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Tools used to assess methodological quality of primary mixed methods or multi-method studies: a scoping review protocol

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ABSTRACT

Objective: The objective of this proposed scoping review is to identify the tools available to critically appraise and assess methodological quality; assess risk of bias of primary mixed methods or multi-method studies; and determine which studies have undergone any formal psychometric evaluation.

Introduction: Currently, JBI does not have an appraisal tool for primary mixed methods or multi-methods studies and recommends reviewers use the JBI qualitative tool and the relevant quantitative tool (based on study design) together. While useful, this does not allow reviewers to consider elements specifically related to the nuances of primary mixed methods studies.

Inclusion criteria: Any tool, checklist, scale, instrument, criteria, system, or framework that has been designed to assess the methodological quality of primary mixed methods or multi-methods studies will be of interest. Adapted or modified versions of tools will also be considered and any psychometric properties measured will be recorded. Published and unpublished primary studies, reviews, and textual evidence are eligible for inclusion in the review.

Methods: The review will follow JBI methodology for scoping reviews and be reported in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). The following databases and resources will be searched: CINAHL, PubMed, PsycINFO, Embase, Scopus, medRxiv, ProQuest Dissertations and Theses Global, and Google Scholar. Various websites will also be searched. No language limits will be placed. Screening, data extraction, and data analysis will be conducted by 2 reviewers independently. Descriptive statistics and basic content analysis will be used to convey the results of the review, supplemented by a narrative synthesis and presented in tabular and graphical form.

Review registration: Open Science Framework: osf.io/da9th

Keywords: critical appraisal; quality assessment; methodological quality; mixed methods; risk of bias

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Conflicts of interest: CS is the Deputy Editor-in-Chief of JBI Evidence Synthesis, but did not have any involvement in the editorial processing of the manuscript. CS, LL, and HL are members of the JBI Scientific Committee.

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Introduction

Assessing the quality of a study is a core element of any robust systematic review.¹ The terms used to describe this process include *critical appraisal*, *assessment of methodological quality*, *quality assessment/appraisal*, *study validity*, and *risk of bias*.

Currently, there is no consensus on what term should be used^{2,3}; however, there is general consensus that undertaking quality assessment is a crucial and necessary step in the systematic review process regardless of study methodology,^{4,5} as systematic reviews play a crucial role in informing policy and practice within the evidence ecosystem.⁶

A range of tools have been developed to assess methodological quality, which are referred to as checklists, scales, instruments, criteria, systems, and frameworks, with many organized by study design. Like any measurement tool, an assessment of these tools' psychometric properties should be conducted to determine their reliability and validity.⁷ While there are a number of tools to assess primary quantitative and qualitative study designs, there appears to be limited tools available to assess the rigor of the research process of primary mixed method studies (those containing qualitative and quantitative methods) or multi-method studies (those containing more than one method, both across and within quantitative and qualitative domains). A preliminary search identified the following tools: Mixed Methods Appraisal Tool (MMAT),⁸ Quality assessment with Diverse Studies (QuADS),⁹ QualSyst,¹⁰ and the Evaluation Tool for Mixed Methods Studies.¹¹ However, there has been limited assessment of the psychometric properties of these tools.¹²

While JBI has a suite of tools available to assess methodological quality,⁴ it currently does not have an appraisal tool for primary mixed methods or multi-methods studies, and recommends reviewers use the JBI qualitative tool and the relevant quantitative tool (based on study design) together.¹³ This approach does not allow reviewers to consider issues specifically related to the design and nuances of primary mixed methods studies, such as integration (eg, transformation and triangulation).¹⁴ This means a complete assessment of study quality is not undertaken.

The JBI Mixed Methods Methodology Group aims to undertake research to determine if a JBI-specific mixed methods tool should be developed or if an existing tool should be adopted or adapted. The first stage of this research is to investigate what tools exist that are specific to mixed methods or multi-methods studies, explore what aspects or domains these tools focus on that are specific to mixed methods, and determine whether these tools have been systematically evaluated and, if so, which psychometric properties have been tested in these evaluations.

