Doing research to impact policy and practice

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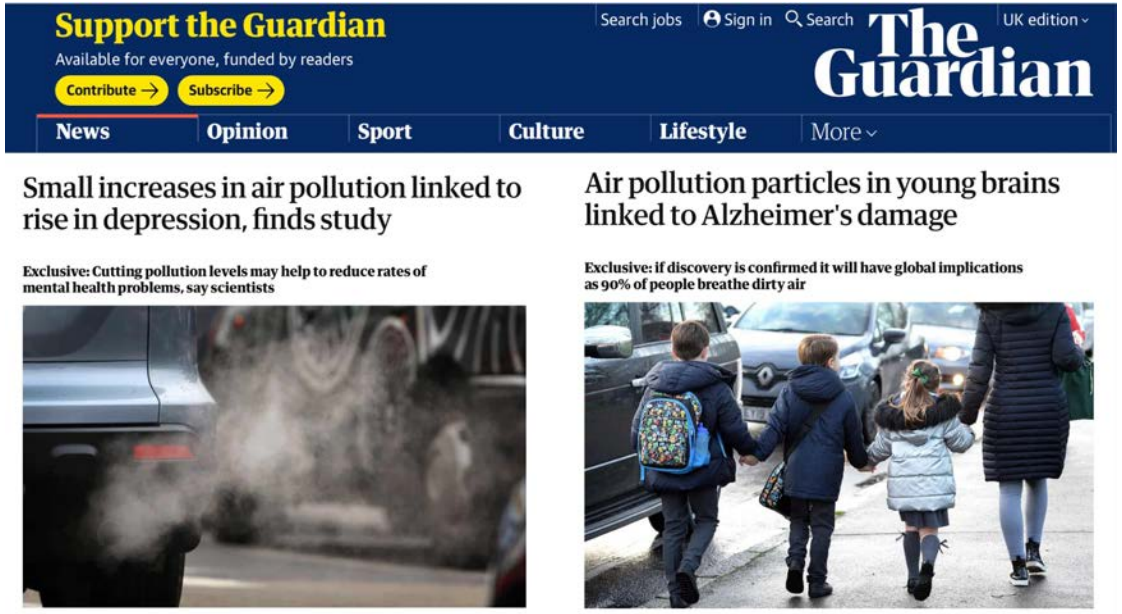
Durham University, UK

Durham University


Our vision is for everyone in the UK to be able to breathe clean air that promotes a healthy brain and cognitive life regardless of where they live.

Headline News!



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Small increases in air pollution linked to rise in depression, finds study

Exclusive: Cutting pollution levels may help to reduce rates of mental health problems, say scientists

Air pollution particles in young brains linked to Alzheimer's damage

Exclusive: if discovery is confirmed it will have global implications as 90% of people breathe dirty air

