



Online Workshop: Qualitative Research Synthesis

Session 4:

Combining quantitative and qualitative evidence in systematic reviews: why, how and when?

James Thomas, PhD

EPPI-Centre, SSRU, University College London

A webinar sponsored by SEDL's Center on
Knowledge Translation for Disability and Rehabilitation Research (KTDRR)

800-266-1832 | www.ktdrr.org

Copyright ©2015 by SEDL, an Affiliate of American Institutes for Research. All rights reserved.

Funded by NIDRR, US Department of Education, PR# H133A120012. No part of this presentation may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from SEDL (4700 Mueller Blvd., Austin, TX 78723), or by submitting an online copyright request form at www.sedl.org/about/copyright_request.html. Users may need to secure additional permissions from copyright holders whose work SEDL included after obtaining permission as noted to reproduce or adapt for this presentation.

Combining quantitative and qualitative evidence in systematic reviews: why, how and when?

James Thomas

Webinar for: Center on Knowledge
Translation for Disability and
Rehabilitation Research (KTDRR)

The EPPI-Centre is part of the Social Science Research Unit at the Institute of
Education, University College London, UK¹



Outline

- Why integrate different types of literature in a systematic review? – the policy context
- Mixed methods primary research & systematic reviews
- Examples

What is the problem?

THE POLICY CONTEXT

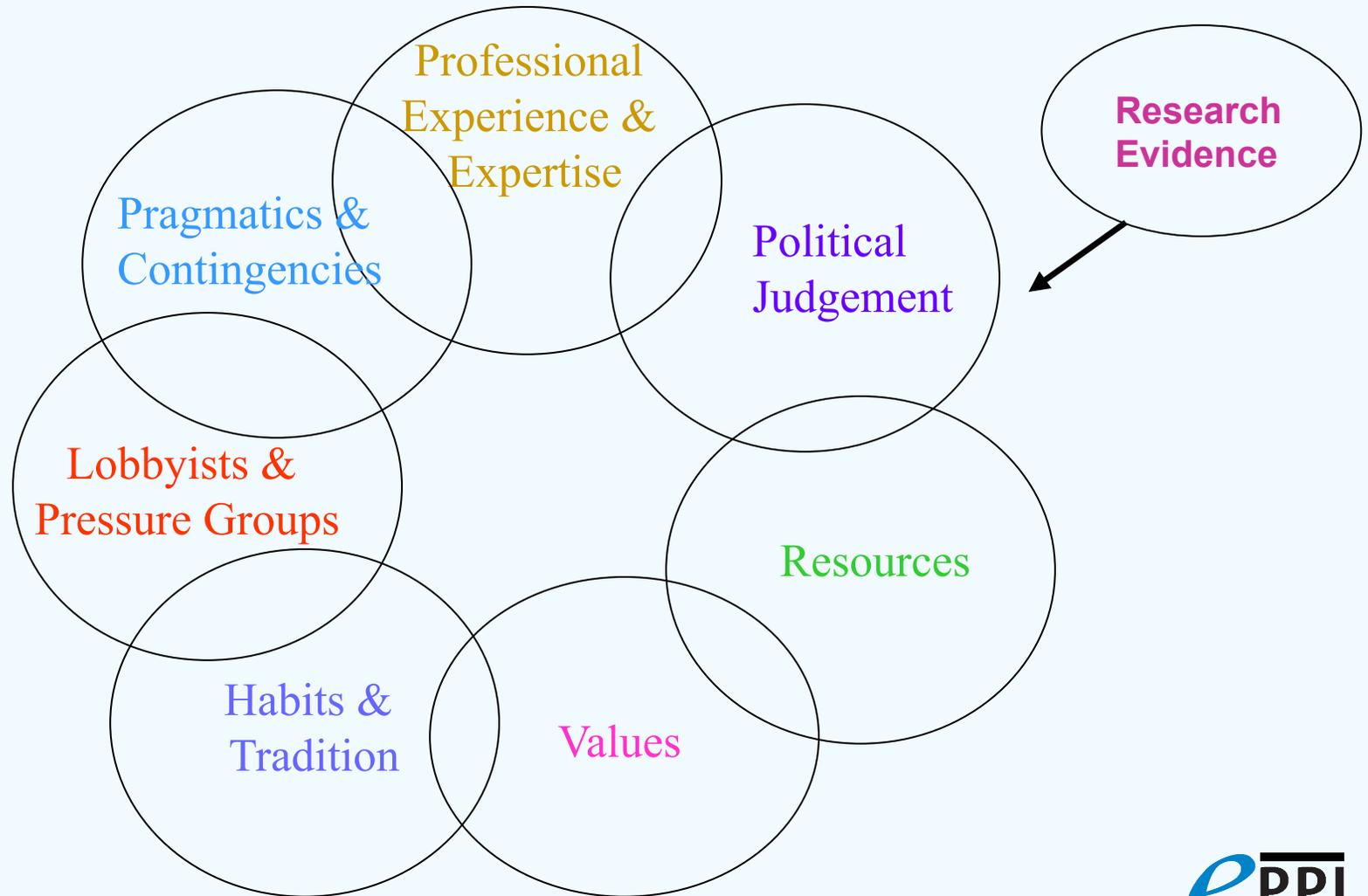
Example context: the Department of Health (DH) health promotion & public health reviews facility

- Since 1995 our aim has been to address the needs of DH Policy Research Programme:
 - Knowledge base of high quality research for policies directed at improving population health and wellbeing and reducing inequalities
 - Ensure that policy decision-making can be informed by 'all available and robust scientific evidence'



Research often just one small factor:

adapted from Davies, P. 'Is Evidence-Based Government Possible?' Campbell Collaboration, Jerry Lee Lecture, 2004



Research evidence for policy and practice

“...policy makers and practitioners who intervene in the lives of other people not infrequently do more harm than good”

— Chalmers I (2003) Trying to do more good than harm in policy and practice: the role of rigorous, transparent, up to date, replicable evaluation. Paper commissioned for the *Annals of the American Academy of Political and Social Science*.

