

MRC/CSO Social and Public Health Sciences Unit



Medical
Research
Council



CHIEF
SCIENTIST
OFFICE



University
of Glasgow

Natural experimental evaluations – new guidance

Peter Craig

MatCHNet Methods Masterclass, 2 November 2022

Outline

- **The 2012 MRC guidance**
 - Main messages
 - Why update?
- **The new (MRC-NIHR) guidance**
 - Aims and methods
 - Structure
 - Concepts and definitions
 - Design and planning
 - Discovering natural experiments
 - Good practice
 - Hierarchies and toolkits

2012 Guidance

Theory and methods

Using natural experiments to evaluate population health interventions: new Medical Research Council guidance

Peter Craig,¹ Cyrus Cooper,² David Gunnell,³ Sally Haw,⁴ Kenny Lawson,⁵ Sally Macintyre,⁶ David Ogilvie,⁷ Mark Petticrew,⁸ Barney Reeves,⁹ Matt Sutton,¹⁰ Simon Thompson¹¹

Main messages

1. What is a natural experiment?

In a natural experiment, assignment is determined by the way the policy or programme is implemented, rather than by the researcher

These processes are sometimes random or ‘as if’ random, but this is rare

Usually there is an element of selection – individuals or groups are selected to receive the intervention on the basis of income, age, where they live, etc.

2. What does this mean for evaluation?

Understanding and taking account of this selection process is key to designing a good natural experimental study

There is no single, universally applicable solution to the problem of selection, but a range of partial solutions that each work well in some circumstances but not others

Why update?

Theory and methods

Using natural experiments to evaluate population health interventions: new Medical Research Council guidance

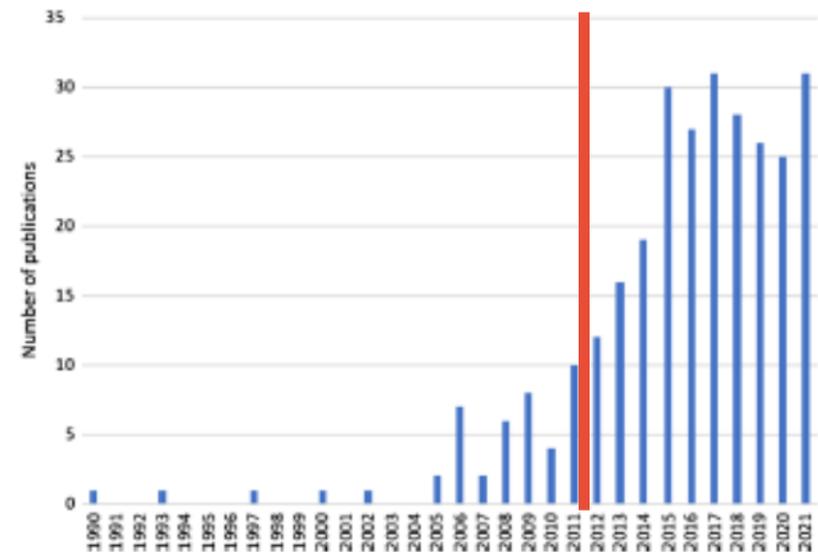
Peter Craig,¹ Cyrus Cooper,² David Gunnell,³ Sally Haw,⁴ Kenny Lawson,⁵ Sally Macintyre,⁶ David Ogilvie,⁷ Mark Petticrew,⁸ Barney Reeves,⁹ Matt Sutton,¹⁰ Simon Thompson¹¹

Since then

- Guidance widely cited (>700)
- Growing interest in the use of natural experiments
- Several other overviews now available

But

- Key concepts and definitions are still debated
- New methods have emerged
- Other developments in design and conduct relevant to natural experimental evaluations



Current Epidemiology Reports

<https://doi.org/10.1007/s40471-022-00288-7>

New guidance - aims and methods

Aims

- Provide a single, integrated, up-to-date guide to the conduct and use of NEEs
- Incorporate a broader range of approaches to natural experimental evaluations than in the previous guidance
- Raise awareness of the range of methods available for evaluating natural experiments
- Provide information to help
 - decision makers decide whether a NEE would be useful
 - journal editors, funders and peer-reviewers assess the strengths and weaknesses of NEE research proposals and papers

Methods

- Convene writing group, advisory group, funders' oversight group
 - International workshops
 - Online consultation
- 

Structure

- **Concepts and definitions**
- **Design and planning**
- Quantitative methods
- Qualitative methods
- Mixed methods
- Critical appraisal and evidence synthesis
- Infrastructure and information governance
- **Good practice considerations**

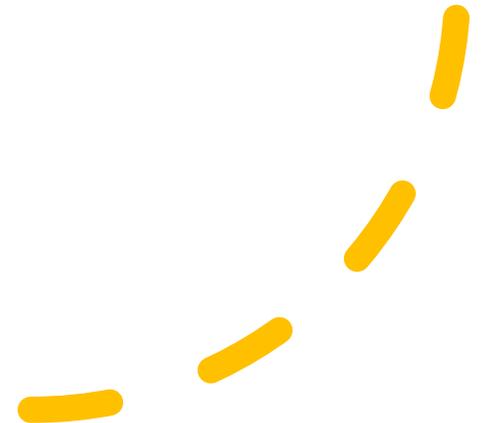
Concepts and definitions

We propose the same broad definition of a **natural experiment**:

an event or process outside the control of a researcher that divides a population into exposed or unexposed subpopulations

