

Introducing EMMIE: An evidence rating scale to encourage mixed-method crime prevention synthesis reviews

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Overview

- Systematic Reviews
- Approaches to reviewing
- EMMIE – the need for a mixed approach
- Review of reviews

Systematic Reviews

- Enormous volume of evidence on what works
 - Primary evaluation studies
 - OXO, Quasi-experimental, RCTs

- Systematic Reviews:
 - Find,
 - Sort,
 - Sift, and
 - Synthesize



Rating existing and conducting new reviews

Approaches to evidence synthesis

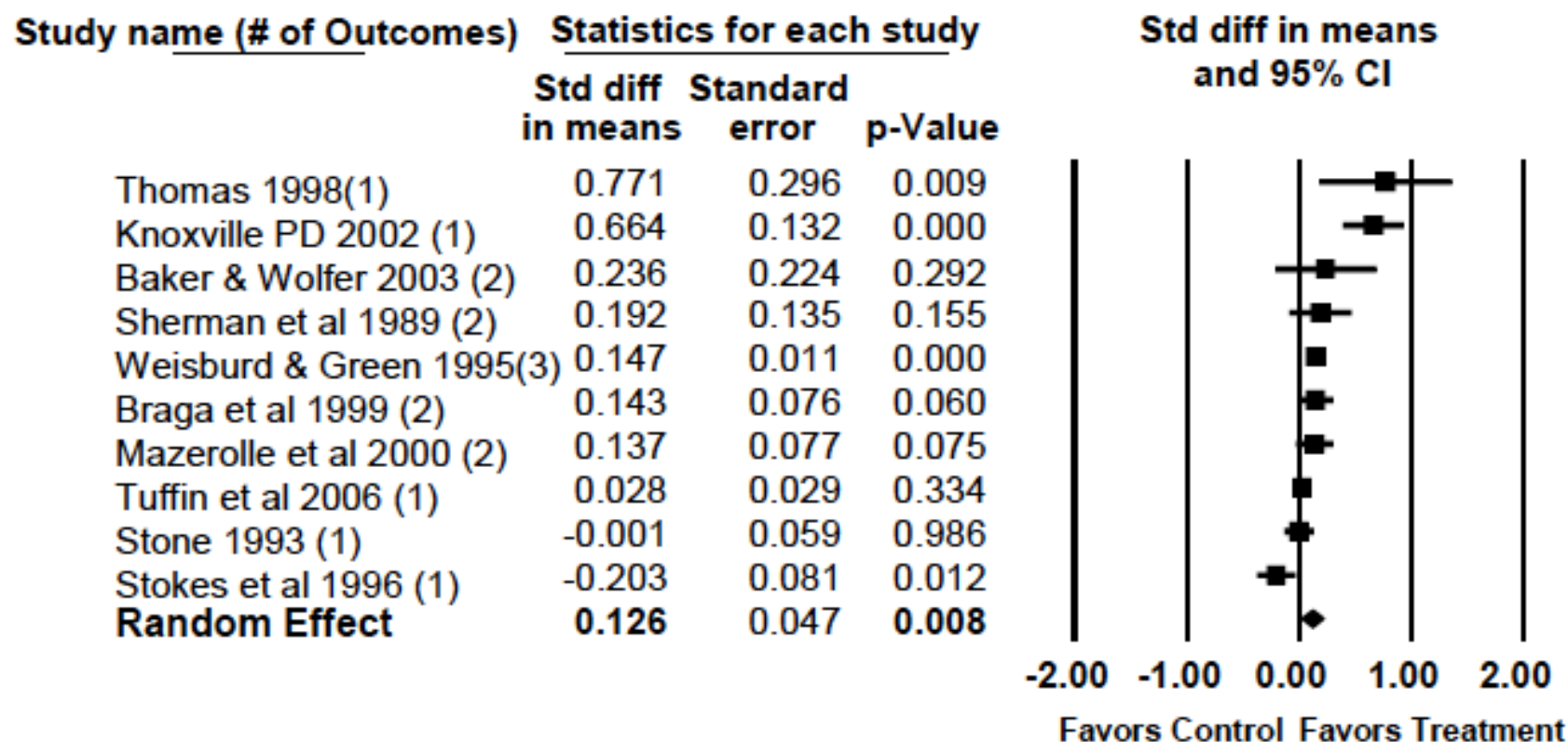
- Cochrane/Campbell – Public health, medicine, education, ...
- Realist reviews

Cochrane and Campbell

Meta-analysis' Overall Quality		
Dimension	Overview	Elements ¹
Methodological Quality	Assesses the extent to which meta-analysis authors were attentive to the methodological quality of the primary studies included in the meta-analysis.	<ul style="list-style-type: none"> • Methodological quality
Main Analysis	Assesses multiple elements related to the quality of the statistical analysis used to calculate and report effect size estimates.	<ul style="list-style-type: none"> • Handling dependent effect sizes • Effect size reporting • Weighting of results • Analysis model • Heterogeneity attentiveness
Eligibility and Search	Assesses the degree to which the meta-analysis provides a clear statement of the inclusion and exclusion criteria for selecting studies to be included, and whether the literature search was comprehensive and not limited to commercial publishers.	<ul style="list-style-type: none"> • Eligibility criteria • Comprehensive literature search • Grey literature search
Reliability, Outliers, and Publication Bias	Assesses methods used in the meta-analysis to extract data from primary studies, account for extreme scores, and account for biases towards large and statistically significant effects in published findings.	<ul style="list-style-type: none"> • Coder Reliability • Outlier Analysis • Publication Bias

¹ Scores for elements in each dimension are combined and then weighted according to their importance to arrive at an Overall Quality score.

Mean Effect Sizes for Experimental and Quasi-Experimental Studies



Strengths and weaknesses of existing approaches to synthesis/ quality assessment

- Advantages
 - Favours evaluations with high quality designs increasing internal validity, construct validity and statistical validity
 - Gives scientific clout to resource allocation
- Drawbacks
 - Dangers in assuming a 'black box'
 - Neglect *how* interventions work
 - Neglect how to implement

“The proper agenda for the next generation of treatment effectiveness research, for both primary and meta-analytic studies, is investigation into which treatment variants are most effective, the mediating causal processes through which they work,”

(Lipsey and Wilson, 1993)

Realist review

Primary objective - what the available evidence can tell us about *how* an intervention might reduce crime, which crimes, under what conditions (where and for whom).

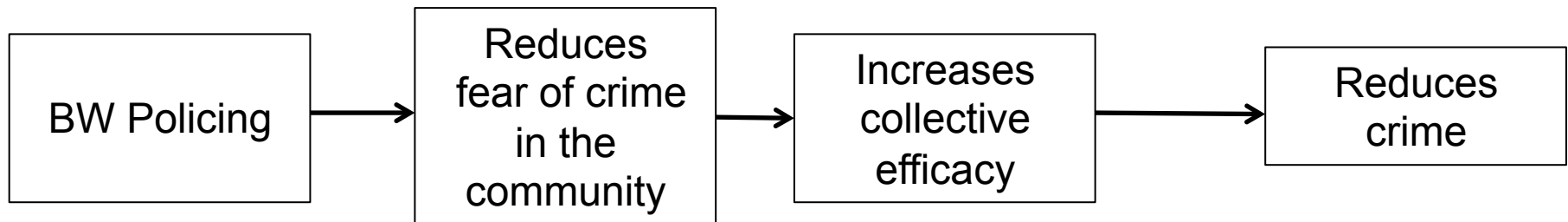
What are the mechanisms? What is necessary to trigger them? How is the intervention implemented?