Baby and Child Care (Dr Benjamin Spock)

The paperback second edition (1957) of the book by Dr Benjamin Spock: “*Baby and Child Care*” has a familiar yellow and blue cover with a smiling baby. Text under the picture declares: “The most widely recommended handbook for parents ever published—Authoritative, illustrated, indexed. Over 19,000,000 copies sold.”

Originally published in 1946 with the title, *The Common Sense Book of Baby and Child Care*, by the time Dr. Spock died in 1998, over 50,000,000 copies of seven editions had been sold. (Maier, 2003, as cited in Wikipedia).

Baby and Child Care (cont.)

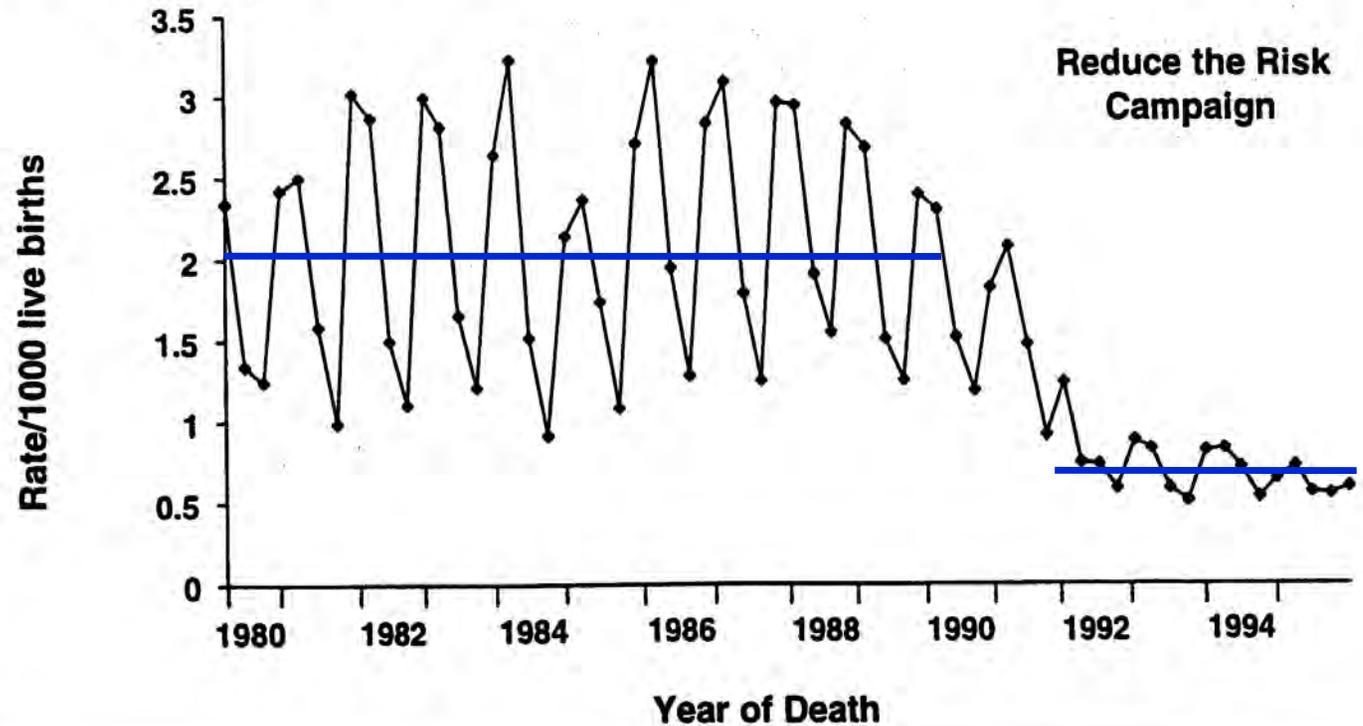
“I think it is preferable to accustom a baby to sleeping on his stomach from the start if he is willing. He may change later when he learns to turn over.”

(Spock, 1946)

‘Reduce the Risk’ Campaign in the early 1990s in the UK

“The risk of cot death is reduced if babies are **NOT** put on the tummy to sleep. Place your baby on the back to sleep. ...Healthy babies placed on their backs are not more likely to choke.”

Figure 3: Sudden Infant Death (SID) incidence (live birth to one year) by quarter. England and Wales 1980-1995



Graph which shows the decrease in Sudden Infant Death incidence after the implementation of the “Reduce the Risk” campaign

