

# Development of a Mixed Methods Appraisal Tool

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## LEARNING OBJECTIVE

**At the end of this workshop, you will be able to apply a *Mixed Methods Appraisal Tool* for concomitantly appraising the methodological quality of primary studies retained in a systematic mixed studies review.**

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## PLAN

### Background

- Mixed studies review (tool usage)
- Mixed methods research (criteria)

### Mixed Methods Appraisal Tool

- Pilot version: Tour & public website
- Pilot test: Ease-of-use & reliability

### Exercise

### Discussion

## Presentations

### Pierre Pluye & Romina Pace

FMED 501 - Mixed studies reviews

- Dr. Pluye
- 1-credit graduate course (summer)
- DENT672 - Applied mixed methods in health research
- Drs. Levine, Nicolau and Pluye
- 3-credit graduate course (winter)

Cochrane collaboration: CCC & RCF

**Mixed Methods Appraisal Tool:** Pilot test, workshops, CIHR grant application (content validity & reliability)

## Presentations

### Name & Affiliation

### Research interests

### Do you have experience or expertise in

- Quantitative research (e.g., epidemiology)?
- Qualitative research (e.g., ethnography)?
- Mixed methods research?
- *Mixed studies reviews?*

## PART 1. BACKGROUND



**A Mutual Understanding**  
Catherine Stones: Artwork & illustrations  
<http://www.google.ca/imgres?imgurl=http://www.catherinestones.net>

MIXED METHODS APPRAISAL TOOL  
for systematic mixed studies reviews

## MIXED STUDIES REVIEWS DEFINITION & EXAMPLE

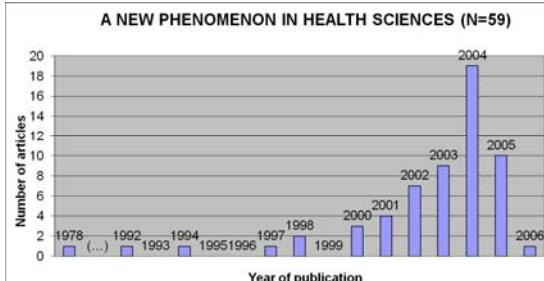
Pluye et al. (2009) *International Journal of Nursing Studies*, 46(4):529-546.

## MIXED STUDIES REVIEWS

### Definition

- Literature review of qualitative, quantitative and mixed methods primary studies, e.g., outcome and process studies
- In contrast to literature reviews of (1) quantitative experimental studies, or (2) quantitative observational studies, or (3) qualitative research
- Mixed methods research applied to reviews (data sources being documents, e.g., research papers)

## MIXED STUDIES REVIEWS



## MIXED STUDIES REVIEWS

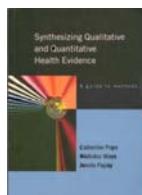
	SYSTEMATIC*	REPRODUCIBLE	CONVENIENCE
Question (N=59)	X	X	X
Identification (N=40)	X		X
Selection (N=40)	X		X
Appraisal (N=17)	X		
Synthesis (N=59)	X	X	X
Number (%)	17 (29%)	23 (39%)	19 (32%)

\*Needs for a mixed methods appraisal tool

## Mixed Studies Reviews

### Suggested reading

- Pope et al. (2007). *Synthesizing qualitative and quantitative health evidence: A guide to methods*. Maidenhead: Open University Press.



