Data Extraction

Systematic Review Training

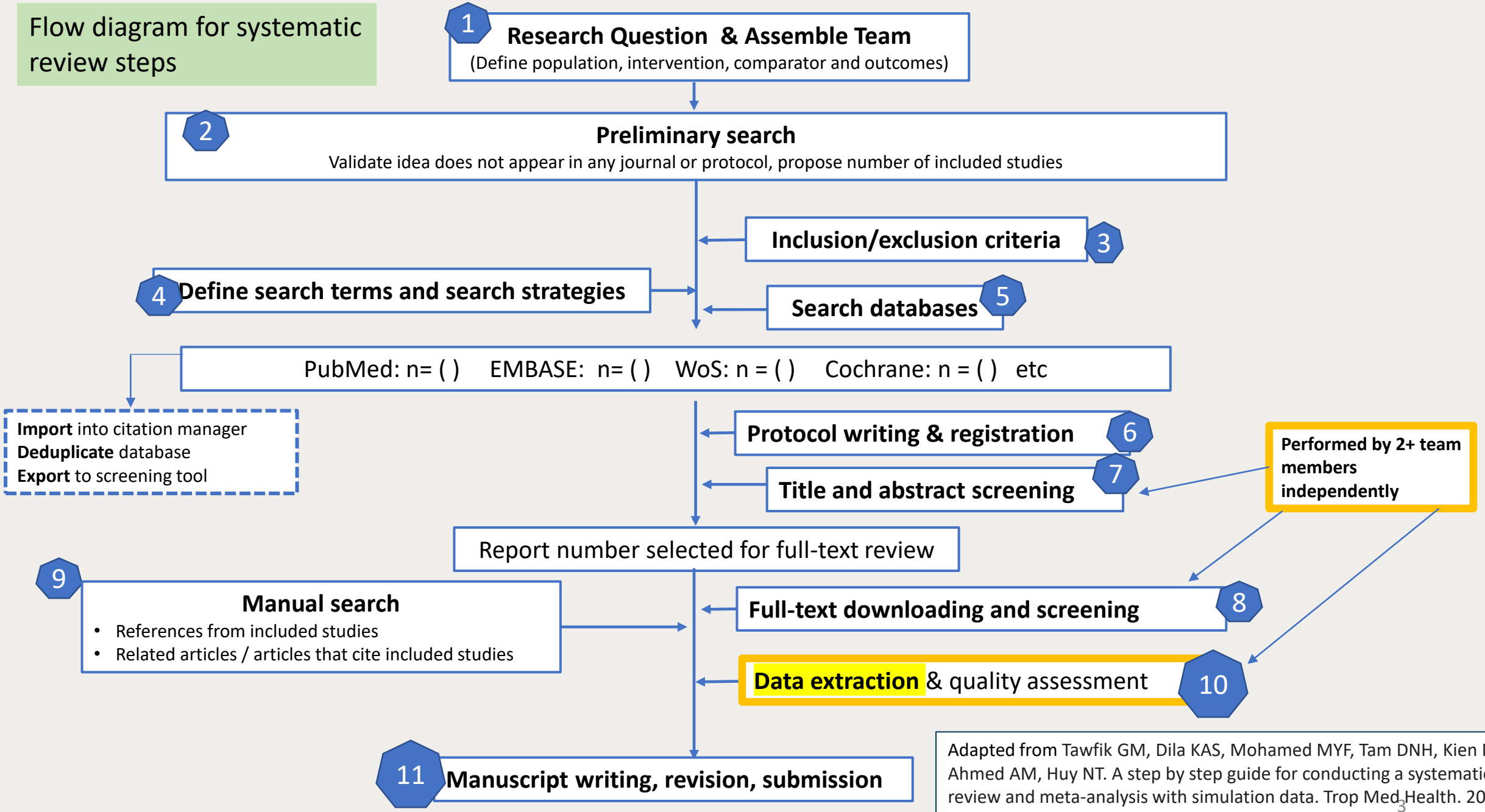
Center for Knowledge Management

VANDERBILT UNIVERSITY MEDICAL CENTER

Objectives:

- ✓ Describe approaches for creating data extraction forms and extracting data

Flow diagram for systematic review steps



Adapted from Tawfik GM, Dila KAS, Mohamed MYF, Tam DNH, Kien ND, Ahmed AM, Huy NT. A step by step guide for conducting a systematic review and meta-analysis with simulation data. Trop Med Health. 2019 Aug 1;47:46. doi: 10.1186/s41182-019-0165-6. PMID: 31388330

Performance of creatinine- or cystatin C–based equations to estimate glomerular filtration rate in sub-Saharan African populations

see commentary on page 1017

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Glomerular filtration rate (GFR) is the best index for kidney function; however, the applicability of GFR estimating equations in sub-Saharan African populations remains unclear. In a cross-sectional study of adults living in Kinshasa, Democratic Republic of Congo (n = 210) and Abidjan, Ivory Coast (n = 284), we evaluated the performance of creatinine and cystatin C–based equations using plasma clearance of iohexol as the reference standard. The race coefficient did not improve the performance of creatinine-based GFR estimates; in fact, both the Modification of Diet in Renal Disease (MDRD) and Chronic Kidney Disease Epidemiology (CKD-EPI) equations performed better without the race coefficient in participants with GFR ≥60 mL/min/1.73m². The CKD-EPI and Full Age Spectrum (FAS) equations were unbiased and had similar precision (SD 17.9 versus 18.1 mL/min/1.73m²) and accuracy within 30% (P30: 86.2% versus 87.3%) in participants with GFR ≥60 mL/min/1.73m². Both equations performed poorly in the subgroup with measured GFR < 60 mL/min/1.73m² (n = 80), but the FAS equation had smaller bias (−4.8 mL/min/1.73m² versus −7.7 mL/min/1.73m² for CKD-EPI). Cystatin C did not improve the performance of GFR estimating equations. The creatinine-based FAS and CKD-EPI equations performed reasonably well and were comparable when GFR was ≥ 60 mL/min/1.73m². Cystatin C did not improve performance. The FAS equation may be preferable when GFR is < 60 mL/min/1.73m², but this should be confirmed in larger studies.

Kidney International (2019) **95,** 1181–1189; https://doi.org/10.1016/j.kint.2018.11.045

KEYWORDS: creatinine; cystatin C; glomerular filtration rate; iohexol; sub-Saharan Africa

Chronic kidney disease (CKD) is recognized as a worldwide public health problem.[1,4] CKD is defined as the presence of persistent kidney damage (most of the time albuminuria) and/or decreased glomerular filtration rate (GFR) (<60 ml/min per 1.73 m² for 3 months. Based on [illegible] and [illegible] systems proposed. Adverse outcomes of CKD such as end-stage renal disease, cardiovascular disease and premature death can be prevented or delayed when treatment is initiated in the early stages of disease.[6–8] Prevention is of paramount importance in low-income countries with no or limited access to dialysis [illegible] cystatin C (CysC),[11,12] those biomarkers being used in equations with other variables such as age, sex, and potentially ethnicity. Nowadays, the Modification of Diet in Renal Disease (MDRD)[13] and Chronic Kidney Disease Epidemi-

Racial Adjustment Adversely Affects Glomerular Filtration Estimates in Black Americans Living with HIV

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The Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) estimating equations are commonly reported by clinical laboratories and used by clinicians to estimate GFR from intrinsic biomarkers (creatinine [eGFRcr], cystatin C, or both biomarkers [eGFRcr-cys]).[1–3] In the creatinine-based CKD-EPI equations, a race calibration factor is used to account for the observation that extrinsically measured GFR was higher, on average, in Black individuals compared with White individuals of the same sex, age, and serum creatinine concentration.[4] However, in contrast with the experience in Black American (BA) individuals, the race coefficient has been found to degrade equation performance among native Black African people.[5,6] In a recent study that included BA and White participants, we reported that eGFRcr was significantly more biased and less accurate than exogenously measured GFR in persons living with HIV than in those who were HIV negative.[7]

