CASA0001 - Urban Systems Theory

Prof Adam Dennett, Dr Esra Suel

Neighbourhood Effects

Neighbourhood effects research
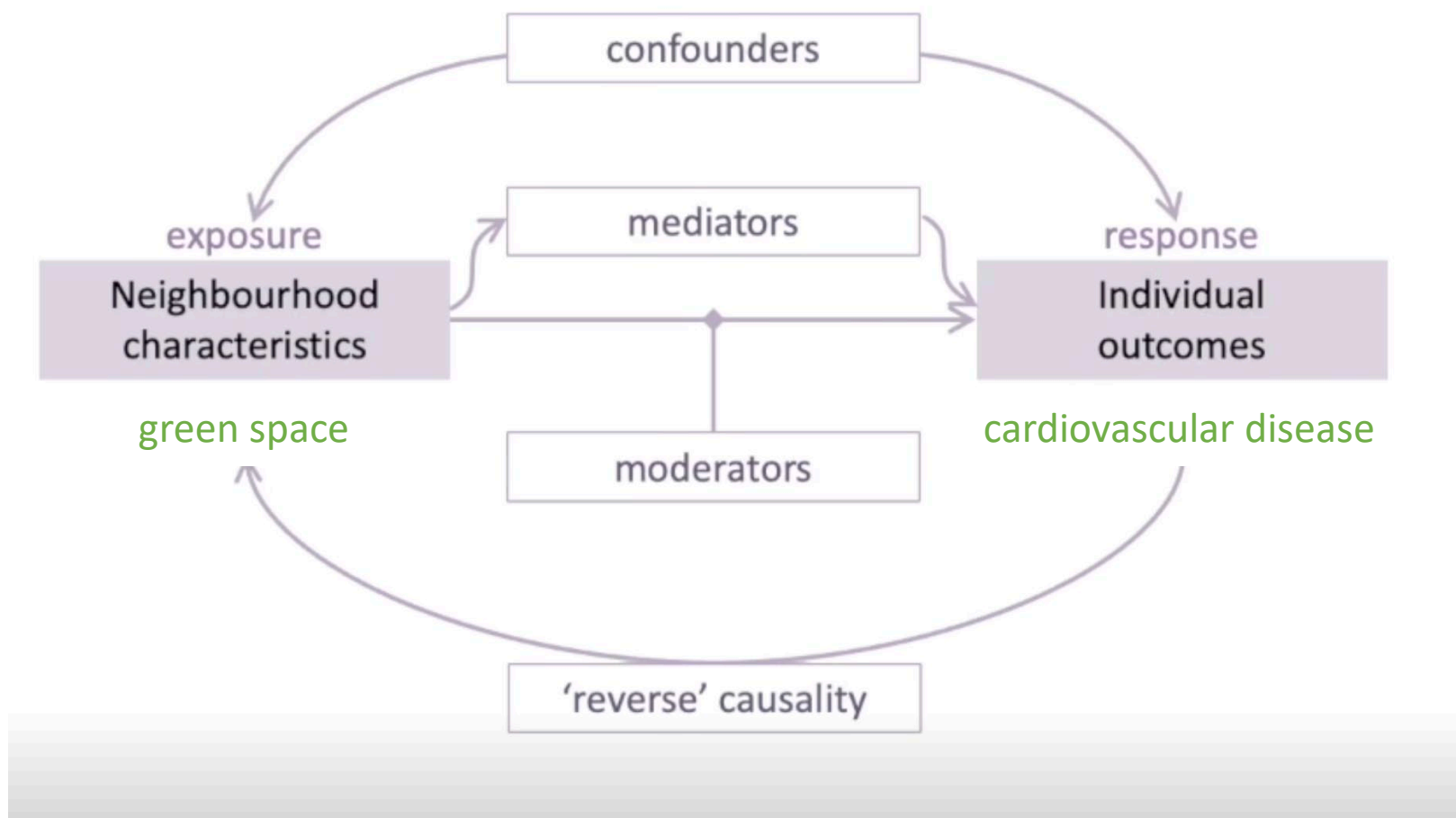
Read *either* of the two papers (A or B) and answer the questions below.

