The SPACE Project: The impact of place on cognitive health

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SPACE

SUPPORTIVE ENVIRONMENTS FOR PHYSICAL & SOCIAL ACTIVITY, HEALTHY AGEING & COGNITIVE HEALTH

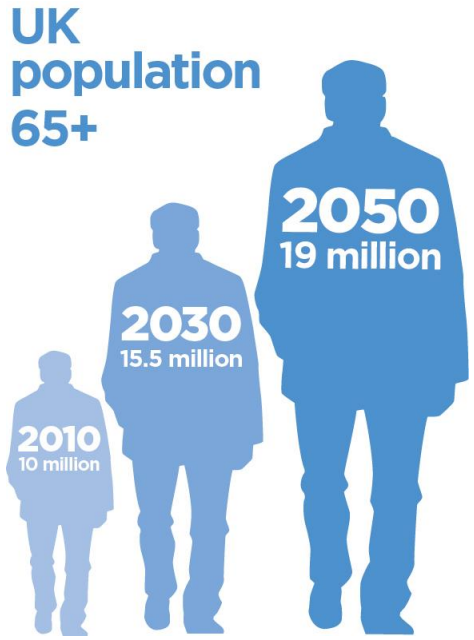
SPACE event
8th February 2024

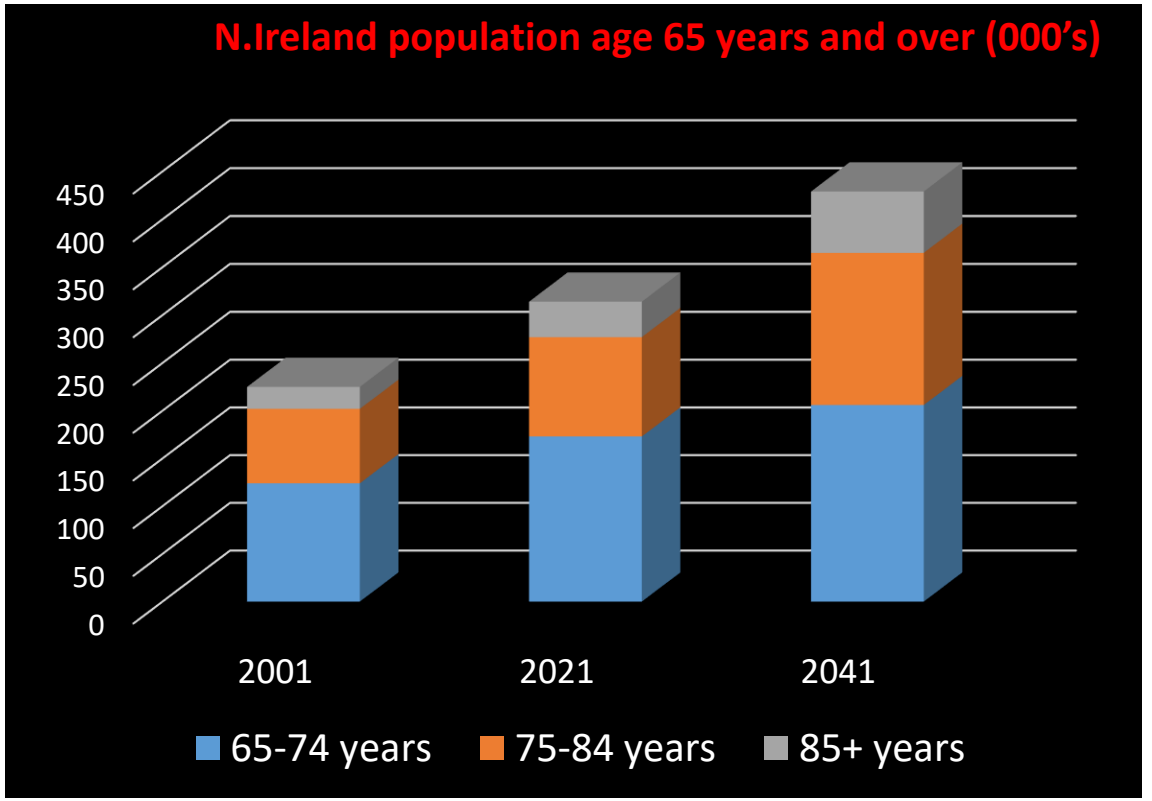
This work was supported by **UK Research and Innovation** [ES/V016075/1]

UKRI Economic and Social Research Council

UKRI Healthy Ageing Challenge Social, Behavioural and Design Research

Societal Transformation





Source: NISRA, Annual Abstract of Statistics, 2003

Third of UK babies 'will live to 100'

26 March 2012

2001: 200,000 → **2021:** 300,000 → **2041:** 400,000

Cognitive Health

- Globally, about 47 million people were living with dementia in 2015
- projected to triple by 2050

- 40% of dementia cases could be prevented or delayed by targeting 12 risk factors throughout life
- Air pollution

