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Topaz Project: How to conduct a transdisciplinary umbrella review

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A MESSAGE FROM PROFESSOR SUSAN DANBY, CENTRE DIRECTOR

In 2021, the Australian Research Council (ARC) funded a Centre of Excellence devoted to studying and researching 'the digital child'. The focus of this Centre is on very young children from birth to age 8, and describes and examines their everyday lives with and through digital technologies, their learning and their health in the family, and various kinds of kindergarten, childcare and early primary education experiences.

The Centre brings together six universities across Australia, as well as partner investigators from North America, Asia and Europe and a range of public bodies and civil society stakeholders, to focus on a holistic understanding of what it might mean to 'grow up digital' today.

The Digital Child Working Paper Series reports on our work in progress. There are five series of papers aimed at different audiences:

A **'how to'** series offers instructional papers aimed at early career researchers or those new to the principles and practices of structured review.

A **'discussion'** series consisting of discussion papers aimed at the scholarly community, raising larger conceptual challenges faced by researchers at the Centre and drawing on forms of literature review.

A **'reviews'** series consisting of scoping reviews, literature reviews and systematic reviews, all addressing specific research questions particular to any of the programme disciplines in the Centre.

A **'methods and methodologies'** series consisting of digital research capacity building resource-rich discussion papers, offering more technical support for the research community and allied scholarship. These are more focused on methods and methodologies.

A **'policy'** series consisting of more public facing, policy-oriented papers produced for stakeholder engagement.

Each of the working papers has been authored by members of the Centre and has been subject to review as explained in each paper. The arguments in each paper represent the view of the authors.

We hope that readers find each of these papers stimulating and generative and that all sections of society can draw on the insights, arguments and ideas within the papers to create healthy, educated and connected futures for all and every child.

Professor Susan Danby

Director, Centre of Excellence for the Digital Child

June 2022

EXECUTIVE SUMMARY

This paper is part of a series of instructional papers aimed at early career researchers or those new to the principles and practices of structured review.

This paper has been checked by the sub-series editorial team to ensure it meets basic standards around clarity of expression and acceptable and inclusive language and content.

It is part of a 'how to …' series aimed at supporting transdisciplinary reviews regarding technology use with, by and for young children. This paper focuses on how to conduct an Umbrella Review. The aim is to encourage the transdisciplinary understanding by providing a structured pathway for researchers from different discipline backgrounds to work together with end-users to provide credible, believable, and useful syntheses of available evidence.

NON-TECHNICAL SUMMARY

This paper is part of a 'how to…' series aimed at supporting researchers from different specialist areas to work together to summarise evidence regarding technology use with, by and for young children. This paper focuses on how to conduct an Umbrella Review. Other papers in this series are focused on how to conduct systematic, scoping, rapid and realist reviews.

With an increasing number of systematic reviews and research syntheses available, the next logical step to provide decision-makers with the evidence is to synthesize the existing reviews. Umbrella reviews can help create findings that are more easily accessible for practitioners and researchers compared to primary literature or systematic reviews. Umbrella reviews provide a very structured process for finding, appraising and synthesising secondary evidence.

The purpose of this paper is to provide a readily accessible resource of information on how to conduct 'transdisciplinary' umbrella reviews. By 'transdisciplinary' we mean researchers from different discipline areas working together with a shared understanding. For example, a review team could include a psychologist, a software engineer and an educator. The umbrella review process is conceptualised to include twelve steps conducted in sequence, with potential for some iteration across steps. This 'how to…' guide provides explanations of what to do at each step, along with a curated list of resources relevant to each step.

Before conducting an umbrella review, first consider whether an umbrella review is needed or desirable and then ensure the resources necessary to conduct the review are available. It is useful to incorporate end-users (the people who will use the synthesis of evidence) early and throughout the process. Umbrella reviews should address answerable questions and fill important gaps in knowledge. A detailed plan for the umbrella review should be written before commencing. The search for evidence should be designed to capture as many relevant reviews as possible. Captured reviews are then screened to remove reviews that are not relevant. After screening, relevant information from the included reviews is gathered. The strengths and limitations of each review are appraised, to provide an indication of the trustworthiness or believability of the evidence in each report. The overlap between included studies is considered. An evidence summary is then prepared and presented in a report, which may be published in an academic journal. Consider who might want to use this information, so useful information is created and publish the findings to allow those who might be interested to access the findings.

Overall, this paper promotes the use of umbrella reviews across multiple specialist areas relevant to young children and digital technologies. It draws on resources from various specialist areas, examples from a variety of disciplines, and uses inclusive language to be more readable across disciplines, aiming to be an integrated resource supporting transdisciplinary umbrella reviews.

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How to…conduct a transdisciplinary umbrella review to support evidence-based decision-making with, by and for young children

ABSTRACT

This paper is part of a 'how to…'series aimed at supporting transdisciplinary reviews regarding technology use with, by and for young children. Umbrella reviews can be used to compare and contrast published reviews to provide an overall summary of a body of information on a given topic. Umbrella reviews can help create findings that are more easily accessible for practitioners and researchers compared to primary literature or systematic reviews. Whilst early use of systematic reviews and umbrella reviews was focussed on determining unbiased estimates of the effect of health interventions tested in randomised controlled trials, such reviews are now used across many disciplines to identify, appraise and synthesise evidence to address many different types of questions. However, many support resources are focussed on specific discipline needs and tend to use discipline-specific language. This paper aims to support transdisciplinary collaboration by bringing together resources from various disciplines and presenting information in a format that is sensitive to discipline differences. The aim is to encourage the transdisciplinary understanding by providing a structured pathway for researchers from different discipline backgrounds to work together with end-users to provide credible, believable, and useful syntheses of available evidence.

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INTRODUCTION

This paper is part of a 'how to…' series aimed at supporting transdisciplinary reviews regarding technology use with, by and for young children. This paper focuses on how to conduct an umbrella review. Other papers in this series are focused on how to conduct systematic, scoping, rapid and realist reviews (Beynon and Straker, 2022, Beynon and Straker, 2022a; Beynon and Straker, 2022b; Beynon and Straker, 2022c).

With an increasing number of systematic reviews and research syntheses available (Bastian et al., 2010), the next logical step to provide decision-makers with the evidence is to synthesize the existing reviews. Umbrella reviews can be used to compare and contrast published reviews to provide an overall summary of a body of information on a given topic (Hartling et al., 2012). Umbrella reviews can help create findings that are more easily accessible for practitioners and researchers compared to primary literature or systematic reviews.

Umbrella reviews are also known as a 'review of reviews', 'overview of reviews', or 'synthesis of reviews'. Umbrella reviews get their name as they aim to bring reviews of literature together under a single canopy or umbrella (Cant et al., 2022). Umbrella reviews were first created as an outcome from activities of the Cochrane Collaboration, to present a 'friendly front end' to The Cochrane Library, displaying an overview of reviews relevant to the topic (Grant & Booth, 2009). Therefore, early use of umbrella reviews focused on systematic reviews and meta-analysis. However, now umbrella reviews have shifted to include reviews of studies of varying designs, to address a specific question or topic (Papatheodorou, 2019; Tsagris & Fragkos, 2016). Overall, a key use is to provide the reader with a report of the available secondary evidence on a given topic (Papatheodorou, 2019).

Umbrella reviews use explicit and systematic methods to search, identify and summarize multiple systematic reviews on a related topic. Similar methods to systematic review are used to conduct umbrella reviews. Therefore, this paper is similar to how to conduct systematic review (Beynon and Straker, 2022). Whether it is appropriate to conduct an umbrella review or a systematic review depends on the review purpose (Straker et al., 2021). Table 1 compares the key features of an umbrella review to a systematic review (Faulkner et al., 2022; Grant & Booth, 2009; Liu et al., 2025; Pollock et al., 2020).

TABLE 1: COMPARISON OF SYSTEMATIC REVIEW AND UMBRELLA REVIEW

Feature	Systematic Review	Umbrella Review
Focus	A focused and specific research question	A relatively broad topic
Objective	Summarise evidence from primary studies	Summarise evidence from systematic reviews
Search Strategy	Exhaustive and comprehensive search for relevant primary studies	Comprehensive systematic search for relevant systematic reviews
Data Source	Raw data from individual studies	Findings (effect size, summaries, conclusions) from the published systematic reviews/meta-analyses
Appraisal	Assess quality/risk of bias of included primary studies	Assess quality/risk of bias of included systematic reviews considering included systematic reviews appraisal of primary studies
Synthesis	Synthesize results of included primary studies (narratively and/or statistically via meta-analysis)	Summarise and/or re-analyse findings across reviews (narratively and graphically)
Goal	Provide rigorous, evidence-based answers for specific decisions.	Offer an overview, compare evidence across interventions, identify gaps.

Umbrella reviews therefore provide a potentially highly valuable method to provide decision-makers with trustworthy syntheses of knowledge to support better outcomes for children growing up in a digital world.

The purpose of this paper is to provide a readily accessible resource of information on how to conduct transdisciplinary umbrella reviews. The umbrella review process is conceptualised to include a number of steps conducted in sequence, with potential for some iteration across steps (see Table 2). Some steps may not be relevant to every review, so steps may need to be skipped. Before starting an umbrella review, it is good to understand all the steps involved.

TABLE 2 OUTLINE OF STEPS INVOLVED IN CONDUCTING AN UMBRELLA REVIEW

Preliminary Activities: Determine need for and type of review and available resources	
Step 1	**Engage and involve users:** Develop an advisory group to ensure uptake of review
Step 2	**Define and formulate the research question**: Create an answerable question
Step 3	**Write a protocol:** Establish the methods
Step 4	**Search the literature:** Locate available reviews
Step 5	**Screen the reviews:** Include relevant reviews
Step 6	**Extract data:** Collate relevant information
Step 7	**Evaluate methodological quality**: Conduct quality assessments
Step 8	**Assess study overlap:** Consider overlap between included studies
Step 9	**Synthesis of evidence:** Summarise and evaluate the overall body of evidence
Step 10	**Write the report:** Consolidate the information and conclusions
Step 11	**Disseminate:** Make academic community aware of the findings
Step 12	**Translate knowledge and engage end-users:** Help end-users apply the evidence
Follow up activities: Renewal watch, update as needed	

This 'how to…' guide provides explanations of what to do at each step, along with a curated list of resources relevant to each step. Many of the resources for systematic reviews are relevant to umbrella reviews.

Systematic reviews and umbrella reviews have a longer history in the health domain, and therefore more health-focussed resources are available. However, this paper promotes the use of umbrella reviews across multiple domains relevant to young children and digital technologies. It therefore draws on resources from various domains, with examples from a variety of disciplines, and uses inclusive language to be more readable across disciplines. The goal is an integrated resource supporting transdisciplinary umbrella reviews.