U.S. INTERNATIONAL CANADA ESPAÑOL 中文

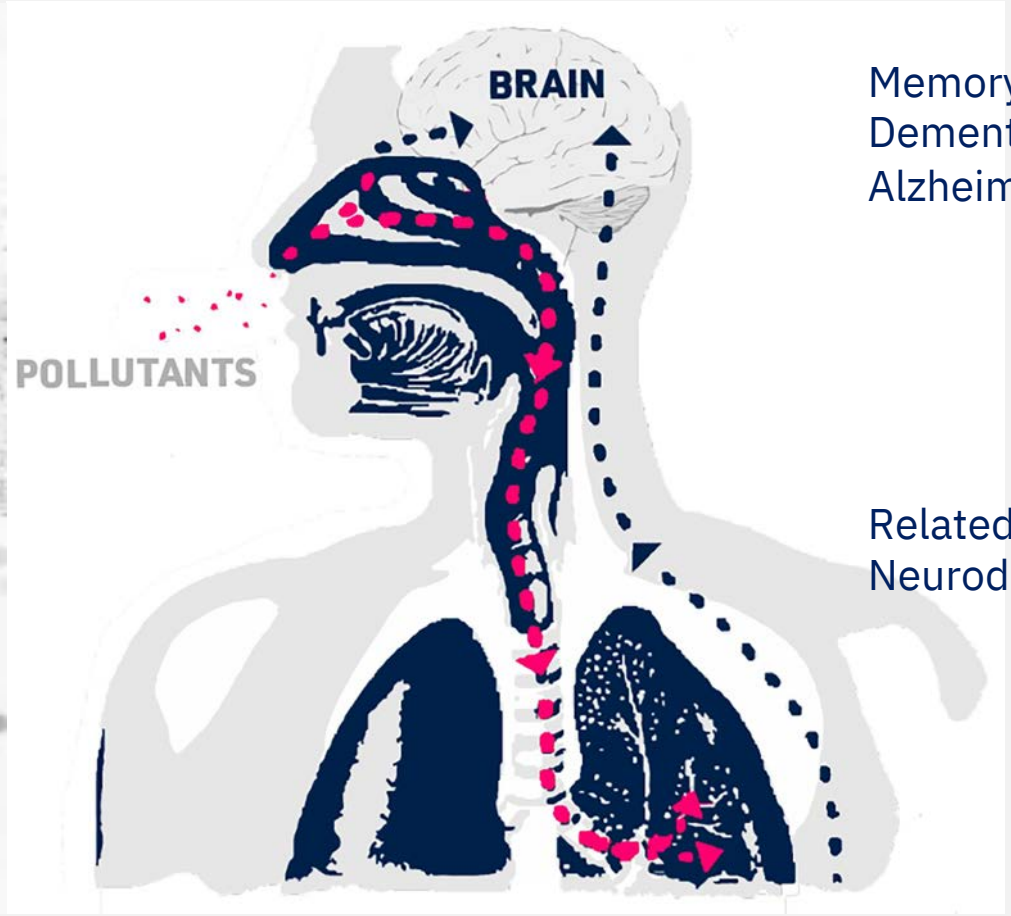
The New York Times

Air Pollution May Damage the Brain

Tiny air pollutants may cause changes in brain structure that resemble those of Alzheimer's disease.

Some scientific context

Birth • Infancy and Early Years • Childhood and Adolescence • Adulthood and Later Life



Memory Impairment
Dementia
Alzheimer’s Disease

Depression
Learning Disabilities
ADHD

Related Cardiopulmonary
Neurodegenerative Disorders


But that is not the whole story

Where people live matters

Our Innovative Primary Prevention Equation

PLACE = Social Determinants Health Inequalities <=> Ambient $PM_{2.5}$ Exposure => Cognitive/Brain Health Outcomes

The *What?* of policy and practice relevance

Mitigating the impact of air pollution on dementia and brain health

Setting the policy agenda

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Environmental Research

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Review article

Mitigating the impact of air pollution on dementia and brain health: Setting the policy agenda

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This paper is the first to outline a policy agenda for addressing the impact of air pollution on brain health and dementia.

Across a two-year period, we engaged our consortium of 20+ academics and 11 cross-sector stakeholder organisations in a series of participatory and consensus-building workshops, meetings, and working groups, as well as conducted an umbrella review for the last ten years of research on the topic.

Our goal was to identify the major domains and priority areas in research, policy and practice needed to inform a policy agenda on the impact of air pollution on brain health and dementia across the life course.

We arrived at three policy domains:

- Research and Funding
- Education and Awareness
- Policy Evaluation

Within these three domains there are 14 priority areas.

Setting the policy agenda.