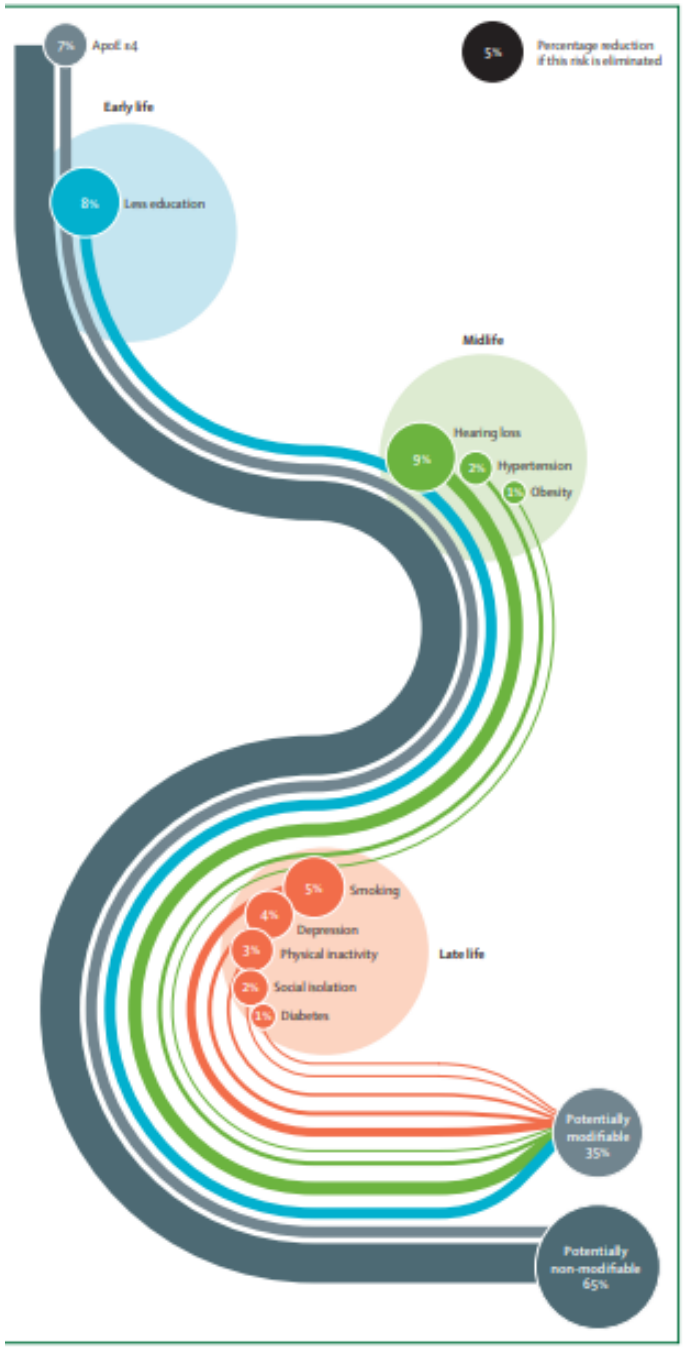


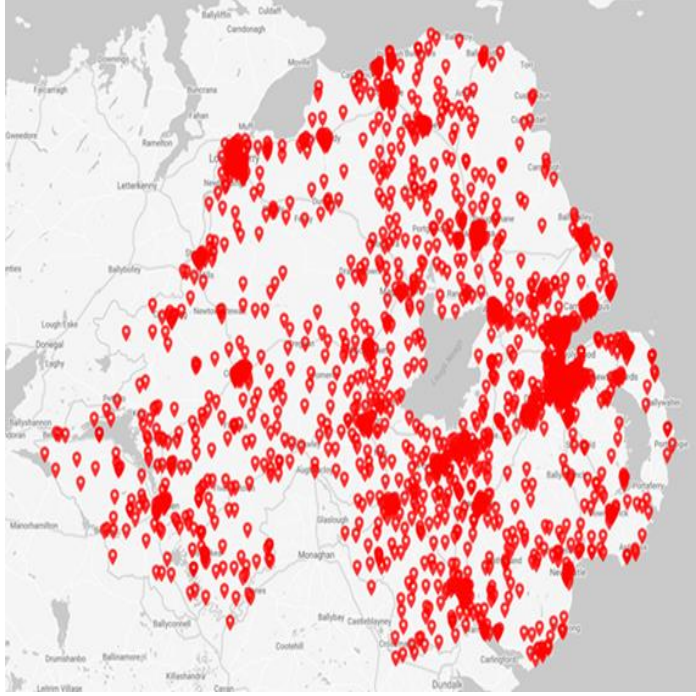
Figure 4: Life-course model of contribution of modifiable risk factors to dementia
Numbers are rounded to nearest integer. Figure shows potentially modifiable or non-modifiable risk factors.

Livingstone et al. Lancet Commission on Dementia Prevention

OUR HEALTH IS LINKED TO THE ENVIRONMENT
where we are born, live, and work

- *Key research questions*:
  - What environmental factors influence healthy ageing and cognitive health ?
  - What are the best policies and interventions for promoting healthy ageing and cognitive health?