Testing the Broken Windows Mechanism

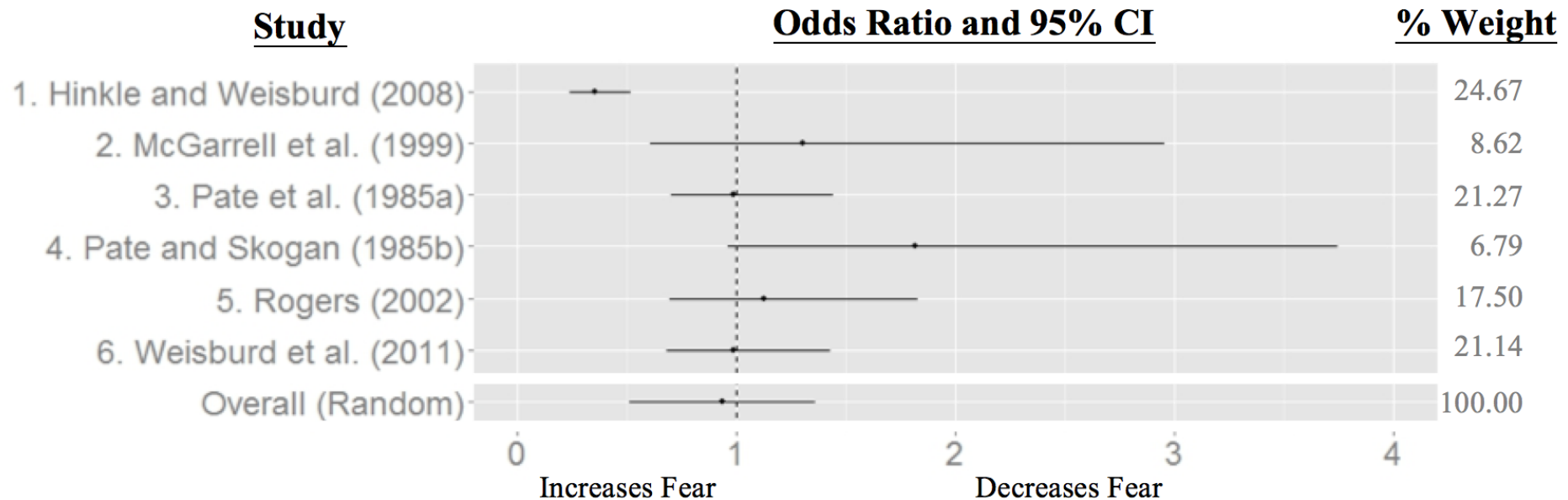
Weisburd et al. (2015)

“The main aim of this paper is to clearly articulate the mechanisms suggested by Wilson and Kelling (1982), to assess whether existing evaluations of disorder policing provide evidence regarding those mechanisms.....”

Simple model



Testing the Broken Windows Mechanism



Introducing a new friend.. EMMIE

Gather evidence and assessing quality on:

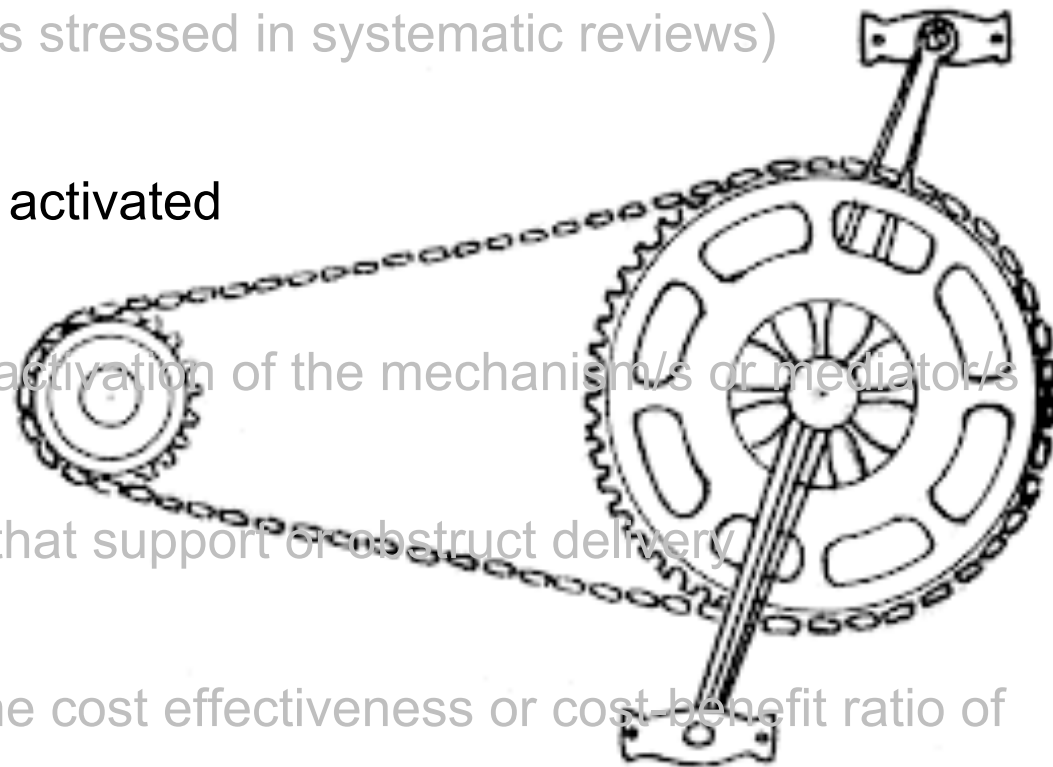
- **Effect**
 - Effect direction and size (as stressed in systematic reviews)
- **Mechanism**
 - Mechanism/s or mediator/s activated
- **Moderator**
 - Moderators or contexts for activation of the mechanism/s or mediator/s
- **Implementation**
 - Implementation conditions that support or obstruct delivery
- **Economic**
 - Economic assessment of the cost effectiveness or cost-benefit ratio of what is delivered



Introducing a new friend.. EMMIE

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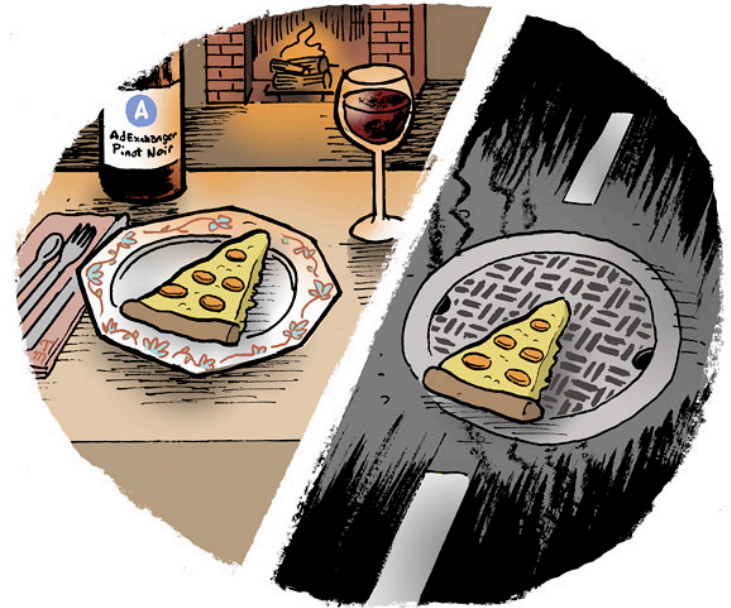
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Introducing a new friend.. EMMIE

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

[Our effect scale](#)

[Our quality scale](#)

[About the Crime Reduction Toolkit](#)

Key

Quality of evidence































	No information
	Limited quality
	Moderate quality
	Strong quality
	Very strong quality