Domains and Priority Areas	Source for identifying priority area	Actionable Items
Domain A: Research and Funding		
1. Embracing a 'complexities of place' approach	Consortium Academics Stakeholders N = 6 Policy Papers	• Applying a complex systems perspective of air quality and brain health • Drawing from the complexities of place literature in public health • Augmenting conventional statistics with computational science and Bayesian modelling • Taking an interdisciplinary methods approach to modelling • Exploring feedback loops and complex configurations of factors to make sense of causality
2. Focusing on vulnerable populations in places	Consortium Academics Umbrella Review	• Exploring the role that health inequalities play in the impact air pollution has on brain health. • Examining how places create brain health vulnerabilities, such that certain populations are more at risk from air pollution than others. • Studying how vulnerable populations may respond to exposure to different levels of air pollution, even levels considered otherwise health.
3. Modelling the impact of ambient PM2.5	Consortium Academics Umbrella Review	• Building high resolution, long-term exposure models • Developing more comprehensive current models for linking aspects of $PM_{2.5}$ source types and composition to specific health outcomes • Helping to develop current and historical models for those parts of the world where such models are significantly underdeveloped
4. Studying indoor air pollution	Umbrella Review	• Drawing on the wider literature linking indoor air quality to public health • Focusing on this issue for school zones, populations living near busy roads or in cities, and for those vulnerable to even mild air quality issues
5. Making breakthroughs in pathways to disease for brain health	Consortium Academics Umbrella Review	• Exploring new and multiple pathways to disease beyond just the blood-brain barrier • Improving study design and research methods • Detailing pathways to disease links and how they are associated with specific forms of brain disease and cognitive impairment • Identifying exposure dose levels and stages in the life course critical to brain health
6. Embracing a life course perspective	Consortium Academics	• Grounding current and future research in a life-course and developmental framing • Developing and studying cohort studies
7. Radically rethinking funding	Consortium Academics	• Restructuring research funding mechanisms • Supporting high-risk, high-payoff scienc
Domain B: Education and Awareness		
8. Making this unrecognised public health issue a known concern	Stakeholders N = 6 Policy Papers	• Developing a global and national agenda to make the unrecognised impact of air pollution on brain health known to the public, government officials, researchers, funding organisations, third-sector organisations, community groups, and business and industry. • Initiating local, national, and international awareness campaigns • Getting the word out to colleagues in public health and air quality through academic channels
9. Developing educational products	Stakeholders	• Developing lesson plans for primary and secondary schools • Co-creating educational products to improve public engagement and collective corrective action • Making sure messages are empowering, given that diseases like dementia have no cure
10. Attaching air pollution and brain health to existing strategies and campaigns	Stakeholders	• Adding air pollution to existing stakeholder campaigns for brain health and dementia • Including brain health to current stakeholder strategies around air quality improvement • Highlighting known links between air quality and brain health and climate change, as well as the sustainable development goals and strategies • Using current evidence on air quality and brain health to bolster existing air quality or brain health campaigns and to demonstrate co-benefits
11. Providing publicly available monitoring, assessment, and screening tools	Stakeholders Consortium Academics N = 6 Policy Papers	• Translating historical and current ambient and indoor air quality datasets, dashboards, and models into useable, publicly accessible resources for citizens, healthcare providers, governments, and third-sector and private sector organisations. • Developing screening and assessment tools for individual exposure, particularly during early life and at critical points in the life course where air pollution exposure is most impactful. • Developing tools for assessing health behaviours, pre-existing conditions, or co-morbid conditions that prevent, slowdown, or exacerbate the impact of air pollution on brain health, including the progression of dementia post-diagnosis
Domain C: Policy Evaluation		
12. Conducting complex systems evaluation	Consortium Academics N = 6 Policy Papers	• Embracing a complex systems perspective of evaluation for air quality and brain health • Drawing from the complexity turn in public policy evaluation to adopt best practices • Augmenting conventional evaluation methods with participatory systems mapping, etc. • mapping barriers and incentives to change and counterfactuals • Engaging in policy evaluation via co-production
13. Engaging in co-production	Stakeholders Consortium Academics	• Drawing from the wider climate change and air pollution literature on co-production • Recognising there are multiple approaches to engagement and co-production • Articulating and improving the rigor of the engagement approach used • Considering the influence regional, national, and international differences on engagement, as for example countries in the global south versus the global north
14. Evaluating current air quality policies for their brain health benefits	Stakeholders	• Drawing on existing policies for air quality and public health in general to develop, in the short-term, a catalogue of useful policy guidelines • Exploring wider policy needs beyond just emissions reduction

So, *What* did we learn?