- *Aim*: Integration of:
  - environmental exposures
  - lifestyle behaviours
  - biological data



NICOLA is the…Northern Ireland Cohort for the Longitudinal Study of Ageing

- Launched in 2013 as N. Ireland's largest public health study of ageing
- Random sample of ~8500 men / women aged 50 years and over
- Longitudinal: interviews every 2-3 years, health assessment every 4-5 years
- Explores why and how social, economic and biological factors are changing the lives of older people
- Unique focus: Legacy of "The Troubles", nutrition, eye health, cognition and the environment – connected studies

https://www.qub.ac.uk/sites/NICOLA/AboutNICOLA

Slide courtesy of Dr Charlotte Neville

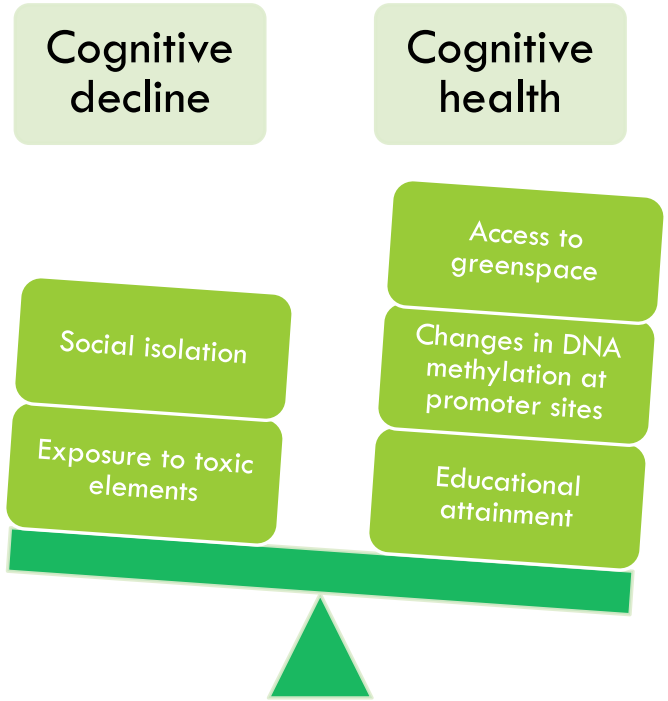
Environmental Data Linkage

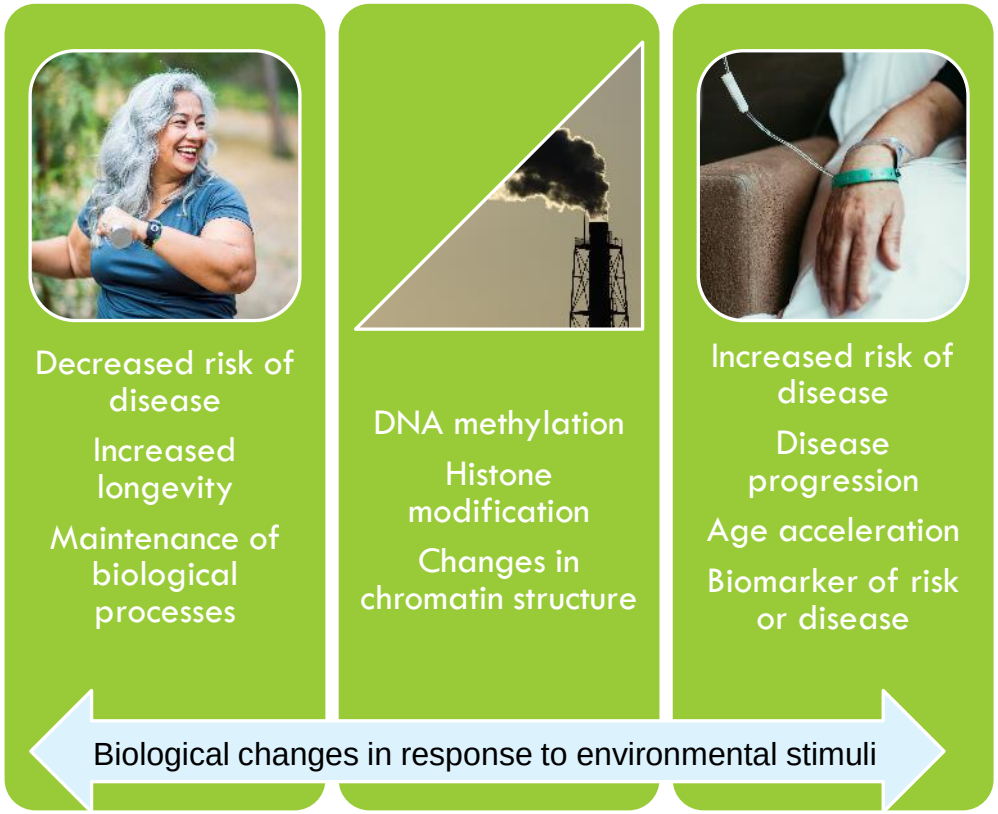
Urban environment data	
Densification	Housing density; population density
Infrastructure	Walkability indices (based on density, land use mix, connectivity, retail plot ratio) for the 500m/1000m hinterlands of the older adult participants in extant cohorts.
Land use	Land use mix; land use type (area and distance to commercial, residential, agricultural, industrial, transport, hospital/medical, educational, 'other land use')
Natural environment	Normalised Difference Vegetation Index (NDVI); access to green space and blue space (water); impervious surfaces
Transportation	Road line, bus stop and train station densities (proxies for air and noise pollution); road speed and traffic collisions
Air, noise and light pollution	Estimates of exposure to ambient air pollution (NO2 and PM2.5), noise and light pollution
Soil geochemistry	Urban geochemical data including soil urbanisation tracers (Co, V, Cr, Ni, Zn, Sn, Pb, Sb, As and Mo)**