Filters

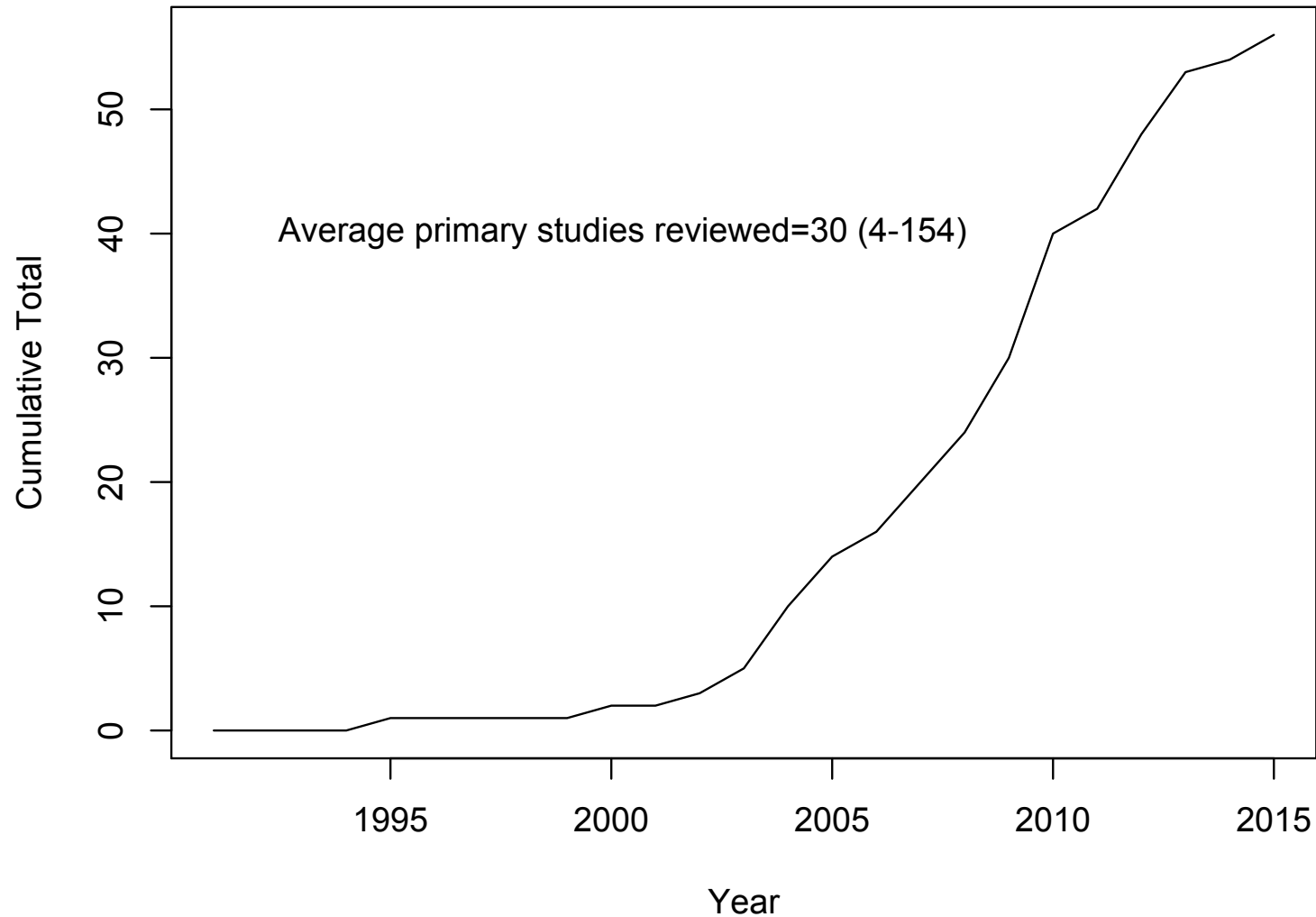
Impact on Crime

(select a range using the markers below)

Crime Reduction Toolkit

Intervention 	Impact on crime  Effect	How it works  Mechanism	Where it works  Moderator	How to do it  Implementation	What it costs  Economic cost	
Alcohol ignition interlock						
Alcohol tax and price policies						
CCTV						
NEW Cognitive Behavioural Therapy (CBT) for Domestic Violence						

Sample to date





Effect Size (EMMIE)

Theme	Components (where appropriate)	Example sources
A transparent and well-designed search strategy*		Higgins & Green (2011)
High statistical conclusion validity (at least four of the following are necessary for a study to be considered sufficient)*	<ul style="list-style-type: none"> -Calculation of appropriate effect sizes -The analysis of heterogeneity -Use of a random effects model where appropriate -Attention to the issue of dependency -Appropriate weighting of individual effect sizes in the calculation of mean effect sizes 	Lipsey & Wilson (2001) Borenstein et al. (2009) Borenstein et al. (2011) Hedges et al. (2010) Lipsey & Wilson (2001)
Sufficient assessment of the risk of bias (at least two necessary for sufficient consideration)*	<ul style="list-style-type: none"> -Assessment of potential publication bias -Consideration of inter-rater reliability -Consideration of the influence of statistical outliers 	Hedges & Vevea (1996) Stock et al. (1982) Hufcutt & Arthur (1995) Petticrew & Roberts (2006)
Attention to the validity of the constructs, with only comparable outcomes combined and/or exploration of the implications of combining outcome constructs.*		
Assessment of the influence of study design (e.g. separate overall effect sizes for experimental and quasi-experimental design)		Bryant & Wortman (1984)
Assessment of the influence of unanticipated outcomes or spin-offs on the size of the effect (e.g. quantification of displacement or diffusion of benefit)		

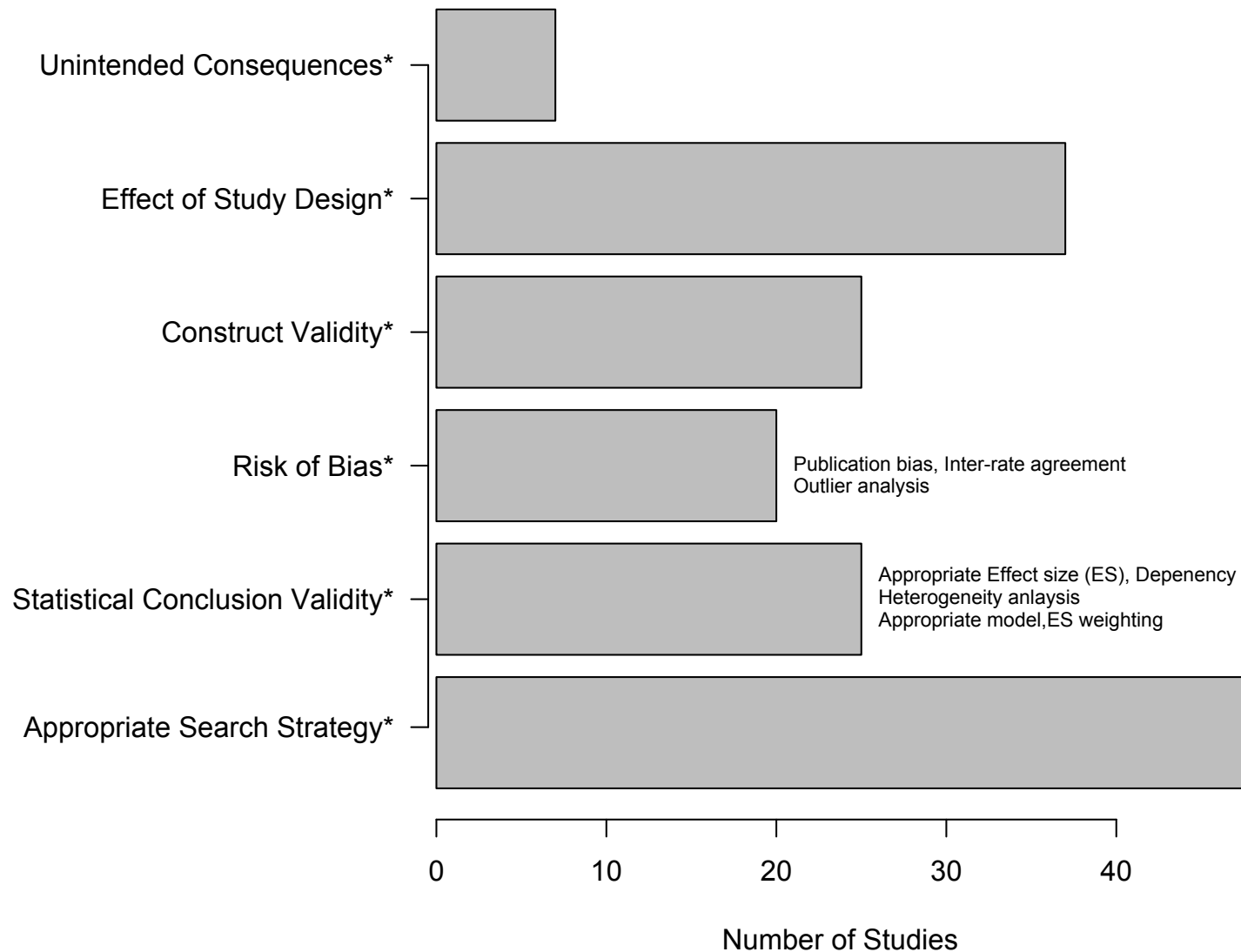


Effect Size (EMMIE)

