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Review Article

The systematic literature review process: a simple guide for public health and allied health students

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ABSTRACT

A literature review is a key part of all academic research that informs researchers of the existing body of knowledge. Reviews conducted systematically are becoming more appealing to the researcher about two reasons. Firstly, they are robust, strong, comprehensive and reproducible and can appropriately serve the background review of any primary research. Secondly, they are qualified to be a stand-alone piece of academic work that contributes to the scientific body of knowledge. Although researchers and students in higher education who wish to write their dissertations are informed about the need for generating a literature review for primary research, when it comes to conducting a full systematic review, they may have some confusion and doubt on the distinction between a traditional literature review and a systematic review. This paper aims to clarify what a systematic review entails and take the readers' attention through the practical steps in conducting a systematic review. So, more of a practical step-by-step guide, rather than theoretical discussion of content, has been included. This paper would benefit early-career researchers, undergraduate students and many post-graduate students who wish to write their papers or dissertations based on a systematic review.

Keywords: Systematic review, Stages, Students, Public health, Allied health

INTRODUCTION

For all academic research, the literature review is a fundamental part that serves the new body of knowledge as a foundation; therefore, these literature reviews must be strong enough to inform the research ahead. Therefore, it must be valid, thorough, reliable, and repeatable.[1]

Nowadays, students of public health, allied health professions and healthcare backgrounds from undergraduate and mainly postgraduate programmes often undertake systematic reviews as dissertation projects. Students find that they can manage their projects more effectively and meet academic assessment deadlines by conducting a systematic review (SR) dissertation project. Undertaking a systematic review means that the student is not required to go through potentially lengthy ethical

approval processes, which are mandatory for primary research projects involving human participants. Systematic review searches and identifies, evaluates and synthesises original studies on a particular topic in an unbiased and reproducible manner to provide evidence for practice. Additionally, systematic review projects are cost-effective as they are typically completed in a shorter time and with minimal use of facilities and financial resources. With the help of widely available digital resources via the university library gateways and support services, students can easily and rapidly access millions of research articles from their personal computer. Nevertheless, students often need help understanding how to start conducting their systematic review research. Systematic literature review differs from structured literature reviews and primary research projects, and students need to understand the difference. Therefore, they must comprehend how to plan and prepare their systematic review dissertation project.

When should you not use a systematic review?

There are certain situations where a systematic review may not be appropriate or necessary. Systematic reviews rely on the availability of an adequate body of literature on the topic of interest.[2] Systematic reviews require a comprehensive search for relevant studies, data extraction, quality assessment, and synthesis of findings. [3] Therefore, systematic reviews are not suitable when there is insufficient evidence or poor-quality evidence on a research subject.

DIFFERENT TYPES OF REVIEW

Systematic review differs from other types of review. Here are some review types are discussed.

Scoping review

Scoping reviews aim to map the existing literature and provide an overview of the available evidence on a broad topic. Scoping reviews involve a systematic search and selection of studies, but the inclusion criteria are typically broader compared to systematic reviews. They may include a variety of study designs. Data extraction and analysis are typically done in a descriptive manner, focusing on summarising the main characteristics and themes of the included studies. Scoping reviews produce a narrative summary or a visual diagram (e.g., a conceptual framework or a flowchart) that illustrates the extent, range, and nature of the literature on the topic.[4]

Narrative review

Narrative reviews provide a subjective summary and interpretation of the available literature on a specific topic. They aim to synthesise existing knowledge, present different viewpoints, and offer expert opinions. Narrative reviews do not follow a predefined protocol or systematic search strategy. The selection of studies is often based on the author's expertise and personal judgment. There is usually no formal quality assessment or data synthesis process. Hence the findings are presented from the author's perspective.[5]

Realist review

Realist reviews focus on understanding the underlying mechanisms, contextual factors, and causal relationships that influence the outcomes of complex interventions or programs. They aim to explain how, why, and for whom an intervention works. Realist reviews use theory-driven inquiry and involve iterative cycles of evidence synthesis, theory refinement, and hypothesis testing. Realist reviews produce context-sensitive theories or program theories that explain the causal processes and contextual interactions influencing intervention outcomes. The findings are often presented in the form of explanatory diagrams or narratives.