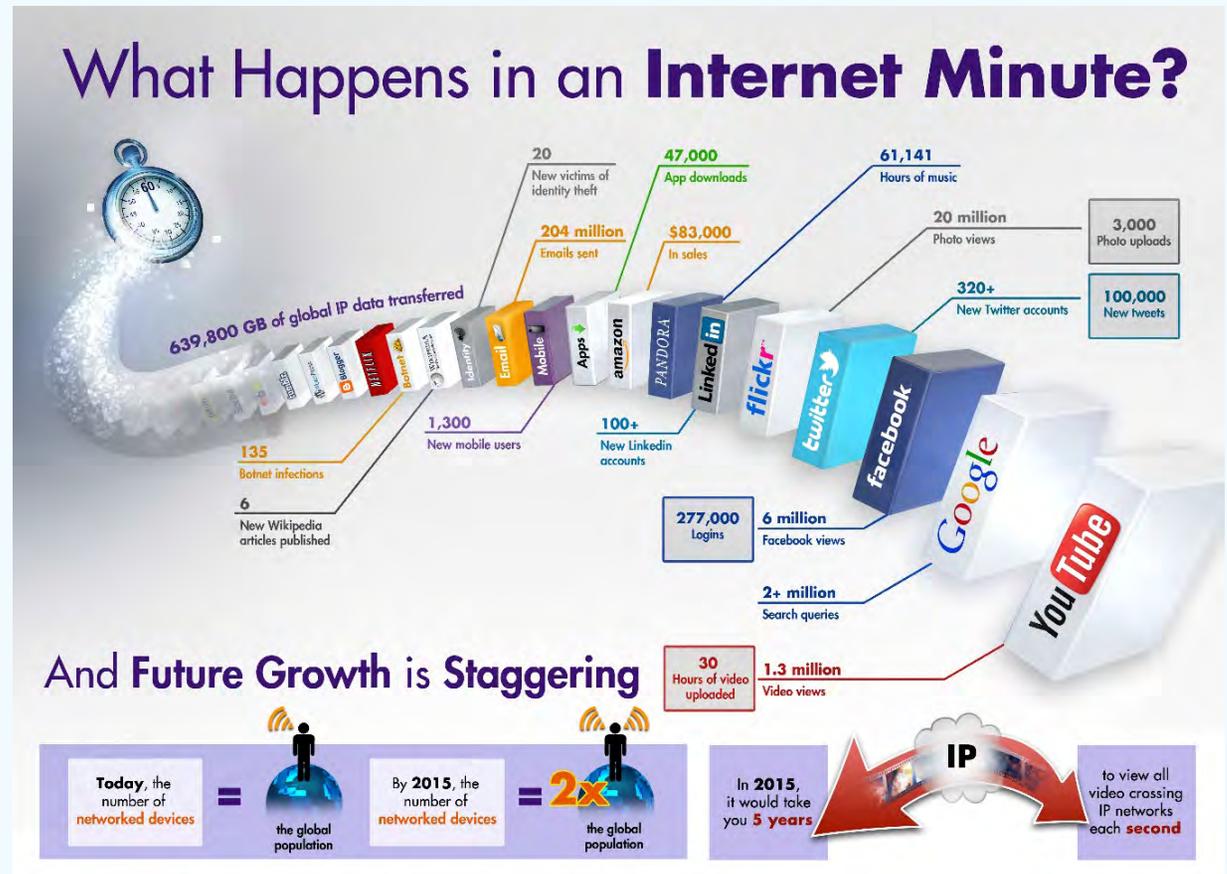
Being evidence-based

- It's the... conscientious, explicit and judicious use of current best evidence in making decisions...

Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS (1996).
"Evidence based medicine: what it is and what it isn't". *BMJ* **312** (7023): 71–2

How can we be evidence-based?

- Where research evidence is able to, it should be used to inform decision-making
- How can we make sense of all the data available?
There's so much!
- Systematic reviews of research



http://upload.wikimedia.org/wikipedia/commons/5/54/Internet_Minute_Infographic.jpg (Creative Commons license)

Rationale for systematic reviews

- “instead of just mooching through the research literature, consciously or unconsciously picking out papers here and there that support [our] pre-existing beliefs, [we] take a scientific, systematic approach to the very process of looking for scientific evidence, ensuring that [our] evidence is as complete and representative as possible of all the research that has ever been done.”
- Goldacre B. Bad Pharma: How drug companies mislead doctors and harm patients
Fourth Estate; 2012

Reviewing Public Health (PH) research is challenging, because...

- Three reasons:
 - Complexity of context
 - Complexity of questions asked
 - ‘complexities’ caused by the data

Complexity in context / intervention

- Complicated complex
- Complex complex

A complex intervention

- Defined in MRC guidance as: “interventions with several interacting components... Many of the extra problems relate to the difficulty of standardising the design and delivery of the interventions, their sensitivity to features of the local context, the organisational and logistical difficulty of applying experimental methods to service or policy change, and the length and complexity of the causal chains linking intervention with outcome.”
- Craig P et al (2008): Developing and evaluating complex interventions: the new Medical Research Council guidance. *BMJ* 337

Some would say the above is merely *complicated*...

Complicated and complex

- Truly complex interventions are best conceptualised as dynamic processes
 - Virtuous circles
 - Feedback loops
 - Non-linear step changes in responses / outcomes
 - Multiple ‘routes’ to effectiveness
- Rogers PJ. Using Programme Theory to Evaluate Complicated and Complex Aspects of Interventions. *Evaluation*. 2008;14(1):29-48

Reviewing Public Health (PH) research is challenging, because...

- Three reasons:
 - Complexity of context
 - Complexity of questions asked
 - ‘complexities’ caused by the data

Complex / compound questions

- E.g.: questions about interventions that require mixed methods to answer
 - To what extent and in what ways does the person who delivers the intervention affect the outcomes attained?
 - Who does this intervention work for, and why?
 - What works to achieve outcome x – for whom, in what circumstances etc.?

