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# Understanding the burden of chronic back pain: a spatial microsimulation of chronic back pain at small area level across England

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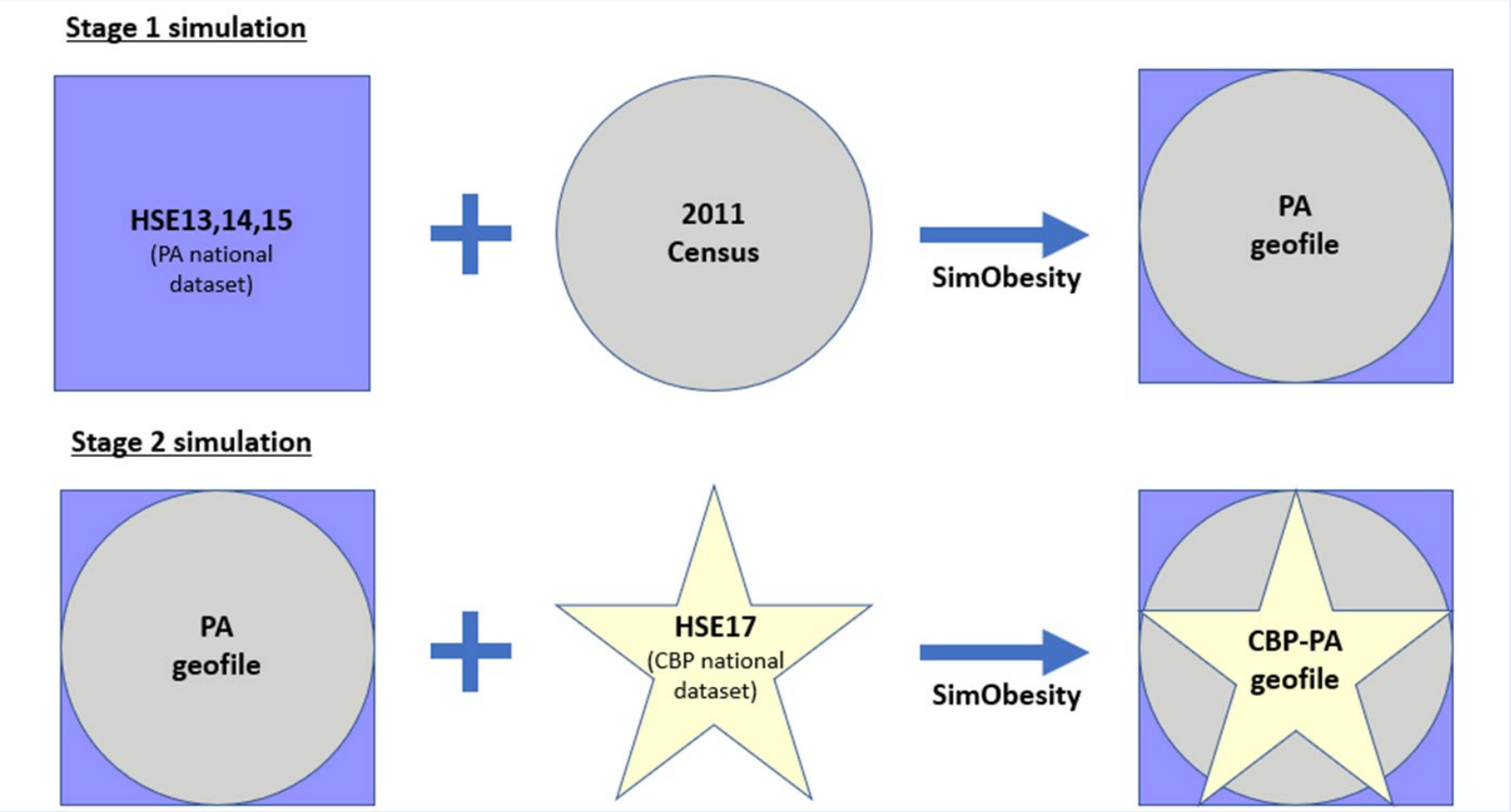
# Background