Focused review

Focused reviews, also known as rapid scoping reviews, aim to address a specific research question or a narrow aspect of a broader topic in a more time-efficient manner compared to systematic reviews. Focused reviews may use a systematic search strategy to identify relevant studies, but the inclusion criteria and selection process are more focused and streamlined compared to systematic reviews. Data extraction and synthesis are often conducted in a narrative or descriptive manner. This helps to produce evidence based specific research question or topic.

Rapid review

Rapid reviews aim to provide timely evidence synthesis to inform urgent decision-making needs or time-sensitive policy discussions. They are conducted with accelerated timelines compared to traditional systematic reviews. Rapid reviews produce a condensed summary of the evidence, often with a focus on the most relevant studies, key findings, and limitations.

Similarities with systematic reviews

All the above methods of reviews aim to synthesising existing evidence and provide summary of the literature on a specific topic. They all surely contribute to evidence-based decision making, policy development on a chosen subject or topic.

The scope of these guidelines are to help the students: understand how to perform a systematic review, including a systematic literature search, and become aware of the various steps involved. It is to make them aware of the wide range of available sources, including electronic databases of published and unpublished data which may be relevant when conducting systematic reviews and understand how to synthesise data from various studies.

O*verview of systematic review*

It is important to consider registering the SR protocol. Every SR includes three distinctive phases; planning,

performing and reporting. The diagram in Figure 1 summarises these steps.

Research question

Developing a research question that is precise, logical, and well-defined is a crucial step in the systematic review. In defining a well-formulated research question, attention must be focused on clarifying questions that help to structure the SR question more concisely and meaningfully.

It is common practice to use an established framework to assist in this process. The systematic review should address an answerable question and PEO, PCC, PICO, SPICE or SPIDER are examples of tools that are often used to help framing the research question and searches (Table 1).

Registration of the SR protocols

Good practice in every SR is that once the research question and basic methodology have been decided, this should be written up as a protocol detailing the research to be conducted and this protocol should be registered online. This protects the research topic and provides the transparency of the SR research process.

There are a number of different databases where SR protocols can be registered. These include but not limited to PROSPERO (http://www.crd.york.ac.uk/PROSPERO/), Cochrane library (https://www.cochranelibrary.com), JBI (https://jbi.global/systematic-review-register), and The Research Registry (https://www.researchregistry.com).

Registration will generate a unique reference number for the SR.[8]

Preliminary search

A preliminary search is recommended to identify relevant articles, check the validity of the proposed idea, avoid duplication of already addressed questions, and ensure that there will be enough articles to perform the analysis.

An initial evaluation of the current literature should be carried out to substantiate the need for a systematic review. A planned study is not necessary if a similar study has already been published recently. The first literature assessment can be conducted using the databases and search engines such as PubMed, Embase, Scopus or Google Scholar. After that, the Cochrane Database of Systematic Reviews (CDSR) can be searched for any existing or current systematic reviews conducted at the search time (Figure 2).

Table 1: Frameworks for setting research question.

PICO (for quantitative studies)	PCC (for both qualitative and quantitative studies)	PEO (for qualitative studies)	SPICE (for qualitative or mixed method studies)	SPIDER (for qualitative or mixed method studies)	PFO (for prognostic models)	CoCoPop (for prevalence and incidence)	ECLIPSE (For qualitative research)
P: Population/ problem	P: Population	P: Population/ problem/patient	S: Setting	S: Sample	Population	Co: Condition	E: Expectation
I: Intervention/ exposure	C: Concept	E: Exposure	P:Perspective	PI: Phenomenon of interest	F: Prognostic factors	Co: Context	CL: Client group
C: Comparison	C: Context	O: Outcome	I: Intervention/exposure	D: Design	O: Outcome	Pop: Population	I: Impact
O:Outcome			C: Comparison	E: Evaluation			P: Professionals
			O: Outcome	R: Study type			S: Service
Example: How mass media intervention (I) is effective compared to other interventions (C) in reducing smoking(O) among young people (P) in the UK?	Example: What are the available mental health services (C) to support (C) the suicidal ideation patients(P)?	Example: What are the views (O)of general population of the UK (P) on Brexit(E) ?	Example: what are the public health interventions (I) are effective in reducing (E) maternal mortality (O) among the women of reproductive age (P) in South Sudan(S)?	Example: what are the challenges (E) to integrate telemedicine (PI) into NHS(S)?	Example: are adults (P) with bronchial asthma (F) more likely to suffer other pulmonary problems (O)?	Example: what is the prevalence of dengue fever (Co) among young children (Pop) in the slums (Co) of Mumbai City?	Example: What are the ways to improve(I) accessibility (E) of mental health care services (S) for asylum seekers (CL) in the UK?