- **Paper A**: Yee, J. & Dennett, A. (2022) Stratifying and predicting patterns of neighbourhood change and gentrification: An urban analytics approach. Transactions of the Institute of British Geographers, 47, 770– 790. Available from: https://doi.org/10.1111/tran.12522

– or –

- **Paper B**: Suel, E., Polak, J.W., Bennett, J.E. et al. Measuring social, environmental and health inequalities using deep learning and street imagery. Sci Rep 9, 6229 (2019). https://doi.org/10.1038/s41598-019-42036-w

1. Describe the epistemological orientation of the author(s)? What aspects of the study can you associate with specific epistemological paradigms?

2. How do the authors attempt to study neighbourhoods and their characteristics in their study? You should refer to both:

   - the overall research design

   - specific methods used

3. Given your answers above, reflect on the strengths and limitations of the study. What spatial and social processes are considered or not considered?

4. Do you think the authors achieve their research objective? What additional work may be done to contribute to the research field of this study?

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(15-20 minutes to read, 5-10 minutes of pair discussion)

Kandt, J., Chang, S.S., Yip, P. & Burdett, R. (2017). The spatial pattern of premature mortality in Hong Kong: How does it relate to public housing? Urban Studies 54(5), 1211–1234. Available from: https://doi-org.libproxy.ucl.ac.uk/10.1177/0042098015620341

Moodle -> Material -> Workshop Slides -> Kandt_et_al_2017.pdf

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15 - 20 minutes to read and try to answer the questions

- For the first read – try to get an overview

- Maybe not spend so much time with the details of methods

    It's ok not to know how Bayesian spatial structural model works.

- You should be able to answer the first two questions if you read until the 'Results' section.

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Context and research topic

General topic: urban density, urban amenities and land-use shaping health and health inequalities. Focus on public housing.

How very dense and compact form affects people's health and wellbeing? How very dense urban form is differentially experienced by residents?

Context: Hong Kong is one of the densest cities in the world, and also one of the healthiest cities judging by the 'life expectancy' metric. How about urban disparities?

Research Design

Specific aim

case of Hong Kong by comparing the spatial pattern of health disadvantage – measured by premature mortality risk (PMR) – to the spatial distribution of public housing in the city. The aim of the study is to investigate whether in Hong Kong's unique context of housing provision and land shortage, neighbourhoods with high levels of social housing coincide with reduced or increased levels of PMR, once area deprivation, access to services and aspects of the built environment and housing instability have been taken into account.

Literature review and research gaps

- Public housing and health, empirical evidence from previous studies: What did previous work say about the relationship: modifiers, mediators, confounders, reverse causality

- Identifies the gap to address:
  - focus on Hong Kong with its unique characteristics (e.g., land-use, housing policy, role of social housing)
  - Health effects of public housing schemes were not investigated
  - Hypothesis: public housing contributes to better health and well-being (if this factor can be isolated from correlating aspects)

Data and methods

Mortality data: Pre-mature mortality rate by at the level of statistical neighbourhoods.

- Standardized by age and sex
- Type I: communicable diseases (e.g., Hepatitis A, B & C, influenza, Covid-19)
- Type II: non-communicable diseases (e.g., heart disease, stroke, cancer)
- Type III: injuries
- Area based mortality risk is calculated using individual level records

Unit of analysis: statistical units

Data and methods

SMALL TERTIARY PLANNING
GROUP (STPUG)
2006

☐ STPUG boundary
■ built-up
■ non built-up

median 5,500 households
per STPUG

MAINLAND CHINA
SHENZHEN

NEW TERRITORIES (NORTH)

FANLING

TIN SHUI WAI

YUEN LONG

TAI PO

NEW TERRITORIES (WEST)

SHA TIN

TUEN MUN

NEW TERRITORIES (EAST)

KOWLOON

LANTAU ISLAND

HONG KONG ISLAND

5 km
10 km

Data and methods

- Neigbourhood characteristics:.
  - Small Tertiary Planning Unit Groups
  - Income, education, demographics etc. from Census based on previous literature
  - Access to local amenities / centrality
  - Land-use density
  - Factor analysis to derive four latent factors representing different dimensions of neighbourhood characteristics: neighbourhood affluence, housing instability, elderly residents, social fragmentation.