KEY RESOURCES

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Preliminary activities: Determine need for and type of review and available resources

A: Determine if an umbrella review is needed or desirable

- Consider if an umbrella review is the right type of review to answer the question and address the issue.
- Check if there are already existing systematic reviews on the issue.
    - Check major databases and registries to determine whether there are already published reviews (or protocols) on the same topic.
    - Conduct preliminary relevant database searches such as within: Cochrane Database, Campbell Collaboration, PubMed/MEDLINE, Embase PROSPERO and DARE (Database of Abstracts of Reviews of Effects), CareData, Educational research abstracts, ERIC (Educational Research Information Centre), Sociological abstracts (formally Sciofile), ACM (Association for Computing Machinery), Digital Library, CINAHL, PsychINFO, EmBase, Institute of Electrical and Electronics Engineers Xplore.
- Some familiarity with the current evidence is required to determine if an umbrella review is the most appropriate review type. An umbrella review could be the right type of review if there are multiple systematic reviews available that are not outdated. If existing systematic reviews are outdated, consider updating existing systematic reviews rather than conducting an umbrella review (Belbasis et al., 2022).
- An umbrella review could be suitable for controversial topics, topics impacted by bias and topics that have been the focus of many reviews (Fusar-Poli & Radua, 2018; Saunders et al., 2024). Also, fields with several meta-analyses with inconclusive evidence could be suitable for an umbrella review, as an umbrella review may assist in determining the robustness of the evidence.
- Umbrella reviews are generally conducted on topics with comprehensive evidence that have reached some maturity, therefore warranting a synthesis of summaries.
- Consider who will use the results of the review, and how.

B: Ensure the resources necessary to conduct the review are available

- Consider the time commitment.
- Consider other resources:
    - Review team
        - Reviews should include a team of more than one person.
        - In creating the review team, the need for domain expertise and review methodological expertise should be considered. For example, a review on human-computer interactions would benefit from including experts in technology design. First-time review authors should work with others who are experienced in the methods of umbrella reviews. Consider including a multidisciplinary team.
        - Having a team ensures tasks are shared and, importantly, that certain tasks (screening articles, data extraction, assessing risk of bias etc.) can be performed by at least two

people independently, which reduces bias, and the likelihood of errors (Cant et al., 2022).
        - Consider involving potential end-user (see Step 1).
    - Access to databases (see Step 4).
    - Technology (hardware and software) needed (see Step 5 and Step 9).

RESOURCES

Belbasis, L., Bellou, V., & Ioannidis, J. P. (2022). Conducting umbrella reviews. *BMJ Med*, *1*(1), e000071. https://doi.org/10.1136/bmjmed-2021-000071

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Step 1: Engage and involve users: Develop an advisory group to ensure uptake of the review

- Determine if the review will be useful to inform decision-makers. It is beneficial to seek early input from colleagues, experts and end-users to ensure the review is relevant and of good quality.
- Consider incorporating end-users such as policy makers, parents, carers, educators, consumers, clinicians, guidelines developers, designers, engineers, policy makers etc. throughout the process.
- For research regarding children, consider involving children as end-users, providing input relevant to their developmental capacity.
- The priorities of end-users and decision-makers could be different from the priorities of researchers. Involving people with a range of experience will ensure the umbrella review is relevant to a broad range of end-users (Rees and Oliver, 2017; Thomas et al., 2004). Engaging end-users is also likely to increase relevance, promote mutual learning, improve uptake and decreases research waste.
- Reviews are likely to be more relevant if the end-users are involved from the early stages. End-users can be involved in formulating the question (Step 2), commenting on the protocol (Step 3), and assisting in the whole review process.

RESOURCES

Abdellatif, M., Dadam, M. N., Vu, N. T., Nam, N. H., Hoan, N. Q., Taoube, Z., Tran, P., & Huy, N. T. (2025). A step-by-step guide for conducting an umbrella review. *Trop Med Health*, *53*(1), 1-9. https://doi.org/10.1186/s41182-025-00764-y

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Step 2: Define and formulate the research question: Create an answerable question

It is very important to define a clear, focused research question. Umbrella reviews should address answerable questions and fill important gaps in knowledge. Question formulation should involve the intended end-users of the review (more information on this in Step 1). When forming the research question, it could be helpful to consider which systematic reviews may be included by considering the eligibility criteria (more information on this in Step 2). This is vital for establishing the scope of the umbrella review.

Consult the FINER criteria when developing the research question. These criteria state that questions should be Feasible, Interesting, Novel, Ethical, and Relevant (Cummings et al., 2013).

  - A feasible review asks a question that the author team can investigate based on the ability of the team, the available resources and the available evidence.
  - Ensure the authors are interested in the question so they are committed to completing the review.
  - A novel review will focus on a gap in knowledge. This decreases duplication of effort. Check if there is already an existing or ongoing umbrella review focussed on the question.
  - The review should be relevant. To facilitate knowledge to inform decisions, end-users should be involved in developing and formulating the question (See Step 1), as well as in writing the review (See Step 10).
  - An ethical review should consider priority questions and the way questions are framed.
- A standardised question format can be helpful, although every component of the format and the order of components does not necessarily need to be followed strictly. Review questions can also be broken down into sections. PICO or a variation is recommended to inform and define variables. See Figure 1 for examples of aims/ questions/objectives.
  - PICO format from health sciences: P-Patient, problem or population, I-Intervention, C-comparison, O-outcome.
  - PICO format: P - Population, I - phenomena of Interest and Co – Context.
  - PICOC format from social sciences: P- Population, I- Intervention or cluster of interventions, C-Comparison, O-Outcomes, C-Context.
  - CoCoPop for prevalence/etiology reviews: Condition, Content, Population.
  - PEO for questions related to qualitative data: Population, Exposure, Outcome.

FIGURE 1 EXAMPLE REVIEW AIMS/QUESTIONS/OBJECTIVES:

- "The aim of this study is to examine the effectiveness of digital nutrition interventions for children on dietary outcomes compared with status quo interventions (eg, conventional face-to-face programming or nondigital support)." (Prowse and Carsley, 2021)
- "This umbrella review aims to systematically evaluate the quality, potential biases, and validity of the evidence regarding the effects of digital device use on adolescents' total sleep duration, bedtime procrastination, and sleep quality." (Fiore et al., 2025)
- "The objective of this umbrella review was to determine if, in adults (population), more time in sedentary postures or behaviors (intervention/comparator) was associated with worse arterial blood pressure and a higher incidence of CVD (outcomes), based on systematic reviews on the topic (study design)." (O'Brien et al., 2024)
- "Can virtual reality (VR) based intervention, a novel technology-driven change of paradigm in rehabilitation, reduce impairments, activity limitations, and participation restrictions?" (Voinescu et al., 2019)

RESOURCES

Abdellatif, M., Dadam, M. N., Vu, N. T., Nam, N. H., Hoan, N. Q., Taoube, Z., Tran, P., & Huy, N. T. (2025). A step-by-step guide for conducting an umbrella review. *Trop Med Health*, *53*(1), 1-9. https://doi.org/10.1186/s41182-025-00764-y

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Belbasis, L., Bellou, V., & Ioannidis, J. P. (2022). Conducting umbrella reviews. *BMJ Med*, *1*(1), e000071. https://doi.org/10.1136/bmjmed-2021-000071

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Fiore, M., Arena, D., Crisafi, V., Grieco, V., Palella, M., Timperanza, C., Conti, A., Cuffari, G., & Ferrante, M. (2025). Digital devices use and sleep in adolescents: An umbrella review. *Int J Environ Res Public Health*, *22*(10), 1517. https://doi.org/10.3390/ijerph22101517

O'Brien, M. W., Shivgulam, M. E., Domínguez, A. H., Liu, H., Waghorn, J., Courish, M., & Tovar-Díaz, J. (2024). Impact of sedentary behaviors on blood pressure and cardiovascular disease: An umbrella review of systematic reviews and meta-analyses. *Sports Med*, *54*(12), 3097-3110. https://doi.org/10.1007/s40279-024-02099-w

Prowse, R., & Carsley, S. (2021). Digital interventions to promote healthy eating in children: Umbrella review. *JMIR Pediatr Parent*, *4*(4), e30160. https://doi.org/10.2196/30160

Voinescu, A., Sui, J., & Stanton Fraser, D. (2021). Virtual reality in neurorehabilitation: An umbrella review of meta-analyses. *Journal Clin Med*, *10*(7), 1478. https://doi.org/10.3390/jcm10071478

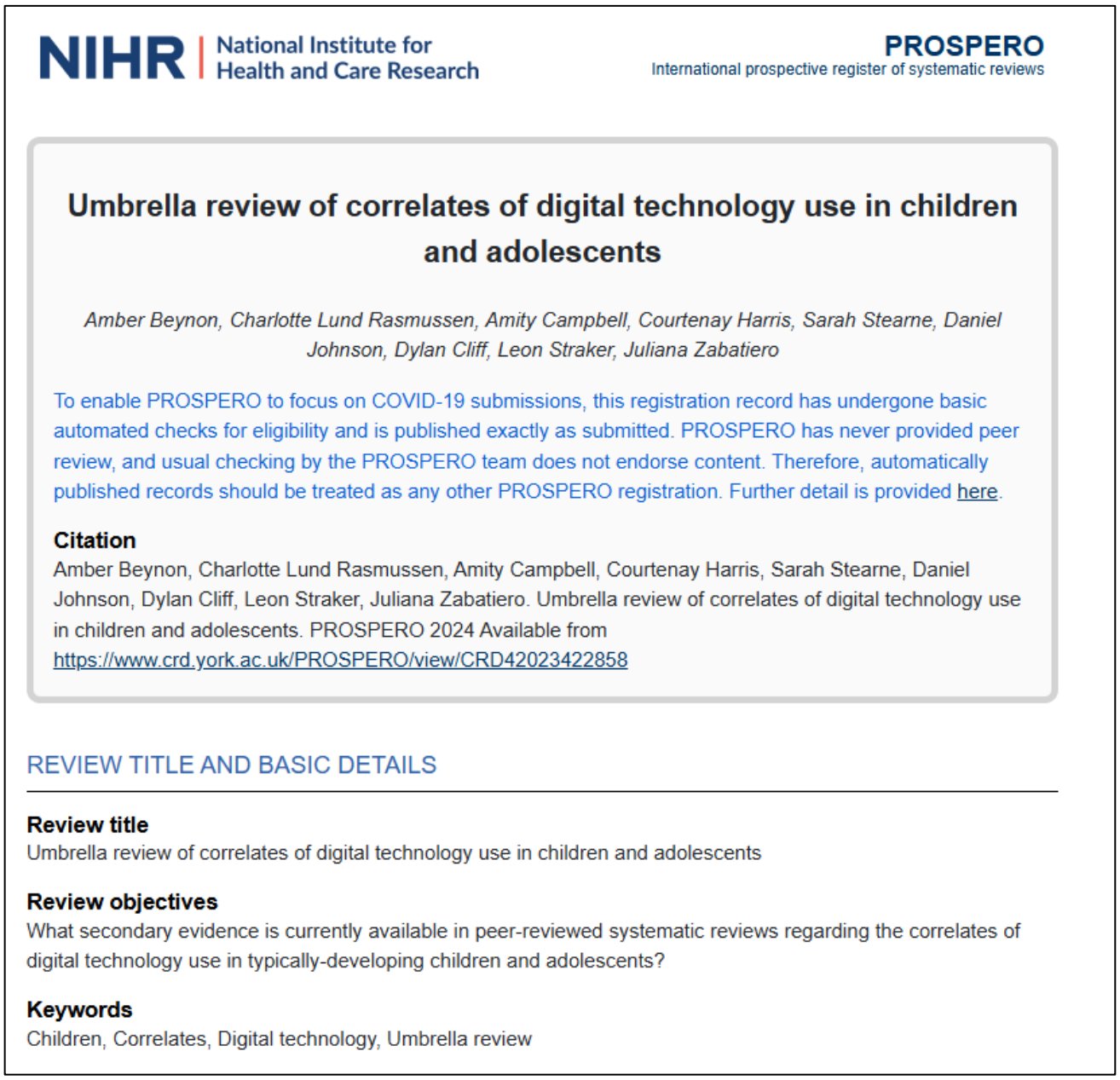
Step 3: Write a protocol: Establish the methods

A protocol for the umbrella review should be written before commencing the search for evidence. The protocol is a separate document to the final umbrella review report and focuses on what will be done whereas the final report documents what was done along with the findings.