Figure 1: Process of systematic review.[1]

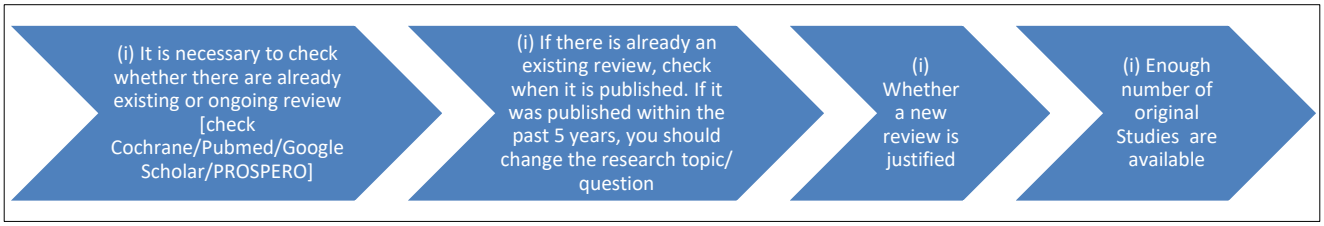

Figure 2: Preliminary search steps.[9,10]

Table 2: Example of using Boolean operators.

Boolean operators	Search terms
And	"Climate change", and "human health"
Or	"Climate change", or "human health"
Not	"Climate change", not "human health"

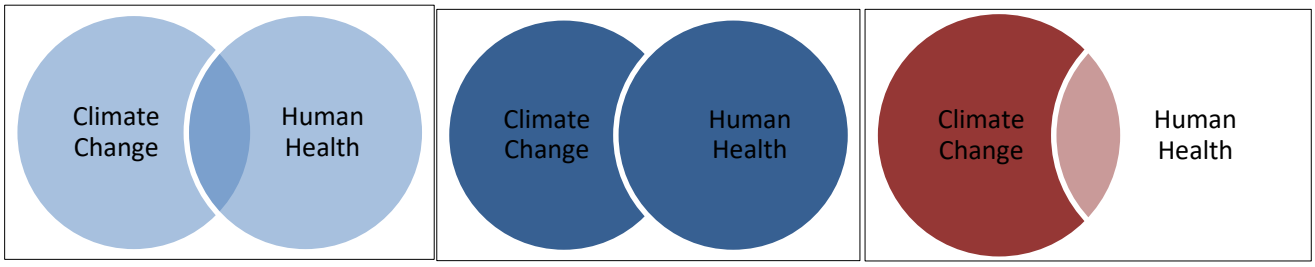

Figure 3: Example of using Boolean operators.