- Chronic lower back pain prevalence ~14-20% (1,2)
- Estimated annual health care cost of £1.5 billion (3)
- Total cost to the economy of over £10 billion annually (4)

# Aims and objectives

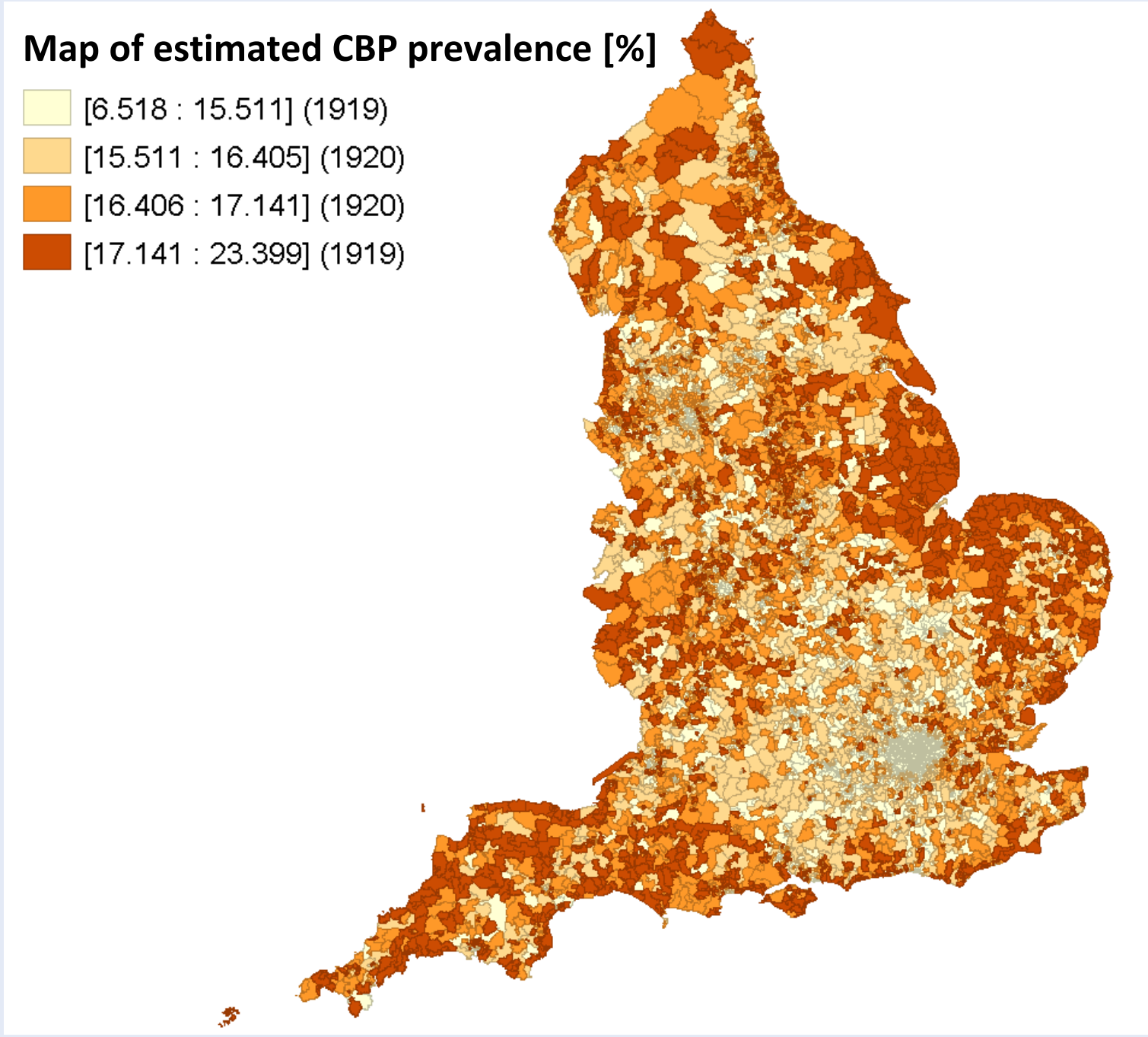
1. Simulate a chronic back pain (CBP) dataset for England
2. Map CBP prevalence at small area level
3. Identify associations that may explain spatial variation
4. Explore counterfactual scenarios for increases in physical activity levels