- The protocol should include objectives, scope and intended methods for the review. The methods should be written in future tense. Protocols help ensure the team has considered the important issues prior to starting and ensure transparency and consistency for the review process (Fernandez et al., 2025).
- Within the protocol it would be important to clarify the objective, for example evaluating effectiveness, comparing interventions, or exploring relationships. Consider the scope of the review including time periods, regions, settings, or study designs. Consider the eligibility criteria and if certain subgroups or specific aspects should be considered (Abdellatif et al., 2025).
- Considering relevant reporting standards is important when developing the protocol. Following the Preferred Reporting Items for Overviews of Reviews (PRIOR) checklist ensures that the review process is rigorous, transparent, and reproducible (Abdellatif et al., 2025). The PRIOR checklist includes the essential steps that should be included within an umbrella review from rationale to data synthesis (Gates et al., 2022).
- There are similar reporting requirements for umbrella reviews and systematic reviews. Therefore, for more information it could be helpful to consult the protocol extension to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, PRISMA-P, outlines standards for what systematic review protocols need to include (Moher et al., 2015). It can also be useful to examine the PRISMA statement to anticipate what the final report on the systematic review will need to include (Page et al., 2021).
- Various checklists for types of reviews are presented by the EQUATOR Network (www.equator-network.org).
    - The protocol for an umbrella review is likely to require the following sections:
        - Title (include Umbrella review (or overview of reviews) protocol)
        - Rationale
        - Aims/Objectives
        - Eligibility criteria:
            - The criteria for both including and excluding reviews should be pre-specified
            - Including the definition of ‘systematic reviews’ as used within the inclusion criteria and the type of primary research within the systematic reviews (e.g., observational studies, randomised trials etc). It is important to consider that not all publications labelled as a systematic review may meet the criteria and some reviews may meet the criteria but are not labelled as such
        - Information sources: Such as databases, registries, websites, organisations, reference lists and any other sources to be searched

  - Search strategy: Including search terms, any search filters or limits
  - Selection process
    - Methods to screen reviews to determine if they meet the eligibility criteria, including how primary study overlap in the systematic reviews will be identified and managed during study selection
  - Data collection process
    - Methods to collect data from reviews, including primary study overlap in the systematic reviews will be during data collection
    - Clearly state if data is going to be exclusively collected from the information within the systematic reviews or if information from the included primary studies within the included systematic review will also be collected
    - Data items: define all variables and outcomes, and ways to deal with missing or unclear information
  - Risk of bias assessment
    - Methods to assess the bias or methodological quality of included reviews
  - Synthesis methods
    - Describe how summary or synthesis of results will be created, including how heterogeneity will be assessed, if relevant.
  - Certainty assessment
    - If relevant assess certainty in the body of evidence for an outcome
  - Other information, such as financial or non-financial support, competing interests, authorship team
- Consider making the umbrella review protocol publicly available. Registering the protocol ensures transparency, reduces the risk of reporting bias, and promotes methodological rigour (Fernandez et al., 2025).
- Currently the main international register for systematic and umbrella reviews is the health-focussed PROSPERO (the international register of systematic reviews). Depending on the purpose of the review protocol, it can also be submitted through the Campbell Collaboration and the International Database of Education Systematic Reviews. Umbrella review protocols may also be published and/or made publicly available on research repositories such as Open Science Framework, Figshare and Research Square. Some journals also publish review protocols (e.g., BMJ Open). See Figure 2 as an example of a review protocol.

FIGURE 2 AN EXAMPLE - THE INITIAL SUBMISSION FOR A PROSPERO REGISTRATION FOR AN UMBRELLA REVIEW ON THE CORRELATES OF DIGITAL TECHNOLOGY USE



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PROSPERO
International prospective register of systematic reviews

Umbrella review of correlates of digital technology use in children and adolescents

Amber Beynon, Charlotte Lund Rasmussen, Amity Campbell, Courtenay Harris, Sarah Stearne, Daniel Johnson, Dylan Cliff, Leon Straker, Juliana Zabatiero

To enable PROSPERO to focus on COVID-19 submissions, this registration record has undergone basic automated checks for eligibility and is published exactly as submitted. PROSPERO has never provided peer review, and usual checking by the PROSPERO team does not endorse content. Therefore, automatically published records should be treated as any other PROSPERO registration. Further detail is provided here.

Citation
Amber Beynon, Charlotte Lund Rasmussen, Amity Campbell, Courtenay Harris, Sarah Stearne, Daniel Johnson, Dylan Cliff, Leon Straker, Juliana Zabatiero. Umbrella review of correlates of digital technology use in children and adolescents. PROSPERO 2024 Available from https://www.crd.york.ac.uk/PROSPERO/view/CRD42023422858

REVIEW TITLE AND BASIC DETAILS

Review title
Umbrella review of correlates of digital technology use in children and adolescents

Review objectives
What secondary evidence is currently available in peer-reviewed systematic reviews regarding the correlates of digital technology use in typically-developing children and adolescents?

Keywords
Children, Correlates, Digital technology, Umbrella review

RESOURCES

Abdellatif, M., Dadam, M. N., Vu, N. T., Nam, N. H., Hoan, N. Q., Taoube, Z., Tran, P., & Huy, N. T. (2025). A step-by-step guide for conducting an umbrella review. *Trop Med Health*, *53*(1), 1-9. https://doi.org/10.1186/s41182-025-00764-y

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Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., . . . Brennan, S. E. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, 372.

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Pollock, M., Fernandes, R. M., Becker, L. A., Pieper, D., & Hartling, L. (2024). Chapter V: overviews of reviews. *Cochrane handbook for systematic reviews of interventions version*, *version 6.5*. Available from cochrane.org/handbook.

Step 4: Search the literature: Locate available reviews

4A: Create a search strategy

Similar to systematic reviews, umbrella reviews require a systematic, transparent and reproducible search strategy. This step involves designing a search strategy aimed to capture as many systematic reviews as possible that meet the eligibility criteria. Creating a search strategy includes careful selection of databases (and other sources), determining appropriate search terms, and restricting the search to focus on systematic reviews (Abdellatif et al., 2025). It is important to decide how to define a 'systematic review' (See Step 3). Consider if there are going to be any restriction to certain types of reviews (e.g. meta-analyses) or relevant criteria set by the systematic reviews themselves (e.g. study design) (Faulkner et al., 2022).

- Consult an experienced subject librarian to assist in creating the search strategy.
- Determine **what key concepts** and words to search on. For umbrella reviews, the search strategy generally consists of two parts. Part 1 aims to identify/restrict research articles that are systematic reviews. Part 2 of the search strategy should capture relevant articles about the research question. Due to specific database characteristics, key concepts and terms may be used differently across databases, so specific search strategies for each database are commonly required.
- Both free-text and subject headings (e.g., Medical Subject Headings (MeSH) and Emtree terms) should be used. Subject headings are standardised terms used for indexing and using them can help in creating a more effective search. See Figure 3 as an example of a list of key terms and Figure 4 as an example of part of a database search.

FIGURE 3 AN EXAMPLE - THE SEARCH TERMS USED IN AN UMBRELLA REVIEW ON EFFECTIVENESS OF SEDENTARY BEHAVIOUR INTERVENTIONS (SOURCE: NGUYEN ET AL., 2020)

> ("sedentary behavio*" OR "sedentary lifestyle*" OR "sedentary time" OR "sedentary activit*" OR "sedentary leisure" OR sitting OR "seated posture" OR "screen time" OR "computer time" OR ((watch* OR view*) N2 (tv OR television)) OR inactive*) AND (effect* OR efficac* OR evaluat* OR intervention* OR program* OR compar*) AND ("systematic review" OR meta-analys* OR meta-analytic* OR "quantitative analys*")

- When creating a search strategy, conduct an exploratory search first. Locate key papers that the search should capture. Create a list of key words from titles and abstracts of the key papers, and of the index terms used in a bibliographic database to describe relevant reviews to build a comprehensive and specific search strategy for each included database.

- Ensure correct use of the Boolean 'AND' and 'OR' operators. Within each concept, terms are joined together with the Boolean 'OR' operator, and the concepts are combined with the Boolean 'AND' operator. The 'NOT' operator should be avoided where possible to avoid inadvertently removing records that are relevant from the search set.
- Restricting the search to focus on systematic reviews can be achieved by:
    - Using specific search filters or limiters, such as the "Systematic Reviews" and "Meta-Analysis" filters in PubMed.
    - Utilizing MeSH headings and search terms specifically targeting systematic reviews, such as "systematic review", "review literature", "literature review", "systematic* review*", "systematic* literature*", "systematic* search*", "systematic* synth*", "systematic* identif*", "systematic overview", "meta-analysis", and "metaanalysis".

- Determine **where** to search, i.e., which databases (and other sources) should be searched. A search should be conducted across multiple databases to identify relevant systematic reviews (Fernandez et al., 2025). For health-related topics, evidence suggests that the combination of MEDLINE and Epistemonikos, followed by reference checking of included studies, is the most effective approach for identifying systematic reviews (Goossen et al., 2020). Grey literature could also be searched to help reduce publication bias.
    - Potential databases and registries to search for articles include (examples of subject-specific bibliographic databases):
        - ACM Digital Library (computing Machinery)
        - ASSIA (social sciences)
        - BIOSIS (life sciences)
        - British Education Index (education and training)
        - CareData (social care)
        - CINAHL (nursing and allied health)
        - Computer Science (computing)
        - Educational research abstracts (education)
        - Embase
        - ERIC (education)
        - IEEE Xplore (electrical engineering, computer science, and electronics)
        - Medline/PubMed (health and biomedicine, PubMed is free access to Medline and includes some extra citations)
        - ProQuest (multidisciplinary)
        - PsycINFO (psychology and psychiatry)
        - SAGE Journals (multidisciplinary)
        - Scopus (multidisciplinary and citation index)
        - Sociological abstracts (social science, formally Sciofile)
        - SPORTDiscus (sports, fitness and sports medicine)
    - Potential systematic review repositories:

        - Cochrane Database of Systematic Reviews
        - Epistemonikos
        - KSR Evidence
        - JBI Database of Systematic Reviews and Implementation Reports
        - DARE
        - PROSPERO register
    - Potential databases to search for grey literature:
        - **Subscribed databases** such as Scopus and Web of Science index conference papers, technical and other reports. ProQuest indexes dissertations and theses, conference papers and proceedings. Informit (an Australian database) indexes conference papers and many government documents.
        - **Websites** or key organisations in the research area are useful to search or browse. These may include government agencies, academic or research institutes, professional associations, and advocacy groups.
        - **Grey literature databases** Specialised databases, such as Open Grey, GreyNet International and MedNar index grey literature in a number of subject areas.
        - Trove is an overarching search interface to search the content of most Australian libraries as well as archives and repositories.
        - **Search engines** such as Google are useful when searching for grey literature. A simple search for keywords is often the best approach. To restrict the search results, limit to domains (.org, .gov) or by file type (pdf).
- The published review should be as up to date as possible. Searches of all the relevant databases (and other sources) should be rerun prior to submission if the initial search date is more than 12 months (preferably 6 months) from the intended submission date.

