

A critical Evidence- Based review of Quality Assessment tools applied in health research

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Abstract—

Quality appraisal is a critical component of health research, ensuring that evidence used for clinical practice, education, and policy-making is credible, valid, and reliable. With the increasing emphasis on evidence-based practice, researchers and healthcare professionals must systematically assess the methodological quality of research studies before applying findings to real-world settings. Numerous quality appraisal tools have been developed to evaluate quantitative, qualitative, and mixed methods studies; however, the diversity of tools often creates confusion regarding their selection and appropriate use. This article presents a comprehensive comparative review of commonly used quality appraisal tools in health research, including the Critical Appraisal Skills Programme (CASP), Joanna Briggs Institute (JBI) checklists, Cochrane Risk of Bias tools, STROBE, CONSORT, AMSTAR, and the Mixed Methods Appraisal Tool (MMAT). The article explores the purpose, structure, strengths, and limitations of each tool and highlights their applicability across different research designs. Challenges in quality appraisal, ethical considerations, and implications for nursing and allied health research are also discussed. The review concludes that selecting an appropriate appraisal tool based on study design and research objectives is essential for enhancing the rigor, transparency, and trustworthiness of health research.

Keywords: Quality appraisal, Health research, Evidence-based practice, Critical appraisal tools, Systematic review

I. INTRODUCTION

The rapid growth of health research literature has created a serious need to evaluate the quality of evidence before it is used in clinical practice, education, or policy making. In nursing and allied health sciences, research findings often influence patient care decisions, intervention planning, and healthcare standards, so it is not enough for a study

to simply exist or report positive results. What matters equally is whether the study was designed well, conducted ethically, analyzed properly, and reported transparently. Without this appraisal, weak or biased studies may be accepted as reliable evidence, which can lead to poor decisions and ineffective practice.

Quality appraisal is the process of systematically examining a study to judge its methodological rigor, trustworthiness, and relevance. It helps identify whether a study has potential problems such as poor sampling, unclear methods, incomplete outcome reporting, confounding, or other sources of bias. This is different from data extraction, which focuses on what the study found; quality appraisal focuses on how the study was done and whether its results can be believed. In evidence-based healthcare, this step is essential because the value of a review depends on the quality of the studies included in it.

A major reason quality appraisal has become so important is that health research now includes many different study designs. Randomized controlled trials, observational studies, qualitative studies, mixed-methods research, and systematic reviews all answer different kinds of questions and are vulnerable to different forms of bias. As a result, no single appraisal method can be used for every type of study. Researchers must therefore select tools that match the design and purpose of the evidence being reviewed. In nursing and allied health research, this issue is especially relevant because studies often explore complex human experiences, clinical interventions, health service delivery, and community-based care. These areas frequently require combining evidence from different methodologies, making appraisal more challenging but also more important. A study may be useful for understanding patient perceptions, but if its methods are weak, its conclusions may still be

unreliable. Likewise, a well-reported study may appear convincing even when it has serious methodological limitations.

Therefore, an evidence-based review of quality assessment tools is highly relevant for contemporary health research. It helps researchers, educators, and clinicians choose suitable methods for evaluating evidence and supports stronger, more dependable conclusions. In a field where decisions can directly affect patient outcomes, quality appraisal is not optional; it is a foundational part of rigorous and responsible research practice.

II. METHODOLOGY

This study is a review of quality assessment tools applied in health research, using articles retrieved from PubMed, Scopus, Web of Science, CINAHL, and Google Scholar published between 2020 and 2026. Relevant studies were identified using predefined search terms related to quality appraisal tools, risk of bias, and critical appraisal in healthcare.

III. REVIEW OF LITERATURE

Recent literature on quality assessment tools in health research shows that the field has moved toward design-specific appraisal rather than using one general checklist for all studies. A 2024 BMJ Open review identified 49 appraisal tools for non-randomized studies of interventions and found that no single tool fully covered all quality concerns, although the RTI Item Bank and STROBE were among the most comprehensive for methodological quality and reporting, respectively. This supports the view that researchers must choose tools according to the study design and the exact purpose of appraisal, rather than assuming one instrument can fit all evidence types.

For randomized controlled trials, recent guidance continues to favour Cochrane's risk-of-bias approach and the NHLBI quality assessment tools because they focus on internal validity, randomization, allocation concealment, blinding, and outcome assessment. These tools are widely used because they help reviewers identify whether the study procedures were strong enough to support trustworthy conclusions. At the same time, the literature emphasizes that reporting guidelines such as CONSORT should not be confused with true quality appraisal tools, since

CONSORT mainly improves completeness and transparency of reporting.