Characteristics of these questions

- Start from a given ‘problem’ (often a known outcome and population)
- They contain multiple components
- They don’t map against any specific type of primary research
 - (apart from, possibly, mixed methods primary research)
- They want to know the causes of variations in outcome
 - Rarely aim to come to a single answer
 - They seek *explanation*
 - They blend the ‘micro’ perspective with the ‘macro’

Understandings at the micro and macro level

- Some social scientists are concerned with generating understandings at the micro level while others are concerned with the macro level.
 - Micro: emphasise the agency of those they study through an emphasis upon studying subjective interpretations and perspectives
 - Macro: concerned with larger scale patterns and trends and seek to pose structural explanations.
- If one is to transcend conceptually the micro and the macro levels then methods must be developed to reflect this transcendence (Kelle 2001)

From: Brannen J (2006) Mixed methods research: a discussion paper. *NCRM Methods Review Papers, NCRM/005*

Reviewing Public Health (PH) research is challenging, because...

- Three reasons:
 - Complexity of context
 - Complexity of questions asked
 - ‘complexities’ caused by the data

Complexities that arise from our data

(almost)

No replications

For some reviews in public health

- Well, if you want to go there, I wouldn't start from here...
- Standard systematic review methods cannot cope with the complexities so far identified
- We need to use appropriate methods of synthesis that
 - Cope with complexity
 - Grapple with explanation
 - Operate in 'small N' scenarios

MIXED METHODS REVIEWS: A POTENTIAL SOLUTION TO THESE PROBLEMS

A potential solution: mixed methods

- Mixed methods reviews have a distinctive heritage
 - They address complex (and compound) questions
 - They use different types of evidence in a ‘dialectical’ fashion to grapple with complexity
 - Can mitigate some of the impact of the lack of intervention / evaluation replication
 - They can blend the macro and micro perspective
- Some of the thinking & methodological development has already taken place – in the primary research mixed methods literature

What is Mixed Methods Research?

- Mixed methods research is formally defined here as the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study.
 - Mixed methods research also is an attempt to legitimate the use of multiple approaches in answering research questions, rather than restricting or constraining researchers' choices (i.e., it rejects dogmatism).
 - It is an expansive and creative form of research, not a limiting form of research.
 - It is inclusive, pluralistic, and complementary, and
 - It suggests that researchers take an eclectic approach to method selection and the thinking about and conduct of research.

Johnson and Onwuegbuzie (2004), pp. 17-18

The 'fit' between mixed methods & Evidence-informed policy & practice

- ... developing a mixed method strategy fits with the political currency accorded to 'practical enquiry' that speaks to policy and policymakers and that informs practice (Hammersley 2000), while scientific research may require closer attention to and justification of the methods used and the types of data generated in reaching conclusions.
- In Britain we have seen a whole industry of mixed method research created around evidence based policy and over a longer time frame in the evaluation of policy (Ritchie 2003; Tashakorri and Teddlie 2003a). However the downside to this is that researchers have less and less leeway to define their own research questions and to follow their own ideas.

From: Brannen J (2006) Mixed methods research: a discussion paper. *NCRM Methods Review Papers, NCRM/005*

Purposes of combining different sorts of data / results

- Elaboration / expansion / explanation
- Initiation
 - Where different data ‘speak’ to one another, we have an empirically-driven analysis to explain findings / analyse variation
- Complementarity
 - Make use of all the evidence at our disposal
- Contextualisation
 - Some questions are really about re-contextualising findings for specific use
- Enables us to see the problem from different directions / perspectives

Mixed methods reviews

- Much in common with mixed methods primary research
- One important difference: the social nature of research activity
- conducted using different primary methods also provides alternative perspectives on the subject under investigation
- These perspectives are known as 'paradigms'

The Structure of Scientific Revolutions, 3rd Ed.
(Thomas S. Kuhn)

The University of Chicago Press, 1996

A bit more on paradigms

- Communities of researchers coalesce around a shared understanding of:
 - What should be studied
 - How concepts are related
 - How research should be done (methods & tools)
- BUT even within a discipline, different methodological approaches (qualitative / quantitative) can reflect different fundamental understandings
 - About what is important
 - Whose ‘voice’ should be heard
- Looking at different methodological approaches simultaneously offers insights into different ways of conceptualising problems

Taxonomy of stances towards combining knowledge from different paradigms (Creswell 2011)

- Incommensurability (cannot be mixed)
- A-paradigmatic (can be mixed and matched in different ways)
- Complementary strengths (not incompatible, but are different and should be kept separate)
- Dialectic (paradigms are important in different ways leading to useful tensions & insights)
- Alternative paradigm ('mixed methods' paradigm; foundation in e.g. pragmatism)

METHODS: HOW MIXED METHODS REVIEWS ARE CONDUCTED

How can we combine different types of research?

- Three overall ways
 - Sequential explanatory design
 - Worked example
 - Sequential exploratory design
 - Convergent design

Pluye P, Hong QN (2014) Combining the Power of Stories and the Power of Numbers: Mixed Methods Research and Mixed Studies Reviews. *Annual Review of Public Health* 35:29–45

Configuration & aggregation

- New (ish) work in SRs has argued that the qualitative / quantitative binary divide conceals more than it reveals
- Suggests a better heuristic is aggregate / configure
 - Voils CI, Sandelowski M, Barroso J, Hasselblad V: Making sense of qualitative and quantitative findings in mixed research synthesis studies. *Field Methods* 2008, 20:3–25.
 - Sandelowski M. Voils CJ, Leeman J, Crandlee JL (2011) Mapping the Mixed Methods-Mixed Research Synthesis Terrain *Journal of Mixed Methods Research*
 - Gough D, Oliver S, Thomas J (2012) *An Introduction to Systematic Reviews*. London: Sage
 - Gough D; Thomas J; Oliver S (2012) Clarifying differences between review designs and methods. *Systematic Reviews*. 1(28)

Aggregation in reviews

Aggregation refers to 'adding up' (aggregating) findings from primary studies to answer a review question...