Find out what questions stakeholders need answered.

As opposed to only strictly academic questions.

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Realise that different stakeholders ask different questions and want different answers.

So, involve or engage different stakeholders in the development of your questions.

Map out the power relations, conflicts, contradictions and so forth.

Recognise that most public policy experts, practitioners and funding organisations are biased toward simple, individual-level, short-term solutions based on clinical/field trials.

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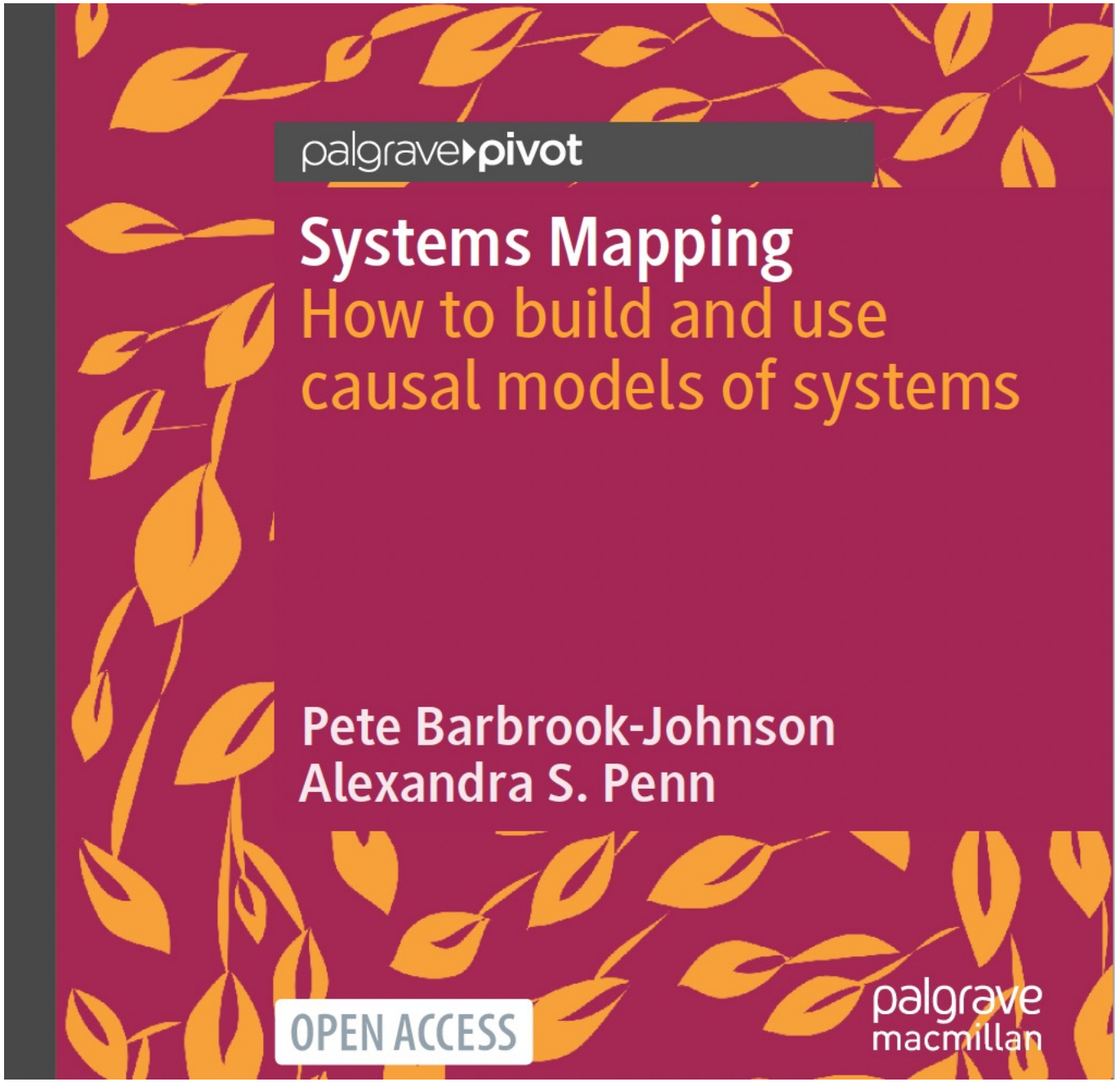
palgrave pivot
Systems Mapping
How to build and use causal models of systems
Pete Barbrook-Johnson
Alexandra S. Penn
OPEN ACCESS
palgrave macmillan


