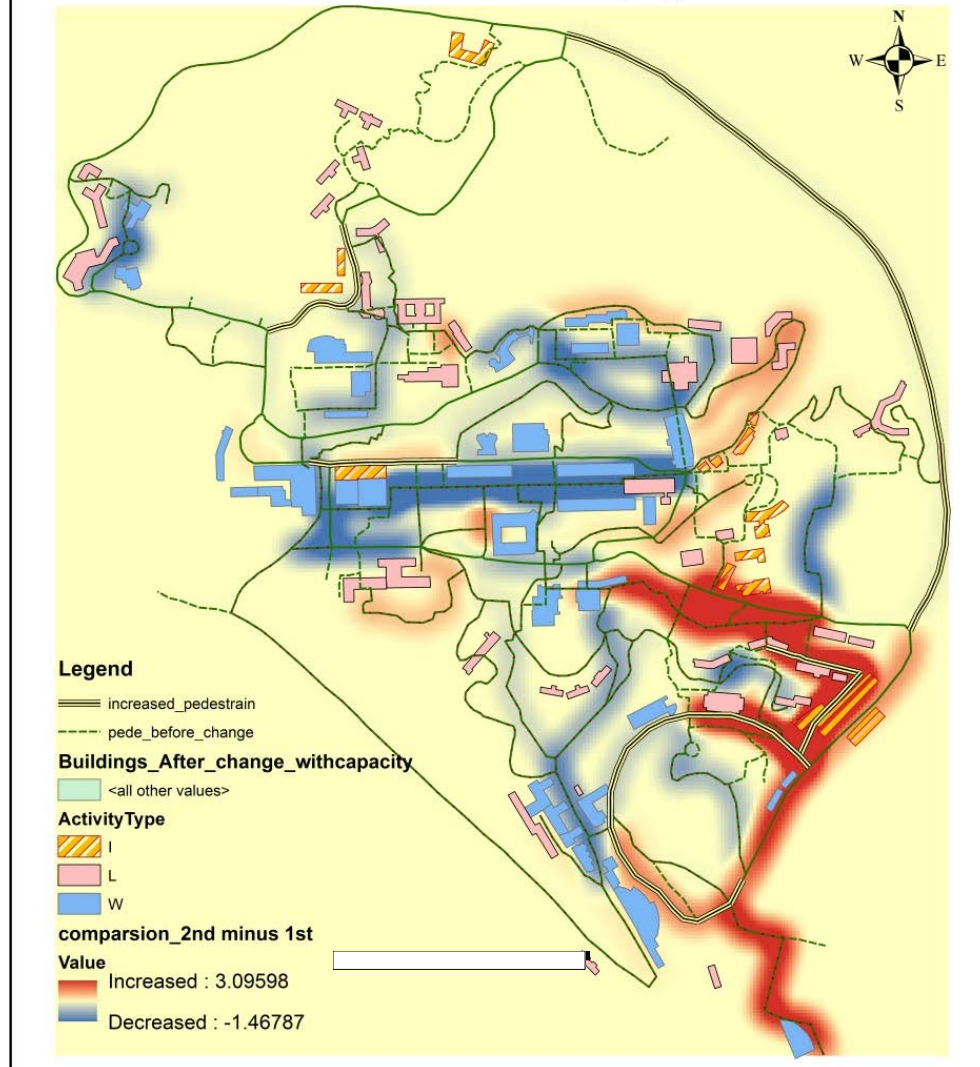
	reply volunteer recruitment	Respondents
First-wave	246	198
Second-wave	198	169