Research Design

Data and methods

relations.

We estimated premature mortality risk ratios for all male and female residents through a series of models: first, a null model of smoothed SMR with no covariates; second, uni-variable models with each of the covariates studied; and third, a full multivariable model including all variables. Since area covariates typically correlate, we ran factor analyses to derive latent variables representing different aspects of area characteristics. We used the Deviance Information Criterion (DIC) and the effective number of parameters (pD) to assess model fit and calculated the additional variance the full models accounted for, compared with the null models with no covariates. In order to test evidence for global spatial patterning of mortality risk, we used the Moran's I test of spatial autocorrelation.[2]

The Bayesian estimation was implemented using Integrated Nested Laplace Approximation (INLA), a deterministic alternative to the computationally intensive

More next week …

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Results and interpretation

- Significant geographical disparities.
- Map corridors of increased risk (Figure 2) with a detailed discussion.
- Neighbourhood effects: e.g.,
  - Higher affluence, the lower the risk of premature death
  - Higher centrality, the higher risk of type I
  - Higher housing instability, the higher the risk of type II

Results and interpretation

association intensified after model adjustment. For public housing, we again observed a switch in directions: the presence of public housing was associated with increased type II PMR, but after controlling for all other area characteristics, notably neighbourhood affluence and housing instability, the association reversed. For men, both of these associations were significant; for women they seemed more moderate yet nearly significant.

- Focus on the role of **public housing** – and how it is different from the Western context.

Neighbourhood 'effects'

	I women	I men	II women	II men	III female	III male
social						
1 n'hood affluence	--	--	-	-	--	--
2 housing instability			+	+	+	
3 older residents	+					+
4 social fragmentation						+
geographical						
5 land use intensity			-	-		
6 centrality		+	+	++	+	
7 n'hood daily commuting			+			
8 public housing		(−)	(−)	-	-	
	communicable		*non-communicable*		*injuries*	

Discussion

- Specific link to Hong Kong context wrt. public housing (e.g., different policies compared to Wester context, and better housing quality)

- Unexpected results – importance of context (e.g., urban density context, commuting and women's role)

Limitations

- Cross-sectional: causality is harder to establish

- Ecological analysis
  - Unobserved covariates that maybe associated with public housing (what can they be?)
  - Area-level associations does not necessarily relate to individual correlations (but you will need individual data!)

Limitations

- Positivist approach - use of deductive reasoning to infer universal laws.

- Alternative view: the research generates causal hypotheses that may explain how urban density may be linked to health disadvantage. Can we use these to design more focused targeted research studies.

Future work

- Wider range of data at higher spatial resolution and/or individual level

- Mixed methods: quantitative and qualitative methods to further investigate complex relationships.

Use of quantitative results to decide on neighbourhoods to visit: three neighbourhoods with different mortality profiles but similar urban density profiles

Sai Ying Pun: advantage for type I, and disadvantage for type II
Whampoo: health advantage across all
Sham Shui Po: disadvantage across all

- Focus groups where local residents are invited to participate structured around urban density, daily activities, health and well-being

Qualitative part:

Revealed importance of social practices, socio-economic circumstances – i.e., the contingent mechanisms through which urban density affects individual health and well-being

- Specific aim: estimate associations between pre-mature mortality rate and neighbourhood characteristics (derived from the Census)

- Study the relationship between observed spatial patterns of pre-mature mortality and identified neighbourhood characteristics?

- Bayesian spatial structural model is used in the paper

- Spatial analysis part: positivist approach - use of deductive reasoning to infer universal laws.

- Alternative view: the research generates causal hypotheses that may explain how urban density may be linked to health disadvantage. Can we use these to design more focused targeted research studies.

Qualitative part

- Revealed importance of social practices, socio-economic circumstances – i.e., the contingent mechanisms through which urban density affects individual health and well-being