PRSM
The Participatory System Mapper (PRSM) is a free, open-source
and secure tool for mind-mapping and system visualisation

Critically interrogate your questions, including their strengths and limitations.

Co-production is not a panacea; it has its limits.

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Embrace a ‘complexities of place’ approach

- Applying a complex systems perspective
- Drawing from the complexities of place literature in public health
- Augmenting conventional statistics with computational science and systems mapping
- Taking an interdisciplinary methods approach to modelling
- Exploring feedback loops and complex configurations of factors to make sense of causality

Create a theory of change model.

What is your goal?

What do you want to accomplish?

What are the major levers and barriers to change?

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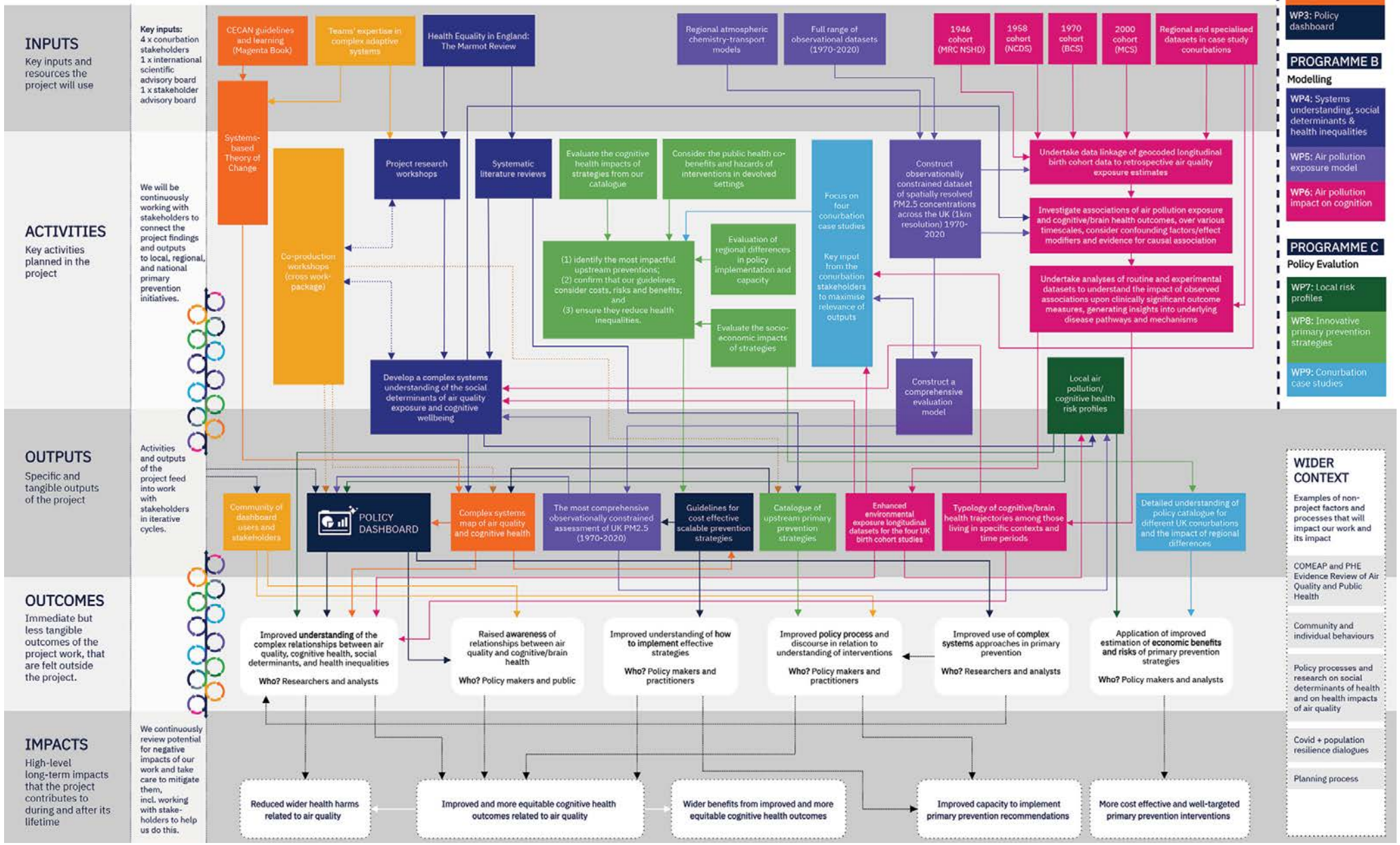
_THEORY OF CHANGE