## Types of synthesis (example)

Analysis or *approach/design	TYPE
Quantitative case survey*	QUAL-QUAN to QUAN (patterns)
Content analysis	QUAL-QUAN to QUAN (variables)
Bayesian analysis (specialized MSR)	QUAL to QUAN (probabilities)
Boolean analysis (research on MSR)	QUAL to QUAN (configurations)
Lexical-semantic analysis (research on MSR)	QUAL to QUAN (textual statistics)
Qualitative multiple case study*	QUAN-QUAL to QUAL (patterns)
Thematic analysis – see example below	QUAN-QUAL to QUAL (themes)
Grounded Theory* (step within a GT study)	QUAN-QUAL to QUAL (theory)
Critical interpretive synthesis* (specialized MSR)	QUAN-QUAL to QUAL (theory)
Realist synthesis* (specialized MSR)	QUAN-QUAL to QUAL (configurations)
Narrative synthesis (separate QUAL & QUAN)	Interpreting QUAN & QUAL results
• EPPI examples	

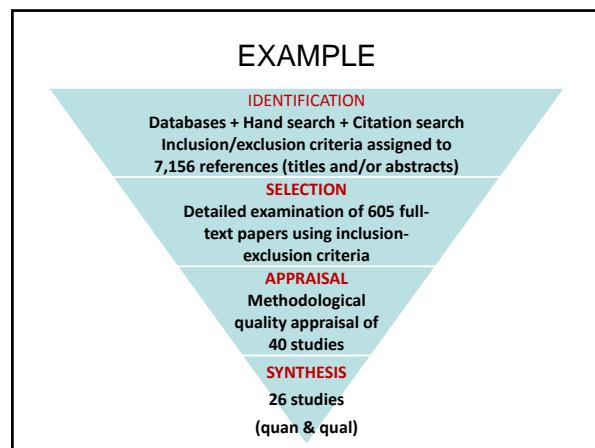
## A SIMPLE EXAMPLE



Clinical Information-Retrieval Technology (CIRT) increasingly used in routine practice

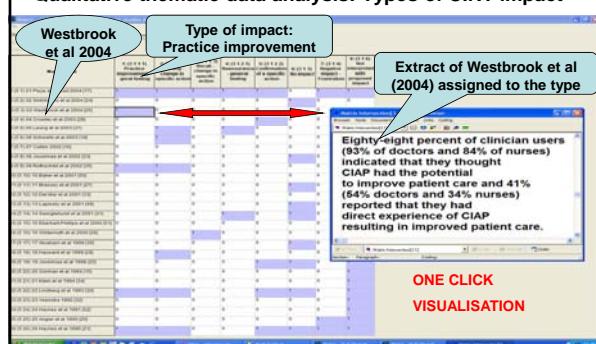
**Review question**  
What are the impacts of information found in CIRT?

Pluye, Grad et al. *International Journal of Medical Informatics*, 74(9):745-768.



## EXAMPLE

Qualitative thematic data analysis: Types of CIRT impact



Westbrook et al 2004

Type of impact: Practice improvement

Extract of Westbrook et al (2004) assigned to the type

Eighty-eight percent of clinician users (93% of doctors and 84% of nurses) indicated that they thought clinician users thought that CIRT had the potential to improve patient care and 41% (64% doctors and 34% nurses) reported that they had direct experience of CIAP resulting in improved patient care.

ONE CLICK VISUALISATION

MIXED METHODS APPRAISAL TOOL  
based on 'quality criteria' of mixed methods research  
(mixed studies reviews = mixed methods applied to reviews)

## MIXED METHODS RESEARCH

### Mixed Methods Research: Definition & History

Combination of quantitative and qualitative methods: Integration of data and/or results

A longstanding practice in research, e.g., evaluation studies\*

Recently conceptualized in terms of mixed methods studies: First handbook in 2003

\*Pluye et al. *Les méthodes mixtes pour l'évaluation de programme*. In Ridde & Dagenais (eds.), *Théories et pratiques en évaluation de programme*, Presses de l'Université de Montréal, 2009, pp. 123-141.

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### Mixed Methods Research : Rationale

Combine strengths of qualitative & quantitative

E.g., strengths of a qualitative assessment

- In-depth descriptions of complex phenomena
- Context-specific empirical findings
- Transferability of conceptual frameworks or theoretical models

E.g., strengths of a quantitative assessment

- Measurement
- Generalizability based on statistical inferences

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## Mixed Methods Research

### Suggested reading

Creswell & Plano Clark (2007).