**** Climate change: flooding, heat, forest fires, UVA and sun exposure, biodiversity**

Biological Responses

How do external impacts get under our skin to influence disease?

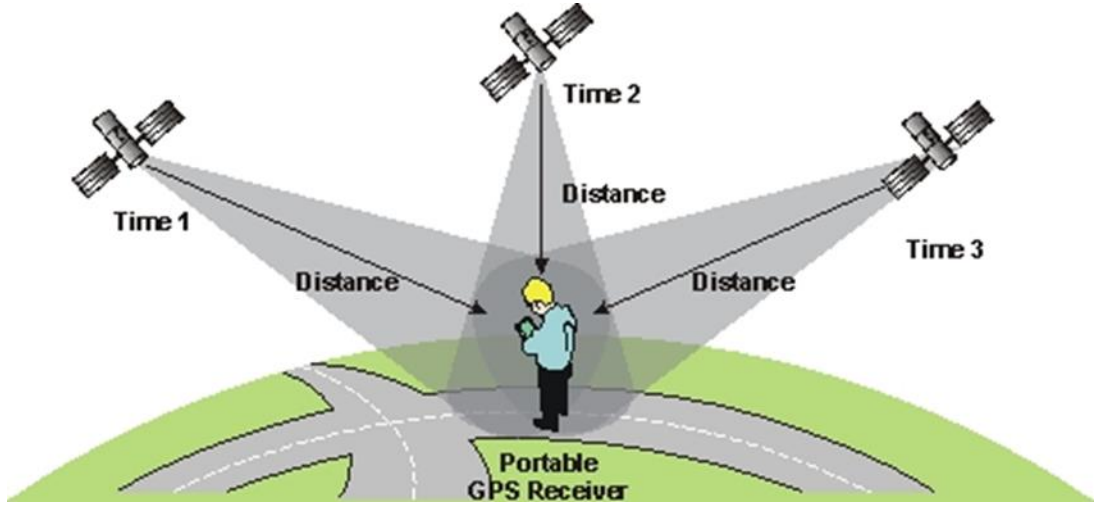




Epigenetic changes can be risk factors or protect against disease…some damage is reversible!

Slide courtesy of Prof AJ McKnight

GPS and Accelerometer Data



HHS Public Access
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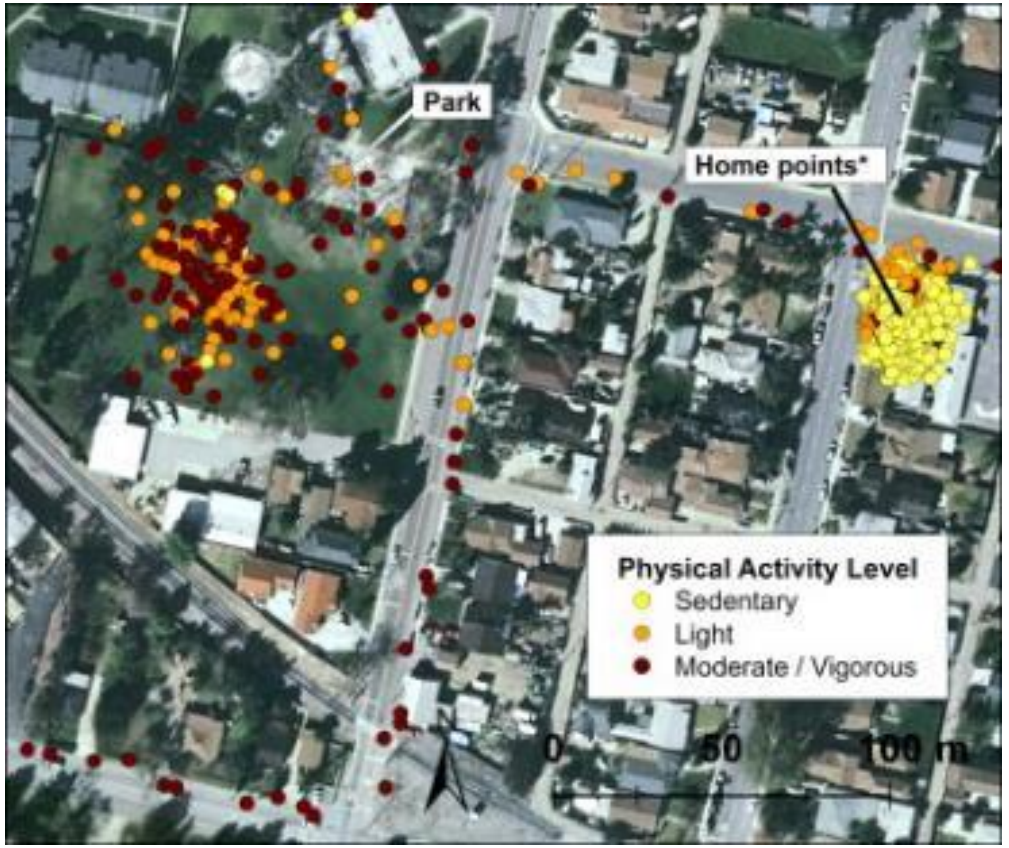
Neuroepidemiology. 2020 ; 54(1): 64–74. doi:10.1159/000503004.