This is the full 'complexity-appropriate' Theory of Change map for the InSPIRE project. The map tries to capture the linkages from inputs into project activities, how these lead to outputs, and ultimately higher-level outcomes and impacts. The map is a simplification of all the elements of the project, highlighting only the most important elements and their connections. The map does not represent time in any dimension, but rather the logic of how different project parts connect to each other, and wider outcomes and impacts.



Think about outlets beyond articles and books.

Policy Briefs.

Lesson Plans.

Workshops with practitioners or policy experts.

Articles for news outlets.

Blogs and social media.

Community Engagement.

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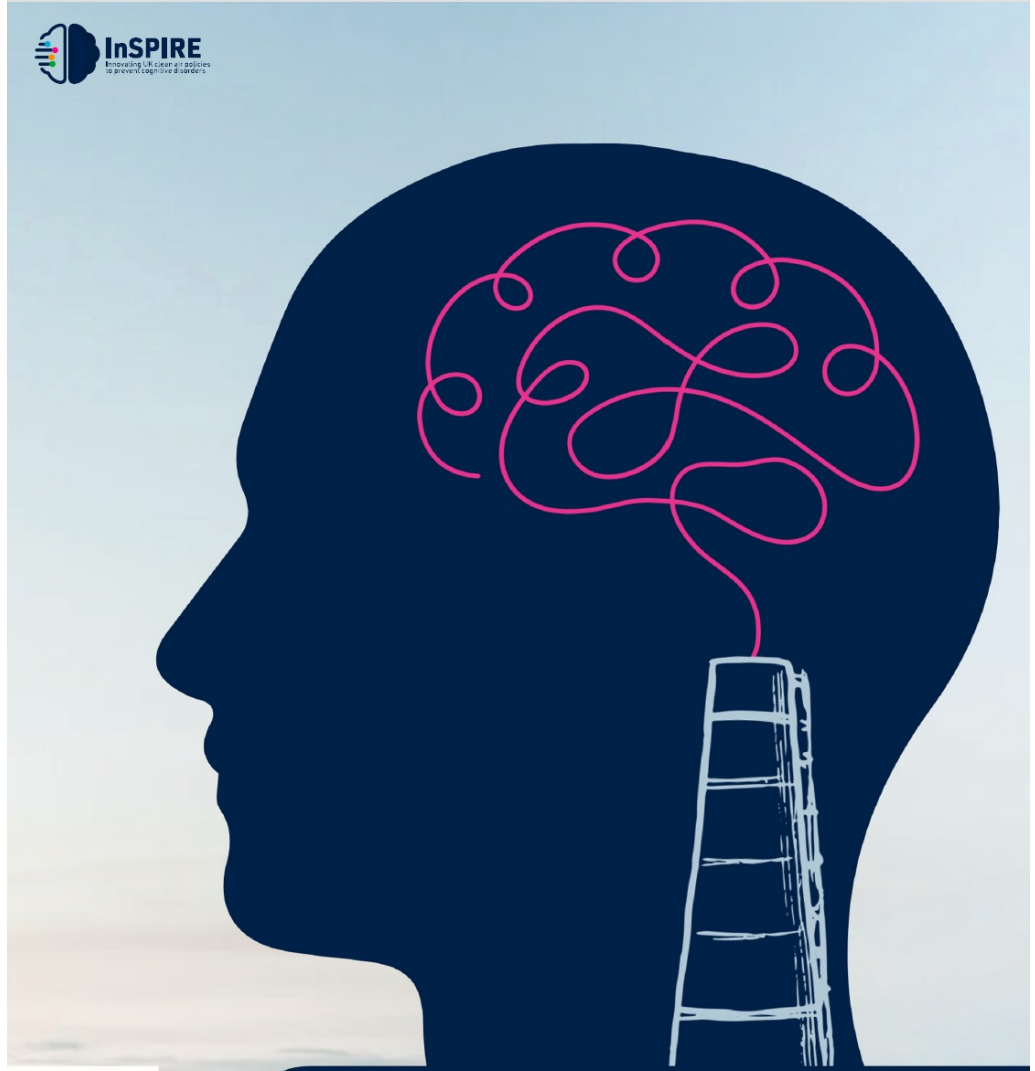