*Designing and conducting mixed methods research*. London: Sage.



## Mixed Methods Research : Quality

### Good Reporting of A Mixed Methods Study (GRAMMS)

O'Cathain et al. *J. Health Services Research & Policy*, 2008, 13(2), 92-98.

- Justification for using mixed methods
- Description of the design
- Description of each methods (sampling, etc.)
- Integration of data collection/analysis and/or results
- Limitations because of the mixing
- Insights gained from mixing

**Overlaps with MMAT while independent development (next slides)**

### Justification: 7 reasons for combining qualitative (QUAL) and quantitative (QUAN) methods

- QUAL data/findings improved by QUAN data/results
- QUAN data/results improved by QUAL data/findings
- QUAL method not enough
- QUAN method not enough
- Needs to generalize QUAL findings
- Needs to interpret QUAN results
- Needs to explore (QUAL) and measure (QUAN)

*Creswell & Plano-Clark. Designing and conducting mixed methods research*. Sage, 2007.

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### Description of design – Integration of data/results

#### Two types of sequential design (2 steps or separate stages)

DESIGN	DESCRIPTION
EXPLANATORY QUAN→QUAL	<ul style="list-style-type: none"><li>• QUAN then QUAL explanation</li><li>• Integration between/after the 2 phases</li></ul> <p>E.g., QUAN assessment (sample), then QUAL follow-up (sub-sample)</p>
EXPLORATORY QUAL→QUAN	<ul style="list-style-type: none"><li>• QUAL proposal then QUAN</li><li>• Integration between/after the 2 phases</li></ul> <p>E.g., tool development (QUAL content then QUAN factor analysis)</p>

### Description of design – Integration of data/results

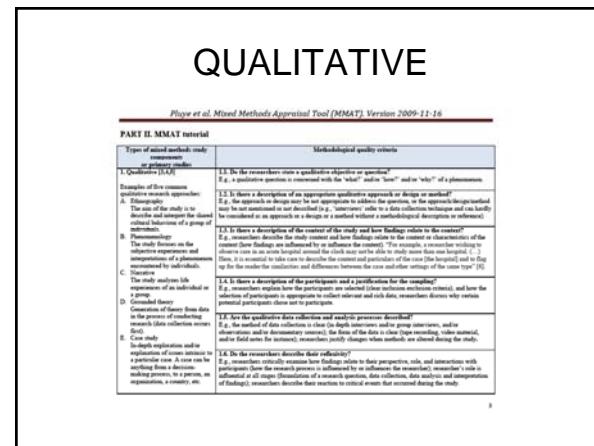
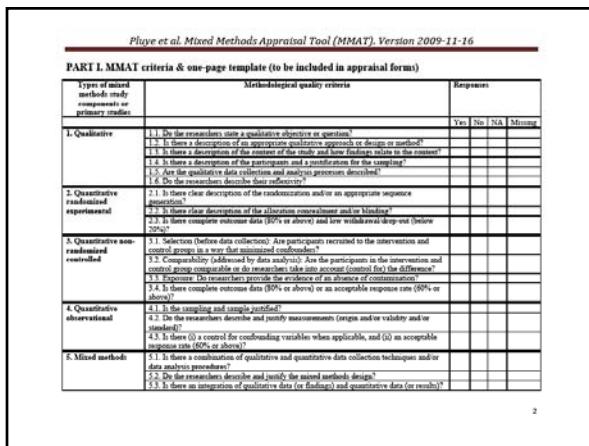
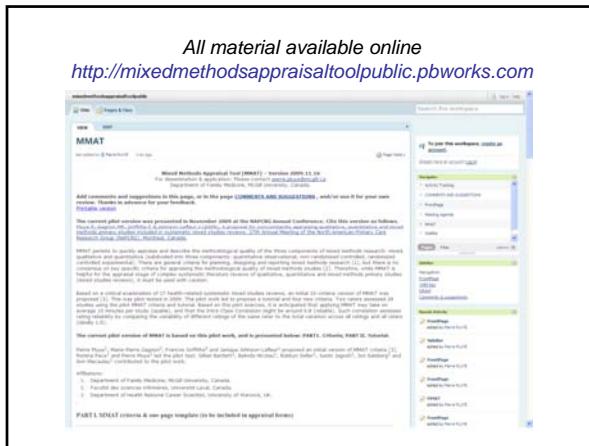
#### Two types of concomitant design

