**Online Workshop: Qualitative Research Synthesis**

**Session 4: Combining quantitative evidence in systematic reviews: why, how and when?**

Presenter: Dr. James Thomas

A webinar sponsored by SEDL’s Center on Knowledge Translation

For Disability and Rehabilitation Research (KTDRR)

Edited transcript for audio/video file on YouTube:

http://youtu.be/G\_9yQyP8VJA

**Slide 1: Title**

Online Workshop: Qualitative Research Synthesis

Session 4: Combining quantitative 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.ktddr.org

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**Slide 2: Title**

Top half of slide: On the left a logo for Social Science Research Unit; on the right a logo for Leading education and social research.

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

Dr. 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, UK

At the bottom of each slide the EPPI-Centre logo

**Slide 3: Outline**

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

**Slide 4**: What is the problem?

 **THE POLICY CONTEXT**

**Slide 5: Example context: the Department of Health (DH) health promotion & public health reviews facility**

**Two columns**

**First column**

* 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’

**Second Column**

Three boxes with green shading, connected with up and down arrows

First box contains the words DH policy teams, second box contains the words Department of health policy research programme, third box contains the words Review facility (us)

**Slide 6:** Research often just one small factor:
*adapted from Davies, P. ‘Is Evidence-Based Government Possible?’ Campbell Collaboration, Jerry Lee Lecture, 2004*

Connected circles, each with different words – starting at top of page and going right, first circle -Professional Experience & Expertise; Political Judgement; Resources; Values; Habits & Tradition; Lobbyists & Pressure Groups; Pragmatics and Contingencies. Another circle with the words Research Evidence is outside the connected circles but has an arrow pointing between Political Judgement and Resources

**Slide 7: 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*.

**Slide 8:** ***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).

**Slide 9: *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)

**Slide 10: ‘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.”

**Slide 11: Graph which shows the decrease in Sudden Infant Death incidence after the implementation of the “Reduce the Risk” campaign**

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

Image of Graph

X Axis- Year of Death (1982 – 1994 in two year intervals

Y Axis Rate/1000 live births (0 – 3.5 in .5 intervals)

When Reduce the Risk campaign went into effect (1992) decrease in death rate

**Slide 12: 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

Slide 13: How can we be evidence-based?

Two columns

First column

* 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

Second column

What happens in an Internet Minute

Image of a stopwatch leading to various online software such as google, YouTube, Facebook, twitter, flickr,etc.

And the Future Growth is Staggering

Today the number of networked devices = the global population

By 2015 the number of networked devices = 2x the global population

In 2015 it would ake you 5 years

Arrow with IP across it

To view all the videos crossing IP networks each second

This link at bottom of page ­- <http://upload.wikimedia.org/wikipedia/commons/5/54/Internet_Minute_Infographic.jpg> (Creative Commons license)

**Slide 14: 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

**Slide 15: Reviewing Public Health (PH) research is challenging, because...**

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

**Slide 16: Complexity in context / intervention**

* Complicated complex
* Complex complex

**Slide 17: 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*…

**Slide 18: 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

**Slide 19: Reviewing Public Health (PH) research is challenging, because...**

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

**Slide 20: 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.?

**Slide 21: 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’

**Slide 22: 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*

**Slide 23: Reviewing Public Health (PH) research is challenging, because...**

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

**Slide 24: Complexities that arise from our data**

Image – (almost) No replications

**Slide 25: 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

**Slide 26: Mixed methods reviews: a potential solution to these problems**

**Slide 27: 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

**Slide 28: 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

**Slide 29: 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*

**Slide 30: 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

**Slide 31: 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’

***To the right of this in a box - The Structure of Scientific Revolutions*, 3rd Ed.**

**(Thomas S. Kuhn)**

The University of Chicago Press, 1996

**Slide 32: 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

**Slide 33: 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)

**Slide 34: Methods: how mixed methods reviews are conducted**

**Slide 35: How can we combine different types of research?**

* Three overall ways
	+ Sequential explanatory design
		- Worked example
	+ Sequentialexploratory 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