The Health and Retirement Study Harmonized Cognitive Assessment Protocol (HCAP) Project: Study Design and Methods

Kenneth M. Langa[a,b,c,d,*], Lindsay H. Ryan[c], Ryan McCammon[c], Richard N. Jones[e], Jennifer J. Manly[f], Deborah A. Levine[a,d,g], Amanda Sonnega[c], Madeline Farron[a], David R. Weir[c]



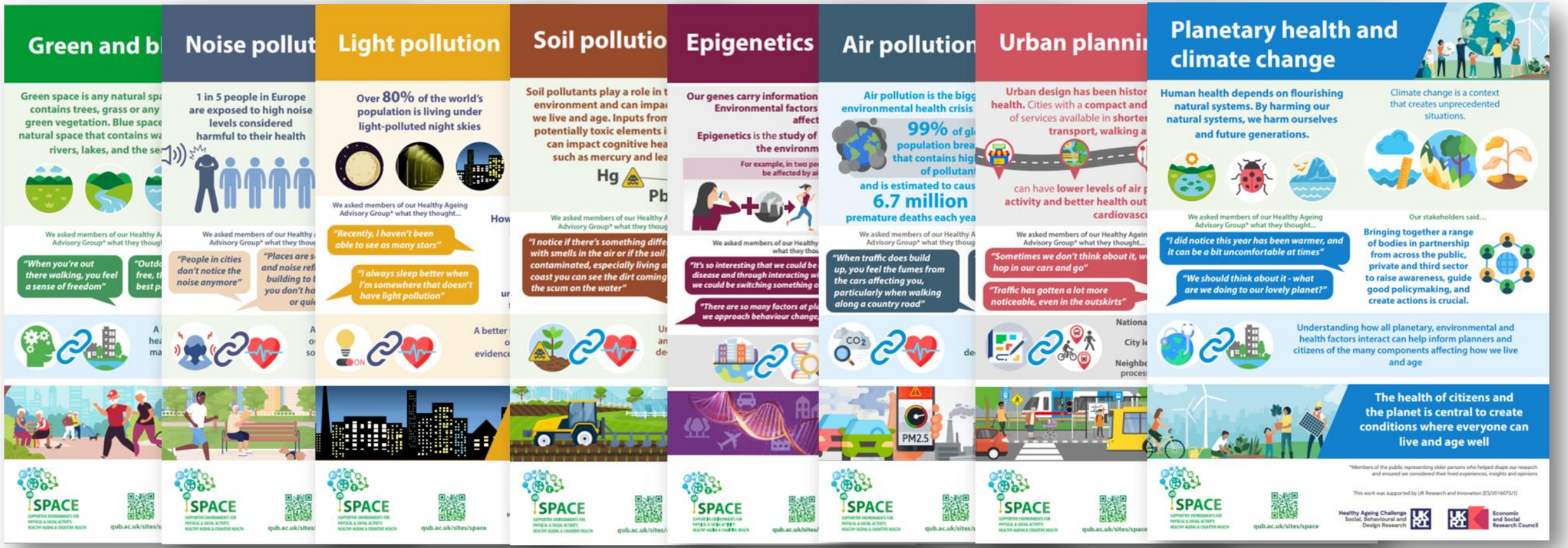
Video series

5 themes:

1. Air & Soil pollution
2. Light & Noise pollution
3. Green & Blue space
4. Urban planning
5. Planetary health & Climate change

qub.ac.uk/sites/space/VideosandFactsheets

Factsheets



qub.ac.uk/sites/space/VideosandFactsheets

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Economic and Social Research Council

Healthy Ageing Challenge Social, Behavioural and Design Research

Policy and Practice

- Cognitive health lacking on the policy agenda
- Addressing the root causes of poor-quality environments will have benefits across a range of policy areas