DESIGNS	DESCRIPTION
EMBEDDED • QUAL(quan) • QUANT(qual)	<ul style="list-style-type: none"><li>• Concomitant assessment QUAL and QUAN</li><li>• Integration during data collection/analysis</li></ul> <p>E.g., Randomized Controlled Trial combined with a qualitative case study</p>
TRIANGULATION QUAL+QUAN	<ul style="list-style-type: none"><li>• Concomitant assessment QUAL and QUAN</li><li>• Integration during data collection/analysis</li></ul> <p>E.g., Convergence, illustration, multi-level and transformation</p>

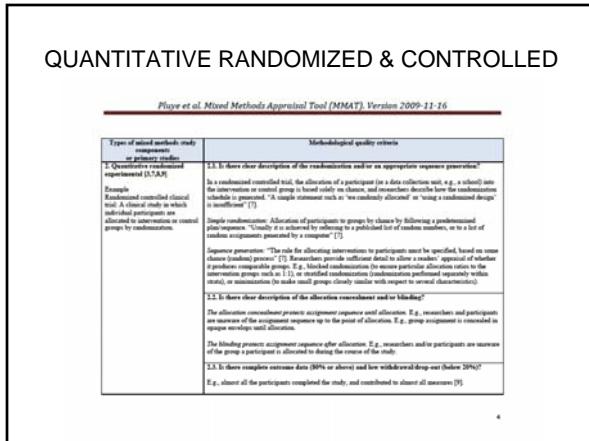
## PART 2. MIXED METHODS APPRAISAL TOOL (MMAT)