4B: Implement the specific searches for each database/registry/source

- Pilot-test the search strategy in the relevant sources and check it correctly identifies the key known papers/primary sources.
- Some refinement of the search strategies is often required to ensure relevant literature is not missed and to try to reduce the number of irrelevant reviews incorrectly identified.
- Once refined, run the search strategy.

4C: Searching reference lists

- Check reference lists of included systematic reviews identified to search for additional reviews.

FIGURE 4 EXAMPLE OF THE DATABASE SEARCH STRATEGY FOR AN UMBRELLA REVIEW ON DIGITAL DEVICE USE AND SLEEP (SOURCE: FIORE ET AL., 2025)

MEDLINE/PubMed

("adolescents"[Title/Abstract] OR "teenagers"[Title/Abstract] OR "children"[Title/Abstract] OR "Adolescent"[Mesh] OR "Minors"[Mesh] OR "high school"[tiab]) AND

("internet"[Title/Abstract] OR "online"[tiab] OR "web"[tiab] OR "addiction"[tiab] OR "Technology Addiction"[Mesh] OR "digital"[tiab] OR "media"[tiab] OR "screen"[tiab] OR "blue light"[tiab] OR "Video Games"[Mesh] OR "videogame"[tiab] OR "gaming"[tiab] OR "games"[tiab] OR "streaming"[tiab] OR "social media"[tiab] OR "Social Media"[Mesh] OR "smart phone"[Title/Abstract] OR "smartphone"[Title/Abstract] OR "mobile phone"[Title/Abstract] OR "tablet"[tiab] OR "mobile device"[tiab] OR "console"[tiab] OR "computer"[tiab]) AND

("sleep"[Title/Abstract] OR "insomnia"[tiab] OR "Sleep Wake Disorders"[Mesh] OR "sleepiness"[tiab]) AND

(meta-analysis[Filter] OR systematicreview[Filter] OR "systematic review"[tiab])

SCOPUS

(TITLE-ABS (adolescents OR teenagers OR children OR {high school})) AND

(TITLE-ABS (internet OR online OR web OR addiction OR digital OR media OR screen OR {blue light} OR {Video Games} OR videogame OR gaming OR games OR streaming OR {social media} OR {smart phone} OR smartphone OR mobile OR tablet OR console OR computer)) AND

(TITLE-ABS (sleep OR insomnia OR sleepiness)) AND

(TITLE-ABS (meta-analysis OR {meta analysis} OR {systematic review}))

RESOURCES

Abdellatif, M., Dadam, M. N., Vu, N. T., Nam, N. H., Hoan, N. Q., Taoube, Z., Tran, P., & Huy, N. T. (2025). A step-by-step guide for conducting an umbrella review. *Trop Med Health*, *53*(1), 1-9. https://doi.org/10.1186/s41182-025-00764-y

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Fernandez, R. S., Sharifnia, A. M., & Khalil, H. (2025). Umbrella reviews: A methodological guide. *Eur J Cardiovasc Nurs*, *24*(6), 996-1002. https://doi.org/10.1093/eurjcn/zvaf012

Goossen, K., Hess, S., Lunny, C., & Pieper, D. (2020). Database combinations to retrieve systematic reviews in overviews of reviews: A methodological study. *BMC Med Res Methodol*, *20*(1), 138. https://doi.org/10.1186/s12874-020-00983-3

Pollock, M., Fernandes, R. M., Becker, L. A., Pieper, D., & Hartling, L. (2024). Chapter V: overviews of reviews. *Cochrane handbook for systematic reviews of interventions version*, *version 6.5*. Available from cochrane.org/handbook.

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Nguyen, P., Le, L. K.-D., Nguyen, D., Gao, L., Dunstan, D. W., & Moodie, M. (2020). The effectiveness of sedentary behaviour interventions on sitting time and screen time in children and adults: An umbrella review of systematic reviews. *Int J Behav Nutr Phys Act*, *17*(1), 117. https://doi.org/10.1186/s12966-020-01009-3

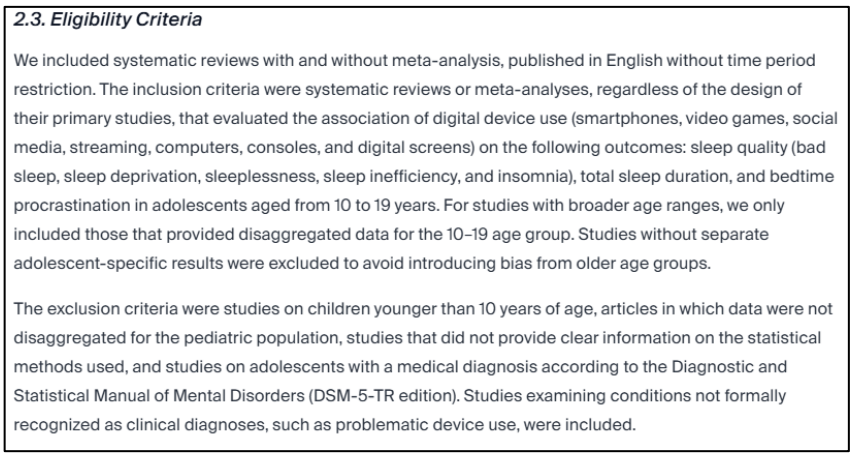
Step 5: Screen the reviews: Include relevant reviews

The screening process consists of two parts. First screening the titles/abstracts and then full-text screening. Both steps are best conducted by at least two independent reviewers to reduce bias.

5A: Screen titles and abstracts

- Consolidate the search results from the different databases or registries.
    - Merge search results from different sources using reference management software.
        - For example: EndNote or Covidence
    - Remove duplicate records of the same reviews (i.e., records reporting the same journal title, volume and pages).
- The criteria for both including and excluding reviews should have been pre-specified within the protocol (See Step 3). This could have included aspects such as the population of interest (e.g., children), which study designs to include, the date range of publication, the publication type and whether the review was peer-reviewed, and the publication language. See Figure 5 for an example of inclusion and exclusion criteria.
- For umbrella reviews it could be possible to include a systematic review in which only a subset of primary studies contained within the systematic review meet the eligibility criteria (i.e. systematic review has a broader focus than the umbrella review). For example, the systematic review could contain primary studies on all ages groups but the umbrella review is only interested in children, if the subset of primary studies could be extracted separately then the systematic review could be included.
- First pilot-test the eligibility criteria on a sample of reviews (approximately six to eight reviews, including ones that are thought to be definitely eligible, definitely not eligible and some that have unclear eligibility). The pilot-test can be used to refine and clarify the eligibility criteria, train the people who will be applying them and ensure that the criteria can be applied consistently by more than one person.
- Screen the titles and abstracts against the eligibility criteria to exclude obviously irrelevant reviews. Be generally over-inclusive at this stage (i.e., if in doubt include report for full-text review).
- It is commonly recommended that at least two people independently screen the titles and abstracts; however, some reviews only independently screen a sub-sample.
- The protocol should have outlined the process for resolving disagreements, which is generally by discussion of the two reviewers, or through consulting another person. A common cause of disagreement is a simple oversight by one of the reviewers. This can generally be resolved through discussion and consensus. If the disagreement is due to differences in interpretation, this may require arbitration by another person.
- The decision and reasons for exclusion should be tracked using reference software, a simple document or spreadsheet, or using specialist systematic review software.

FIGURE 5 AN EXAMPLE – ELIGIBILITY CRITERA IN AN UMBRELLA REVIEW OF DIGITAL DEVICE USE AND SLEEP (SOURCE: FIORE ET AL., 2025).



2.3. Eligibility Criteria

We included systematic reviews with and without meta-analysis, published in English without time period restriction. The inclusion criteria were systematic reviews or meta-analyses, regardless of the design of their primary studies, that evaluated the association of digital device use (smartphones, video games, social media, streaming, computers, consoles, and digital screens) on the following outcomes: sleep quality (bad sleep, sleep deprivation, sleeplessness, sleep inefficiency, and insomnia), total sleep duration, and bedtime procrastination in adolescents aged from 10 to 19 years. For studies with broader age ranges, we only included those that provided disaggregated data for the 10–19 age group. Studies without separate adolescent-specific results were excluded to avoid introducing bias from older age groups.

The exclusion criteria were studies on children younger than 10 years of age, articles in which data were not disaggregated for the pediatric population, studies that did not provide clear information on the statistical methods used, and studies on adolescents with a medical diagnosis according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR edition). Studies examining conditions not formally recognized as clinical diagnoses, such as problematic device use, were included.

5B: Screen full-text reviews

- Retrieve the full texts of potentially relevant reviews.
- Again, first pilot-test the eligibility criteria on a sample of reviews (approximately six to eight reviews, including ones that are thought to be definitely eligible, definitely not eligible and unclear). As for Step 5A, the pilot-test can be used to clarify the eligibility criteria, train the people who will be applying them and ensure that the criteria can be applied consistently by more than one person.
- Screen full-text reviews against eligibility criteria.
- As with title and abstract screening, it is commonly recommended that at least two people independently determine if each study meets the eligibility criteria. The process for resolving disagreements should have been pre-determined and reported in the protocol.
- When multiple systematic reviews have been conducted on the same topic have partial or complete overlap, decisions should be made to determine which systematic reviews to include (See Step 3). Decisions could be made to include the most recent systematic review/meta-analysis, or the systematic review or meta-analysis with the largest number of studies. Consideration should also be given to the quality of the systematic review. A decision could be made to include all eligible systematic reviews irrespective of overlap (more information in Step 8).
- The decision and reasons for exclusion (including due to overlap) should be tracked using reference software, a simple document or spreadsheet, or specialist systematic review software.

Overall

- Throughout the selection process, keep track of the number of reviews so that a flow diagram can be constructed (such as in a PRISMA or QUORUM flow diagram). See Figure 6 for an example of a PRISMA flow diagram.
- In managing and keeping track of the selection process, some basic productivity tools can help including word processors, spreadsheets and references management software, and systematic review tools that can assist in the process of screening search results (NOTE: AI developments are

happening rapidly - that may substantially reduce researcher workload - but AI has no understanding of 'truth' so all information needs to be checked for veracity by human):

- Research Screener – an AI tool developed to reduce the need to manually screen all titles and abstracts learning from the decisions made on the first sample of 50 reviews and presents a prioritised list of reviews for manual review. An iterative process continues until the reviewer is confident subsequent batches of 50 do not include relevant reviews.
- Abstrackr – a web-based screening tool that can prioritise the screening of records using machine-learning techniques.
- Covidence – a web-based software platform for conducting systematic reviews, which includes support for collaborative title and abstract screening, full-text review, risk of bias assessment and data extraction.
- DistillerSR – a web-based software application for undertaking bibliographic record screening and data extraction. It has a number of management features to track progress, assess interrater reliability and export data for further analysis.
- EPPI-Reviewer– web-based software designed to support all stages of the systematic review process, including reference management, screening, risk of bias assessment, data extraction and synthesis.
- Rayyan – a web-based application for collaborative citation screening and full-text selection.