... to indicate the direction or size of effect
... and our degree of confidence in that finding

Gough D; Thomas J; Oliver S (2012)
Clarifying differences between review designs and methods. *Systematic Reviews*. 1(28)



Configuration in reviews

Configuration involves the arrangement (configuration) of the findings of primary studies to answer the review question....

... to offer a meaningful picture of what research is telling us

... across a potentially wide area of research



Philosophy:

Idealist

Realist

Relation to theory:

Generate

Explore

Test

Approach to synthesis:

Configuring

Aggregating

Methods:

Iterative

A priori

Quality assessment:

Theoretical search

Value study
contributions

'Exhaustive' search

Avoid bias

Product:

Emergent concepts

Magnitude & precision

Review use:

Enlightenment

Instrumental

Mixed methods synthesis type 1: Sequential explanatory design

- For this type of synthesis design
 - a) the QUAN synthesis is followed by, and informs, the QUAL synthesis; and
 - b) the QUAL synthesis helps to explain some results of the QUAN synthesis

Thomas J, Harden A, Oakley A, Oliver S, Sutcliffe K, Rees R, Brunton G, Kavanagh J (2004) Integrating qualitative research with trials in systematic reviews: an example from public health. *British Medical Journal* 328: 1010-1012. (<http://www.bmj.com/cgi/content/full/328/7446/1010>)

Example: Sequential explanatory design

Review question

e.g. What is known about the barriers to, and facilitators of, fruit and veg intake amongst children aged 4 to 10 years?

MAPPING

(193 studies in 272 reports)

'Views' studies (N=8)

1. Application of inclusion criteria
2. Quality assessment
3. Data extraction
4. **Thematic synthesis**

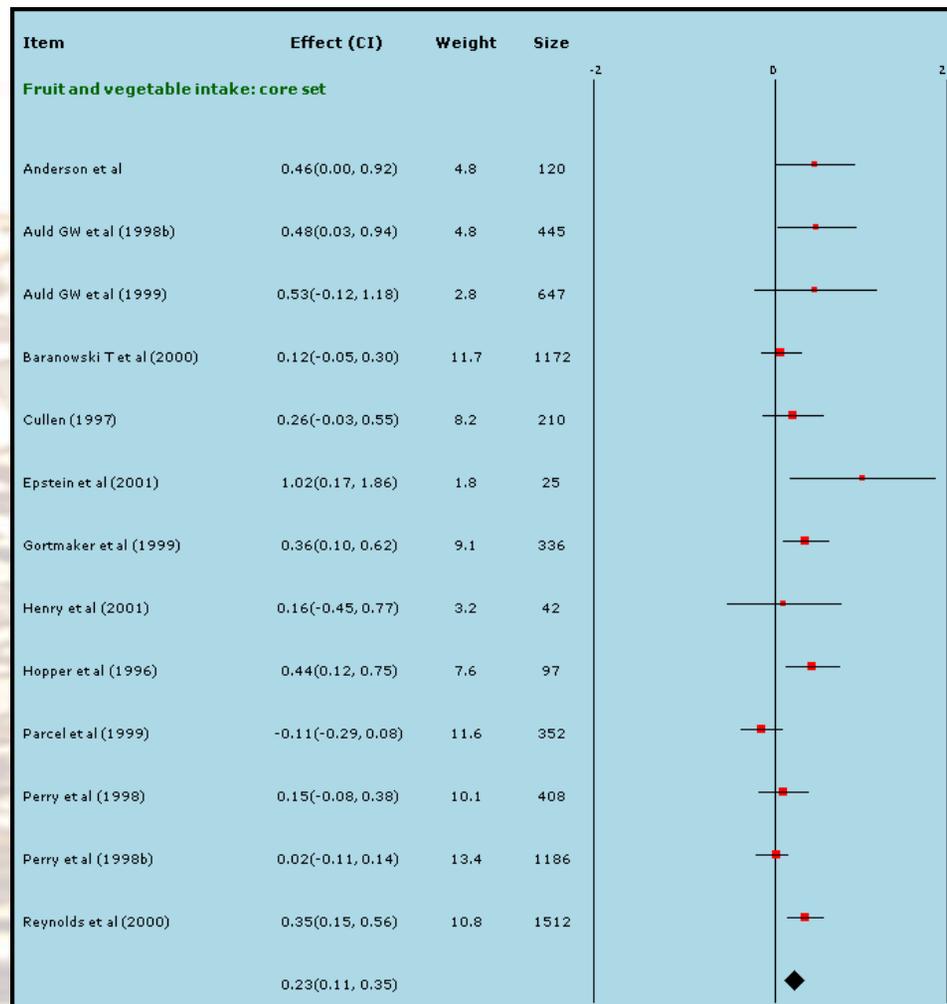
Trials (N=33)

1. Application of inclusion criteria
2. Quality assessment
3. Data extraction
4. **Statistical meta-analysis**

Trials and 'views'
Mixed methods synthesis

Findings for statistical meta-analysis of 'Quantitative' studies (Trials)

(not very illuminating in itself!)