For observational studies, the literature shows frequent use of STROBE, the Newcastle-Ottawa Scale, JBI checklists, and NIH tools. Recent reviews note that observational studies are especially vulnerable to confounding, selection bias, and measurement problems, so appraisal tools must capture more than whether a paper is well written. The 2024 BMJ Open review also found that commonly used tools often address confounding, outcome measurement, and intervention measurement, but still leave important quality concerns uncovered.

Systematic reviews and meta-analyses are increasingly appraised using AMSTAR 2, which evaluates protocol registration, search methods, study selection, data synthesis, and risk-of-bias handling. The literature strongly recommends using AMSTAR 2 as a structured judgment tool rather than converting it into a simple score, because such scoring can hide important weaknesses in critical domains. This makes AMSTAR 2 particularly useful in evidence synthesis, where the quality of the review can directly influence clinical recommendations.

Mixed-methods and complex health service studies have led to the development and use of tools such as MMAT and QUADS. Recent methodological discussions highlight that these tools are valuable because modern health research often combines quantitative outcomes with qualitative experiences, and traditional single-method appraisal tools are not enough for such designs. QUADS, in particular, has been highlighted for its ability to assess both methodological and reporting quality across diverse study designs, making it relevant to implementation research and health service evaluations.

Overall, the literature consistently shows that quality appraisal tools improve the rigor, transparency, and credibility of health research when they are matched carefully to the study design. However, the evidence also warns that these tools differ in scope, depth, and purpose, and many require training to use properly and consistently. For nursing and allied health research, this means appraisal should be a thoughtful interpretive process, not a mechanical checklist exercise.

IV. RESULTS AND DISCUSSION

The review of recent literature indicates that quality assessment tools are essential for evaluating the trustworthiness of health research evidence. A major result is that appraisal tools are not interchangeable; each one is designed for a specific type of study, such as randomized trials, observational studies, systematic reviews, or mixed-methods research. This means that using the wrong tool may lead to incomplete or inaccurate judgments about study quality.

The literature also shows a clear distinction between reporting quality and methodological quality. Some tools mainly check whether the study is well written and transparently reported, while others assess whether the research methods are strong enough to reduce bias. This distinction is important because a study may appear complete in its reporting but still have serious flaws in design or analysis.

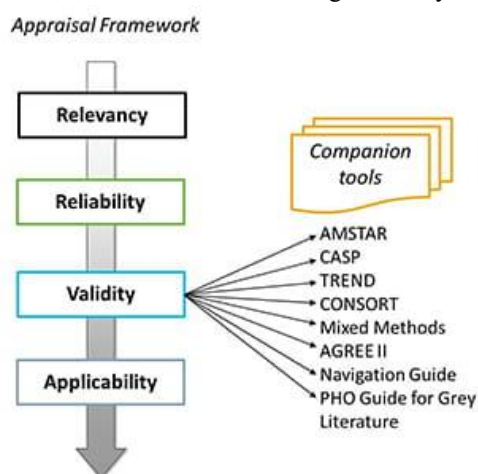


Figure 1

Another important finding is that recent appraisal practices are moving toward more detailed and design-specific evaluation. Tools for randomized studies often focus on bias, while tools for systematic reviews assess literature searching, study selection, and synthesis methods. Mixed-methods tools are increasingly important because health research now frequently combines quantitative outcomes with qualitative experiences.

The discussion also highlights practical challenges. Many appraisal tools require training, careful judgment, and time to use properly. In busy academic and clinical settings, this can make quality assessment difficult, especially for novice researchers. However, despite these limitations, the

literature consistently supports the use of appraisal tools because they improve transparency, reduce bias, and strengthen evidence-based decision-making.

V. CONCLUSION

Quality assessment tools are essential for evaluating the trustworthiness of health research evidence, especially in nursing and allied health sciences where research findings directly influence practice and policy. Recent literature from 2020 to 2026 shows a clear movement toward using different tools for different study designs rather than relying on one general checklist. This approach improves the accuracy of evidence appraisal and reduces the risk of including weak or biased studies in reviews and guidelines.

The main conclusion from the review is that no tool is universally best for all studies. Instead, researchers should choose tools based on the research design, the purpose of appraisal, and the level of methodological detail required. In practical terms, randomized trials, observational studies, systematic reviews, and mixed-methods studies each need different appraisal approaches.

For nursing and allied health research, quality assessment should be treated as a core step in evidence-based practice, not as an optional task. When used properly, appraisal tools help researchers identify strong evidence, reduce bias, and make more confident conclusions. This strengthens the scientific basis of healthcare decisions and improves the overall credibility of research in the field.

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