We evaluated annual measurements of [illegible] pants were HIV negative) who completed 1160 visits between 2010 and 2018 (Supplemental Table 1). We calculated eGFRcr and eGFRcr-cys with and without the race

units in ml/min per 1.73 m². Positive bias values correspond to overestimation of iGFR by eGFR, and negative bias values correspond to underestimation of iGFR by eGFR. We defined accuracy as a binary indicator of whether eGFR was within ±30% of iGFR. We used multilevel mixed models (logistic for accuracy and linear for bias), which allowed efficient use of all observations while accounting for the within-visit linked structure of the data (*i.e.*, multiple estimates of GFR bias or accuracy in the same participant at the same visit) and repeated observations in the same individuals over multiple visits (Supplemental Methods).

Focusing on participants who were HIV positive (Figure 1A), eGFRcr was substantially more accurate with the race term omitted than when it was retained (86.3% versus 78.4%, $P<0.001$) and, similarly, but with a smaller difference, eGFRcr-cys was significantly more accurate with the race term omitted than when it was retained (90.7% versus 88.1%, $P=0.05$). Consistent with a prior [illegible] GFRcr [illegible] ained) [illegible] partic- [illegible] han in [illegible] (78.4% versus 87.9%, $P<0.001$). Conversely, the accuracy of eGFRcr with the race term omitted was similar in participants who were HIV positive and those who

Focusing on participants who were HIV negative (Figure 1B), the accuracy of eGFRcr was similar when the race term was retained or omitted (88% for each), whereas the accuracy of eGFRcr-cys was significantly higher with the race term omitted than when it was retained (94% versus 90%, $P=0.009$). eGFRcr-cys without the race adjustment was the most accurate of the equations in both the HIV-positive and HIV-negative groups. Standard eGFRcr estimates in participants who were HIV positive overestimated iGFR by an average of 9.1 ml/min per 1.73 m² (95% CI, 7.2 to 11.0 ml/min per 1.73 m²). Compared with the standard equation, omitting the race term from eGFRcr reduced the absolute bias (from 9.1 to 3.9 ml/min per 1.73 m²) and changed the direction of the average bias from overestimation to underestimation among individuals who were HIV positive (Figure 1C). In participants who were HIV negative, omitting versus retaining the race term from eGFRcr changed the average bias from 5.1 to −8.2 ml/min per 1.73 m². For both the participants who were HIV positive and those who were HIV negative, omitting the race term from eGFRcr-cys produced changes in bias

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Data Extraction

What are the goals of the data extraction process?

- accurately describe the studies included in the review
- support the creation of article tables and figures
- provide the information needed for the risk of bias assessment
- enable syntheses and meta-analyses

Li T, Higgins JPT, Deeks JJ. Chapter 5: Collecting Data. In: Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). *Cochrane Handbook for Systematic Reviews of Interventions* version 6.3 (updated February 2022). Cochrane, 2022. Available from www.training.cochrane.org/handbook

What do you include on the data extraction form?

- Methods
- Participants
- Intervention
- Outcome
- Results
- Misc

Li T, Higgins JPT, Deeks JJ. Chapter 5: Collectiog Data. In: Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). *Cochrane Handbook for Systematic Reviews of Interventions* version 6.3 (updated February 2022). Cochrane, 2022. Available from www.training.cochrane.org/handbook.