FIGURE 6 AN EXAMPLE PRISMA FLOW DIAGRAM FROM AN UMBRELLA REVIEW ON VIRTUAL REALITY IN NEUROREHABILITATION (SOURCE: VOINESCU ET AL., 2021).

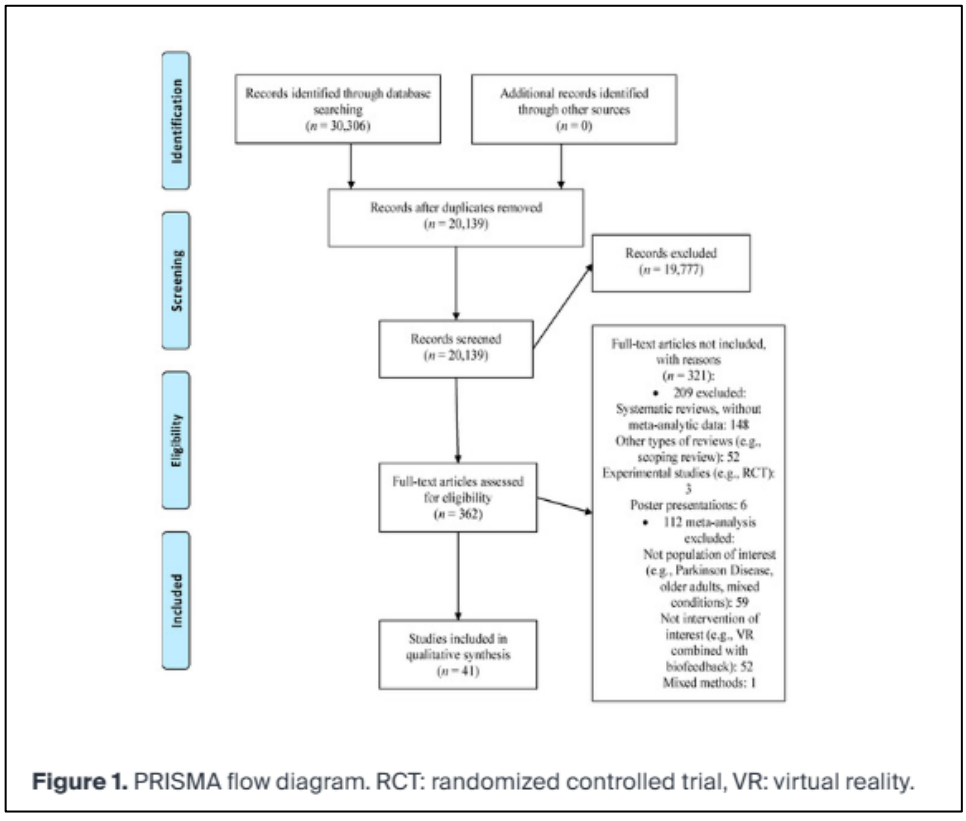


Figure 1. PRISMA flow diagram. RCT: randomized controlled trial, VR: virtual reality.

RESOURCES

Abdellatif, M., Dadam, M. N., Vu, N. T., Nam, N. H., Hoan, N. Q., Taoube, Z., Tran, P., & Huy, N. T. (2025). A step-by-step guide for conducting an umbrella review. *Trop Med Health*, *53*(1), 1-9. https://doi.org/10.1186/s41182-025-00764-y

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Belbasis, L., Bellou, V., & Ioannidis, J. P. (2022). Conducting umbrella reviews. *BMJ Med*, *1*(1), e000071. https://doi.org/10.1136/bmjmed-2021-000071

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Voinescu, A., Sui, J., & Stanton Fraser, D. (2021). Virtual reality in neurorehabilitation: An umbrella review of meta-analyses. *Journal Clin Med*, *10*(7), 1478. https://doi.org/10.3390/jcm10071478

Step 6: Extract data: Collate relevant information

- Collect relevant information from the included reviews using a standardised template for consistency and accuracy.
- Pilot-test the data collection form on several included reviews to ensure suitable content coverage and depth. Then if necessary, modifications should be made to the data extraction forms.
- It is commonly recommended that at least two people independently extract data from each included review to minimise errors and reduce the risk of introducing potential biases by review authors.
- After data have been extracted independently (by two or more members of the review team), compare the responses to ensure agreement or to identify discrepancies. The process for resolving disagreements should have been predetermined, usually through discussion and/or consulting another member of the review team.
- It can be beneficial to include end-users at this stage to ensure relevant information is collated and help build end-users' understanding of the evidence base.
- Data extraction should include collecting information about the included systematic reviews and the eligible primary studies within the included systematic reviews.
- Cross-checking all the primary studies from all included systematic reviews would be impractical. However, where data is missing from the included systematic review, where possible this missing data could be extracted directly from the underlying primary studies by referring to the underlying primary study. Occasionally, umbrella review authors could go back to primary studies to collect additional information (e.g., sample size, and number of cases) (Belbasis et al., 2022).
- It is possible that only a subset of primary studies contained within the included systematic reviews could meet the eligibility criteria, therefore, only the subset of primary studies that fulfil the inclusion criteria could be extracted (e.g., for a systematic review including studies on both adults and children only primary studies including children may be extracted, or for a systematic review on sedentary behaviours only factors relating to digital technology use could be extracted, or the umbrella review focused on only randomised trials but the systematic review also contains observational studies).
- Depending on the objective of the umbrella review typical data collection could include:
    - Descriptive characteristics of systematic reviews including citation details (i.e., authors and year), review objective, search inclusion date, databases used in the review, total number of studies included in the reviews and number of studies included in the reviews that are eligible for the current umbrella review, framework used, quality assessment used.
    - Citation details of included eligible underlying primary studies (i.e., authors and year), countries of the included eligible studies, primary study design/s, total number of participants of included studies in the reviews and number of participants of the included studies that are eligible for the current umbrella review, age range or mean age of participants, gender proportion, year range of included studies, outcomes measured within the underlying primary studies.

- Overall result/findings of the systematic review (e.g. effect size), overall recommendations and limitations as provided by the review itself. See Figures 7 and 8 for examples of part of data extraction summary tables.

FIGURE 7 AN EXAMPLE OF PART OF A DATA EXTRACTION SUMMARY TABLE FROM AN UMBRELLA REVIEW ON BARRIERS, FACILITATORS AND INTERVENTIONS FOR CHILDREN WITH DISABILITIES. (SOURCE: ABUNGIN ET AL., 2026)

Table 1 Descriptive summary of the included reviews ($N = 18$).

Author (year)	Search databases	Key concepts	Review type[a]	No. of articles	Type of disability included	Age group	SEM[b]
Anaby *et al.* (2013)	CINAHL, MEDLINE, SSCI, Geobase, EMBASE, and Measures	Terms related to environment, participation "leisure", "recreation", "play"), disability, and children	2	31	Cerebral palsy ($n = 17$), physical disabilities ($n = 6$), acquired brain injury ($n = 3$), autism ($n = 3$), down syndrome ($n = 2$)	6–14 years	2, 3, 4, 5
Askari *et al.* (2015)	CINAHL, EMBASE, MEDLINE, and PsychINFO	Terms related to participation ('leisure', 'recreation', 'play'), ASD, and children	2	16	ASD, PDD, Asperger syndrome, Kanner syndrome	5–17 years	1, 2, 3, 4, 5
Brown *et al.* (2021)	Medline, PsycINFO, CINAHL, EMBase, ERIC and Scopus	Terms related to playgrounds	2	35	All types of disability included	Not indicated	4, 5
Coussens *et al.* (2022)	MEDLINE and Web of Science	Terms related to participation, parents, children and developmental disability	2	13	ADHD, developmental coordination disorder, ASD	0–6 years	1, 2
Crawford *et al.* (2014)	CINAHL; PubMed; Scopus; PsycINFO; Physical Education Index; ERIC; CBCA Education; and ProQuest Education Journals; and Dissertations and Theses	Terms related to child, disability, play, inclusion, and day care	1	9	Physical disability	2.5–5 years	2, 3
Dabiri Golchin *et al.* (2024)	MEDLINE, CINAHL, Central, ERIC, Scopus, and EMBASE	Terms related to play, children with disabilities, and assistive technology	2	31	All types of disability included	1–20 years	1, 3
Gately *et al.* (2023)	Academic Search Complete/EBSCO, CINAHL/EBSCO, Education Research Complete/EBSCO, ERIC, OTseeker, and PubMed	Terms related to playground, Inclusive, accessible, play, child, and disability	1	9	All types of disability included	3–12 years	1, 4

FIGURE 8 AN EXAMPLE OF PART OF A DATA EXTRACTION SUMMARY TABLE FROM AN UMBRELLA REVIEW ON FACTORS ASSOCIATED WITH DIGITAL ADDICTION. (SOURCE: HAN ET AL., 2025)

Table 1. The basic characteristics of the studies.

Study	Region	Study design of included study	Studies	Cases	Influencing factor	Outcomes	Quality assessment	I2 values (%)	*P* value of publication bias	SSE[a]
Akbari et al [27]	Iran	Case-control, cohort, experimental study, cross-sectional	85	55,134	Fear of missing out	Internet addiction	—[b]	58.37	0.23	No
Chung et al [7]	Taiwan (China)	—	5	300	Probability discounting	Internet gaming disorder	—	85.66	<.01	Yes
Mak et al [28]	Korea	—	37	34,438	Neuroticism	Facebook addiction	—	96	>.05	Yes
Noroozi et al [29]	Iran	Cross-sectional, case-control, and cohort	18	2589	Quality of life	Internet addiction	STROBE[c]	85.23	0.6	Yes
Bäcklund et al [30]	Sweden	Cross-sectional, longitudinal	46	49,192	Gaming motivations	Gaming disorder	JBI checklist[d]	96	ND	No
Ding et al [31]	China	Cross-sectional	14	11,561	Self-esteem	Smartphone addiction	JBI checklist	74	0.9	No
Eirich et al [32]	Canada	Observational, experimental	87	159,425	Behavior problems	Screen time overuse	JBI checklist	87.8	ND	No
Hao et al [33]	China	Case-control, cross-sectional	26	14,638	Personal relationship	Internet addiction	NOS[e]	94.1	>.05	Yes
Li et al [34]	China	—	50	38,488	Academic burnout	Problematic mobile phone use	—	91.71	0.83	No
Rajesh et al [35]	India	—	96	35,608	Personality traits	Facebook addiction	—	84.27	>.05	No

RESOURCES

Belbasis, L., Bellou, V., & Ioannidis, J. P. (2022). Conducting umbrella reviews. *BMJ Med*, *1*(1), e000071. https://doi.org/10.1136/bmjmed-2021-000071

Fernandez, R. S., Sharifnia, A. M., & Khalil, H. (2025). Umbrella reviews: A methodological guide. *Eur J Cardiovasc Nurs*, *24*(6), 996-1002. https://doi.org/10.1093/eurjcn/zvaf012

Pollock, M., Fernandes, R. M., Becker, L. A., Pieper, D., & Hartling, L. (2024). Chapter V: overviews of reviews. *Cochrane handbook for systematic reviews of interventions version*, *version 6.5*. Available from cochrane.org/handbook.