'Thematic synthesis'

- Similar to other methods of synthesising qualitative research (e.g. 'meta-ethnography')
- Source data = text (documents)
- Source material = conceptual
- Key method = translation
- Final product = interpretation

Thomas J, Harden A (2008) Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, 8:45 doi:10.1186/1471-2288-8-45

Stages of thematic synthesis

- Stages one and two: coding text and developing descriptive themes
 - Identifying the ‘findings’
 - Line-by-line coding
 - Developing descriptive themes
- Stage three: generating analytical themes
 - In the light of the review question

Developing descriptive codes & themes

- Data extraction: results from primary studies
- Coded the themes described in our data extraction (e.g. 'bad food = nice, good food = awful')
 - 36 initial *descriptive codes*
- Looked for similarities and differences among *descriptive codes* in order to group them
 - 13 *descriptive themes* (e.g. 'Perceptions of health benefits')

EPPI-Reviewer 4.0 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://eppi.ioe.ac.uk/EPPIReviewer4/EPPIReviewer4TestPage.aspx

Most Visited BBC News E-mail EPPI - www EPPI-Reviewer EPPI-RM Google IOE IOE Home MSDN Telerik Forums NaCTeM ASSIST Brow... SSRU Internal site

Microsoft Outlook Web Access EPPI-Reviewer 4.0

Document details

Codes

- Not specifically body shape / size / weight
- Authors' gender comparisons
- Authors' Weight status comparisons
- Body size matters
 - the salience of body size
 - judged bodies
 - using body size to judge people
 - ideal and acceptable bodies
 - blame and responsibility for fat
 - Stereotypes
 - stereotype of thin person
 - discrimination is normal
- Analysing and experiencing size
- where d
- redunda
- Authors'
- Taking e
- Inclusion / e
- Lingo3G clu

Code selected text

Uncode selected text

Show text coded with this code

Report: all text coded with this code

Add child code

Add new code set

Delete code

Citation details Text document PDF document

"In one group, a large boy accused the others in the group of hypocrisy, as they had said that it did not matter if someone was fat ± "They say that now but in real life they'll make fun of you if you're different." He said that he had been bullied, and another boy in the same group said that this might make a boy "want to leave the school." Several girls' groups agreed that "some people don't like fat

people", that boys bullied those who were fat, and that some girls made hurtful remarks:

*"When I was really chubby they all used to call me 'fatty', so I had to stop tennis and so I went on a diet and nobody has called me 'fatty' since."

*"You don't care about it and then people pick on you and it makes you want to lose weight."

*The abuse was said to come from "thin girls". In another group a girl stated, "You shouldn't take silly comments to heart." The girls showed less concern than the boys with being "picked on". Rather, their chief reason for not being overweight was to do with making friends. A fat girl should:

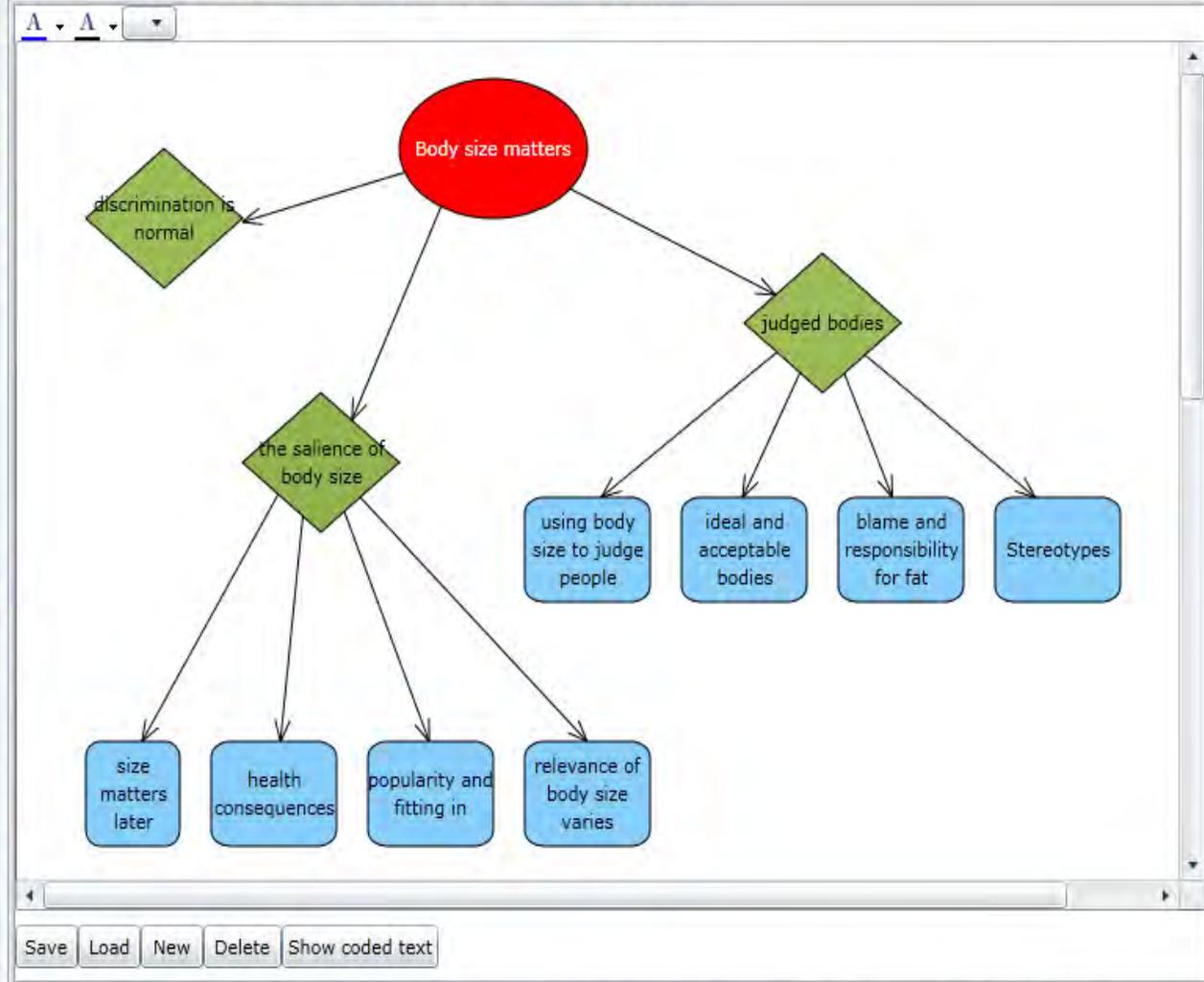
*"... start a diet ... so she can get thin ... and make friends."