EMMIE component	EMMIE-E (evidence itself)	EMMIE-Q scoring
Effect	<p>Effect Size</p> <p>Moderator analysis</p> <p>Measurement/ consideration of unanticipated effects</p>	<p>0. Insufficient consideration of validity elements listed above (in Table 1)</p> <p>1: Sufficient consideration of one *element of validity</p> <p>2: Sufficient consideration of two *elements of validity</p> <p>3: Sufficient consideration of three or four *elements of validity</p> <p>4: Sufficient consideration of five or six elements of validity (including all of those marked with an *)</p>

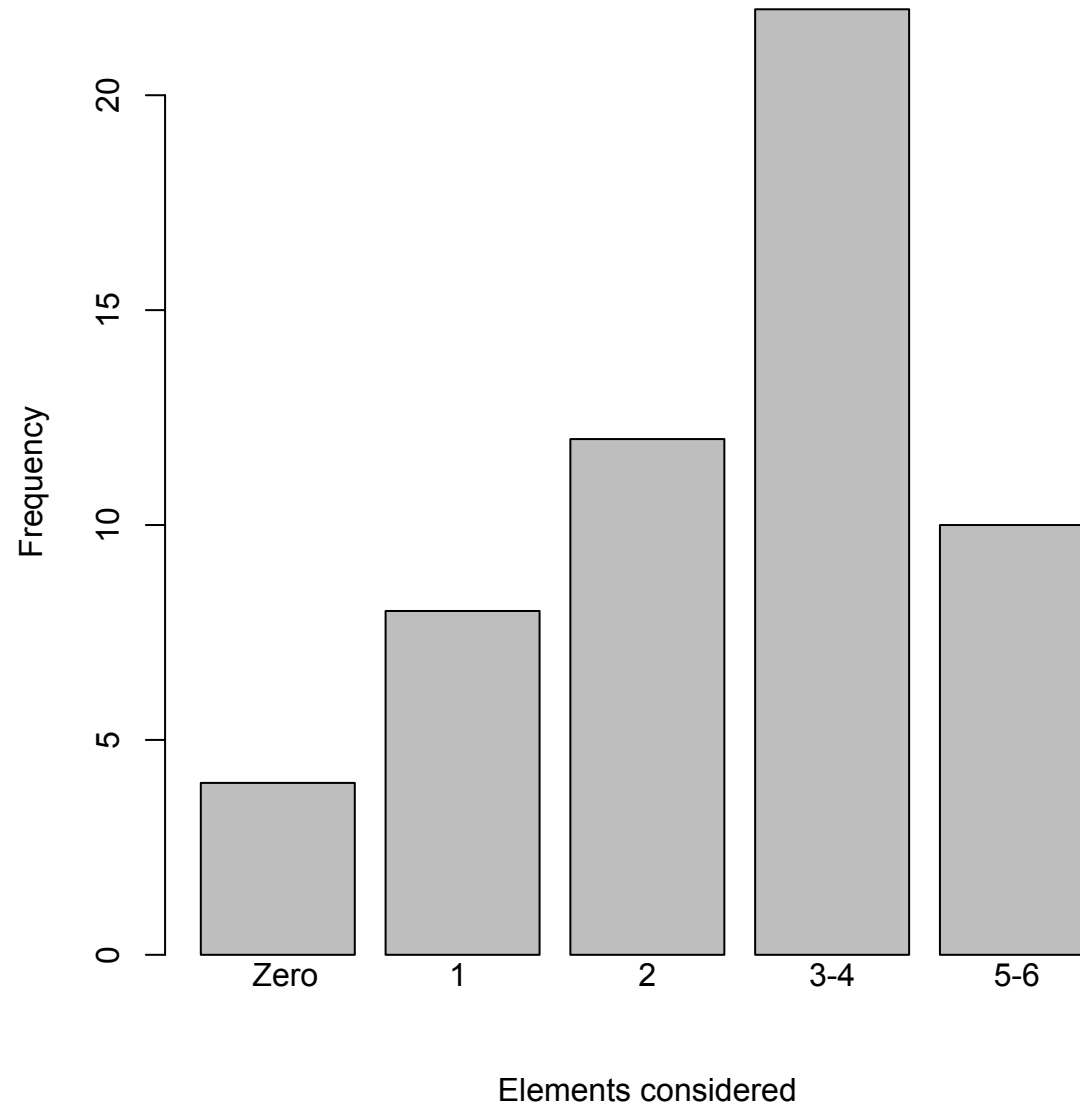


Effect Size (EMMIE)



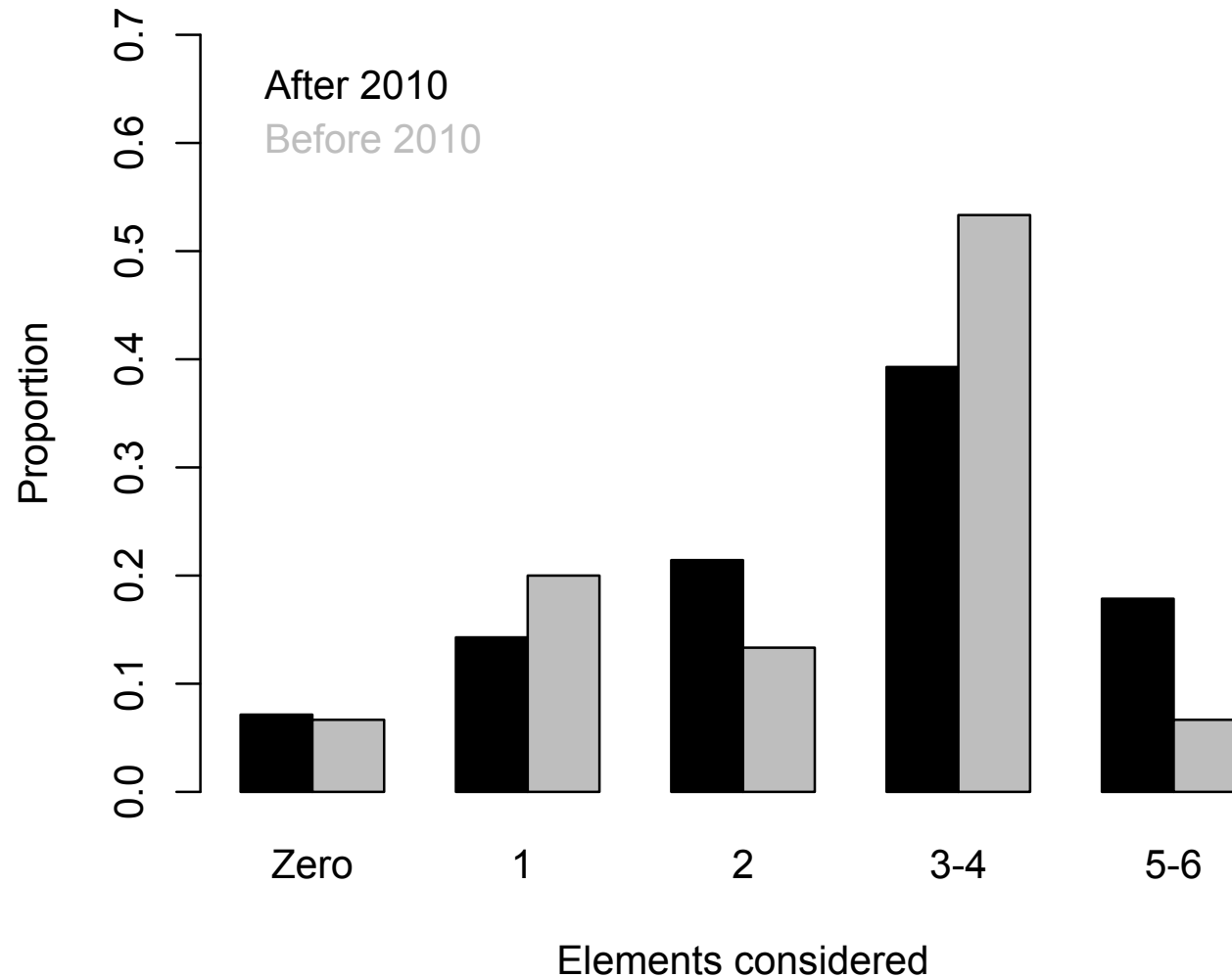


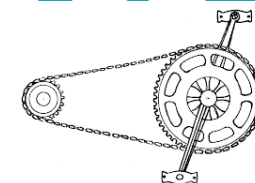
Effect Size (EMMIE)