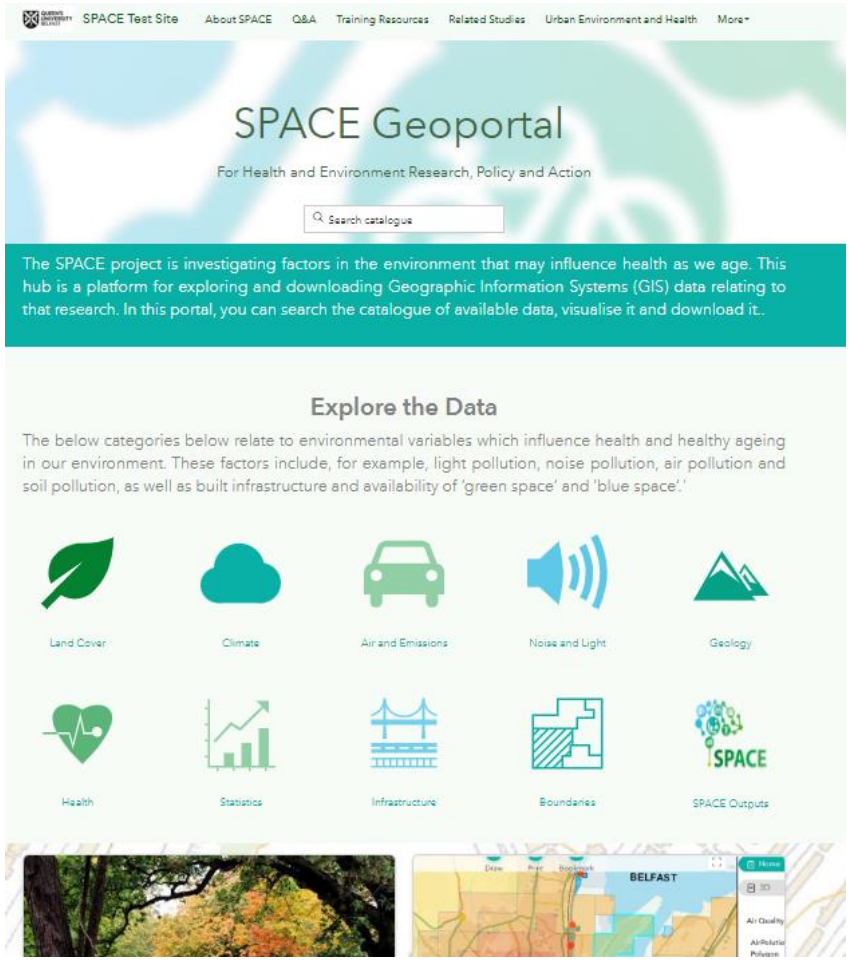
Addressing:
Poor transport infrastructure, absence of good-quality green space, poor housing

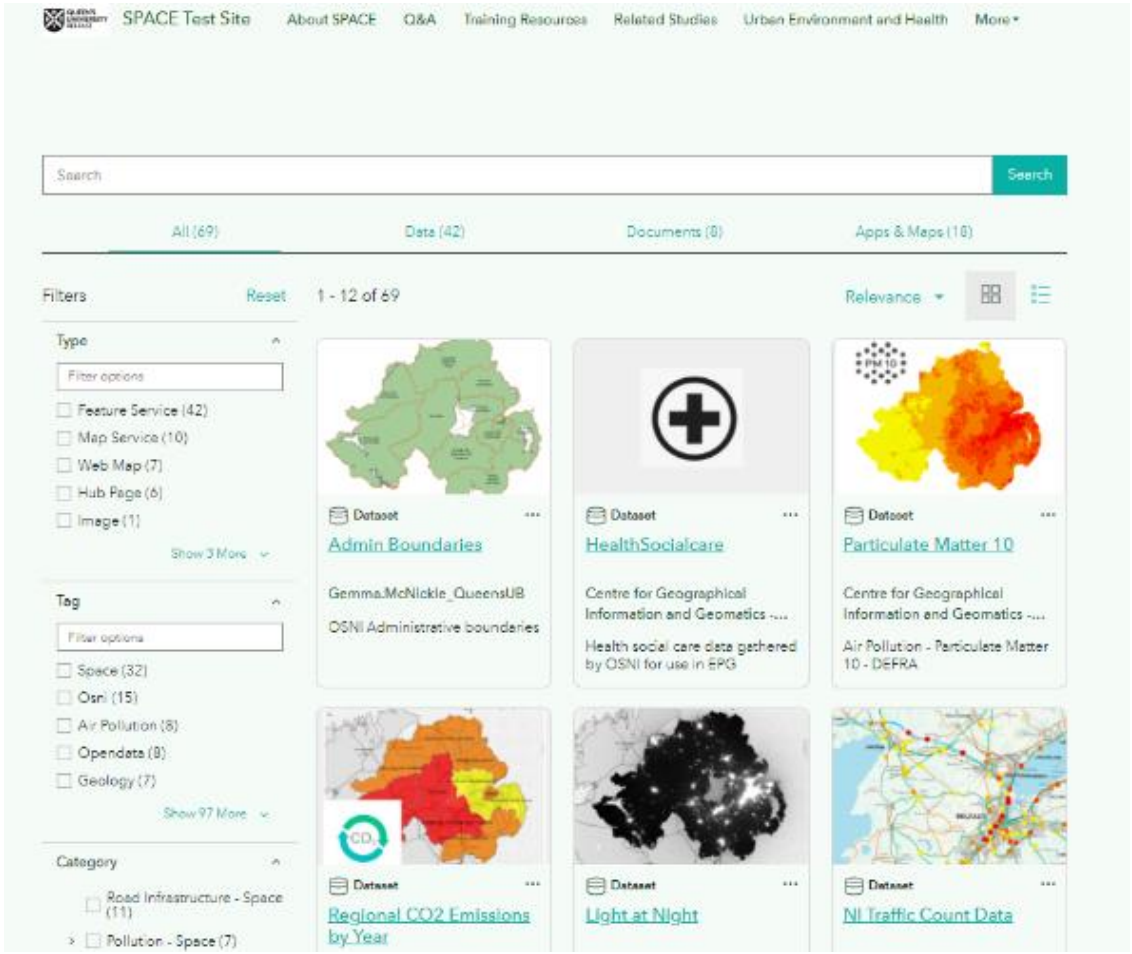
Will impact:
Ageing, health, cognitive decline, liveable communities, environment, climate crisis