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Han, Y., Qiu, J., Shi, C., Huang, S., Huang, H., Wang, X., Zhu, S., Lu, D.-L., Lu, P., & Zeng, F. (2025). Factors associated with digital addiction: Umbrella review. *JMIR Ment Health*, *12*, e66950. https://doi.org/10.2196/66950

Step 7: Evaluate methodological quality: Conduct quality assessment

When conducting an umbrella review, it is important to evaluate the methodological quality and risk of bias of the included systematic reviews to ensure credibility and reliability of the synthesized evidence. This is separate to the later step of potentially estimating the quality of the overall body of evidence, that is, considering the evidence from all available reviews. Issues such as overall generalisability, applicability, and publication bias should be considered at this later step (see Step 9C).

It is also important to consider including information on the quality of the primary studies included in each systematic review as it is possible to have a high-quality review with lower quality primary studies (Pollock et al., 2020).

- General procedures for risk of bias or quality assessment:
    - First, pilot-test the risk of bias tool on a sample of systematic reviews (approximately three to six reviews). The pilot-test can be used to improve the reliability of assessments and to help ensure that the criteria are being applied consistently by the reviewer team.
    - Assessment of the quality is commonly conducted by at least two people independently performing the risk of bias assessment and using a pre-determined the process for resolving disagreements. This is done to reduce errors and ensure judgments are not influenced by one person's preconceptions.
    - Disagreements can be generally resolved by discussion, or through consulting another person.
    - The procedure of the risk of bias judgements should be transparent, with justifications for assessments reported in the umbrella review. A clear summary of the risk of bias of each systematic review can be presented, acknowledging the dangers of a single numerical score. See Figure 9 as an example of a quality assessment.
- Example tools that could be used to evaluate the quality of reviews:
    - AMSTAR (A MeaSurement Tool to Assess systematic Reviews): Designed to appraise the methodological quality of systematic reviews focusing on randomized controlled trials (RCTs).
    - AMSTAR2: An updated version of AMSTAR, AMSTAR2 assess the methodological quality of systematic reviews that include both randomized and non-randomized studies of healthcare interventions.
    - ROBIS (Risk of Bias Assessment Tool for Systematic Reviews): Assess the risk of bias in systematic reviews, including questions related to interventions, diagnosis, prognosis, and aetiology.
    - JBI critical appraisal instrument for Systematic reviews and Research Syntheses: JBI Critical appraisal checklist for systematic reviews.

FIGURE 9 AN EXAMPLE OF A SUMMARY TABLE OF THE ASSESSED METHODOLOGICAL QUALITY FOR EACH ITEM FROM AN UMBRELLA REVIEW USING AMSTAR2. (SOURCE: HAN ET AL., 2025)

Table 2. Methodological quality evaluation.

Study	Items #1[a]	#2[b]	#3[c]	#4[d]	#5[e]	#6[f]	#7[g]	#8[h]	#9[i]	#10[j]	#11[k]	#12[l]	#13[m]	#14[n]	#15[o]	#16[p]	Methodological quality
Akbari et al [27]	Y[q]	Y	Y	Y	Y	N[r]	Y	Y	Y	N	N	Y	N	Y	Y	N	Very low
Chung et al [28]	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N	Low
Mak et al [29]	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	Y	N	N	Very low
Noroozi et al [30]	Y	Y	N	N	N	Y	N	Y	Y	N	Y	N	N	N	N	N	Very low
Bäcklund et al [31]	Y	Y	N	PY[s]	Y	Y	Y	PY	N	Y	N	Y	N	N	Y	Y	Very low
Ding et al [32]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Moderate
Eirich et al [33]	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Very low
Hao et al [34]	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	N	N	Very low
Li et al [35]	Y	N	N	Y	N	N	Y	Y	N	Y	N	Y	N	Y	N	N	Very low
Rajesh et al [36]	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	N	Y	Y	N	Low
Wan et al [37]	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	N	Y	N	Moderate
Wang et al [38]	Y	Y	Y	PY	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	Low
Zewde et al [39]	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Moderate
Hidalgo-Fuentes et al [40]	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	N	N	Very low
Niu et al [41]	Y	Y	Y	Y	Y	Y	Y	N	PY	Y	N	Y	Y	Y	Y	N	Low
Zhuang et al [8]	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Moderate
Hao et al [42]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Moderate
Wu et al [43]	Y	Y	Y	Y	Y	Y	PY	Y	Y	Y	Y	Y	Y	Y	Y	Y	Moderate

[a]#1-Did the research questions and inclusion criteria for the review include the components of PICO?
[b]#2-Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?
[c]#3-Did the review authors explain their selection of the study designs for inclusion in the review?
[d]#4-Did the review authors use a comprehensive literature search strategy?
[e]#5-Did the review authors perform study selection in duplicate?
[f]#6-Did the review authors perform data extraction in duplicate?
[g]#7-Did the review authors provide a list of excluded studies and justify the exclusions?
[h]#8-Did the review authors describe the included studies in adequate detail?
[i]#9-Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?
[j]#10-Did the review authors report on the sources of funding for the studies included in the review?
[k]#11-If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?
[l]#12-If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?
[m]#13-Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review?
[n]#14-Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?
[o]#15-If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?
[p]#16-Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?
[q]Y: complaint.
[r]N: not complaint.
[s]PY: partially complaint.

RESOURCES

Abdellatif, M., Dadam, M. N., Vu, N. T., Nam, N. H., Hoan, N. Q., Taoube, Z., Tran, P., & Huy, N. T. (2025). A step-by-step guide for conducting an umbrella review. *Trop Med Health*, *53*(1), 1-9. https://doi.org/10.1186/s41182-025-00764-y

Aromataris, E., Fernandez, R., Godfrey, C., Holly, C., Khalil, H., & Tungpunkom, P. (2020). Chapter 10: Umbrella Reviews. In: Aromataris, E., & Munn, Z. JBI Manual for Evidence Synthesis. JBI. Available from https://synthesismanual.jbi.global. https://doi.org/10.46658/JBIMES-20-11

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Pollock, M., Fernandes, R. M., Becker, L. A., Pieper, D., & Hartling, L. (2024). Chapter V: overviews of reviews. *Cochrane handbook for systematic reviews of interventions version*, *version 6.5*. Available from cochrane.org/handbook.

Risk of bias tools: https://www.nhmrc.gov.au/guidelinesforguidelines/develop/assessing-risk-bias

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Han, Y., Qiu, J., Shi, C., Huang, S., Huang, H., Wang, X., Zhu, S., Lu, D.-L., Lu, P., & Zeng, F. (2025). Factors associated with digital addiction: Umbrella review. *JMIR Ment Health*, *12*, e66950. https://doi.org/10.2196/66950

Step 8: Assess study overlap: Consider overlap between included studies

To ensure a robust synthesis it is important to consider the potential overlap of the literature. Overlap between the underlying primary studies may introduce bias by counting a primary study's outcome data multiple times, which may give some studies more influence (Pollock et al., 2020) leading to misinterpretation of the umbrella review (Faulkner et al., 2022). Overlap between systematic reviews can provide good information. High (or large amount of) overlap allows for comparison conclusions to be made and helps to investigate why there are potential divergence in the interpretations. Low (or minimal amount of) overlap could indicate the need to consider the search strategies of the systematic reviews (Gutierrez-Arias et al., 2023).

To identify overlaps, examine the list of primary studies included in each systematic review and generate a matrix in which each row represents a primary study and each column represents a systematic review (Hennessy & Johnson, 2020; Lunny et al., 2017), marking where studies overlap.

There are no universally accepted thresholds, but some tools can be used to quantify the overlap. For example, corrected covered area (CCA) calculates the proportion of shared studies and classifying overlap as minimal (<5%), moderate (5–10%), or high (>10%) (Hennessy & Johnson, 2020) and the Graphical Representation of Overlap for OVErviews (GROOVE) visually maps study overlap (Bracchiglione et al., 2022).

Potential ways to manage identified overlap:

- Combine overlapping systematic reviews
- Selecting the most comprehensive or highest quality review
- Adjusting the data (e.g. use a weighted average)
- Narrative approach in describing the overlap
- Conduct sensitivity analyses excluding reviews with high overlap to evaluate their impact on conclusions

RESOURCES

Abdellatif, M., Dadam, M. N., Vu, N. T., Nam, N. H., Hoan, N. Q., Taoube, Z., Tran, P., & Huy, N. T. (2025). A step-by-step guide for conducting an umbrella review. *Trop Med Health*, *53*(1), 1-9. https://doi.org/10.1186/s41182-025-00764-y

Bracchiglione, J., Meza, N., Bangdiwala, S. I., Niño de Guzmán, E., Urrútia, G., Bonfill, X., & Madrid, E. (2022). Graphical representation of overlap for overviews: GROOVE tool. *Res Synth Methods*, *13*(3), 381-388. https://doi.org/10.1002/jrsm.1557

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Lunny, C., Brennan, S. E., McDonald, S., & McKenzie, J. E. (2017). Toward a comprehensive evidence map of overview of systematic review methods: paper 1—purpose, eligibility, search and data extraction. *Syst Rev*, *6*(1), 231. https://doi.org/10.1186/s13643-017-0617-1

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Step 9: Synthesis of evidence: Summarise and evaluate the overall body of evidence

Evidence synthesis for an umbrella review could include a narrative and/or quantitative approach. A narrative synthesis is a descriptive summary of the findings and interpretation of the evidence without further statistical analysis (see Step 9A), whereas a quantitative synthesis includes meta-analyses of the data from multiple meta-analyses resulting in pooled results (see Step 9B) (Fernandez et al., 2025) The final component of the synthesis should be a summary of the trustworthiness or believability of the overall body of evidence (see Step 9C). Reporting large amounts of extracted data or re-analysed data can be a large and difficult task (Hennessy et al., 2019) therefore, results are usually presented through tables, graphs, or figures to display synthesized evidence in a reader-friendly way. Ideally an umbrella review should not simply reiterate findings from each included systematic review but rather offer new insights through its collective synthesis (Faulkner et al., 2022).

9A: Narrative meta-synthesis

- Summarising study characteristics, study quality, and study results of the included reviews.
    - Synthesis is the process of bringing together the data from the included reviews with the aim of making conclusions about a body of evidence. See Figures 10 to 12 for examples.
    - This step typically builds on the tabulation of study characteristics in Step 6 as this facilitates inspection and evaluation of the important characteristics across reviews, supporting the synthesis of evidence.
    - Based on the study characteristics tables, consider which results are similar enough to be grouped within each comparison and synthesise the results of the reviews contributing to each comparison. Results can be presented in additional table/s and figures.
    - Alternative synthesis and visual display methods should be planned and specified in the protocol. When writing the umbrella review, details of the synthesis methods should be described. Examples of alternative synthesis:
        - Summarising effect estimates. This provides information on the magnitude and the range of effects. Can be presented as box-and-whisker plot or bubble plots.
        - Vote counting based on direction of effect. This method can be used when only the direction of effect is reported or there are inconsistencies in the effect measures. Can be presented as harvest plot or effect direction plots.
    - Results can be summarized by using a descriptive approach with conclusions categorized as follows: definite association, suggestive (possible) association, no association or inconclusive association (insufficient evidence) (Fusar-Poli & Radua, 2018).
    - Tables and plots structure information to show patterns in the data and convey detailed information more efficiently than text. This aids interpretation and assessment of the veracity of the review findings.