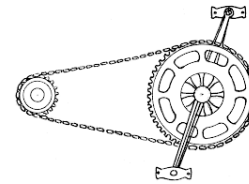
Effect Size (EMMIE)



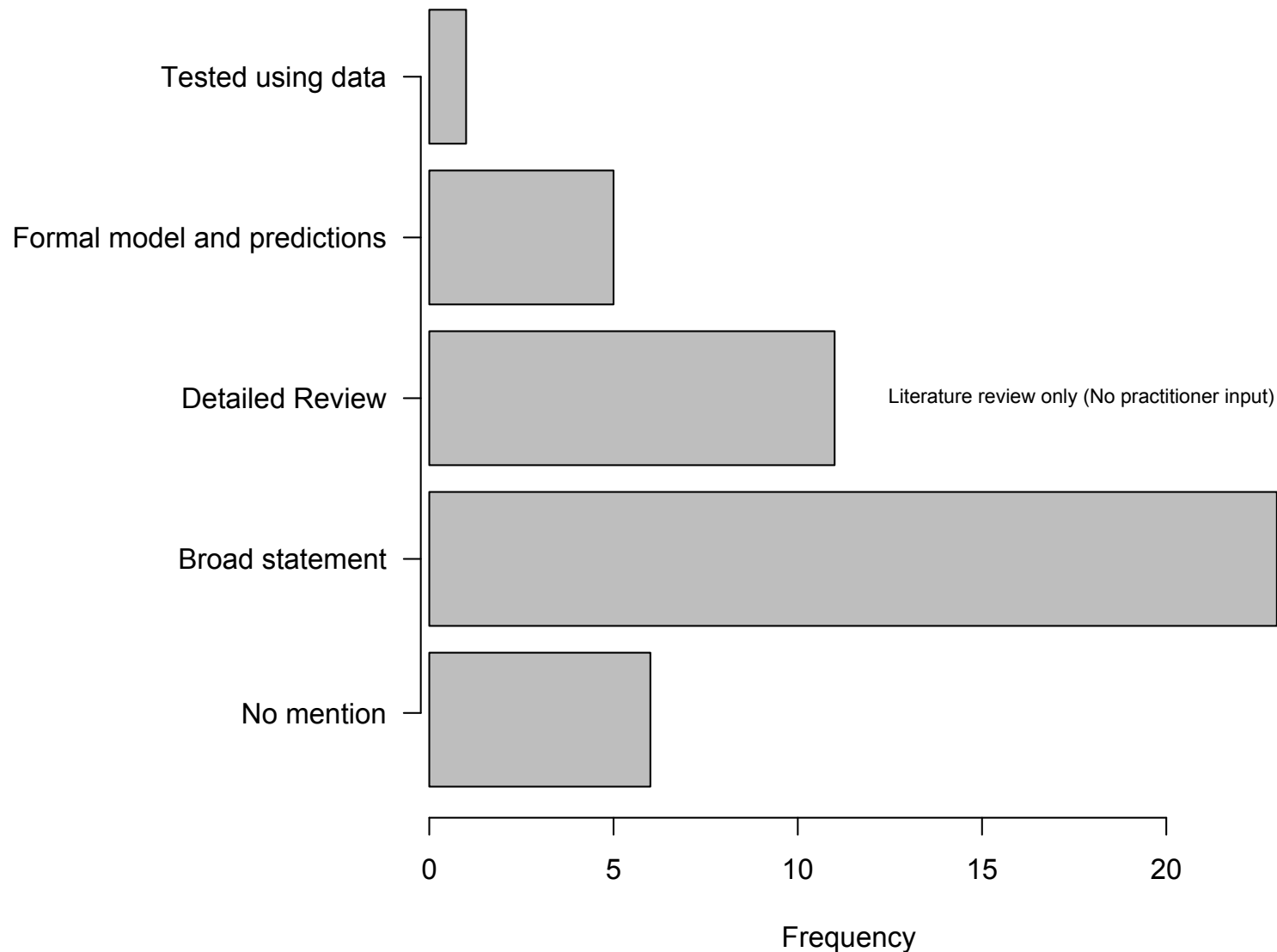


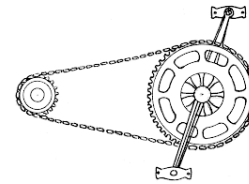
Mechanisms (EMMIE)

EMMIE component	EMMIE-Q scoring
Mechanism/ Mediator	<p>0. No reference to theory - simple black box</p> <p>1: Broad statement of assumed program theory stated (mechanisms and/or processes)</p> <p>2: Detailed articulation of theory, based on interrogation of relevant literature and/or elicited from practice.</p> <p>3: Formalization of theory and derivation of precise predictions from it</p> <p>4: Test, corroboration, falsification and refinement of theories, using data assembled for the purpose.</p>

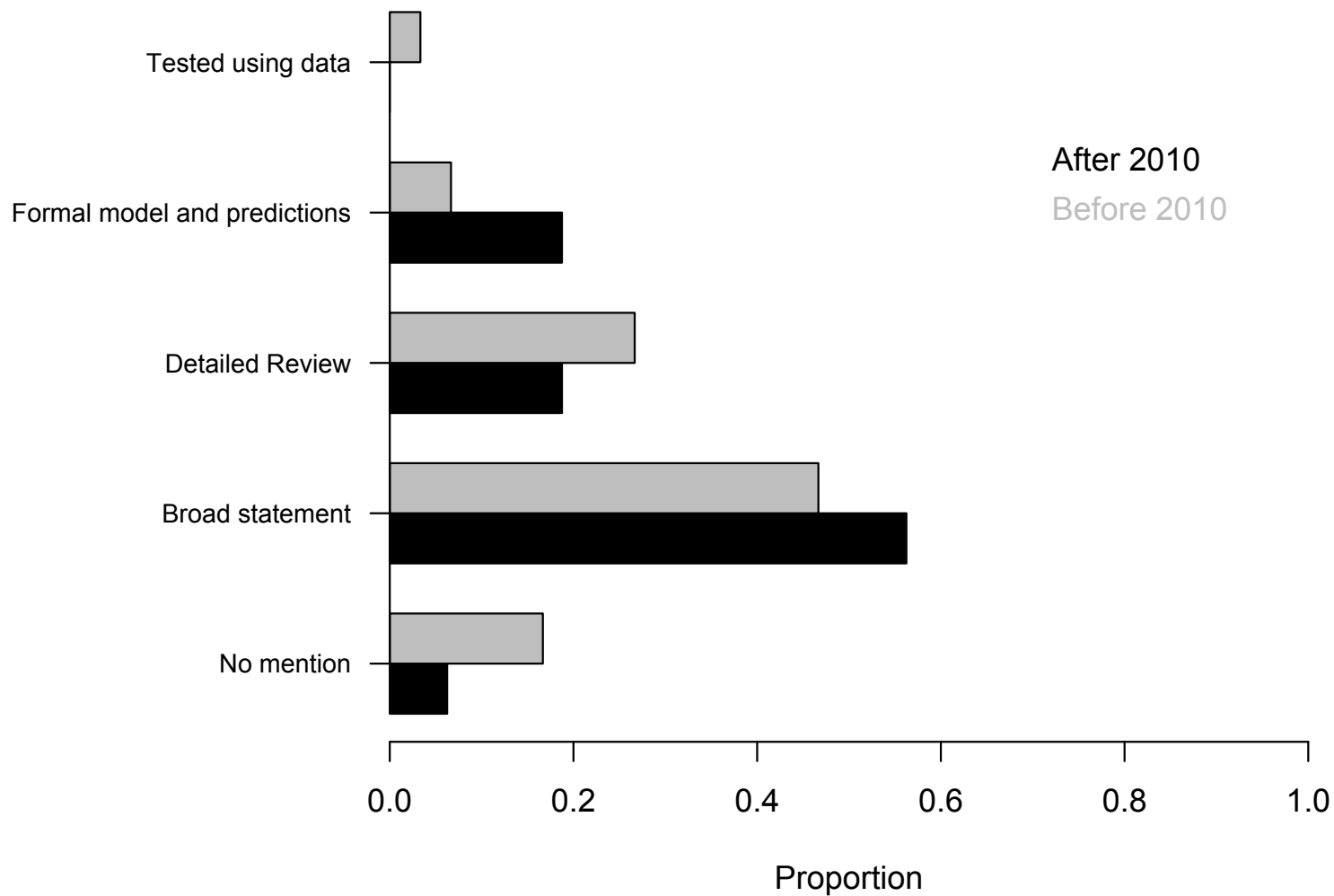


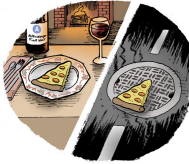
Mechanisms (EMMIE)