- Agreed set of policy recommendations for how to achieve success in this issue
- Report that can be used to support local action
- New collaborations, raised awareness of issue etc.
- Practice-oriented outputs – policy briefs, evidence summaries etc

SPACE geoportal

https://space-geoportal-queensub.hub.arcgis.com/

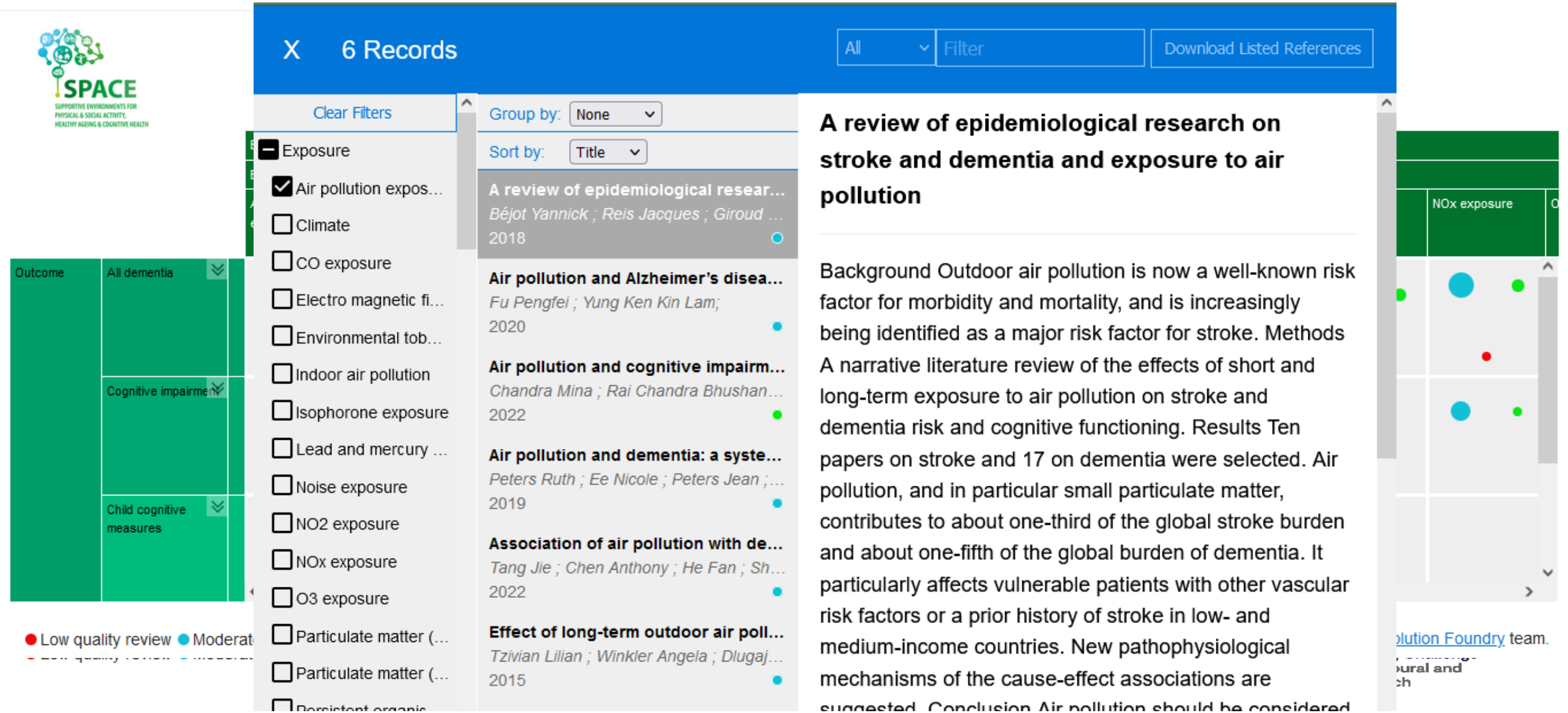




The SPACE project explores the important role that the environment plays in supporting healthy ageing and cognitive health. Over the past year, in collaboration with Land & Property Services, we have been developing a platform for exploring and accessing geospatial data across Northern Ireland. Our geoportal can be used to search the catalogue of available data, visualise it, and download it.

