Systematic Review of Value Assessment Frameworks for Digital Health Interventions: Toward a Multidimensional Evaluation Approach

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Introduction & Problem Statement

- Digital Health Interventions (DHIs) address major healthcare challenges such as accessibility, efficiency, and quality of care.
- Evaluation remains complex due to multidimensional impacts.
- Traditional approaches often focus on clinical outcomes while overlooking usability, system integration, and societal value.

Methods: Systematic Review PRISMA Guideline

- Searched in PubMed, Web of Science, Google Scholar.
- Search strategy: combined PICO-based terms into Boolean search strings, e.g. *(“digital health” OR “eHealth” OR “mHealth” OR “telemedicine”) AND (“evaluation framework” OR “value assessment” OR “assessment model” OR “checklist” OR “scorecard”) AND (“criteria” OR “dimensions” OR “indicators”).*
- Qualitative synthesis categorized identified frameworks and extracted value dimensions and criteria across approaches.

Results: Identified Frameworks and Value Dimensions

- Identified Studies: 2,104 records screened; 97 studies met inclusion criteria.

Subquestion 1: Existing Frameworks and Approaches

- Checklists & scorecards support structured evaluation.
- Unidimensional frameworks contribute additional perspectives (e.g., usability, equity, maturity, readiness).
- Multidimensional frameworks integrate multiple value domains (e.g., Digi-HTA, TEHAI).
- Lack of harmonization and failure to provide systematic processes for comparative value assessment:
  - Limited application of **scoring, weighting,** or **aggregation.**
  - Reducing comparability and the ability to derive composite value indices across DHIs.

Subquestion 2: Identified Value Dimensions and Criteria

- **Impact on Subject:** individual outcomes and experiences, emphasizing how well DHIs meet needs and improve well-being.
- **Impact on Interaction:** usability and user experience, determining adoption and sustained engagement.
- **Impact on System:** integration of DHIs into technical and organizational infrastructures, ensuring efficiency and scalability.
- **Impact on Society:** broader societal, ethical, and regulatory context that shapes acceptance and sustainability of DHIs.

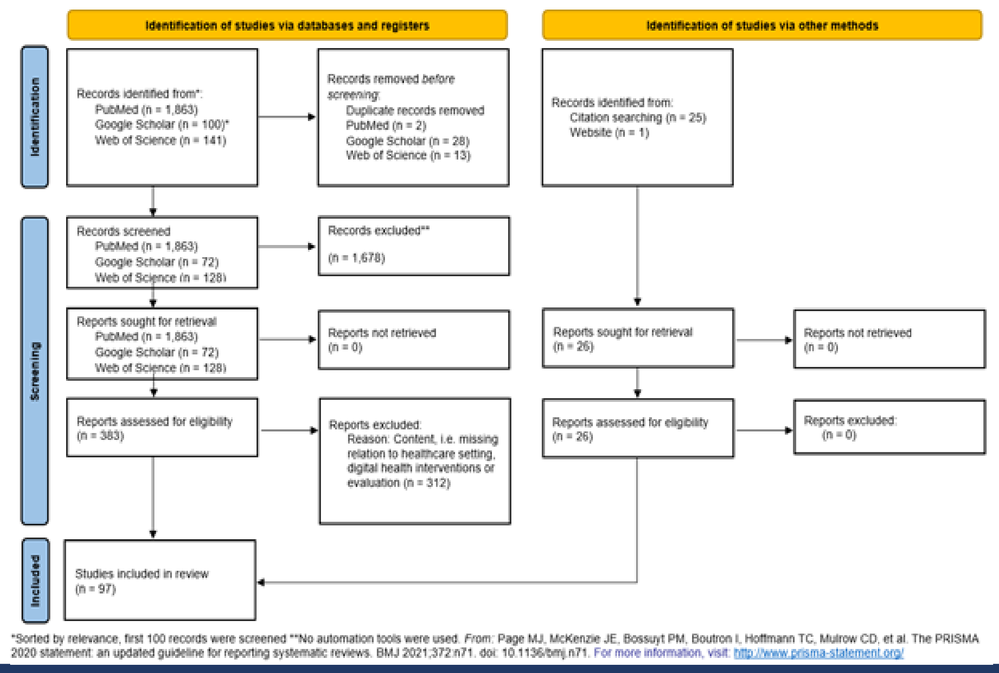

Figure 1: PRISMA-Flow Chart

Research Question: Structured Value Assessment

Main research question:

What comprehensive evaluation enables systematic assessment of the impact of DHIs on patient experience and outcomes, healthcare delivery, and societal welfare?