Let's take a closer look at what's included…

Methods	• design, recruitment details, sampling methods, enrollment dates, length of follow-up, details of randomization and allocation, masking procedures, statistical methods used, selection & information biases (non-randomized studies)
Participants	• study setting, disease state, regions/countries of recruitment, eligibility/diagnostic criteria, participant characteristics at baseline (e.g., age, sex)
Intervention	• protocols, routes of delivery, doses, timing, frequency, implementation details, integrity & fidelity, descriptions of control groups, length of exposure (observational studies)

Li T, Higgins JPT, Deeks JJ. Chapter 5: Collectiog Data. In: Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). *Cochrane Handbook for Systematic Reviews of Interventions* version 6.3 (updated February 2022). Cochrane, 2022. Available from www.training.cochrane.org/handbook.

Let’s take a closer look at what’s included…

Outcomes

- e.g., measurement tools or instruments, definitions of clinical endpoints, names of scales, threshold definitions

Results

- e.g., results for each group and for each outcome at each time point, numbers of participants assigned and included in analyses, participant withdrawals/lost to follow-up/excluded, summary data by group

Misc

- key conclusions of study authors, reference to other studies

Li T, Higgins JPT, Deeks JJ. Chapter 5: Collectiog Data. In: Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, Welch VA (editors). *Cochrane Handbook for Systematic Reviews of Interventions* version 6.3 (updated February 2022). Cochrane, 2022. Available from www.training.cochrane.org/handbook.

A well-designed data extraction form…

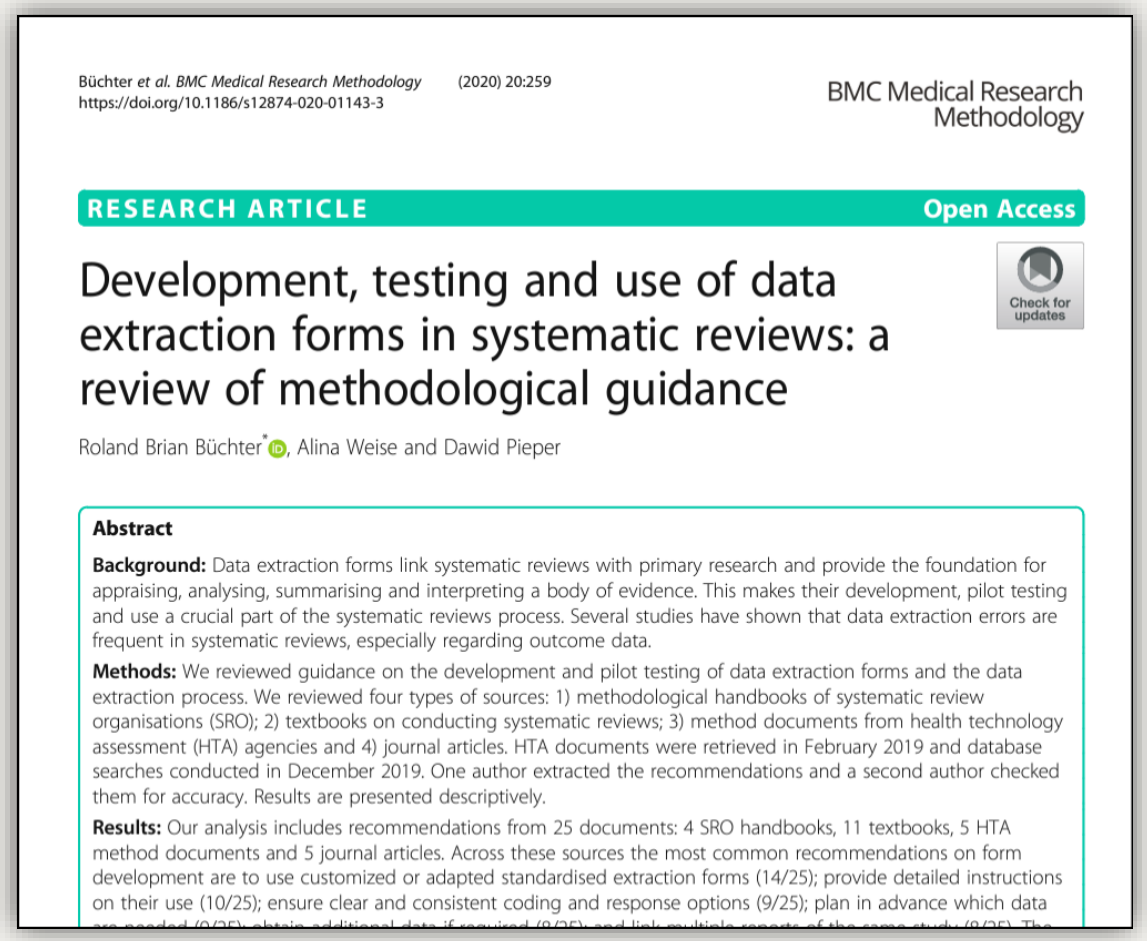
…is easy to use.