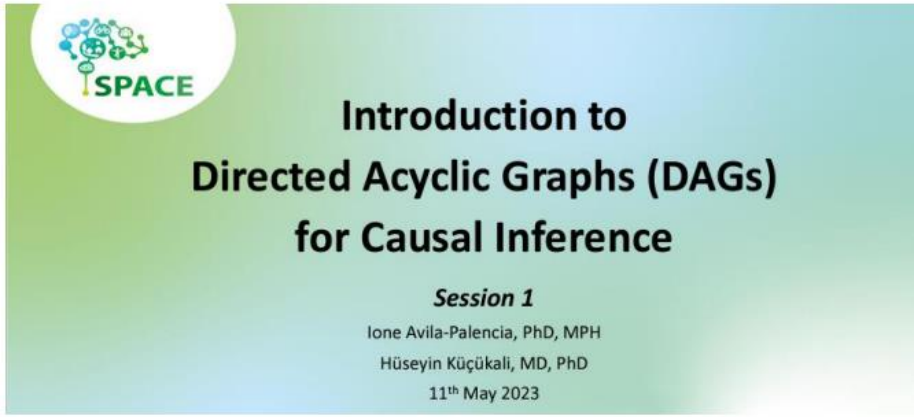
Land & Property Services

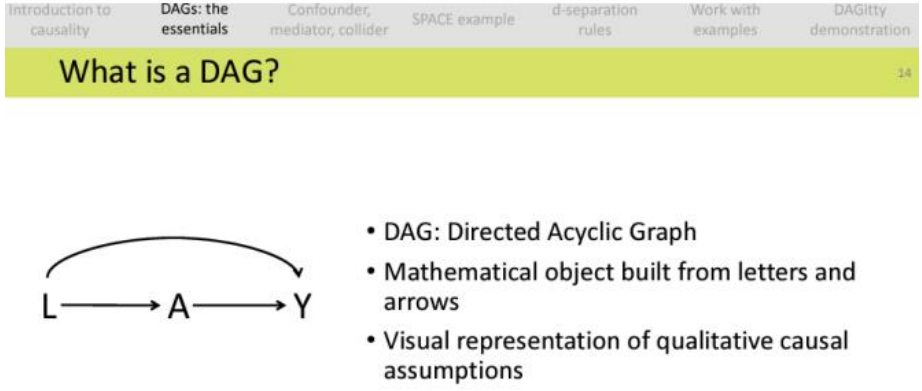
Interactive Evidence Gap Map



Capacity Building

Early Career Researcher 2-day workshop, Belfast, August 2023 led by Dr Claire Cleland





https://www.qub.ac.uk/sites/space/Resources/#an-introduction-to-directed-acyclic-graphs-dags-for-causal-inference-online-training-1844834-1

Healthy Ageing Advisory Group

- ❑ Videos
- ❑ Factsheets
- ❑ Rural environments focus
- ❑ Policy workshops

Thank you

SPACE Partners

- ❑ Videos
- ❑ Factsheets
- ❑ Webinar series
- ❑ Policy workshops
- ❑ Policy briefs
- ❑ Practice-oriented reports
- ❑ Policy report

Thank you

What next?

Other environmental factors:

- Climate change: flooding, heat, forest fires, UVA and sun exposure, biodiversity
- microplastics
- novel environmental exposures associated with net zero transition
- food environment

Other health conditions:

- mental health
- chronic respiratory conditions
- cancer
- eye health

Policy and Practice:

- Report on the role of the environment and prevention
- Extension of geoportal and case studies to support policy and practice
- WHO Healthy Ageing Taskforce
- Practice-oriented outputs

This work was funded by UK Research and Innovation (ES/V016075/1), with two additional ESRC Impact Acceleration (IAA) awards and three leveraged Department for the Economy (NI) PhD Studentships.

It represents a collaboration between Queen's University Belfast and partnering organisations from across health, government, third sector, private and public organisations, the NICOLA Advisory Research Group and the SPACE Project Team, without whom the research would not have been possible. Full details are available on our website: qub.ac.uk/sites/space

THE SPACE TEAM

𝕏 @spacequb

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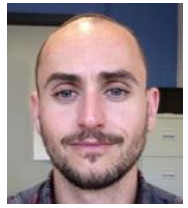
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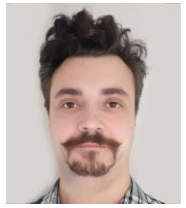
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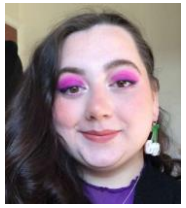
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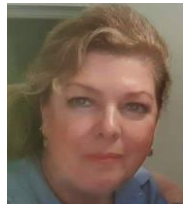
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