- Can be grouped by certain characteristics (comparison, outcome domains, populations).
- Can be ordered by most relevant and/or trustworthy evidence (certainty of the evidence, risk of bias, study size or study design characteristics).

FIGURE 10 AN EXAMPLE OF A THEMATATIC DIAGRAM IN AN UMBRELLA REVIEW ON BARRIERS AND FACILITIATORS AND INTERVENTIONS FOR CHILDREN WITH DISABILITIES (SOURCE: ABUNGIN ET AL., 2026).

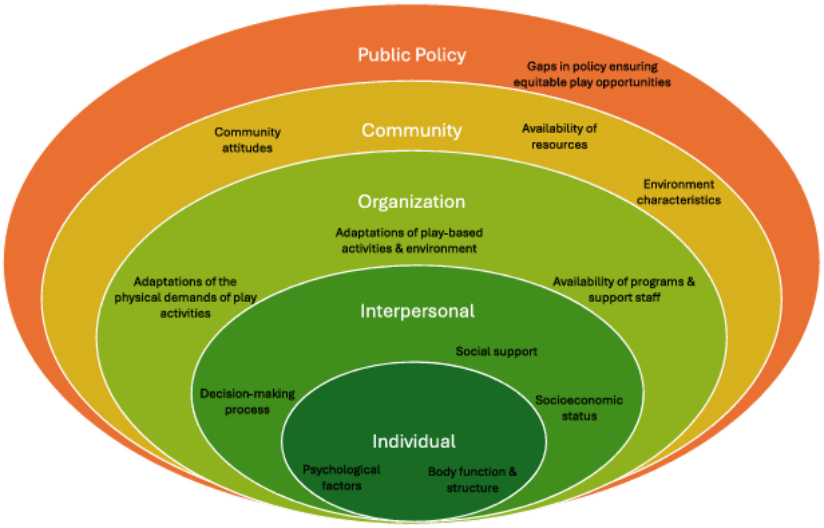


Figure 2 Identified themes of active play among children and youth with disabilities within the social ecological model.

FIGURE 11 AN EXAMPLE SUMMARY OF RESULTS TABLE IN AN UMBRELLA REVIEW ON VIRTUAL REALITY IN NEUROREHABILITATION (SOURCE: VOINESCU ET AL., 2021).

Table 2. Adverse effects. Summary of findings.

Author(s), Year	Number of Primary Studies Which Reported Adverse Events	Reported Results and Severity of Symptoms
Corbetta et al. [38]	1 study	No major adverse effects.
Laver et al. [50]	23 studies	19 studies reported no significant adverse events linked to study participation; 4 studies reported: transient dizziness and headache (2 cases); pain (2 cases); pain and dizziness (several participants) not related to intervention; increase in hypertonicity (3 cases).
Booth et al. [33]	3 studies	Minor adverse effects: either no effects noted, loss of control, or dizziness.
Chen et al. [35]	No study reported adverse effects	N/A
Cheok et al. [37]	1 study	Minor adverse effects: increased spasticity (3 cases).
Li et al. [52]	1 study	No major adverse effects.
Tay et al. [62]	4 studies	Mild pain, back ache and fatigue (4 studies).
Mohammadi et al. [56]	2 studies	No major adverse effects.
Veerbeek et al. [63]	23 studies	No major adverse effects.
Warnier et al. [65]	7 studies	No major adverse effects.

FIGURE 12 AN EXAMPLE SUMMARY OF RESULTS OF QUANTITATIVE STUDIES IN AN UMBRELLA REVIEW (SOURCE: HAN ET AL., 2025)

Table 4. Factors associated with digital addiction.

Author (Year)	Influencing factor	Model	Confounding adjusted	ES[a] (95% CI)	*P* value
Intrapersonal factors					
Akbari et al [27]	Fear of missing out	Random	No	*r*=0.41 (0.38-0.44)	<.001
Li et al [35]	Academic burnout	Random	Yes	*r*=0.41 (0.38-0.44)	<.001
Chung et al [28]	Probability discounting	Random	Yes	Hedges *g*=–0.32 (–0.85 to –0.20)	.470
Mak et al [29]	Neuroticism	Random	No	SMD=0.54 (0.38-0.69)	<.001
Bäcklund et al [31]	Gaming motivations	Random	No	*r*=0.50 (0.45-0.54)	<.001
Ding et al [32]	Self-esteem	Random	Yes	*r*=–0.25 (–0.29 to –0.22)	<.001
	Self-control	Random	Yes	*r*=–0.48 (–0.53 to –0.42)	<.001
Rajesh et al [36]	Openness	Random	Yes	*r*=–0.05 (–0.08 to –0.01)	<.05
	Agreeableness	Random	Yes	*r*=–0.07 (–0.10 to –0.04)	<.05
	Conscientiousness	Random	Yes	*r*=–0.15 (–0.18 to –0.11)	<.001
	Loneliness	Random	Yes	*r*=0.23 (0.18-0.27)	<.001
	Narcissism	Random	Yes	*r*=0.23 (0.12-0.33)	NS[b]
	Impulsivity	Random	Yes	*r*=0.25 (0.18-0.32)	<.001
	Shyness	Random	Yes	*r*=0.20 (0.14-0.25)	<.001
	Extraversion	Random	Yes	*r*=0.01 (0.02-0.04)	NS
Eirich et al [33]	Behavior problems	Random	Yes	*r*=0.11 (0.09-0.12)	<.05
Zewde et al [39]	Male sex	Fix	No	OR[c] 1.92 (1.43-2.75)	<.001
Hidalgo-Fuentes et al [40]	Resilience	Random	No	*r*=–0.27 (–0.32 to –0.22)	<.001
Zhuang et al [8]	Depression	Random	No	*r*=0.18 (0.13-0.23)	<.05
	Grade point average	Random	No	*r*=–0.15 (–0.25 to –0.16)	<.05
	Gaming time	Random	No	*r*=0.33 (0.21-0.44)	<.05
Interpersonal factors					
Hao et al [34]	Personal relationship troubles	Random	No	*r*=0.36 (0.35-0.38)	<.001
Niu et al [41]	Positive parenting styles	Fix	Yes	*r*=–0.14 (–0.17 to –0.11)	<.001
Niu et al [41]	Negative parenting styles	Fix	Yes	*r*=0.18 (0.14-0.22)	<.001
Zhuang et al [8]	Parent-child relationship	Random	No	*r*=–0.15 (–0.18 to –0.11)	<.05
Social factors					
Noroozi et al [30]	Quality of life	Random	No	OR 0.39 (0.27-0.55)	<.001
Wang et al [38]	Negative life events	Random	Yes	*r*=0.31 (0.28-0.34)	<.001
Wan et al [37]	Social support	Random	Yes	*r*=–0.17 (–0.21 to –0.13)	<.001
Zewde et al [39]	Urban residence	Random	No	OR 2.32 (1.19-4.53)	<.001
Hao et al [42]	Childhood adverse experiences	Random	Yes	*r*=0.21 (0.18-0.24)	<.001
Wu et al [43]	Social anxiety	Random	Yes	*r*=0.34 (0.19-0.48)	<.001

[a]ES: effect size.
[b]NS: not significant.
[c]OR: odds ratio.

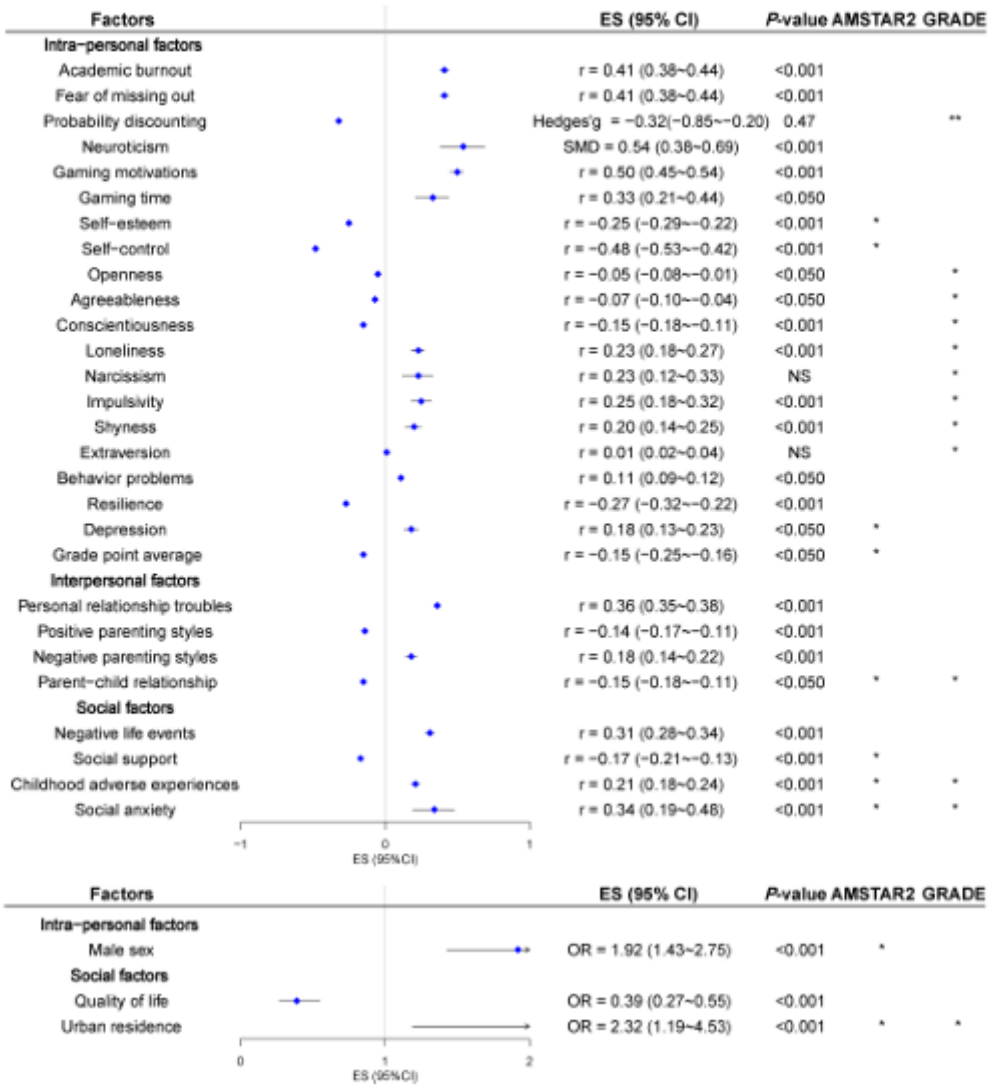
9B: Quantitative synthesis- Meta-analysis (optional)