A preliminary search of Open Science Framework, PubMed, medRxiv, and *JBI Evidence Synthesis* was conducted in November 2024 and 1 systematic review protocol¹⁵ was located that aims to look at measurement properties of appraisal tools for mixed methods research. However, no subsequent review was identified and we did not receive a response from the authors when we contacted them. A number of methodological commentaries were also located that discuss how quality should be addressed in mixed methods research.^{16,17} This review will build on the work undertaken by Hong¹⁸ who searched the literature in 2015 to identify tools for primary studies (either qualitative, quantitative, or mixed methods studies) that had undertaken validity and reliability testing. Scoping review methodology was chosen as the aim of the review is to identify the types of available evidence in a given field and examine how research is conducted in the area.¹⁹

The objective of this review is to identify and examine tools that exist to assess the methodological quality of mixed methods and multi-method studies, and determine the type and extent of psychometric testing and properties evaluated.

Review questions

- i) What tools exist to assess the methodological quality of mixed methods or multi-methods primary studies?
- ii) What aspects or domains do these tools focus on that are unique to primary mixed methods or multi-method designs?
- iii) What process or approach was used in psychometric testing and what properties have been evaluated?

Inclusion criteria

Participants

Given the objective of this review focuses on tools that assess the methodological quality of mixed methods and multi-method studies, and the type and extent of psychometric testing and properties evaluated, participants are not relevant to this review.

Concept

The concept of interest is any tool, checklist, scale, instrument, criteria, system, or framework that has been designed to assess or appraise the methodological quality of primary mixed methods or multi-methods

studies. For the purpose of this review the term *tool* will encompass all terms listed. Mixed methods studies (those containing qualitative and quantitative methods) or multi-method studies (those containing multiple methods) are the focus regardless of specific design; however, we will only include multi-methods tools that include a qualitative component and a quantitative component. Tools that are solely designed to rank studies based on study design and do not assess aspects related to methodological quality will be excluded. Adapted or modified versions of tools will also be considered. All psychometric properties will be considered, including those that sit under the domains of reliability, validity, and responsiveness.²⁰

Context

There will be no limitations regarding setting or geographical location.

Types of sources

The proposed scoping review will consider diverse types of sources including all primary qualitative, quantitative, and mixed method study designs (including development studies, pilot or validation studies), methodological papers, systematic and scoping reviews, and textual evidence.

Methods

The proposed scoping review will be conducted in accordance with the JBI methodology for scoping reviews²¹ and in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).²² This protocol has been registered in Open Science Framework (<https://osf.io/da9th>).

Search strategy

The search strategy will utilize the JBI 3-phase search strategy²³ to locate both published and unpublished primary studies, reviews, and textual papers. First, an initial limited search of *JBI Evidence Synthesis*, Open Science Framework, PubMed, and medRxiv was undertaken to identify any articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles, were used to develop a full search strategy for PubMed (see Appendix I). The search strategy was developed in consultation with an information scientist at The University of Adelaide who has expertise in

evidence syntheses. Phase 2 involves adapting all the identified keywords and index terms of the search strategy for each of the included information sources. The final step will involve screening the reference lists of all articles included in the review for additional papers.

Articles published in any language will be included. DeepL Translator (DeepL, Cologne, Germany) will be used to translate any titles and abstracts in languages the authors are not fluent in. Where articles qualify for full-text review, they will be translated using DeepL and, if considered relevant, be translated by a professional translator. Articles published from 2014 to the present will be included to continue the work previously undertaken by Hong.¹⁸

The resources to be searched for published, unpublished, and gray literature include: CINAHL Ultimate (EBSCOhost), PubMed, PsycINFO (OvidSP), Embase (Elsevier), Scopus, medRxiv, ProQuest Dissertations and Theses Global (ProQuest), Open Science Framework, and Google Scholar. The first 20 pages of Google Scholar will be searched based on the recommendation of Haddaway et al.²⁴ and conducted using incognito mode.

The following websites will also be searched: Centre for Evidence-Based Medicine (CEBAM), Critical Appraisal Skills Programme (CASP), CATevaluation, Latitudes network, Cochrane, The Campbell Collaboration, Centre for Reviews and Dissemination and the EQUATOR network, National Collaborating Centre for Methods and Tools.