**Slide 36: 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)

**Slide 37:** **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)

Image on the left of a tall stack of rocks

**Slide 38: 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

Image on the left of brightly colored stitched flowers

**Slide 39: Three columns**

**Column 1**

Philosophy:

Relation to theory:

Approach to synthesis:

Methods:

Quality assessment:

Product:

Review use:

**Column 2**

Idealist

Generate (Explore)

Configuring

Iterative

Theoretical search

Value study contributions

Emergent concepts

Enlightenment

**Column 3**

Realist

Test

Agreegating

A priori

‘Exhaustive’ search

Avoid bias

Magnitude & precision

Instrumental

**Slide 40: Mixed methods synthesis type 1: Sequential explanatory design**

* + For this type of synthesis design
		1. the QUAN synthesis is followed by, and informs, the QUAL synthesis; and
		2. 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>)

**Slide 41: 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**

**Slide 42: Findings for statistical meta-analysis of ‘Quantitative’ studies (Trials)**

(not very illuminating in itself!)

Blue image/chart of fruit and vegetable intake forest plot

**Slide 43: ‘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

**Slide 44**: **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

**Slide 45: 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’)

**Slide 46: Screenshot – line-by-line coding**

**Selecting Option- Show text coded with this code**

**Text highlight in a text document**

**Slide 47: Screenshot – descriptive codes diagram**

**Selected option- judged bodies**

**Diagram with Body Size Matters branching to three main sections**

1. **Discrimination in normal**
2. **The salience of body size**
	1. **Size matter later**
	2. **Health consequences**
	3. **Popularity and fitting in**
	4. **Relevance of body size varies**
3. **Judged bodies**
	1. **Using body size to judge people**
	2. **Ideal and acceptable bodies**
	3. **Blame and responsibility for fat**
	4. **stereotypes**

**Slide 48: 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)

**Slide 49: 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?

**Slide 50: 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

A column in between with 3 arrows pointing from the above column to the column below

On far right side of slide

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

**Slide 51: Cross study synthesis via a matrix**

First column:

Top heading - Children’s views

Second heading - Recommendation for interventions

Do not promote fruit and vegetables in the same way

Brand fruit and vegetables as an ‘exciting’ or child-relevant products, as well as a ‘tasty’ one.

Reduce health emphasis in messages to promote fruit and vegetables particularly those which concern future health

Second column has 2 columns within it.

First column under the words Good Quality

No soundly evaluated interventions

5 soundly evaluated interventions identified

5 soundly evaluated interventions identified

Second column

Under the word Other

No other interventions identified

5 other interventions

6 other interventions identified

**Slide 52: 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

Graph to the right of above sentence.

Image of stacked rocks on right side of slide

**Slide 53: 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

**Slide 54: 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

**Slide 55: 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>

**Slide 56: Mixed methods synthesis type 2: Sequential exploratory design**

* For this type of synthesis design
	1. the QUAL synthesis is followed by, and informs, the QUAN synthesis; and
	2. the QUAN synthesis generalizes or tests findings of the QUAL synthesis
* Aim:
	1. 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

**Slide 57: Mixed methods synthesis type 3: Convergent approaches**

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

**Slide 58: 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 RAMESES training materials at: http://www.ramesesproject.org/index.php?pr=Project\_outputs)

**Slide 59: 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

**Slide 60: 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!

**Slide 61: Thank you for your attention**

Websites

EPPI-Centre Website [http://eppi.ioe.ac.uk](http://eppi.ioe.ac.uk/)

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

Caption under picture of London at night reads:

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**Slide 62: 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@air.org

*Please fill out the brief Evaluation Form:*

http://www.surveygizmo.com/s3/1883016/QualSynth-4

**Slide 63: Disclaimer**

This presentation was developed for grant number H133A120012 from the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR), 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.