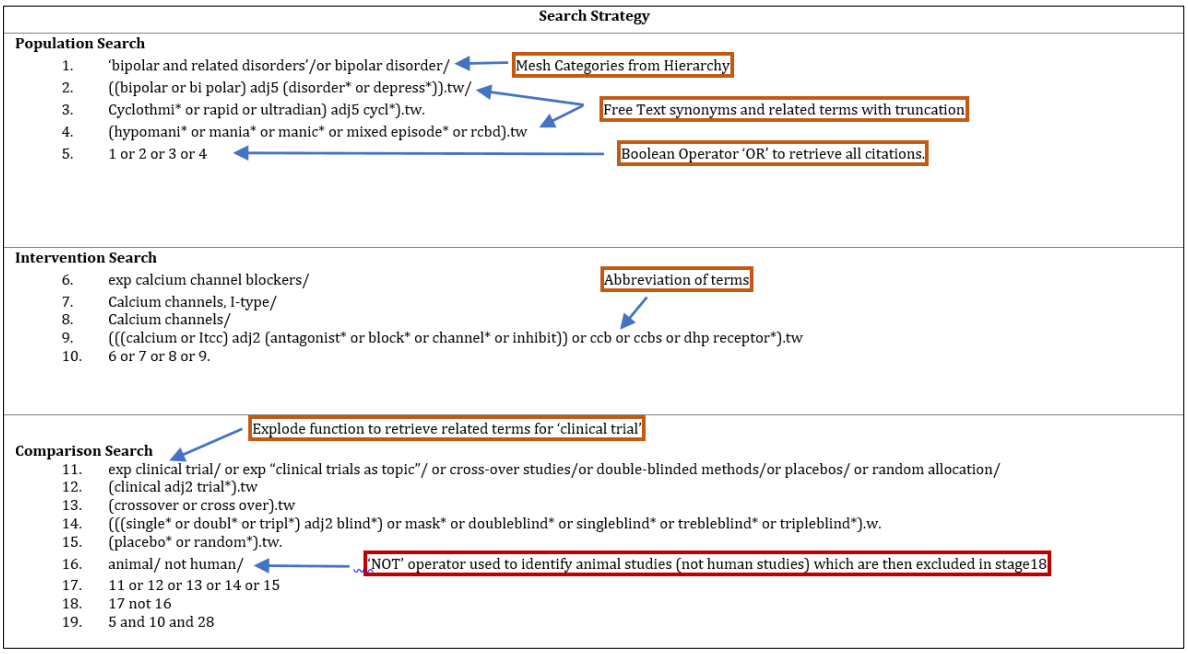

Figure 4: Example of search strategy using PICO.[11]

Search strategy

A widening search would be expected to maximise the retrieval of relevant articles for a systematic review.

Therefore, researcher should use search terms and find the index terms (MeSH or Medical Subject Headings) for the chosen topic.

Alternative words: Synonyms, Acronyms Spelling variations, Plurals, country-specific terms, Medical lay terms etc.

Also, clarifications need to be included on the issues such as the following:

What Time constraints does the researcher want to set up?

Which Geographical location research would fall in?

Any specific setting/context for the SR?

What Population/group are subject for the SR.

To narrow down/widen the results, researcher should use:

Phrase searching – use quotation marks. e.g. "robotic surgery".

Truncations – use * or $. e.g. child* finds child, children, childhood…etc.

Wildcards - replace the letter with "?'. e.g. wom?n finds women and woman.

Brackets/nesting e.g. (elder OR old) AND (diet OR nutrition).

Boolean operators (AND, OR) e.g. AND reduce the number of records and OR increase the number of records (Table 2, Figures 3 and 4).

SEARCH DATABASES

Finding an appropriate database for search

It is vital to identify the appropriate databases in which the indexing strategy matches the research question. Many researchers use bibliographic databases for published articles, i.e. Medline, Embase, PubMed, Cochrane central register of controlled trials (CENTRAL), EBM Reviews, PsycINFO (including Cochrane), PubMed Central, Scopus, Web of Science, CINAHL Complete, Academic Search, Health Source, Psychology and Behavioral Sciences, Collection, Social Work Abstracts, SocINDEX with Full Text, ERIC, HINARI, BASE, CORE, Semantic Scholar, RefSeek, Data One Search, Jurn, DOAJ. For grey literature - Google, OAISter (World Cat), Google Scholar, ProQuest (theses and dissertations), OpenDOAR (institutional repositories), ETHOS, Health Sciences Online, Turning Research into Practice (TRIP) and National Institutes of Health (NIH).[12,13]

Search strategy

The researcher must record the search strategy and findings in a search record/log (Table 3). Export all records to either one of the reference managers (Endnote, Mendeley, Zotero, and Refworks) The reference manager tool will help to remove duplicates. It is required to use the remove duplicating function with two options. All references with the same title and authors published in the same year, and the same title and author in the same journal would be eliminated.

After this stage, all remaining references should be exported to an Excel file with the necessary information for screening. These could be the authors' names, the year of publication, the journal, the DOI, the URL link, and the abstract.

Table 3: Sample search record/log.