- Pilot version: Tour & public website
- Pilot test: Ease-of-use & reliability

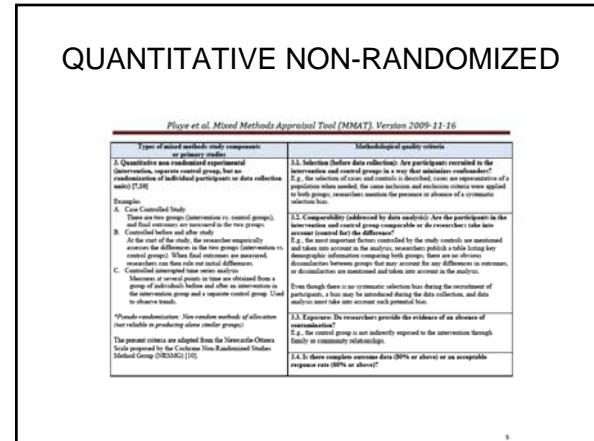




## QUANTITATIVE RANDOMIZED & CONTROLLED



## QUANTITATIVE NON-RANDOMIZED



## QUANTITATIVE OBSERVATIONAL

Pluye et al. Mixed Methods Appraisal Tool (MMAT). Version 2009-11-16

Type of mixed methods study component	Methological quality criteria
<b>4. Quantitative observational (no separate control group when interventions, or exposures vs. non-exposures, and no randomization)</b> [3,13,17]	<b>4.1. Is the sampling and sample appropriate and justified?</b> E.g., the source of sample is relevant to the population under study, the method of sampling is described, there is a rationale provided for the sample size, and the sampling method is appropriate for the sample size or justified (using power calculations for instance). E.g., authors why certain eligible individuals/units were not participants.
<b>Examples:</b>	
<b>A. Cohort study:</b> Follows a group of people over time to see what happens to them (prospective).	
<b>B. Cross-sectional study:</b> Patients with a certain outcome and a corresponding group of controls are selected, and data are collected on the patient and controls (cross-sectional data are collected at one point in time).	
<b>C. Longitudinal time series analysis:</b> Measures of the same outcome over time are obtained from a group of individuals before and after an intervention. In this type of analysis the intervention is the independent variable (and the outcome is the dependent variable). Used to observe trends.	
<b>D. Descriptive study:</b> Used to empirically assess the differences between the start and end of a study (at one particular time, exposure and outcome are measured at the same time).	
<b>E. Cross-sectional study:</b> In a defined population at one particular time, exposure and outcome are measured at the same time.	
<b>F. Case series:</b> A collection of individuals with similar characteristics are used to describe a condition.	
<b>G. Case report:</b> Detailed description of an individual or group with a unique/interesting outcome.	

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## MIXED METHODS

Pluye et al. Mixed Methods Appraisal Tool (MMAT). Version 2009-11-16

Type of mixed methods study or primary studies	Methological quality criteria
<b>1. Mixed methods [1]</b>	<b>1.1. Is there a combination of qualitative and quantitative data collection techniques and/or data analysis procedures?</b> E.g., researchers describe sampling and sample, data collection and data analysis for each method.
<b>B. Tutorial:</b> [1]	<b>1.2. Do the researchers describe and justify the mixed methods design?</b> E.g., authors describe the rationale for each method, and the augmentation of methods (sequentially or concurrently), and one of the following reasons for using methods [1]
<b>C. Description:</b> [1]	<ul style="list-style-type: none"> <li>• QCAQ data represented by QCAQ data,</li> <li>• QCAQ method not merged,</li> <li>• QCAQ method merged,</li> <li>• Needs to generate QCAQ findings,</li> <li>• Needs to explain QCAQ findings,</li> <li>• Needs to explore (QCAQ) and explain (QCAQ)</li> </ul>
<b>D. Iteration:</b> [1]	<b>1.3. Is there an integration of qualitative data (or findings) and quantitative data (or results)?</b> E.g., there is evidence that data collected by both research methods was brought together to form a common picture, and/or authors describe when integration occurred (during the data collection/analysis period, or after data collection/analysis, or both qualitative and quantitative results), and to describe how integration occurred and who participated in this integration.

## REFERENCES

Pluye et al. Mixed Methods Appraisal Tool (MMAT). Version 2009-11-16

**References:**

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## Pilot test: Ease-of-use & reliability

### Methods (continued)

For each criterion (presence = 1 and absence = 0)

- Discussion of responses
- Consensus reached for 19 of 25 disagreements (76.0%)
- Calculation of an inter-reviewer reliability score (kappa)

For each study (global score)

- Consistency between reviewers
  - Calculation of an intra-class correlation (ICC)
  - Two-way mixed model (absolute agreement type)
- Ease-of-use: Mean appraisal time

## Pilot test: Ease-of-use & reliability

### Methods

#### Summer of 2009

- Initial version tested by 4 reviewers for appraising 6 studies: 4 improvements and a tutorial

#### Fall of 2009

- Systematic mixed studies review on benefits of participatory research (PR), PRAM, McGill
- 23 PR programs (120 papers) retained up to January 2010
- Of those, 19 PR evaluation studies appraised using MMAT by 2 reviewers
- Corresponding to 32 evaluation components (qualitative, quantitative or mixed methods)

## Pilot test: Ease-of-use & reliability

### Promising results

- On average: 14 minutes per study
- Consistency of a 'score/study': ICC = 0.963 post-discussion
- Post-discussion inter-rater reliability
  - *With respect to 17 of the 19 scoring criteria (kappa / criterion)*
    - perfect agreement for 13 criteria
    - substantial agreement for 2 criteria
    - moderate agreement for 2 criteria
  - *With regards to the two remaining criteria (1.1 and 3.3)*
    - Consistent score for all studies (kappa not calculated)
    - Inter-rater agreement: 88.9% (1.1) and 83.3% (3.3)