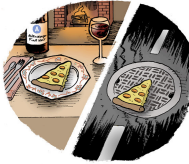
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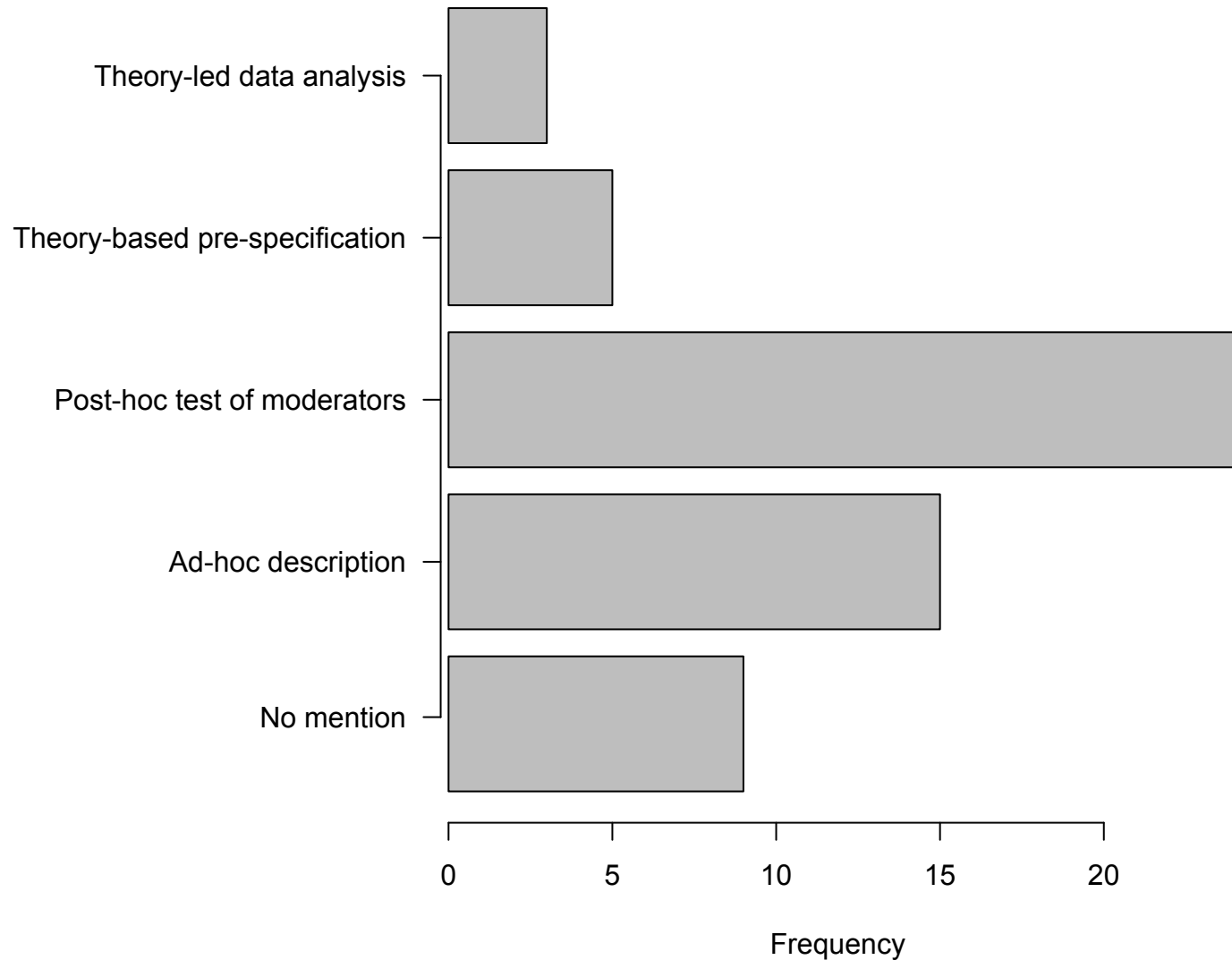


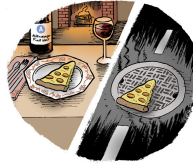
Moderators (EMMIE)

EMMIE component	EMMIE-Q scoring
Moderator/Context	<p>0: No reference to condition contexts or moderators that may be significant for activation of mediators or mechanisms</p> <p>1: Ad hoc description of possible relevant moderators or contexts</p> <p>2: Tests of the effects of moderators or mechanisms defined post hoc using variables that are at hand</p> <p>3: Theory-based pre-specification of expected moderators and mediators relevant to the activation of mediators or mechanisms</p> <p>4. Collection and analysis of relevant data relating to the pre-specified expected moderators and contexts.</p>

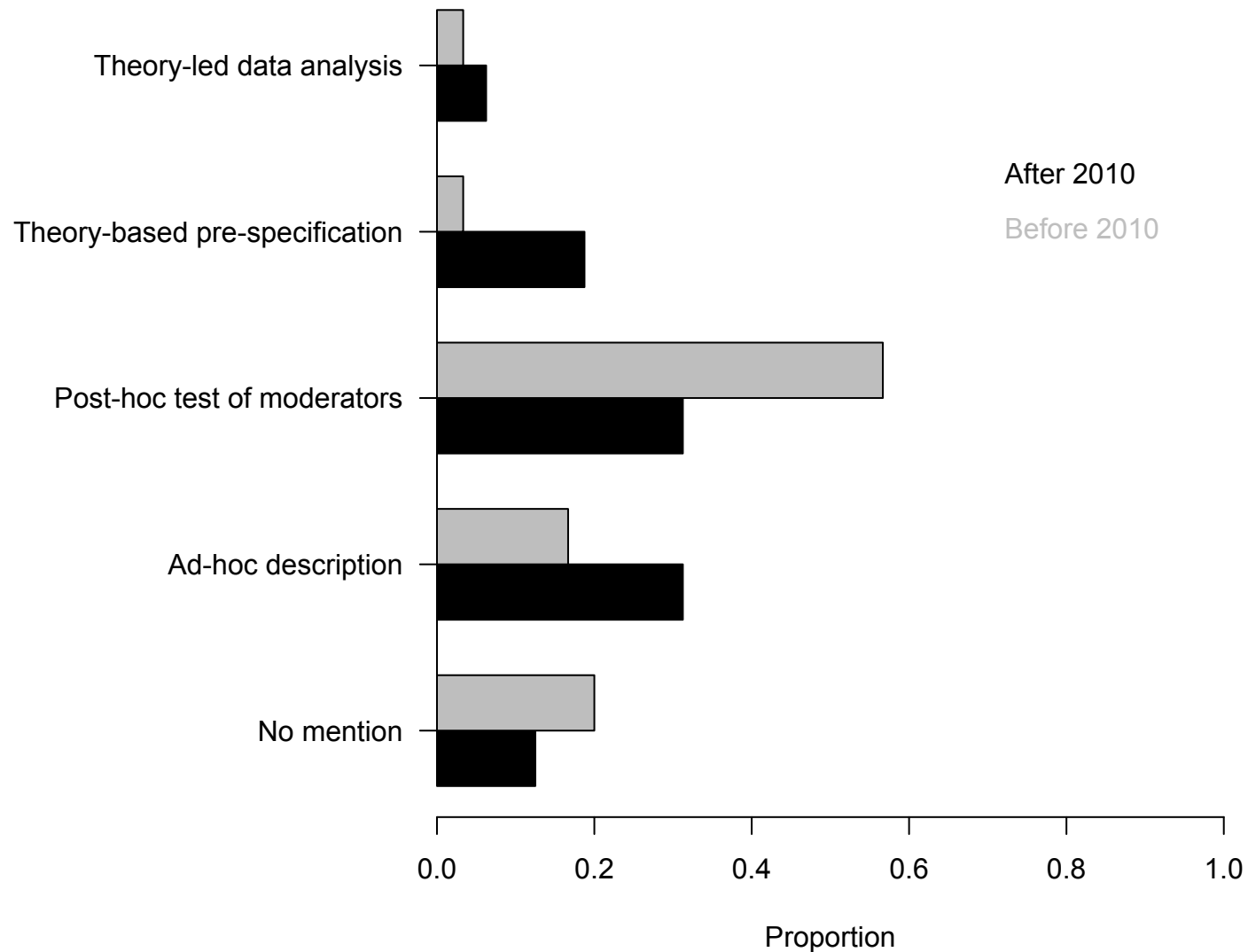


Moderators (EMMIE)





