SYSTEMATIC MIXED STUDIES REVIEWS: RELIABILITY TESTING OF THE MIXED METHODS APPRAISAL TOOL

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Mixed Methods Appraisal Tool - MMAT

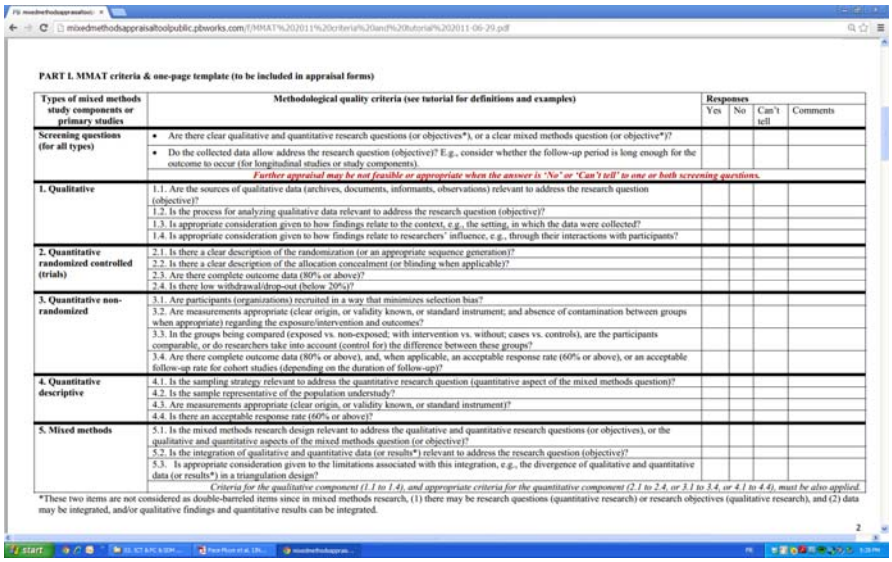
- Critical appraisal tool developed to assess the most common types of study designs, including mixed methods (Pluye, 2013)
- Based on a review of tools used for systematic mixed studies reviews including studies with diverse designs (Pluye et al., 2009)
- Initial version tested for efficiency and reliability, then revised with experts in qualitative, quantitative, and mixed methods studies (Pace, Pluye et al., 2012)
- User manual with examples (see website)

Systematic Mixed Studies Review

Stage 1: Formulate a review question
Stage 2: Define eligibility criteria
Stage 3: Apply an extensive search strategy
Stage 4: Identify potential relevant studies
Stage 5: Select relevant studies
Stage 6: Appraise the quality of studies
Stage 7: Synthesize included studies
Guidance for reporting: Report mixed studies reviews

Pluye & Hong. Annual Review of Public Health 2014

http://mixedmethodsappraisaltoolpublic.pbworks.com/w/page/24607821/FrontPage



PART I. MMAT criteria & one-page template (to be included in appraisal forms)

Types of mixed methods study components or primary studies	Methodological quality criteria (see tutorial for definitions and examples)	Responses: Yes	No	Can't tell	Comments
Screening questions (for all types)	• Are there clear qualitative and quantitative research questions (or objectives*), or a clear mixed methods question (or objective*)?				
	• Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components).				
	Further appraisal may be not feasible or appropriate when the answer is 'No' or 'Can't tell' to one or both screening questions.				
1. Qualitative	1.1. Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?				
	1.2. Is the process for analyzing qualitative data relevant to address the research question (objective)?				
	1.3. Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?				
	1.4. Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?				
2. Quantitative randomized controlled (trials)	2.1. Is there a clear description of the randomization (or an appropriate sequence generation)?				
	2.2. Is there a clear description of the allocation concealment (or blinding when applicable)?				
	2.3. Are there complete outcome data (80% or above)?				
	2.4. Is there low withdrawal/drop-out (below 20%)?				
3. Quantitative non-randomized	3.1. Are participants (organizations) recruited in a way that minimizes selection bias?				
	3.2. Are measurements appropriate (clear origin, or validity known, or standard instrument; and absence of contamination between groups when appropriate) regarding the exposure/intervention and outcomes?				
	3.3. In the groups being compared (exposed vs. non-exposed; with intervention vs. without; cases vs. controls), are the participants comparable, or do researchers take into account (control for) the difference between these groups?				
	3.4. Are there complete outcome data (80% or above), and, when applicable, an acceptable response rate (60% or above), or an acceptable follow-up rate for cohort studies (depending on the duration of follow-up)?				
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?				
	4.2. Is the sample representative of the population understudy?				
	4.3. Are measurements appropriate (clear origin, or validity known, or standard instrument)?				
	4.4. Is there an acceptable response rate (60% or above)?				
5. Mixed methods	5.1. Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?				
	5.2. Is the integration of qualitative and quantitative data (or results*) relevant to address the research question (objective)?				
	5.3. Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results*) in a triangulation design?				
	Criteria for the qualitative component (1.1 to 1.4), and appropriate criteria for the quantitative component (2.1 to 2.4, or 3.1 to 3.4, or 4.1 to 4.4), must be also applied.				