*"Depends on whether it matters to them or not."

1 of 8 122%

User: James Thomas | Review: A systematic review on children's views relating to obesity, and the factors influencing healthy weight.

Transferring data from eppl.ioe.ac.uk... Open Notebook zotero



- Codes
- ▶ Intial coding tool: a systematic review on children's views
 - ▶ EPPI-Centre health promotion keywording strategy: Peers
 - ▲ Inductive codes
 - not right age range
 - Not specifically body shape / size / weight or views
 - Authors' gender comparisons
 - Authors' Weight status comparisons
 - ▲ Body size matters
 - ▲ the salience of body size
 - relevance of body size varies
 - size matters later
 - health consequences
 - popularity and fitting in
 - ▲ judged bodies
 - using body size to judge people
 - ideal and acceptable bodies
 - blame and responsibility for fat
 - ▶ Stereotypes
 - discrimination is normal
 - ▶ Analysing and experiencing size
 - ▶ where does this go?
 - ▶ redundant codes

Developing 'recommendations' and analytical themes

- Further analysis of *descriptive themes*: in the light of our review question
 - up until this point, we had no 'results': our analysis did not address our review question, it was a synthesis of the studies in their own terms
 - 6 *analytical themes* (e.g. 'Children do not see it as their role to be interested in health')
- From these themes, we inferred barriers, facilitators and recommendations for interventions (e.g. reduce emphasis on health messages)

Sub-questions for 3rd phase: driven by main review question

- What are children's perceptions of and attitudes towards healthy eating? What does healthy eating mean to children?
- What do children think stops them from eating healthily?
- What do children think helps them to eat healthily?
- What ideas do children have for what could or should be done to promote their healthy eating?

Analytical themes

1) Children don't see it as their role to be interested in health.

2) Children do not see future health consequences as personally relevant or credible.

3) Fruit, vegetables and confectionary have very different meanings for children.

4) Children actively seek ways to exercise their own choices with regard to foods.

5) Children value eating as a social occasion.

6) Children recognise contradiction between what is promoted and what is provided

Brand fruit and vegetables as 'tasty' rather than 'healthy'.

Reduce health emphasis of messages

Do not promote fruit and vegetables in the same way within the same intervention.

Create situations for children to have ownership over their food choices.

Ensure messages promoting fruit and vegetables are supported by appropriate access to fruit and vegetables



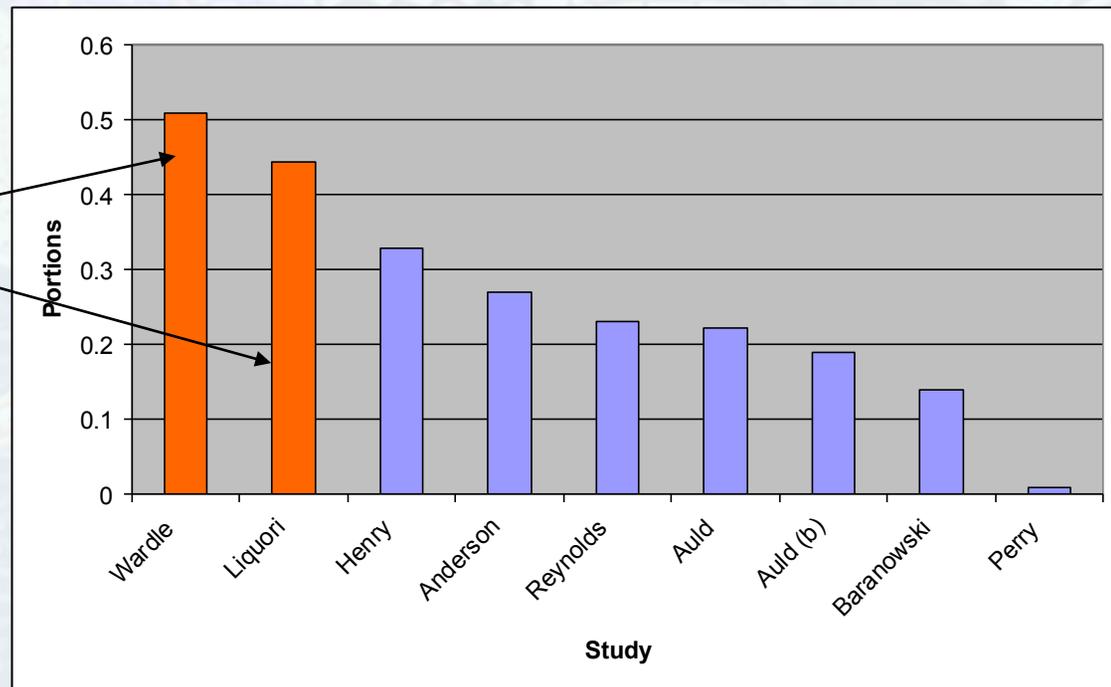
Cross study synthesis via a matrix

Children's views	Outcome evaluations	
Recommendation for interventions	Good quality	Other
Do not promote fruit and vegetables in the same way	No soundly evaluated interventions	No other interventions identified
Brand fruit and vegetables as an 'exciting' or child-relevant product, as well as a 'tasty' one	5 soundly evaluated interventions identified	5 other interventions
Reduce health emphasis in messages to promote fruit and vegetables particularly those which concern future health	5 soundly evaluated interventions identified	6 other interventions identified