# Method

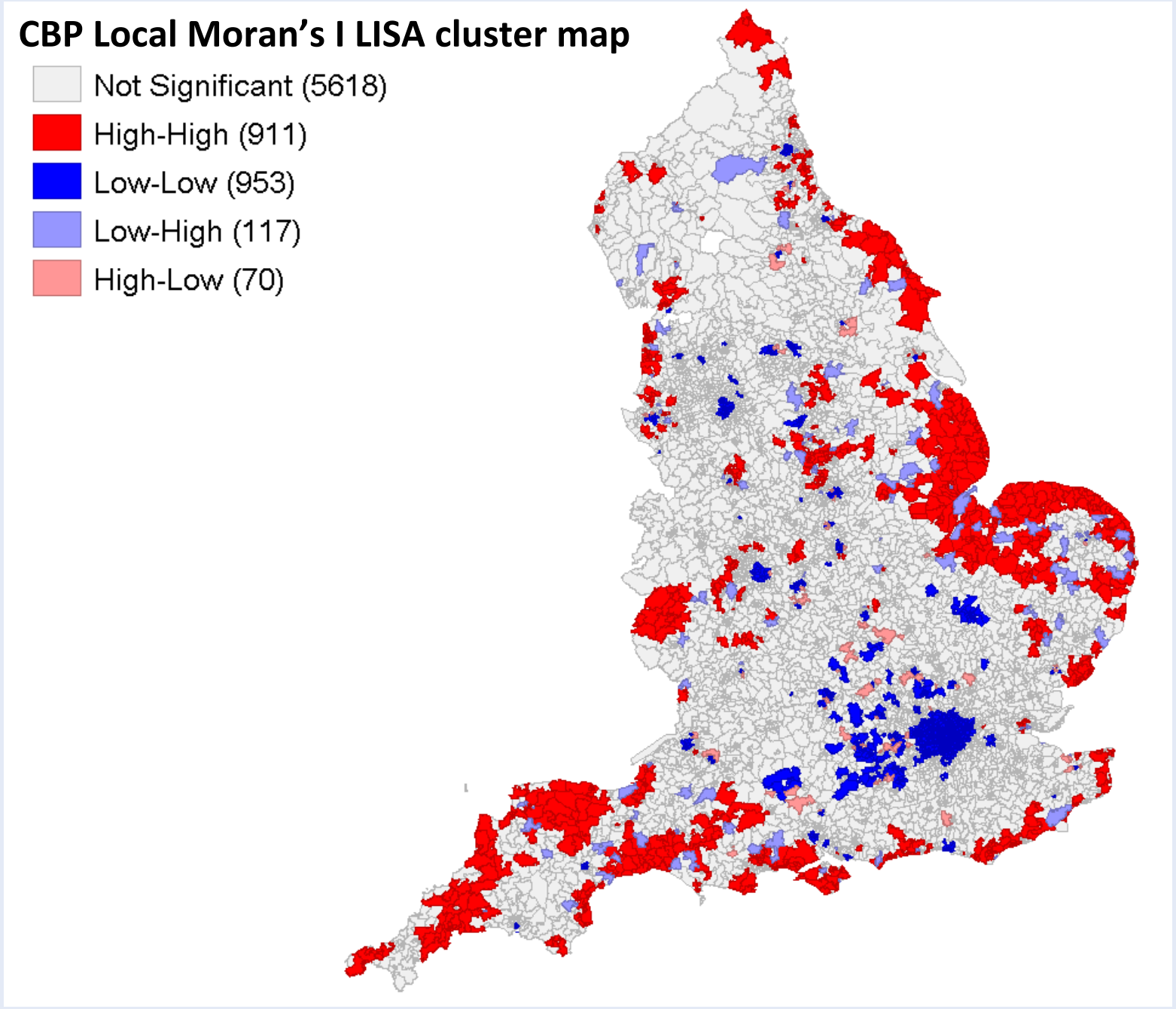



Ethical approval was granted by the University of Nottingham Faculty of Medicine and Health Research Ethics Committee (FMHS 199-0221; February 2021).