Source of evidence selection

Once searching is completed, citations will be exported from their relevant source and data will be collated and uploaded into Covidence (Melbourne, Australia), and duplicates removed. A pilot test of 10 randomly chosen records will be undertaken by all the reviewers involved in screening and selection. Once consensus is achieved, titles and abstracts will then be screened by 2 independent reviewers for assessment against the inclusion criteria for the review. All potentially relevant papers will be retrieved in full and their citation details imported into Covidence. As with title and abstract screening, the full text of selected citations will be assessed in detail against the inclusion criteria by 2 independent reviewers. Any full-text papers that do not meet the inclusion criteria will be excluded, and the reason for exclusion will be reported in the scoping review. Any disagreements that arise between

the reviewers at each stage of the selection process will be resolved through discussion or with a third reviewer. The results of the search and selection process will be reported in full in the scoping review and presented in a PRISMA flow diagram.²⁵

Data extraction

Two reviewers will independently extract data from papers included in the scoping review using a data extraction tool developed by the reviewers in Covidence (see Appendix II). The tool will be piloted on 4 papers of varying designs as per guidance from Pollock *et al.*²⁶ Extracted data will include the bibliographic details of the included source, the tool (including its development and any psychometric properties evaluated), and domains/items covered. The draft data extraction tool will be modified and revised as necessary during the process of extracting data from each included paper and any modifications will be detailed in the scoping review. Any disagreements between the reviewers will be resolved through discussion or via a third reviewer. Authors of papers will be contacted up to 2 times via email to request missing or additional data, where required. If no response is received, papers will be included and any missing data will be noted as a limitation.

Data analysis and presentation

All extracted data will be analyzed using either descriptive analysis or basic qualitative content analysis²⁶ and supplemented by a narrative synthesis. Data pertaining to study/paper characteristics, identified tools, and psychometric properties will be analyzed using descriptive analysis and presented using tables and figures, while tool domains will be analyzed using basic qualitative content analysis and presented in figures.

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Author contributions

CS and LL conceptualized the manuscript and wrote the manuscript. HL, CG, MS, KR, NK, JF, QNH, and DP assisted in the writing and refining of the manuscript.

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Appendix I: Search strategy

PubMed (NLM)

Date searched: December 10, 2024

("mixed stud*" [Title/Abstract] OR "mixed research" [Title/Abstract] OR "mixed knowledge" [Title/Abstract] OR "multi-method*" [Title/Abstract] OR "multimethod*" [Title/Abstract] OR "diverse designs" [Title/Abstract] OR "mixed approach" [Title/Abstract] OR "mixed method" [Title/Abstract:~5] OR "mixed methods" [Title/Abstract:~5] OR "multiple method" [Title/Abstract:~5] OR "multiple methods" [Title/Abstract:~5])

AND

("critical appraisal" [Title/Abstract] OR "appraisal tool" [Title/Abstract] OR "critical assessment" [Title/Abstract] OR "methodological quality" [Title/Abstract] OR "methodological assessment" [Title/Abstract] OR "study quality" [Title/Abstract] OR "quality assessment" [Title/Abstract] OR "risk of bias assessment" [Title/Abstract] OR "evidence appraisal" [Title/Abstract])

Total = 3393

Appendix II: Draft data extraction form

Field	
Author/year	
Type of paper/evidence source	
Name of tool	
Version of tool	
Is this an adapted or modified version of the tool?	Y/N If yes, please describe
Tool for:	Mixed methods, multi-method, or both
If tool for multi-methods does the tool specify which study designs it focuses on?	Y/N If yes, please list
Type of tool:	checklist, scale, instrument, criteria, system, risk of bias, framework, other (please elaborate), not mentioned/not clear
Number of items in tool	
If information provided on tool development please summarize (include methodological development, interest-holder engagement)	
List domains tool is organized into	
Describe methods how items are scored	(eg, y/n, scale, free-text)
Were psychometric properties measured?	Y/N
If yes, which properties:	Reliability: test-retest Reliability: inter-rater Reliability: intra-rater Internal consistency Measurement error: test-retest Measurement error: inter-rater Measurement error: intra-rater Responsiveness Content validity: Face validity Criterion validity: concurrent validity Criterion validity: predictive validity Construct validity: structural validity Construct validity: hypotheses-testing Construct validity: cross-cultural validity