- A quantitative synthesis within an umbrella review can combine data to present new insights and allow for further exploration of the data, for example, comparing outcomes across reviews or the ability to conduct new subgroup analyses (Siontis et al., 2013).
- A decision to combine the numerical results of all, or perhaps some, of the reviews should be made carefully.
- Ideally if conducting a quantitative synthesis, data should be used based on the relevant study specific data extracted by each systematic review and meta-analysis to repeat the meta-analysis separately instead of using the reported meta-analysis results that are included in the systematic review and meta-analysis (Belbasis et al., 2022). By re-analysing the results, the same or similar methods for all meta-analyses can be used as well as the ability to assess the heterogeneity or bias for the umbrella meta-analysis.
- To conduct the analysis, study specific data including specific effect estimates, with relevant uncertainty estimates and sample sizes are generally needed (as reported by the included systematic reviews and meta-analyses). However, some systematic reviews and meta-analysis may not report all required information to re-analyse the results, therefore decisions may need to be made whether to extract required data from the primary studies.
- Systematic reviews and meta-analyses use many different measures of effect size depending on the purpose, design and analytical methods of the primary studies. If different measures of associations/effect sizes are used, then conversions can potentially be made in order to estimate a common effect size to synthesize the results. Exact conversions are not always possible as there could be inherent differences or the calculations may require data that is not available (Fusar-Poli & Radua, 2018).
- Conducting a meta-analysis:
    - Statistical software such as Stata, R and Comprehensive Meta-Analysis may be used to perform statistical analyses.
    - Software packages such as MetaUmbrella (an R package) assist comprehensive data analysis for umbrella reviews.
- Meta-analyses based on report group data are usually illustrated using a forest plot (see example in Figure 14).
    - A forest plot shows effect estimates and confidence intervals for each individual report and the overall meta-analysis estimate (Lewis and Clarke., 2001). Each individual report is denoted by a block at the point estimate of result with a horizontal line extending either side of the block. The size of the block indicates the weight assigned to that report in the meta-analysis while the horizontal line depicts the confidence interval (usually a 95% level of confidence). The confidence interval depicts the range of intervention effects compatible with the study's result. Studies with more power (larger sample sizes) will carry more weight (larger size block), generally narrower confidence intervals (shorter horizontal lines) and will have more impact on the summary results (depicted as a diamond).

- Following summarising and representation of the synthesis, a judgement on the overall body of evidence should be made – see Step 9C.

FIGURE 14 AN EXAMPLE OF A FOREST PLOT SHOWING THE EFFECT ESTIMATES AND CONFIDENCE INTERVALS (SOURCE: HAN ET AL., 2025)

Figure 2. Forest plot of factors associated with digital addiction. AMSTAR 2: a measurement tool to assess systematic reviews version 2; ES: effect size; g: Hedge's g; GRADE: Grading of Recommendations Assessment, Development, and Evaluation; NS: not significant; OR: odds ratio; *: classified as moderate with AMSTAR 2 or GRADE; **: classified as high with AMSTAR 2 or GRADE.



9C: Summary of findings and quality assessment

- In addition to the narrative and/or quantitative summary of the body of evidence created in Steps 9A and 9B, it is important to characterise the certainty or trustworthiness of this summary for the specific purpose of the umbrella review being undertaken.
- Currently there are no universally accepted standards for assessing the certainty of evidence for umbrella reviews (Sadoyu et al., 2022). Commonly, the Grading of Recommendations, Assessment,

Development and Evaluation (GRADE) framework (Guyatt et al., 2011) is used to assess the certainty of the evidence, particularly for questions about interventions. GRADE was originally developed for primary studies in systematic reviews, however, can be adapted to evaluate evidence in umbrella reviews. The GRADE approach was created to support guideline developers in health and initially focussed on intervention effects typically from randomised control trials. However, variants of GRADE have now been developed with applicability to evidence from observational studies, economic evidence, overviews of reviews, qualitative evidence and patient preference and values evidence. Other approaches include PRECEPT (for public health) (Harder et al., 2015), and GRADE-CERQual (qualitative evidence syntheses).

- Particularly for epidemiological associations, considerations could include the amount of evidence, significance level and heterogeneity between studies for each meta-analysis (Bellou et al., 2017).

RESOURCES

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Assessing certainty of evidence: https://www.nhmrc.gov.au/guidelinesforguidelines/develop/assessing-certainty-evidence

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Step 10: Write the report: Consolidate the information and conclusions

- Umbrella reviews are often reported as a peer-reviewed journal article but can also be disseminated as a self-published detailed report, and, less commonly, in a brief report perhaps aimed at a community level.
- Regardless of the report format chosen, the report should be written clearly and identify recommendations for policy, practice, product and/or future research.
- Interpreting results and drawing conclusions.
    - When interpreting the results and drawing conclusions, ensure the results are applicable to the question asked. Consider the external validity of the findings. Consider whether the overall evidence is derived from studies conducted in specific populations and/or through specific methods, such that the findings may not be applied more generally.
    - In drawing conclusions, consider the implications of the results for the end-users, which could include a range of people including (but not limited to) researchers, educators, policy makers, clinicians, patients, etc.
    - It is often desirable to have end-users engaged in this process to assist in the report being relevant and comprehensible.
- If the plan is to publish within an academic journal (more information in Step 11) check the author guidelines for requirements.
- Whether aiming to publish in a journal or not, it is useful to use journal guidelines relating to the publication of systematic reviews, which help to ensure consistency of reporting. There are also internationally recognised checklists to follow depending on the type and purpose of the review.
    - The Preferred Reporting Items for Overviews of Reviews (PRIOR), provide a checklist for review authors on how to report an umbrella review (Gates et al., 2022).
    - Reporting is generally similar to relevant reporting guidelines of systematic reviews for observational or randomised studies (ie, MOOSE (Meta-analysis Of Observational Studies in Epidemiology) (Stroup et al., 2000) and PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses)) (Moher et al., 2009).
    - Check the EQUATOR (Enhancing the Quality and Transparency Of health Research) Network which contains a range of reporting guidelines for various types of research/study designs. https://www.equator-network.org/.

Example outline for the review
(always check that all relevant information as per the relevant reporting guidelines has been included):

- Background and objectives
    - Include the rationale for the review and why the questions being addressed are important.
    - At the end of the background, reviews usually include the review objective/s

- Methods
    - In a completed review, the methods should usually be written in past tense.
    - Should describe what was done to obtain the results
    - Should include:
        - Inclusion/exclusion criteria (eligibility criteria)
        - Search methods for identification of reviews
        - Selection of reviews
        - Data extraction process
        - Assessment of risk of bias/quality
        - Data synthesis (i.e., narrative and/or meta-analysis)
        - Summarising findings
- Results
    - Description of reviews and relevant primary studies
        - The flow of records/systematic reviews from searches to inclusion in the study? e.g. PRISMA OR QUORUM flow diagram
        - Characteristics of included reviews and relevant primary studies e.g., study designs, study population
    - Risk of bias/quality assessment of each included review
    - Summary of results- could be presented in table or figures as well as any meta-analysis
    - Overall trustworthiness of body of evidence
- Discussion
    - Summary of main results
    - Comparison with other studies/reviews
    - Implications of findings
    - Strengths and limitations of the review
- Conclusion
- Disclosures and contributions
    - Umbrella reviews should be transparent regarding contributions and organisations, conflict of interests and sources of funding

RESOURCES

Aromataris, E., Fernandez, R., Godfrey, C., Holly, C., Khalil, H., & Tungpunkom, P. (2020). Chapter 10: Umbrella Reviews. In: Aromataris, E., & Munn, Z. JBI Manual for Evidence Synthesis. JBI. Available from https://synthesismanual.jbi.global. https://doi.org/10.46658/JBIMES-20-11

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Step 11: Disseminate: Make academic community aware of the findings

Consider publishing the review in an academic journal. When deciding on a journal, consider the scope and aims of the journal, where it is indexed (i.e., whether other researchers will be able to easily find the review), the impact factor of the journal relative to the field, and the requirements of the journal (check the author guidelines for requirements). Aim for Q1 journals, but also consider target audience, including industry.

- Sites to help in searching for journals and their impact include: Scimago Journal & Country Rank https://www.scimagojr.com/journalrank.php
- Sites to help select a journal appropriate for topic - JANE
- Journal guidelines relating to the publication of systematic reviews can be consulted to ensure consistency of reporting. Checklists to follow differ depending on the type and purpose of the review (More detail in Step 10)
- The report should be transparent and easily available to others. Also, it should clearly identify recommendations for policy, practice, product and research. End-user engagement can help the relevance and impact discussion.
    - Identify and prioritise key messages
    - Many journals require a brief description of "What do we already know? And what does this article add?" Answering these questions are key first steps to presenting key messages
- To help dissemination of the review message, consider having a shorter, user-friendly summary, potentially with an infographic for social media, targeting other researchers and other end-users.
- Promote review to academic audiences
    - Presentations at conferences
    - Via social media
    - By direct email to key academics
    - Academic industry newsletters

RESOURCES

Scimago Journal & Country Rank https://www.scimagojr.com/journalrank.php

JANE: https://jane.biosemantics.org/

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Step 12: Translate knowledge and engage end-users: Help end-users apply the evidence

Effective dissemination and, importantly, knowledge translation involves considering who might want to use this information, creating useful information and putting it in the right place to allow those who might be interested to utilise the findings. For the research to be useful and available for use, the research findings need to be communicated effectively.

- End-user engagement — preferably from the early steps of the review process as indicated in Step 1.
- To achieve its purpose as an information base, we need to know the most effective means of:
    - Making research outcomes accessible to the appropriate end-users.
    - Ensuring research addresses issues of value to the end-users.
    - Interpreting the practical and theoretical implications of research into the policies, procedures, and activities of organizations.
- Consider:
    - What message needs to be delivered? Should be clear and relevant to an end-user.
    - Who should the message be delivered to? Identify the target audience.
    - Who should deliver the message? Use a credible delivery method.
    - How should the message be delivered? Transfer of the message should be interactive.
- Strategies for effective dissemination and communication:
    - Be clear in your strategy and objectives for the review.
    - Develop a simple clear message and adapt it for different sources (newspaper, social media, webpage).
    - Be clear about your target audience and end-user.
    - Think about the best ways to target your audience to maximise impact.
    - Keep your review manageable and do not underestimate the time involved.
- Ways to get the information out:
    - Involvement with end-users to guide best modes (having previously assisted with selected key messages and how to word them).
    - Websites and blog posts.
    - Newsletters.
    - Invitation seminars.
    - Direct mailing to agencies.
    - Social media.
    - Press releases.

RESOURCES

Petticrew, M., & Roberts, H. (2008). Chapter 8: Disseminating the review. *Systematic Reviews in the Social Sciences: A Practical Guide*. Malden, MA: Blackwell Publishing.

Follow-up activities: Renewal watch, update as needed

- Consider evaluating the impact of the review. This should normally involve discussions with end-users.
- Consider a plan for renewal as umbrella reviews can become outdated.
    - As new reviews are completed, the results of an umbrella review could become outdated and thus be misleading.
    - Depending on the scope of the umbrella review, the umbrella review may not need to be updated as regularly as a systematic review, as there would need to be a substantial amount of new literature to typically change the conclusion of the umbrella review.
- When updating a review, ensure the latest guidelines are used, which may have also changed since the original review.

CONCLUDING COMMENTS

Umbrella reviews provide a very structured process for finding, appraising and synthesising secondary evidence. Transdisciplinary umbrella reviews can therefore provide an incisive mechanism for not only aiding in transdisciplinary understanding of issues, but for creating evidence syntheses that are relevant to end-user needs. The goal is informed decision-making by those supporting the vision of a digital world that benefits children.

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