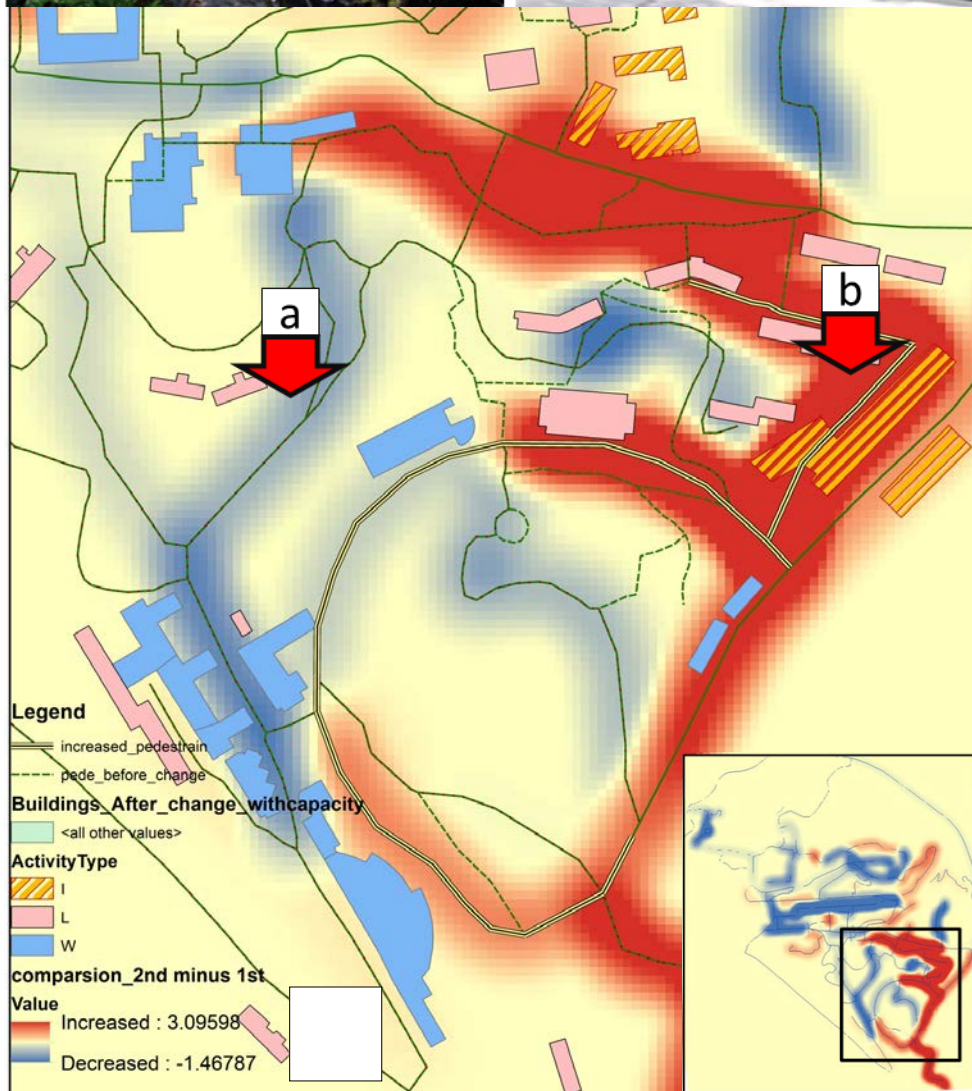
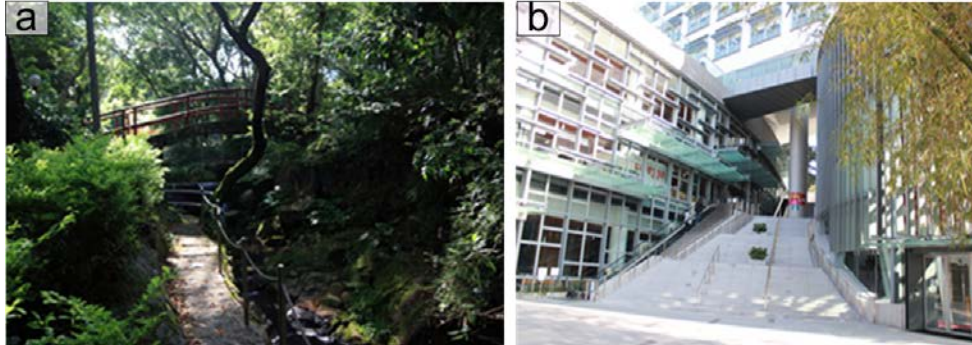
Changes analysis