Cross study synthesis: an example of sub-group analysis

Increase (standardised portions per day) in vegetable intake across trials

Little or no emphasis on health messages



This method of synthesis across study types:

- Methodologically:
 - preserves the integrity of the findings of the different types of studies
 - allows the exploration of heterogeneity in ways in which it would be difficult to imagine in advance
 - facilitates analytical *explanation*
 - protects against ‘data dredging’
- Epistemologically:
 - allows us to integrate ‘quantitative’ estimates of benefit and harm with ‘qualitative’ understanding from people’s lives
 - i.e. allows cross-paradigm knowledge to be generated

In terms of the mixed methods / synthesis heuristics

- The single meta-analysis *aggregated* findings across studies, employing a *single paradigm* stance
- The qualitative synthesis *aggregated* within concepts and *configured* between them; mostly using a *single paradigm* stance (but sometimes *complementary* is more appropriate)
- The mixed methods synthesis *aggregated* within each recommendation in a *single paradigm* and *configured* findings between them within a *dialectical* paradigm stance

References

- Thomas J, Harden A (2008) Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, 8:45 doi:10.1186/1471-2288-8-45 <http://www.biomedcentral.com/1471-2288/8/45>
- Thomas J, Harden A, Oakley A, Oliver S, Sutcliffe K, Rees R, Brunton G, Kavanagh J (2004) Integrating qualitative research with trials in systematic reviews: an example from public health. *British Medical Journal* 328: 1010-1012. <http://www.bmj.com/cgi/content/full/328/7446/1010>

Mixed methods synthesis type 2: Sequential exploratory design

- For this type of synthesis design
 - a) the QUAL synthesis is followed by, and informs, the QUAN synthesis; and
 - b) the QUAN synthesis generalizes or tests findings of the QUAL synthesis
- Aim:
 - Identification of new hypotheses and knowledge gaps (e.g. development of a typology)

Sutcliffe K, Stokes G, O'Mara-Eves A, Caird J, Hinds K, Bangpan M, Kavanagh J, Dickson K, Stansfield C, Hargreaves K, Thomas J (2014) Paediatric medication error: A systematic review of the extent and nature of the problem in the UK and international interventions to address it. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London. ISBN: 978-1-907345-73-9

Mixed methods synthesis type 3: Convergent approaches

- Two types:
 - QUAL data
 - QUAN data
- Data from primary studies are transformed before synthesis begins

3.1: Convergent (QUAL)

- Results from studies that included QUAL, QUAN, and Mixed Methods (MM) are transformed into QUAL findings such as themes, configurations, theories, concepts, and patterns.
- The most common data transformation technique is QUAL thematic synthesis. More complex data transformation methods are realist synthesis (see RAMESSES training materials at: http://www.ramesesproject.org/index.php?pr=Project_outputs)

3.2: Convergent (QUAN)

- These are still rare in practice, though worked examples exist
- Data transformations are typically to facilitate Bayesian synthesis (i.e. probabilities) or configurational comparative analysis (set theoretic), or qualitative comparative analysis (QCA)
- Further reading:
 - Thomas J, O'Mara-Eves A, Brunton G (2014) Using Qualitative Comparative Analysis (QCA) in systematic reviews of complex interventions: a worked example. *Systematic Reviews*. 3: 67
 - Stewart GB, Mengersen K, Meader N (2014) Potential uses of Bayesian networks as tools for synthesis of systematic reviews of complex interventions. *Research Synthesis Methods*; 5(1): 1-12

Summary

- Mixed methods research syntheses have a dynamic and evolving ‘heritage’
- They address complex (and compound) questions
- They blend ‘micro’ and ‘macro’ perspectives in order to generate *explanation*
- They enable us to reflect the state of current knowledge more faithfully by overcoming gaps in perspective caused by paradigmatic divisions
- Methods are still evolving: it’s an interesting and rewarding field to work in!



Leading education
and social research
Institute of Education
University of London

Thank you for your attention

Websites

EPPI-Centre Website <http://eppi.ioe.ac.uk>

Twitter

@James_M_Thomas

@EPPICentre

Email

j.Thomas@ioe.ac.uk

The EPPI-Centre is part of the Social Science Research Unit at the Institute of Education, University College London



EPPI-Centre

Social Science Research Unit
Institute of Education
University of London
18 Woburn Square
London WC1H 0NR

Tel +44 (0)20 7612 6397
Fax +44 (0)20 7612 6400
Email eppi@ioe.ac.uk
Web eppi.ioe.ac.uk/

We invite you to:

- Provide your input on today's session
- Share your ideas for future sessions
- Participate in the Community of Practice to continue the dialogue
- PLEASE CONTACT:

joann.starks@sedl.org

Please fill out the brief Evaluation Form:
<http://www.surveygizmo.com/s3/1883016/QualSynth-4>

Disclaimer

- This presentation was developed for grant number H133A120012 from the National Institute on Disability and Rehabilitation Research (NIDRR), Office of Special Education and Rehabilitative Services (OSERS), U.S. Department of Education. However, the contents do not necessarily represent the policy of the Department of Education, and you should not assume endorsement by the federal government.