May 2023

Mitigating the Impact of Air Pollution on Brain Health and Dementia

POLICY AND PRACTICE BRIEF

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- InSPIRE - Consortium Development Grant. (1 May 2020 - 17 Dec 2020) Medical Research Council, United Kingdom, RF010140, RF050391, RF200182, £41k.

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Committee on the Medical Effects of Air Pollutants

COMEAP advises the government on all matters concerning the health effects of air pollutants.

Cognitive decline, dementia and air pollution

A report by the Committee on the Medical Effects of Air Pollutants

Chairman: Professor Frank Kelly
Chairman of Subgroup on Cognitive Decline and Dementia: Professor Robert L Maynard

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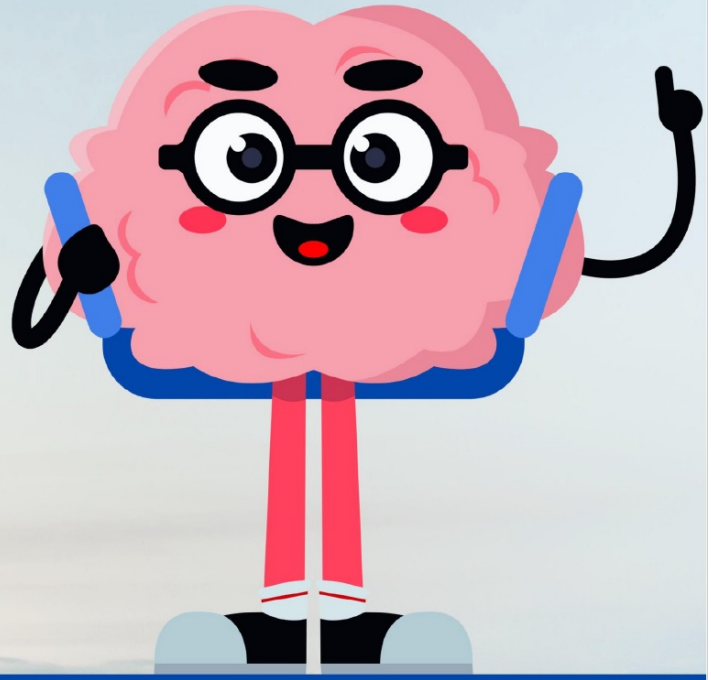