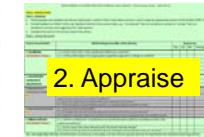
## PART 3. EXERCISE

### Development of a Mixed Methods Appraisal Tool for systematic mixed studies reviews



## Paper, answer sheet, booklet

1. Read



2. Appraise

Tutorial Examples

Paper copies will be re-used – Tutorial available online  
<http://mixedmethodsappraisaltoolpublic.pbworks.com>

DEVELOPMENT OF A MIXED METHODS APPRAISAL TOOL (MMAT) – CEC Seminar Series – 2010-05-12

**SIDE A: INSTRUCTIONS**  
 Step 1 – Individual  
 • Read the paper and complete the answer sheet (side A: section 5 then if time allows sections 1 and 2) using the appropriate sections of the booklet (PART II).  
 • Provide feedback on MMAT: Write your feedback directly in the answer sheet, e.g., “not relevant” item (or sentence or section), and suggestions for improvement.  
 • Complete the side B of the answer sheet if time allows.  
 Step 2 – Group discussion

Study characteristics	Methodological quality criteria (items)	Responses
		Yes   No   NA   Missing
<b>1. Qualitative</b> SEE BOOKLET PAGE 3	1.1. Do the researchers state a qualitative objective or question? 1.2. Is there a design? 1.3. Is there a description of the context of the study and how findings relate to the context? 1.4. Is there a description of the participants and a justification for the sampling? 1.5. Are the qualitative data collection and analysis processes described? 1.6. Do the researchers describe their reflexivity?	
<b>2. Quantitative randomized experimental</b>	2.1. Is there clear description of the randomization and/or an appropriate sequence generation? 2.2. Is there clear description of the allocation concealment and/or blinding? 2.3. Is there complete outcome data (80% or above) and low withdrawal/drop-out (below 20%)?	
<b>3. Quantitative non-randomized controlled</b>	3.1. Selection (before data collection): Are participants recruited to the intervention and control groups in a way that minimized confounders? 3.2. Comparability (addressed by data analysis): Are the participants in the intervention and control group comparable or do researchers take into account (control for) the difference? 3.3. Exposure: Do researchers provide the evidence of an absence of contamination? 3.4. Is there complete outcome data (80% or above) or an acceptable response rate (60% or above)?	
<b>4. Quantitative observational</b>	4.1. Is the sampling and sample justified? 4.2. Do the researchers describe and justify measurements (origin and/or validity and/or standard)? 4.3. Is there (i) a control for confounding variables when applicable, and (ii) an acceptable response rate (60% or above)?	
<b>5. Mixed methods</b> SEE BOOKLET PAGE 7	5.1. Is there a combination of qualitative and quantitative data collection techniques and/or data analysis procedures? 5.2. Do the researchers describe and justify the mixed methods design? 5.3. Is there an integration of qualitative data (or findings) and quantitative data (or results)?	

NA = Not Applicable; Missing: The information is not found in the paper, but the criterion may be met and not reported (to be solved by contacting authors)

## PART 4. DISCUSSION



Study characteristics	Methodological quality criteria (items)	YES?
<b>1. Qualitative</b>	1.1. Do the researchers state a qualitative objective or question? 1.2. Is there a description of an appropriate qualitative approach or design or method? 1.3. Is there a description of the context of the study and how findings relate to the context? 1.4. Is there a description of the participants and a justification for the sampling? 1.5. Are the qualitative data collection and analysis processes described? 1.6. Do the researchers describe their reflexivity?	
<b>2. Quantitative randomized experimental</b>	2.1. Is there clear description of the randomization and/or an appropriate sequence generation? 2.2. Is there clear description of the allocation concealment and/or blinding? 2.3. Is there complete outcome data (80% or above) and low withdrawal/drop-out (below 20%)?	
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Thank you