Increased intersections of pedestrian network

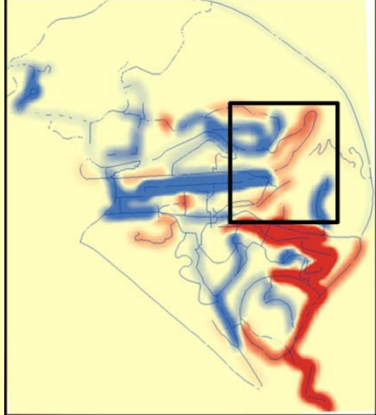


Comparison of density change to pedestrian network utilization (1st as referent category)





The increased using of escalator near YIA, and the decrease of traditional path (maybe induced by the hilly topography)

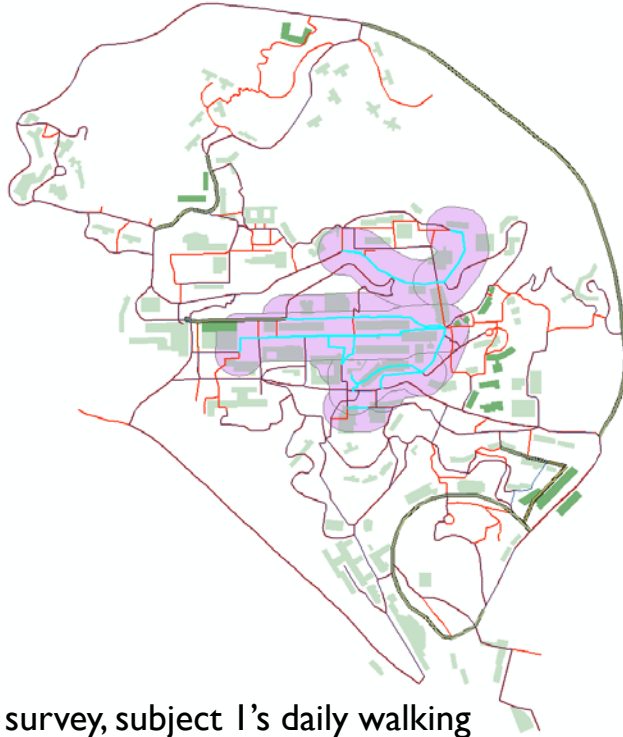


The increased using of New Asia pedestrian (maybe induced by the decrease of New Asia bus timetable)

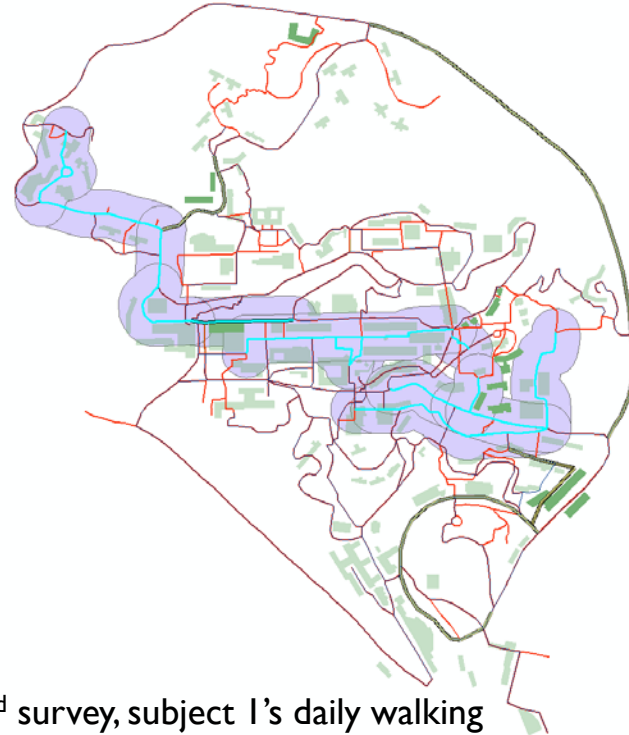


The decreased using of road in the central campus (maybe induced by change of classroom)