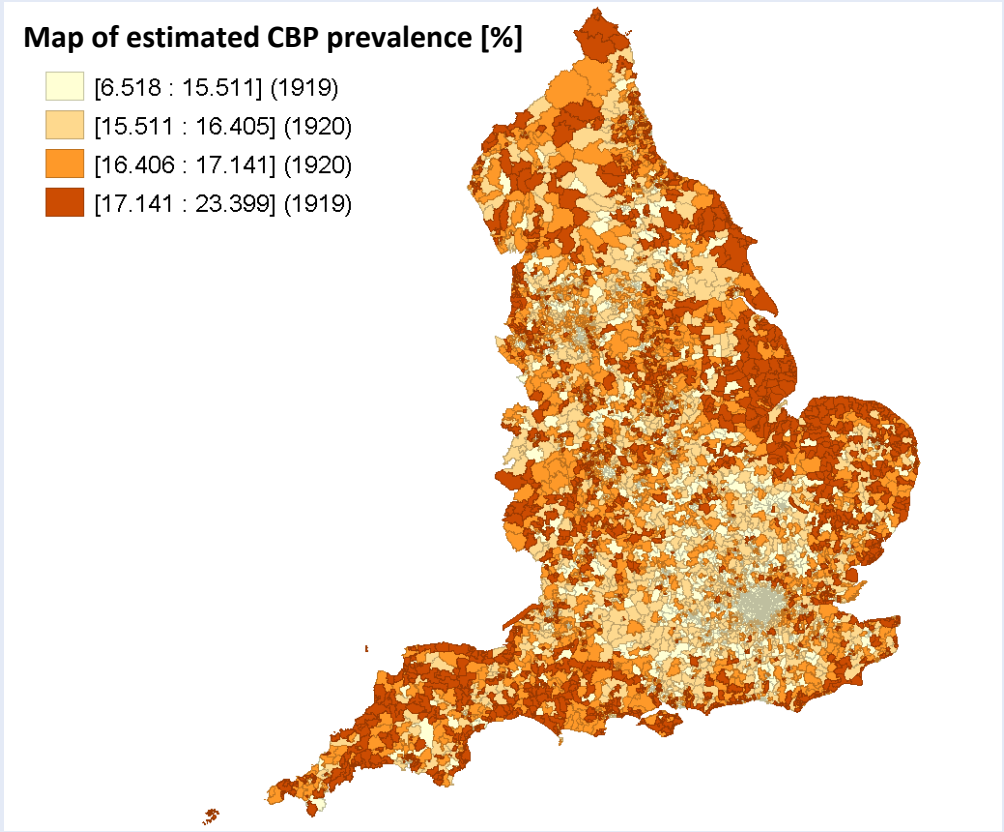
# Chronic back pain prevalence

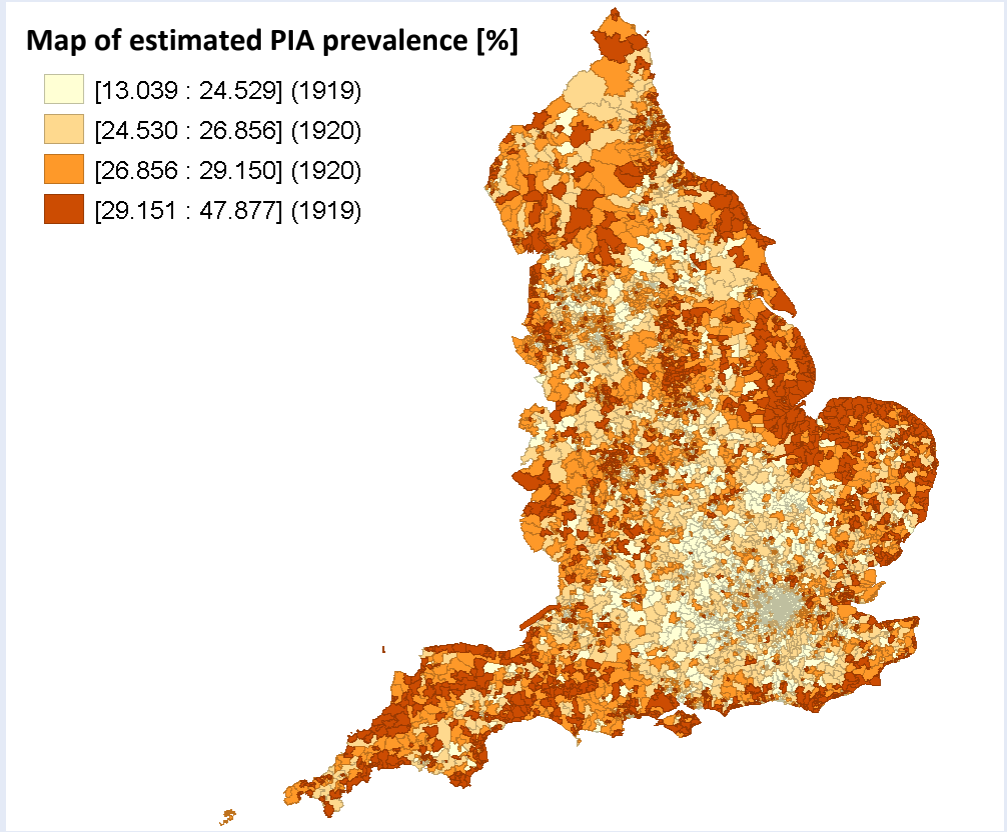

Map of estimated CBP prevalence [%]
[6.518 : 15.511] (1919)
[15.511 : 16.405] (1920)
[16.406 : 17.141] (1920)
[17.141 : 23.399] (1919)

# CBP Local Moran's I LISA cluster map



# Physical inactivity (PIA)




| **Model** | **β mean** | **Bandwidth** | **$R^2$** |
|---|---|---|---|
| Univariate GWR | 0.833 | 52 | 0.815 |
| Multivariate MGWR | 0.070 | 7675 | 0.924 |

| | Baseline | + 15 minutes | + 30 minutes | + 60 minutes |
|---|---|---|---|---|
| **CBP prevalence (%)** | 15.87 | 15.86 | 13.16 | 13.16 |
| **Reduction from baseline** | | -0.01 | -2.71 | -2.71 |

# Conclusions and discussion

- Chronic back pain prevalence varies at ward level across England
  - High prevalence clusters in coastal areas
  - Low prevalence clusters in cities
- At an area level, physical inactivity is highly positively correlated with chronic back pain
  - This can largely be explained by geographic variation in confounders
- Policies to reduce physical inactivity will likely result in a significant but relatively ‘small’ reduction in chronic back pain prevalence

# Discussion – cont.

**Strengths**

- Spatial microsimulation methodology
- High quality data sets

**Limitations**

- Self-reported physical activity data
- “Back pain”
- Static model

**Future work**

- Finer spatial scale
- Other predictors e.g. obesity
- Dynamic/pseudo-dynamic modelling

Thank you!

# References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3. Hong J, Reed C, Novick D, Happich M. Costs associated with treatment of chronic low back pain: An analysis of the UK general practice research database. Spine (Phila Pa 1976) [Internet]. 2013 Jan 1 [cited 2021 Mar 5];38(1):75–82. Available from: https://pubmed.ncbi.nlm.nih.gov/23038621/

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