*These two items are not considered as double-barreled items since in mixed methods research, (1) there may be research questions (quantitative research) or research objectives (qualitative research), and (2) data may be integrated, and/or qualitative findings and quantitative results can be integrated.

MMAT Checklist

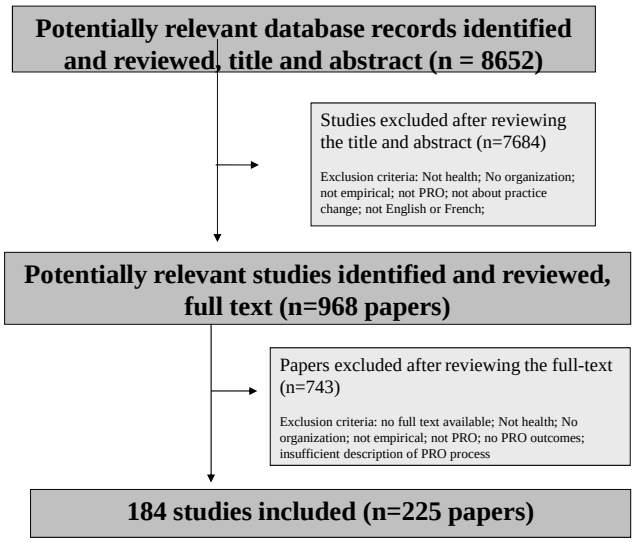
- 2 screening questions
- 19 items for five types of studies
  - Qualitative research (n=4)
  - Randomized controlled trials - RCT (n=4)
  - Non-randomized studies - NRS (n=4)
  - Quantitative descriptive studies - QDS (n=4)
  - Mixed methods studies (n=11)
    - 4 items for the qualitative component
    - 4 for the quantitative component (RCT or NRS or QDS)
    - 3 specific items for the mixed methods component

2 Systematic Mixed Studies Reviews

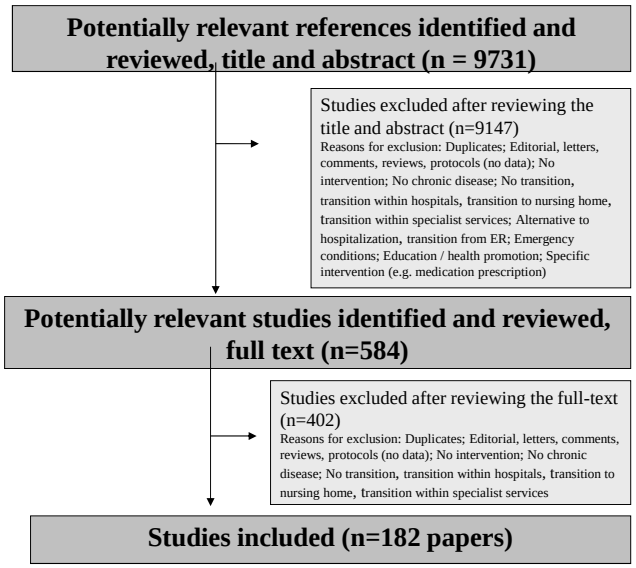
- Study I - Participatory systematic mixed studies review on the key processes and outcomes of Participatory Research with Health Organization (PRO); Review involving organization representatives at all stages of the research process

- Study II – Systematic mixed studies review on the transition of patients with chronic conditions (congestive heart failure, cardiovascular diseases, chronic pulmonary diseases, elderly with multiple chronic conditions) from the hospital to home: Mixed evaluation of the transition intervention outcomes (clinical, service use, needs, quality of care, satisfaction)

Study I (PRO) - Flow diagram



Study II (Transition) - Flow diagram



Critical Appraisal

•Study I (PRO) - Two trained reviewers conducted independent appraisal
  - VK and RQ: course and practice
  - 3rd party decision (PP) when disagreement not easily resolved

•Study II (Transition) – Two trained reviewers conducted independent appraisal
  - VK and QN: course and practice
  - 3rd party decision (PP) when disagreement not easily resolved

•Using the Mixed Methods Appraisal Tool (MMAT)

Results

Total

- PRO: 184 studies (qual, quan and mixed)
- Transition: 182 studies (qual, quan and mixed)

Sub-sample for reliability testing: 261 studies

- PRO: 167 studies (140 qualitative and 27 MM)
- Transition: 94 quantitative studies (72 RCT and 22 NRS)

Average time spent for critically appraising one study (minutes)

Type of study	VK	RQ	QN	Average time
RCT	5.6		9.1	**7.4**
NRS	6.4		10.3	**8.4**
Qual	17	7.9		**12.5**
MM	23	14.4		**18.7**

MMAT-based higher vs. lower quality (of the reporting) of studies

Type of design:	Higher > 52%* Nb of studies:	Lower ≤ 52%** Nb of studies:
Randomized controlled trial	53	19
Qualitative research	52	88
Non randomized study	19	3
Mixed methods study***	17	10

* - 3 and more items out of 4 are met;
** - 2 and less items out of 4 are met;
*** - 2 and more items out of 3 are met.