…minimizes the need to go back to the source document.

…avoids blank responses; uses “not applicable,” “not reported,” etc.

…is pilot tested

What do most groups do?



Büchter *et al. BMC Medical Research Methodology* (2020) 20:259
https://doi.org/10.1186/s12874-020-01143-3

BMC Medical Research Methodology

RESEARCH ARTICLE Open Access

Development, testing and use of data extraction forms in systematic reviews: a review of methodological guidance

Roland Brian Büchter*, Alina Weise and Dawid Pieper

Abstract

Background: Data extraction forms link systematic reviews with primary research and provide the foundation for appraising, analysing, summarising and interpreting a body of evidence. This makes their development, pilot testing and use a crucial part of the systematic reviews process. Several studies have shown that data extraction errors are frequent in systematic reviews, especially regarding outcome data.

Methods: We reviewed guidance on the development and pilot testing of data extraction forms and the data extraction process. We reviewed four types of sources: 1) methodological handbooks of systematic review organisations (SRO); 2) textbooks on conducting systematic reviews; 3) method documents from health technology assessment (HTA) agencies and 4) journal articles. HTA documents were retrieved in February 2019 and database searches conducted in December 2019. One author extracted the recommendations and a second author checked them for accuracy. Results are presented descriptively.

Results: Our analysis includes recommendations from 25 documents: 4 SRO handbooks, 11 textbooks, 5 HTA method documents and 5 journal articles. Across these sources the most common recommendations on form development are to use customized or adapted standardised extraction forms (14/25); provide detailed instructions on their use (10/25); ensure clear and consistent coding and response options (9/25); plan in advance which data

- Authors conducted an analysis of 25 sources (e.g., handbooks, textbooks, journal articles) for data extraction form development

- Findings:
  - Use customized/adapted extraction forms and standardize use
  - Decide on data needs in advance of extraction process
  - Seek missing data, if needed
  - Create links between multiple reports of the same study

Büchter RB, Weise A, Pieper D. Development, testing and use of data extraction forms in systematic reviews: a review of methodological guidance. BMC Med Res Methodol. 2020 Oct 19;20(1):259. doi: 10.1186/s12874-020-01143-3. PMID: 33076832; PMCID: PMC7574308.