Walking exposed to built environment: by walking diary



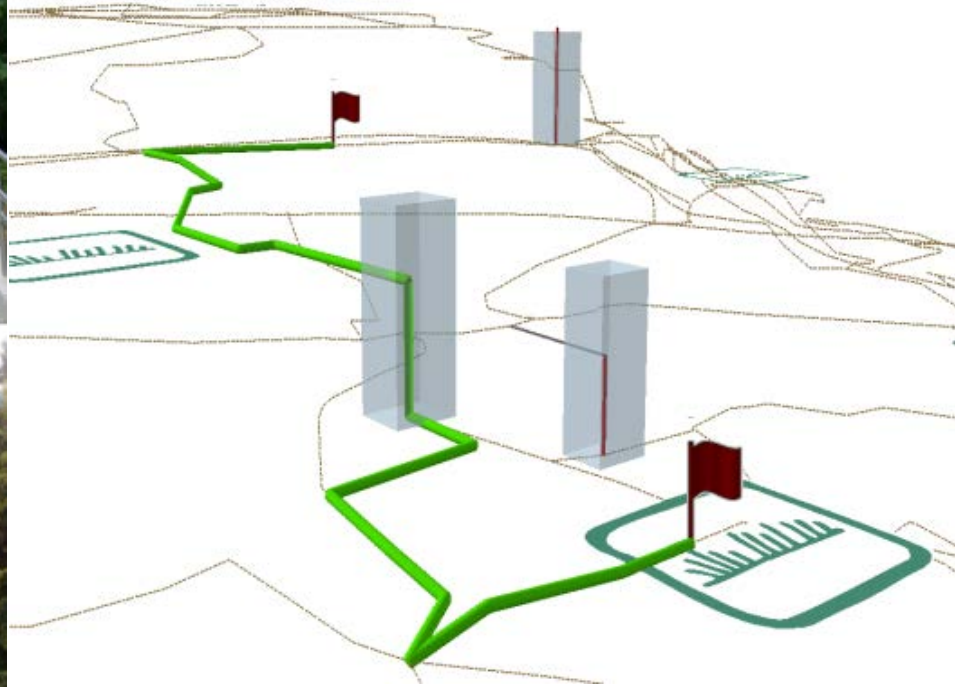
1st survey, subject 1's daily walking



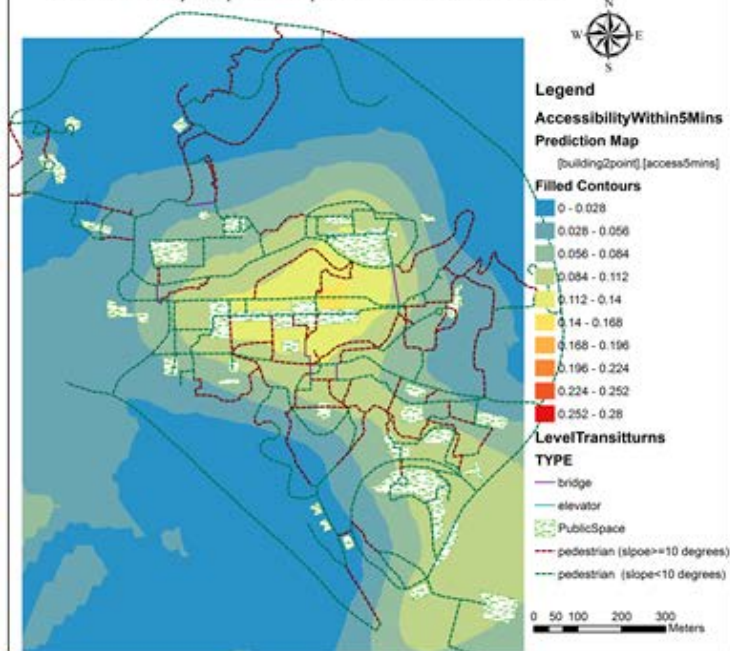
2nd survey, subject 1's daily walking

Independent variables:	Dependent variables:
Exposed to buildings	D_walkingratio
ED_workcapacityU	D_walkingdistance
ED_workcapacityM	D_altituderange
ED_workcapacityL	
ED_lifecapacityU	
ED_lifecapacityM	
ED_lifecapacityL	
Exposed to pedestrian network	
ED_pedeintersct	
Exposed to bus stations	
ED_busregular	
ED_busmiddleclass	
Exposed to population density	
ED_popdensity	