Simple Kappa - Qualitative studies

Item	KAPPA	INTERPRETATION
1.1 Relevance of sources of data to address question	0.62	Substantial agreement
1.2 Relevance of data analysis to address question	0.52	Moderate agreement
1.3 Consideration of how context influences findings	0.36	Fair agreement
1.4 Consideration of how researchers influence findings	0.21	Fair agreement

Interpretation of Kappa	
0.21– 0.40 Fair agreement 0.41–0.60 Moderate agreement	0.61–0.80 Substantial agreement 0.81–0.99 Almost perfect agreement

Simple Kappa – Randomized Clinical Trials

Item	KAPPA	INTERPRETATION
2.1 Description of the randomization	0.70	Substantial agreement
2.2 Description of the allocation concealement	0.58	Moderate agreement
2.3 Complete outcome data	0.41	Moderate agreement
2.4 Low withdrawal rate	0.30	Fair agreement

Interpretation of Kappa	
0.21– 0.40 Fair agreement 0.41–0.60 Moderate agreement	0.61–0.80 Substantial agreement 0.81–0.99 Almost perfect agreement

Simple Kappa – Non-Randomized Studies

Item	KAPPA	INTERPRETATION
3.1 Recrutement of participants to minimize selection bias	0.86*	NA
3.2 Appropriateness of measurements	0.77*	NA
3.3 Comparison of participants	0.38	Fair agreement
3.4 Complete outcome data (80% or above)	0.64	Substantial agreement

* - agreement on positive ratings only

Interpretation of Kappa	
0.21– 0.40 Fair agreement 0.41–0.60 Moderate agreement	0.61–0.80 Substantial agreement 0.81–0.99 Almost perfect agreement

Simple Kappa - Mixed Methods Studies

Item	KAPPA	INTERPRETATION
5.1 Is the mixed methods research design relevant to address the qualitative and quantitative research questions?	0.92*	NA
5.2 Is the integration of qualitative and quantitative data relevant to address the research question?	0.68	Substantial agreement
5.3 Is appropriate consideration given to the limitations associated with this integration?	**	NA

* - agreement on positive ratings only
** - No disagreement between raters

Interpretation of Kappa	
0.21– 0.40 Fair agreement 0.41–0.60 Moderate agreement	0.61–0.80 Substantial agreement 0.81–0.99 Almost perfect agreement

Weighted Kappa by domain

Item	KAPPA	INTERPRETATION
Non-Randomized Studies	0.15	Low agreement
Qualitative studies	0.29	Fair agreement
Randomized Controlled Trials	0.53	Moderate agreement
Mixed Methods Studies	0.72*	Substantial agreement

* - based on the mixed methods section only (5.1, 5.2, 5.3)

Interpretation of Kappa	
0.21– 0.40 Fair agreement 0.41–0.60 Moderate agreement	0.61–0.80 Substantial agreement 0.81–0.99 Almost perfect agreement

Discussion

Why is it difficult to attain high appraisal reliability for NRS and qualitative studies?

- Criteria might be understood in different ways by raters of qualitative studies.
- E.g., “appropriate consideration given to the influence of the context or the researchers on the findings”: Information on context or reflexivity is not always provided; When present, the levels of detail differ (e.g., simple description vs. documentation strategy), so appropriate consideration may be rated when ‘description’ (rater-1) or ‘strategy’ (rater-2).

Thus, clarification of the items with low kappa value will be needed in future validation research on the MMAT.

Conclusion

- MMAT is an easy tool to understand
- Using MMAT is effective
- Given lack of standardised reporting for qualitative and mixed methods research, contacting authors could help clarify how to rate certain criteria (which are otherwise unclear)

References

PUBLIC WEBSITE

- Pluye, P., Robert, E., Cargo, M., Bartlett, G., O'Cathain, A., Griffiths, F., Boardman, F., Gagnon, M.P., & Rousseau, M.C. (2011). *Proposal: A mixed methods appraisal tool for systematic mixed studies reviews.* Retrieved on September 15, 2013 from http://mixedmethodsappraisaltoolpublic.pbworks.com.

REFERENCES

- Cohen J (1968). Weighted kappa: Nominal scale agreement provision for scaled disagreement or partial credit. *Psychological Bulletin*, 70(4):213-20.
- Pace R, Pluye P, Bartlett G, Macaulay AC, Salsberg J, Jagosh J & Seller R (2012). Testing the reliability and efficiency of the pilot Mixed Methods Appraisal Tool (MMAT) for systematic mixed studies review. *International Journal of Nursing Studies* 49(1):47-53.
- Pluye P (2013). Critical appraisal tools for assessing the methodological quality of qualitative, quantitative and mixed methods studies included in systematic mixed studies reviews [Letter]. *Journal of Evaluation in Clinical Practice* 19(4):122.
- Pluye P, Gagnon MP, Griffiths F & Johnson-Lafleur J (2009). A scoring system for appraising mixed methods research, and concomitantly appraising qualitative, quantitative and mixed methods primary studies in mixed studies reviews. *International Journal of Nursing Studies* 46(4):529-546.
- 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.*