Clean Air and Happy Brain

LESSON PLAN FOR PRIMARY SCHOOLS

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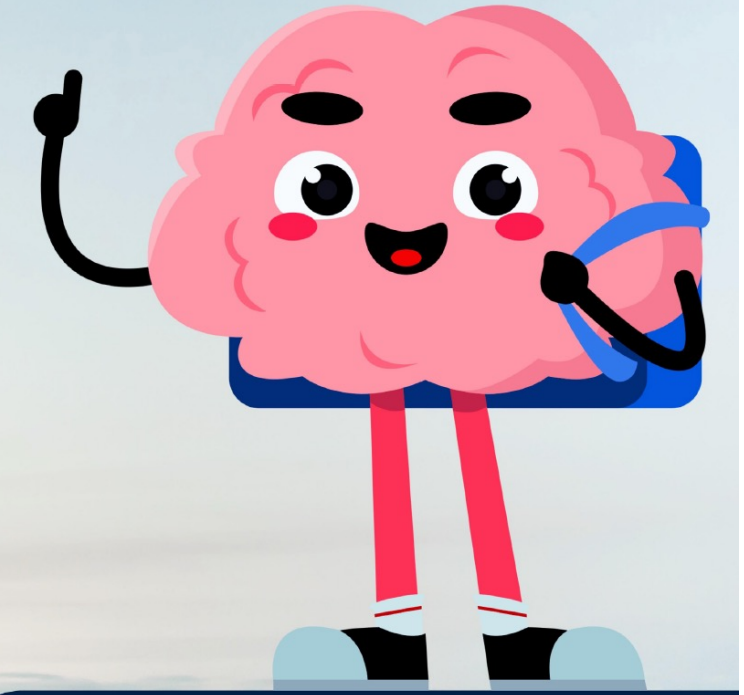

Clean Air and Happy Brain

LESSON PLAN FOR SECONDARY SCHOOLS

Recognize your place in the process.

Models and research play a small part in policy and practice

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Realising your work is more about changing how policy and practice experts think about and approach their work, as opposed to impacting a particular policy per say –although the latter is important.

You are helping people do their work better.

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Put more emphasis on interrogating the development, implementation and evaluation of interventions.

Less emphasis on only modelling or describing the issue.

For example, do we need any more studies demonstrating that inequalities impact health?

Or that rich communities have better educational outcomes than poor communities?

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The three ‘U’s

USEFUL

USEABLE

USED

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Explore co-benefits

Explore how your results and impact can be linked to existing policies, practices, interventions, strategies or campaigns.

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For example, in our work we explored attaching air pollution and brain health to existing strategies and campaigns

- Adding air pollution to existing stakeholder campaigns for brain health and dementia
- Including brain health to current stakeholder strategies around air quality improvement
- Highlighting known links between air quality and brain health and climate change, as well as the sustainable development goals and strategies
- Using current evidence on air quality and brain health to bolster existing air quality or brain health campaigns and to demonstrate co-benefits

For some of you, conduct complex systems evaluation

- Embracing a complex systems perspective of evaluation
- Drawing from the complexity turn in public policy evaluation to adopt best practices
- Augmenting conventional evaluation methods with participatory systems mapping, etc.
- mapping barriers and incentives to change and counterfactuals
- Engaging in policy evaluation via co-production

cecan
Centre for the Evaluation of Complexity Across the Nexus

Questions

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to prevent cognitive disorders