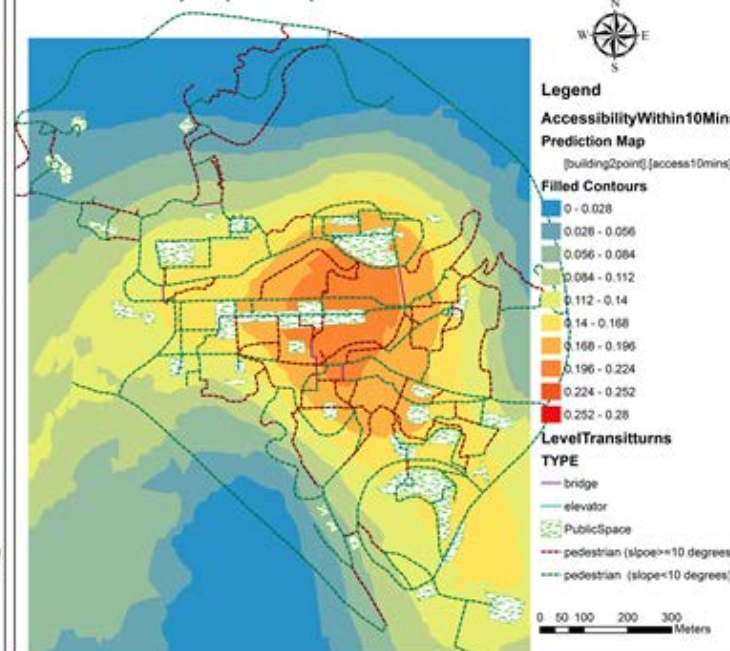
Accessibility in hilly environment



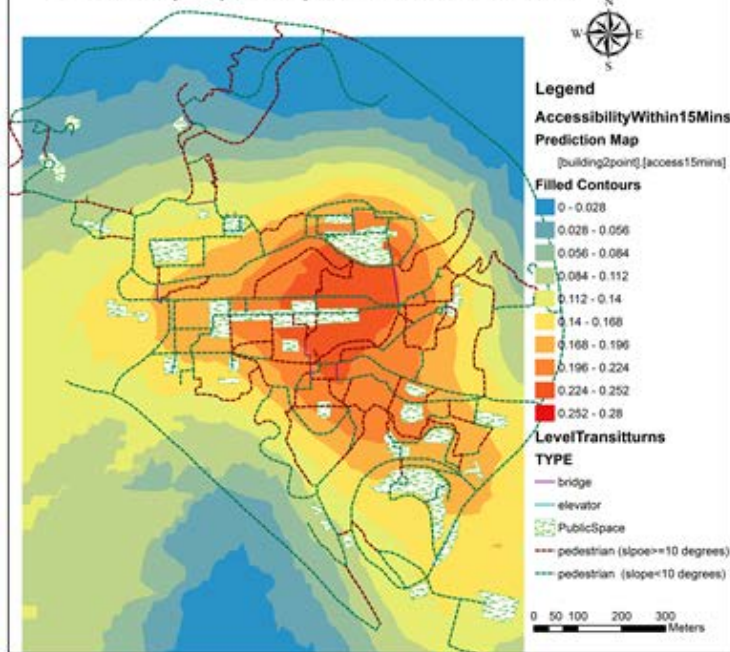
Accessibility to public spaces within 5 Minutes