So a **natural experimental evaluation**:

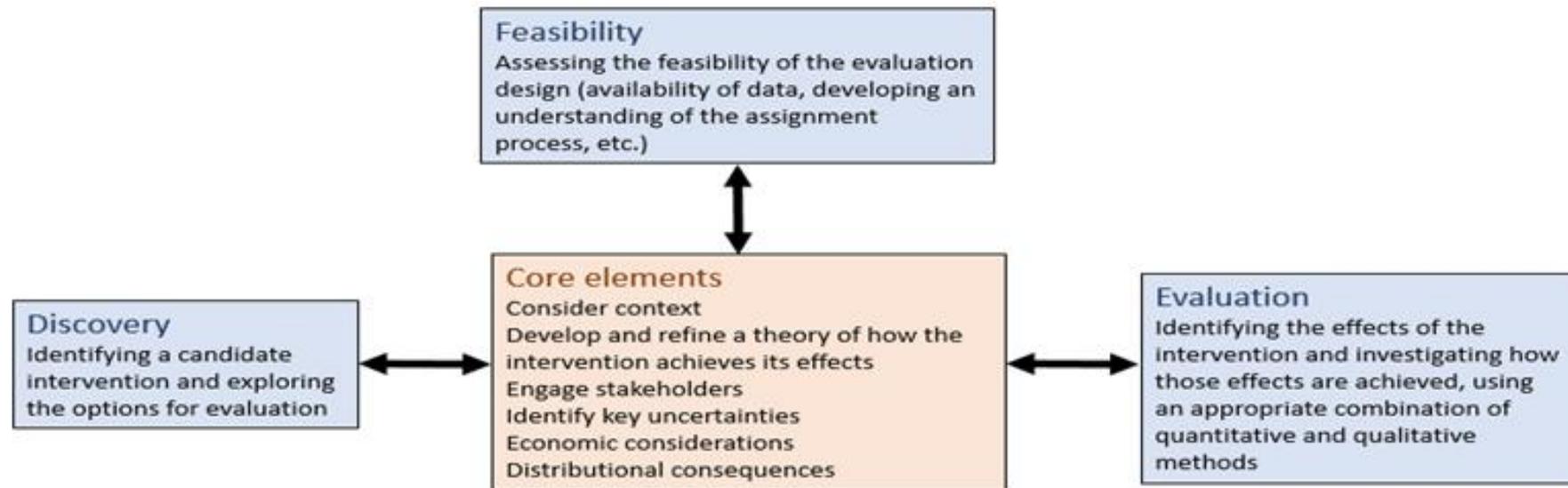
uses an event or process associated with the introduction, delivery or withdrawal of an intervention to evaluate the impact of the intervention on some outcome or range of outcomes



Identifying opportunities for natural experimental evaluations

Type of opportunity	Examples
Difference over time or between places in presence or level of exposure between otherwise similar subpopulations	State level gun control laws in the US; English Teenage Pregnancy Strategy
Eligibility criteria within a policy that identify some units within a population but not others as exposed	Minimum legal age for driving or purchasing alcohol; eligibility rules within social security systems
Phased implementation of a policy across a population in which outcome data is continuously accumulating	Rollout of Universal Credit
Randomisation used as an assignment mechanism within a policy	Vietnam Draft Lottery; housing and education vouchers
Flaws or shortcomings in policy implementation	Database errors and false negative test results in the UK's Test and Trace programme

Designing and planning a natural experimental evaluation



(informed by core elements of the MRC/NIHR framework for development and evaluation of complex interventions)

Good practice

All producers and users of NEEs

understand the design and planning processes, engage stakeholders, recognise the respective strengths of quantitative, qualitative, and integrated analysis approaches

Researchers

be aware of good opportunities for a NEE, use appropriate methods, adopt open science practices, report the NE, NEE and results of all planned analyses

Research funders and commissioners

encourage best practice (i.e. require a protocol, open access publishing, adherence to relevant reporting guidelines), support capacity building (e.g., trusted research environments) and training, make routinely collected data available for NEEs of policies and programmes

Journal editors, policymakers, decisionmakers

provide guidance for authors and reviewers on requirements for reporting NEEs, use evidence from high quality NEEs, incorporate evaluation plans into the implementation of new policies and programmes



Evaluation methods: hierarchy or toolkit?



Craig P, Campbell M, Bauman A, Deidda M, Dundas R, Fitzgerald N et al. Making better use of natural experimental evaluation in population health. *BMJ* 2022; 379 :e070872 doi:10.1136/bmj-2022-070872

Acknowledgements

Project team

University of Glasgow

Professor Peter Craig (PI)
Professor Ruth Dundas
Professor Srinivasa Vittal Katikireddi
Professor Jim Lewsey
Dr Manuela Deidda
Ms Mhairi Campbell

University of Cambridge

Professor Martin White

Professor David Ogilvie

University of Essex

Professor Judith Green

University of Bristol

Professor Frank de Vocht

Funders: NIHR and MRC