Date	Database	Keywords	Strategy	Results (Hits)	Refine	Notes
11/05/2023	CINAHL Plus	Elderly AND Exercise AND Obesity	Use of Boolean AND	280	Reduced to last 10 years + peer-reviewed journals =160	6 studies look useful. 5 Literature reviews. 1 Systematic Review. Key References added to RefWorks
12/05/2023	EMBASE	Older People AND Sports AND Obese	Use of Boolean AND	160	Reduced to last 10 years + peer-reviewed journals =68	2 studies look useful. 7 Literature reviews. 2 Systematic Reviews. Key References added to RefWorks (5 duplicated from 1st search)

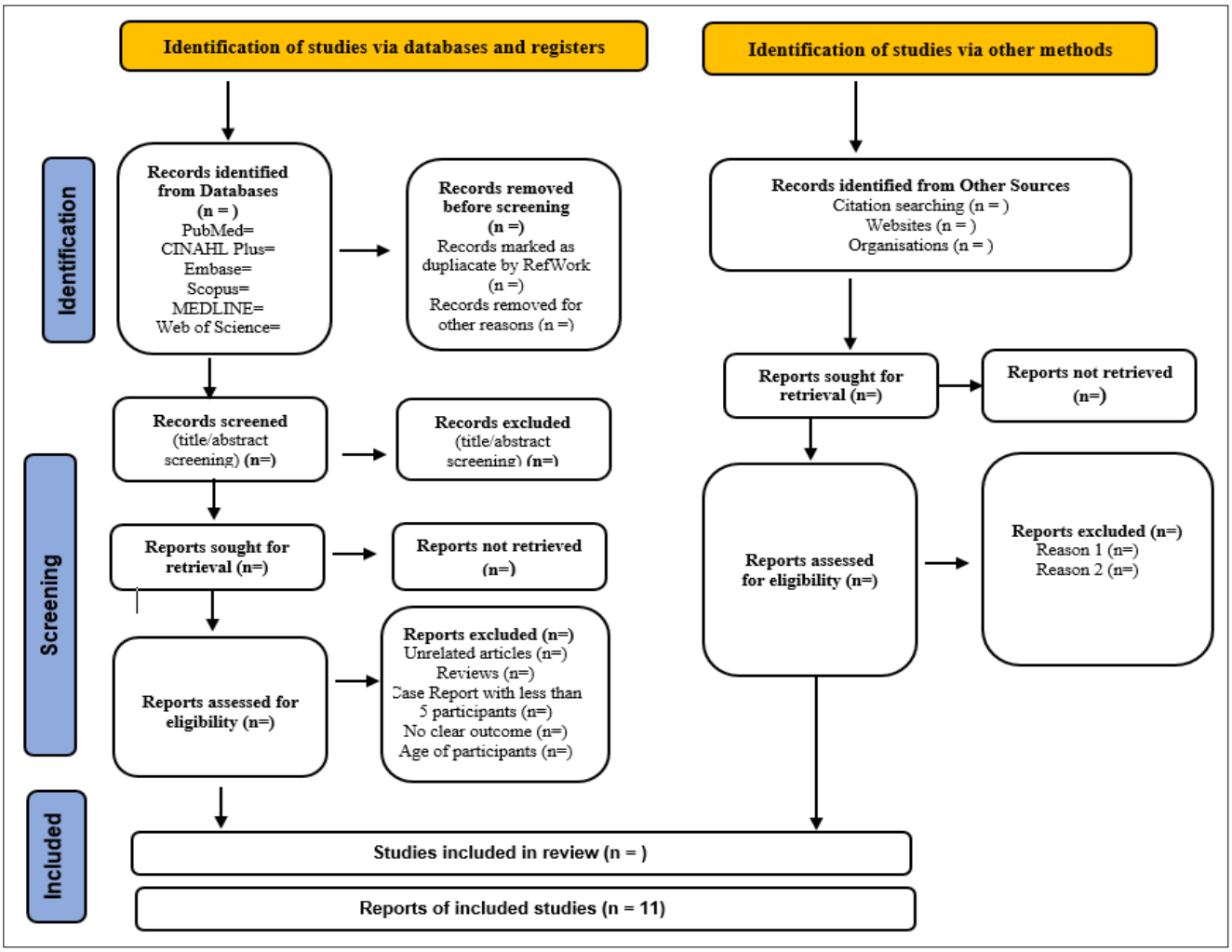

Figure 5: PRISMA flow diagram.[15]