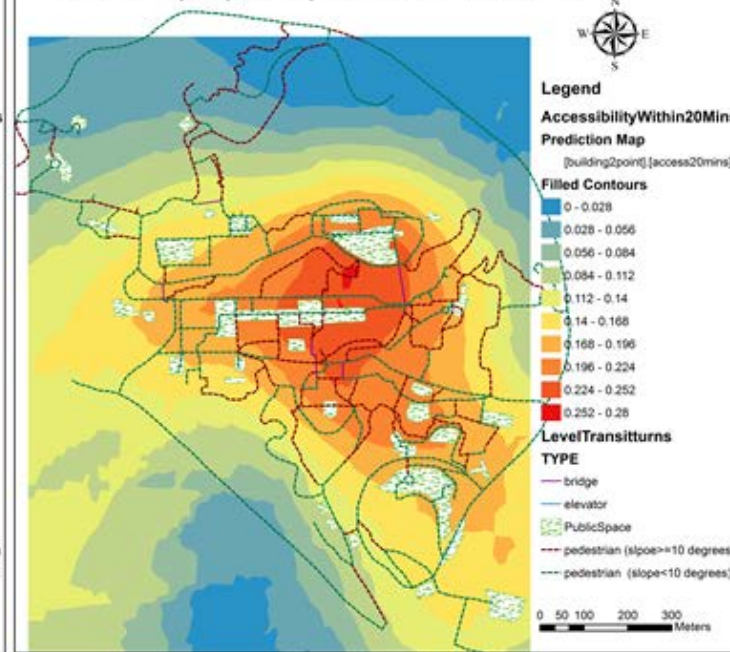
Accessibility to public spaces within 10 Minutes



Accessibility to public spaces within 15 Minutes



Accessibility to public spaces within 20 Minutes

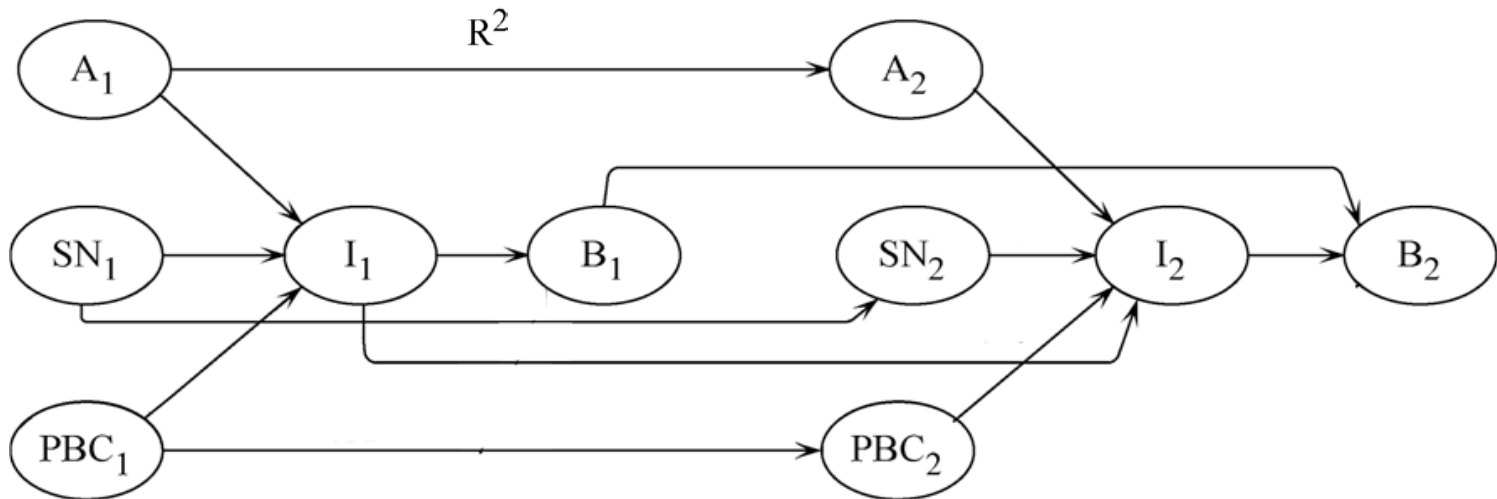


$$A_i = \frac{\sum_{j=1}^{29} (Public_Space_j * e^{-\beta * Walking_Time_{ij}})}{\sum_{j=1}^{29} Public_Space_j}$$

(Guibo SUN, Hui LIN, Rongrong LI 2012)