Moderators (EMMIE)



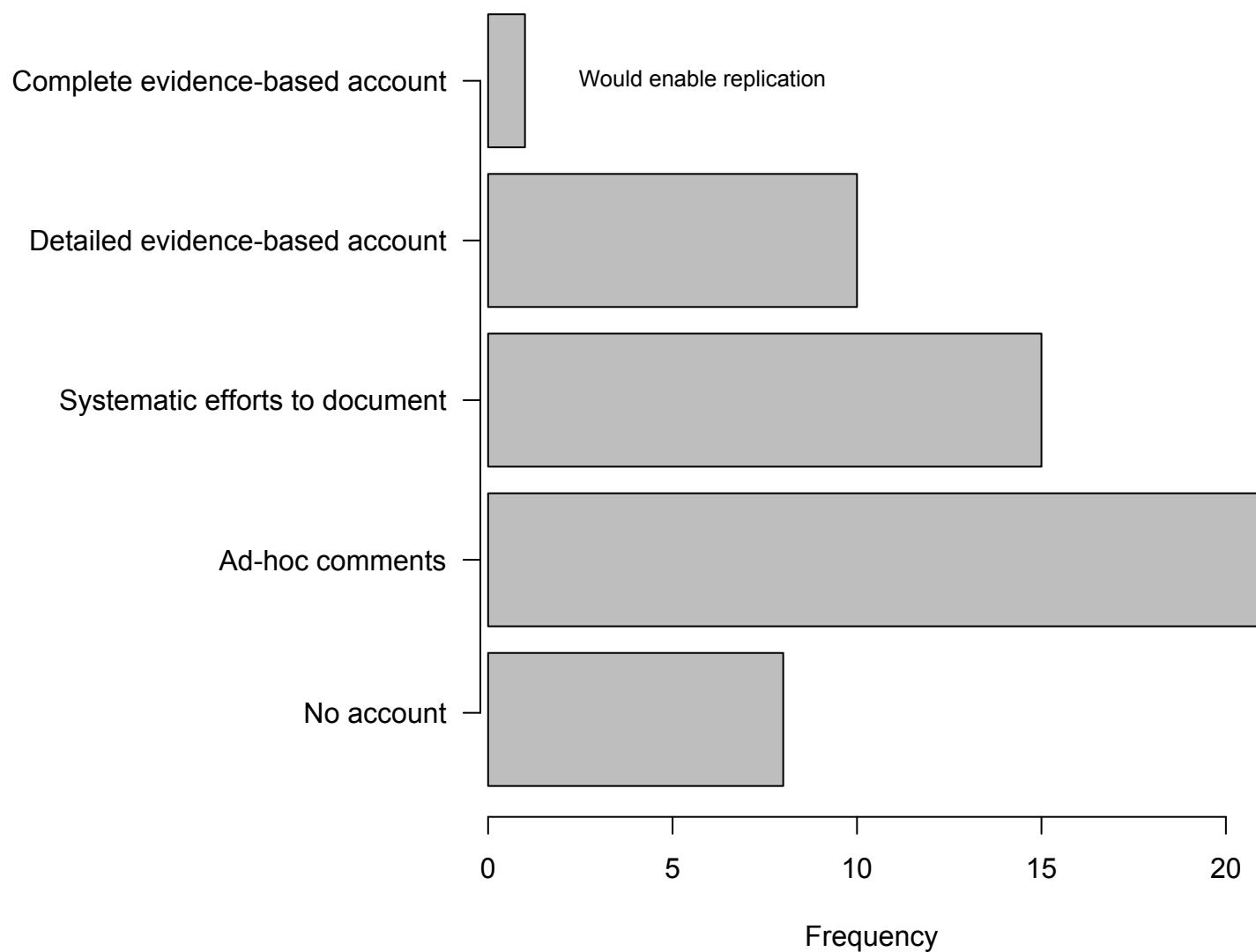


Implementation (EMMIE)

EMMIE component	EMMIE-Q scoring
Implementation	<p>0: No account of implementation or implementation challenges</p> <p>1: Ad hoc comments on implementation</p> <p>2: Systematic efforts to document implementation issues</p> <p>3: Detailed evidence-based account of expected levels of fidelity to program, policy or treatment plans</p> <p>4: Complete evidence-based account of expected levels of fidelity to program, expected obstacles and specification of elements necessary for replication elsewhere.</p>

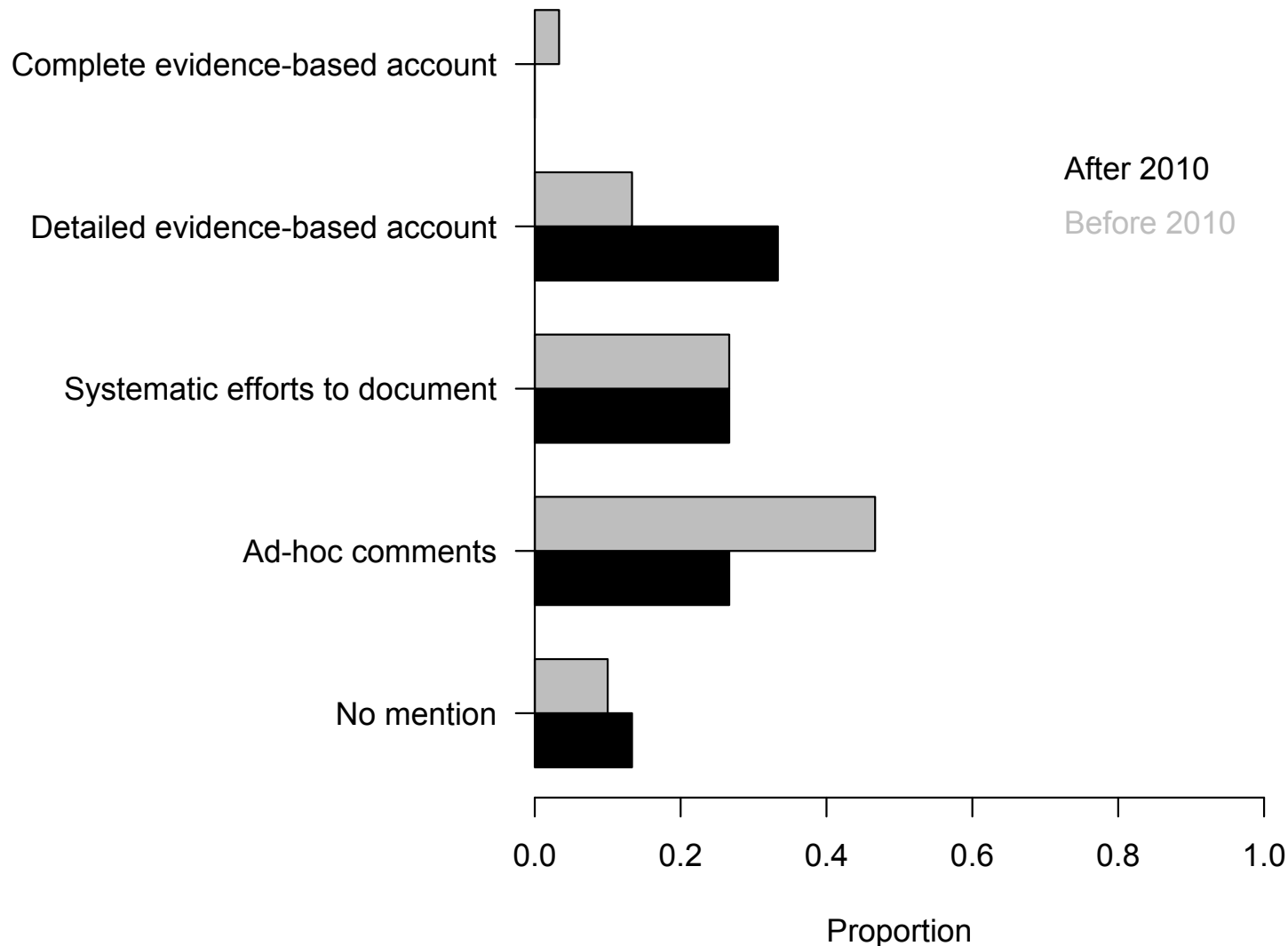


Implementation (EMMIE)