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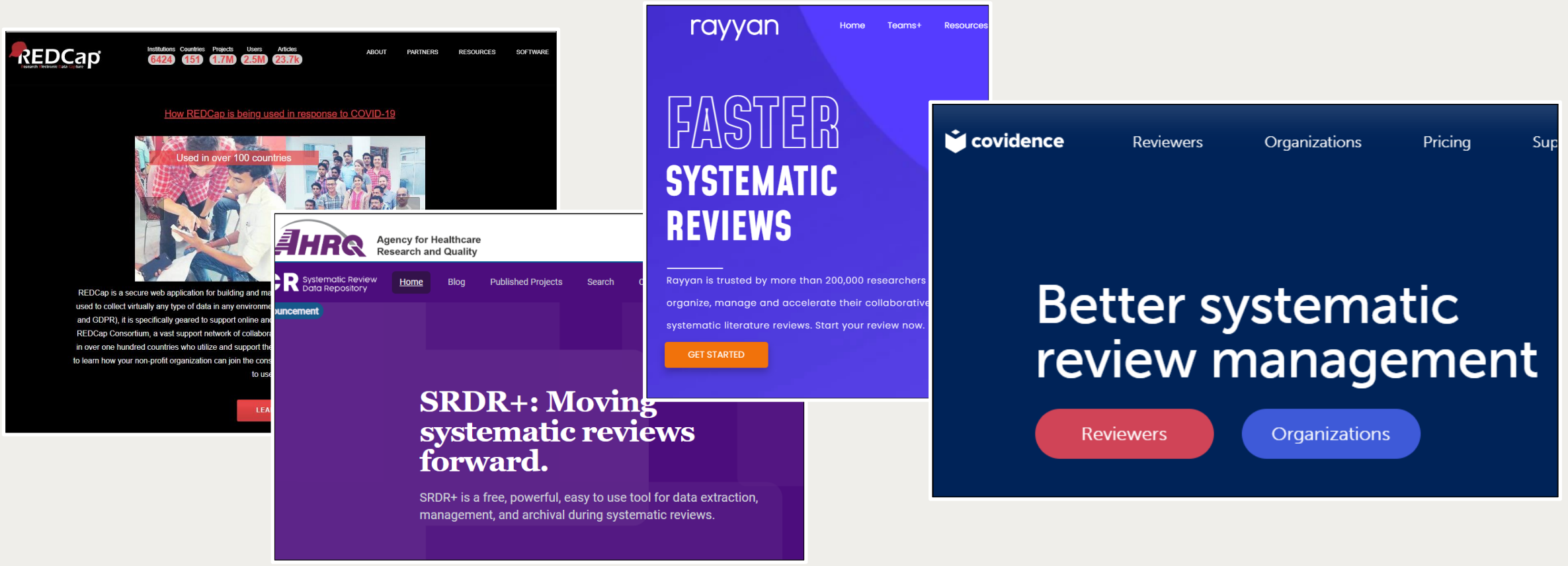
Screening for Anxiety in Adults: A Systematic Evidence Review for the U.S. Preventive Services Task Force
Date: June 2023
Report Type: U.S. Preventive Services Task Force Evidence Syntheses
Affiliation: Kaiser Permanente Research Affiliates
Report Status: Final

Screening for Depression and Suicide Risk in Adults: A Systematic Evidence Review for the U.S. Preventive Services Task Force
Date: June 2023
Report Type: U.S. Preventive Services Task Force Evidence Syntheses

Evidence-based Practice Center Reports. [Internet]. Rockville (MD): Agency for Healthcare Research and Quality [cited 2023 Sep 19]. Available from https://www.ahrq.gov/research/findings/evidence-based-reports/search.html.

There are many systematic review software options.



Harrison H, Griffin SJ, Kuhn I, Usher-Smith JA. Software tools to support title and abstract screening for systematic reviews in healthcare: an evaluation. BMC Med Res Methodol. 2020 Jan 13;20(1):7. doi: 10.1186/s12874-020-0897-3. PMID: 31931747; PMCID: PMC6958795.

Elamin MB, Flynn DN, Bassler D, Briel M, Alonso-Coello P, Karanicolas PJ, Guyatt GH, Malaga G, Furukawa TA, Kunz R, Schünemann H, Murad MH, Barbui C, Cipriani A, Montori VM. Choice of data extraction tools for systematic reviews depends on resources and review complexity. J Clin Epidemiol. 2009 May;62(5):506-10. doi: 10.1016/j.jclinepi.2008.10.016. PMID: 19348977.

Objectives:

- ✓ Describe approaches for creating data extraction forms and extracting data

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