Subquestions:

- What value assessment frameworks or further evaluation approaches exist for evaluating DHIs?
- What value dimensions and criteria can be identified across existing frameworks and evaluation approaches, and how do these contribute to a comprehensive understanding of DHI value?

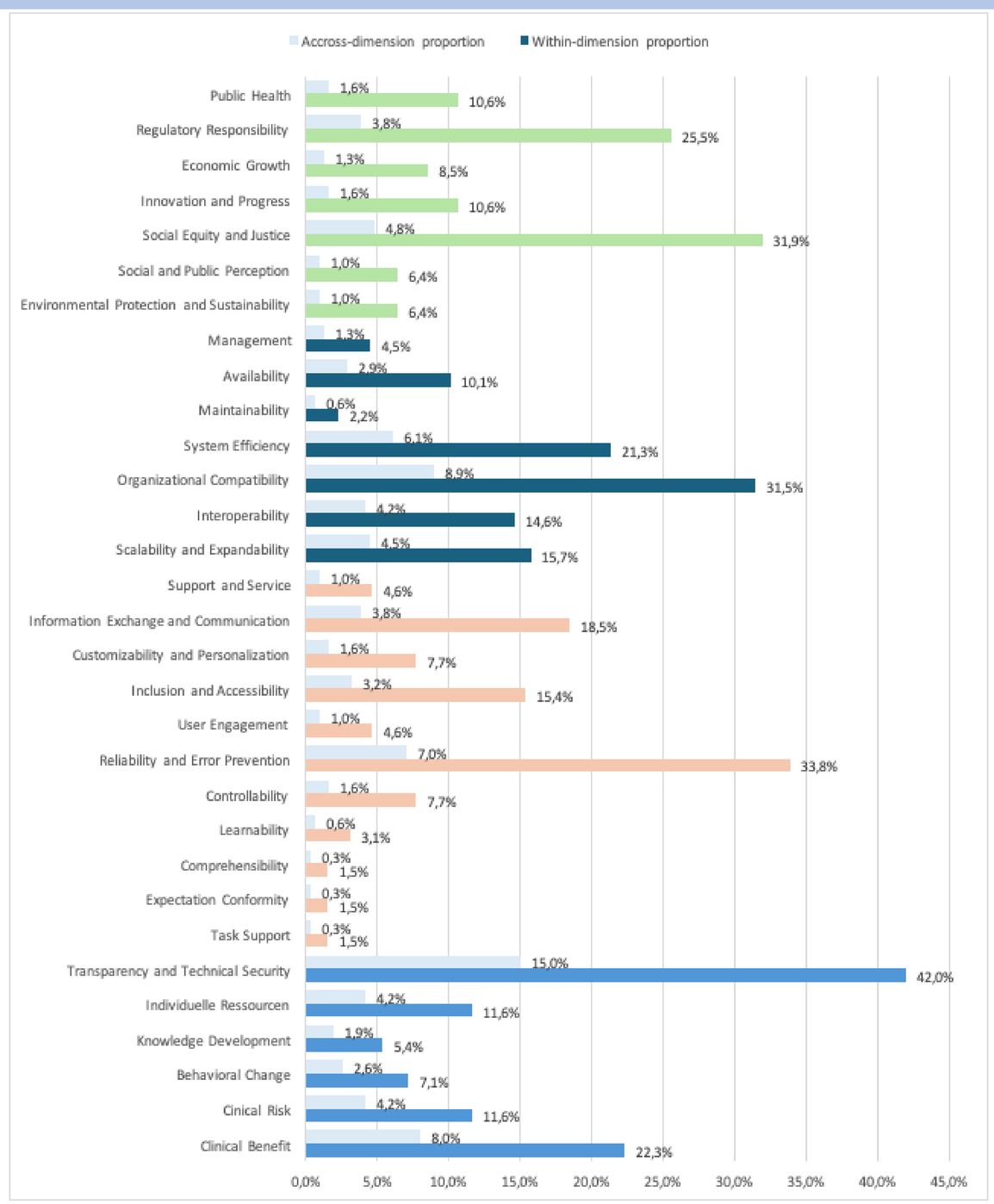

Figure 1: Proportion of criteria within and across dimensions

Discussion: Implications for Future Value Evaluation

- Existing frameworks focus mainly on clinical and economic outcomes.
- Usability, integration, and societal impact remain less systematically addressed.
- Scoring, weighting, and aggregation are rarely applied but essential for comparability and transparency.
- Scoring enables measurable evaluation; weighting reflects stakeholder value; aggregation supports composite value creation.
- Lack of standardized procedures limits consistency across DHIs.
- Structured, multidimensional, and weighted approaches enhance objectivity, reproducibility, and patient-centeredness.
- Comprehensive frameworks are needed to capture DHI value across subject, interaction, system, and societal domains.

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