Implementation (EMMIE)





Economic Analysis (EMMIE)

- Direct costs
 - Explicit costs (e.g. staff, supplies, space etc)
- Indirect costs
 - Lost time, supervision, knock on effects to business etc
- Intangible costs
 - Quality of life
- Marginal costs
 - Cost of an additional unit of output/outcome

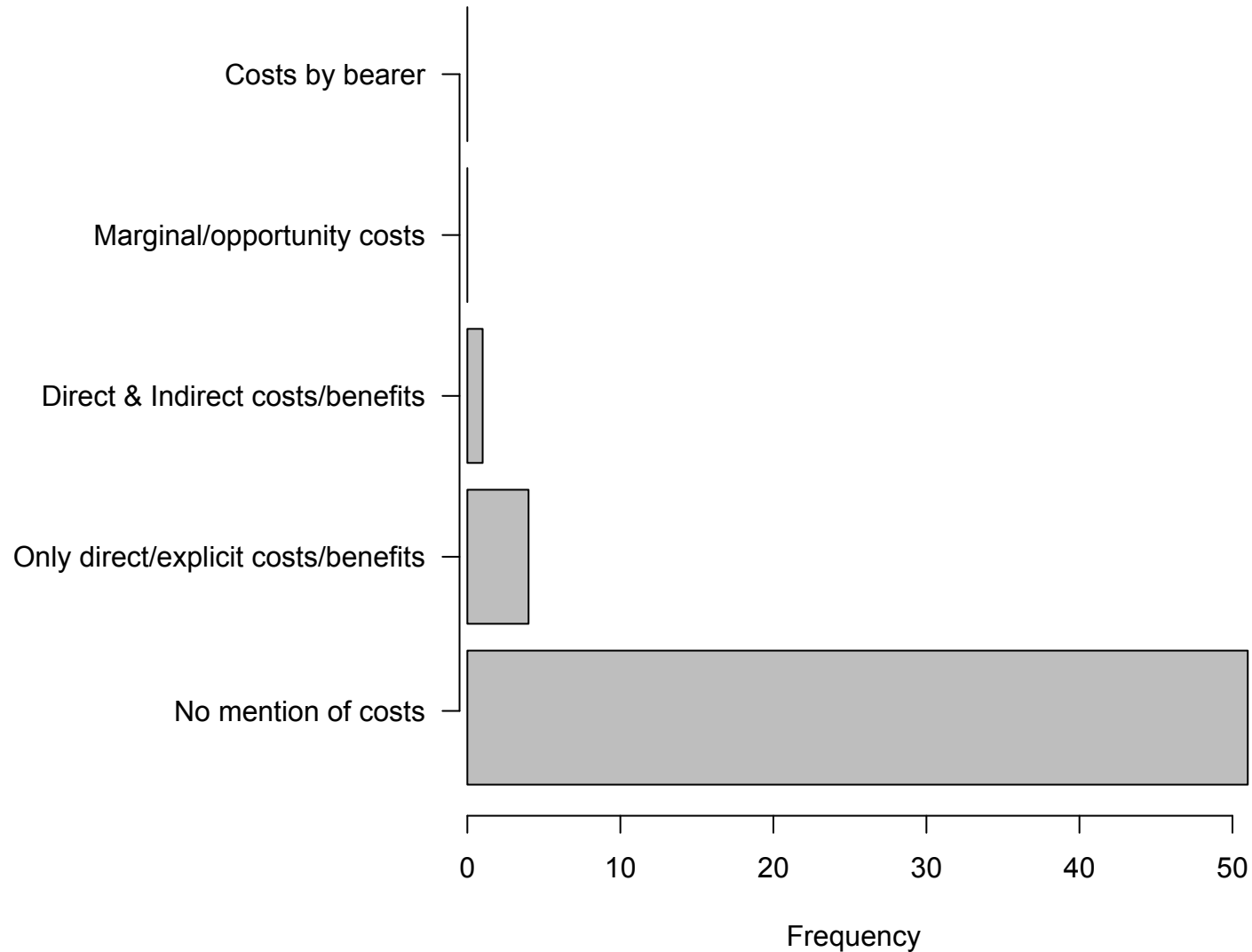


Economics (EMMIE)

EMMIE component	EMMIE-Q scoring
Economic	<p>0: No mention of costs (and/or benefits)</p> <p>1: Only direct or explicit costs (and/or benefits) estimated</p> <p>2: Direct or explicit and indirect and implicit costs (and/or benefits) estimated</p> <p>3: Marginal or total or opportunity costs (and/or benefits) estimated</p> <p>4: Marginal or total or opportunity costs (and/or benefits) by bearer (or recipient) estimated</p>



Economics (EMMIE)



Costing Tool

COSTS	Costs of Implementation (total costs)	Predicted costs notes/assumptions	Who bears the costs?	Optimism bias correction (%)	Costs (without inflation and discount)	Annual Costs	Best-case Estimate	Worst-case Estimate
Capital Costs								
Plant and Equipment								
<i>Purchasing plant and equipment</i>								
<i>Purchasing 1</i>	£ 22,300		Police	0%	£ 22,300	£4,460	£4,460	£4,460
<i>Set up expenses</i>								
<i>Set up expenses 1</i>	£ 48,687		Police	20%	£ 58,424	£11,685	£11,685	£11,685
Operating Costs								
Intervention-related staffing expenses								
<i>Hiring New Staff</i>								
<i>Hiring New Staff 1</i>	£ 72,500		Police	0%	£ 72,500	£15,225	£13,804	£16,646
<i>Hiring New Staff 2</i>	£ 80,086		Police	10%	£ 88,095	£18,500	£16,569	£20,430
<i>Wages for Existing Employee</i>								
<i>Wages for Existing Employee 1</i>	£ 43,888		Police	0%	£ 43,888	£9,216	£8,356	£10,077
Other administrative expenses								
<i>Utilities</i>								
<i>Utilities 1</i>	£ 10,200		Police	0%	£ 10,200	£2,040	£1,861	£2,219
<i>Cost of Maintenance</i>								
<i>Cost of Maintenance 1</i>	£ 27,060		Police	0%	£ 27,060	£5,412	£4,938	£5,886
Indirect Costs								
<i>Indirect Costs 1</i>	£ 20,263		Business	20%	£ 24,316	£4,863	£3,705	£6,021
Intangible Costs								
<i>Intangible Costs 1</i>	£ 7,000		Society	40%	£ 9,800	£1,960	£1,644	£2,276
TOTAL COSTS						£ 73,361	£ 67,023	£ 79,699

Summary

- Need to improve the primary evidence base
- Use EMMIE as guidance
 - CONSORT for RCTs in medicine
 - AMSTAR for SRs in medicine

Introducing EMMIE: an evidence rating scale to encourage mixed-method crime prevention synthesis reviews

Shane D. Johnson¹ • Nick Tilley¹ • Kate J. Bowers¹

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Abstract

Objectives This paper describes the need for, and the development of, a coding system to distil the quality and coverage of systematic reviews of the evidence relating to crime prevention interventions. The starting point for the coding system concerns the evidence needs of policymakers and practitioners.

Methods The proposed coding scheme (EMMIE) builds on previous scales that have been developed to assess the probity, coverage and utility of evidence both in health and criminal justice. It also draws on the principles of realist synthesis and review.