Statistical analysis

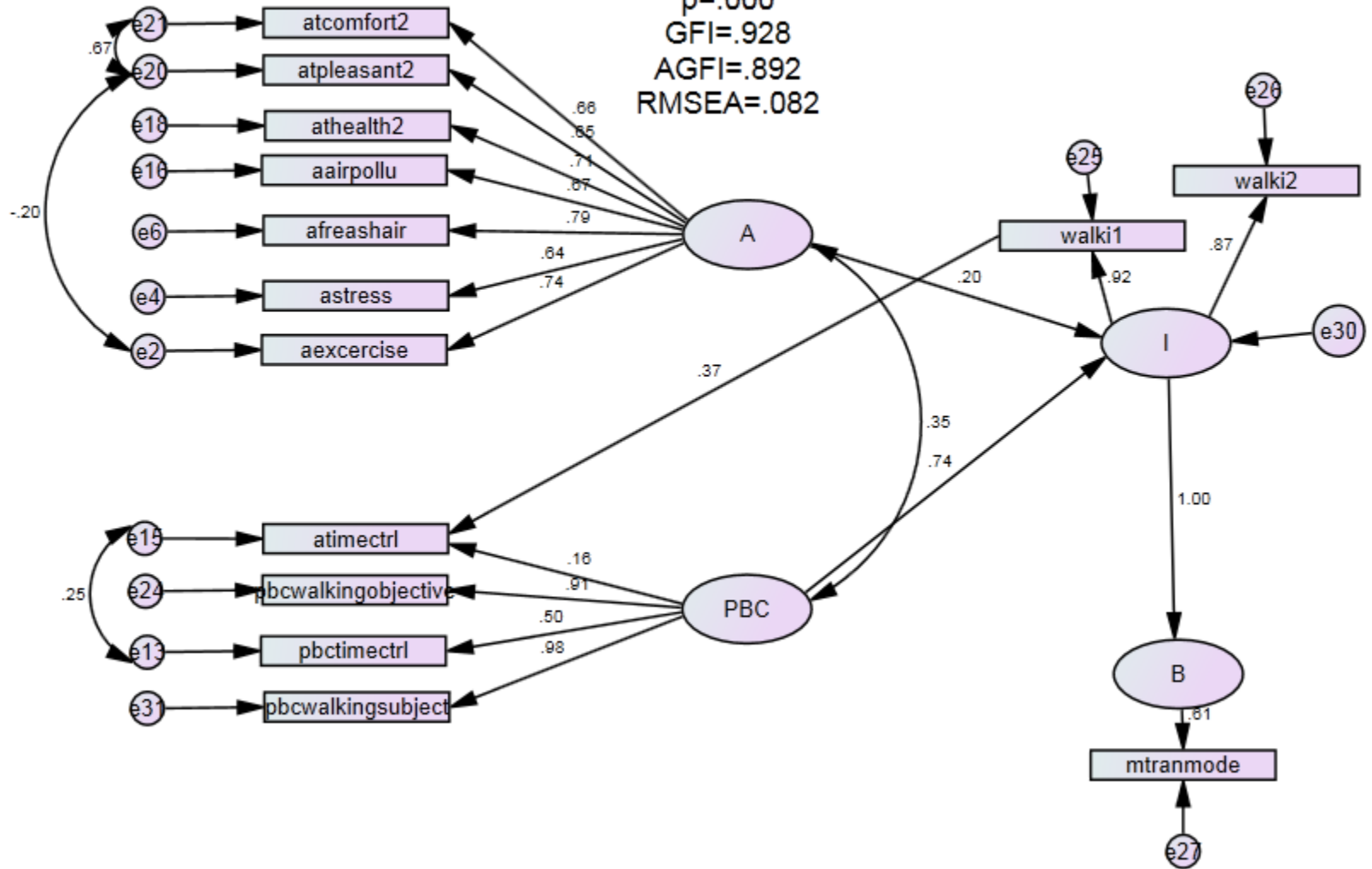
- Two waves of survey



Walking behavior (or bus riding behavior): Structural Equation Model with standardized path coefficients and explained variance in intentions and behavior. The subscripts 1 and 2 refer to Wave 1 and Wave 2, respectively.

A = attitude toward the behavior; SN = subjective norm;
PBC = perceived behavioral control; I = intention; B = behavior.

Chi square=336.336
 df=70
 p=.000
 GFI=.928
 AGFI=.892
 RMSEA=.082



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Working here...

- Changes analysis: A built environment natural experiment
- Statistical analysis consulting
- Prepare a manuscript for submission

Thanks!

Questions and comments are welcome!

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