Hand searching

It is with added value when a researcher reading identified research, sections such as introduction and discussion can potentially offer additional references on a subject that might have been left out following the search strategy. So, it is suggested that researchers manually search the reference lists of the identified research also as the last check to make the SR as inclusive as possible. This is known as reference harvesting and is also helpful to find relevant articles.[14]

Structuring the primary findings into a PRISMA flowchart

In addition to the search record/log (Table 3), keeping a standardised flow diagram is mandatory, which depicts the flow of information through the different phases of a review. It maps out the number of records initially identified, included and excluded, and the reasons for exclusions. PRISMA guidelines could be used as the flow diagram to capture the different phases of article selection (Figure 5).

STUDY SELECTION

Determining explicit inclusion and exclusion criteria for selecting studies is good practice. The criteria for inclusion are all the things a study must have to be included. Similarly, the exclusion criteria are the factors that would make a study unsuitable to be included. To maintain the rigour of the review, the specific reasons for including or excluding all studies identified in the search should be recorded. It will reduce the risk of selection bias, and if at any point this exercise is subjected to scrutiny, then it will allow a rapid reassessment, as it has been well evidenced.

Defining inclusion and exclusion criteria

After the removal of duplicate papers, apply the inclusion and exclusion criteria.

One of the critical parts of any SR is determining the studies to include or exclude. One of the criteria would be the study design. The scientific articles retrieved as an outcome of the search should be screened for research design in the first step. After that, the title and abstract of each search result will be screened using for example

PICO(S) or SPIDER or PEO inclusion and exclusion criteria. Common exclusion criteria include irrelevant, duplicated, unavailable full texts, or abstract-only papers. These exclusions should be expressed in advance to avoid bias in the research. The process briefly includes articles with inclusive information that answer the study research question/s. The most significant aspect is that there should be clear and sufficient positive and negative information to answer the question. By clearly outlining the criteria, systematic reviewers can decide whether to include a study in the SR.

Other factors to consider are study demographics, intervention types, comparison groups, and measurable outcomes. The use of database-provided limitations such as language, dates, persons, female/male, age groupings, and publication/study type- (randomised controlled trials, etc.) are further factors to apply as criteria.

Title and abstract screening

As a reviewer initially, the titles and abstracts of each reference need to be checked to ascertain whether the study reported is potentially eligible for inclusion.

Full-text screening

Many search engines provide free links to full-text articles. If the full-text article is not found, we can look for it on some research websites, such as ResearchGate, which allows us to obtain full-text articles directly from the authors. Reviewers will explore each study in further depth by reading the full text. This extra information will aid in determining eligibility, which may not be apparent during the initial screening.

Quality assessment

The quality level of the included studies will be seen as an indicator of the certainty with which conclusions can be drawn in the review. Therefore, the quality assessment is performed at the stage where all the relevant studies have been identified. Selected studies should have their quality assessed more thoroughly using generic critical evaluation guides and design-based quality checklists.

Critical appraisal involves assessing the quality, reliability, and relevance of the research in the review with its relation to the research question. It evaluates each study based on certain criteria such as: is the research study relevant to the research question? is the study reliable? e.g., were the research methodologies used correctly? concerning the review question, were appropriate methods used?

Numerous standardised methods are available for critical appraisal depending on the study design and review type. Each study's critical assessment approach and appraisal decisions should be documented. The various tools that are used for assessing the quality of studies are – AXIS for cross-sectional studies, KMET for evaluating primary research papers from a variety of fields), the consolidated for reporting qualitative research (COREQ) for qualitative studies such as focus groups and interviews, standards for reporting qualitative research for qualitative studies (SRQR), critical appraisal skills programme (CASP) tools for qualitative studies, economic evaluation, randomized controlled trials, cohort, case-control studies, diagnostic studies, clinical prediction, effective public health practice project (EPHPP) for both qualitative and quantitative studies, mixed methods appraisal tool (MMAT) for mixed method study design, JBI critical appraisal tools for analytical cross-sectional studies, case control studies, case reports, case series, cohort studies, diagnostic tests, economic evaluations, prevalence studies, qualitative research, quasi experimental studies, randomized controlled trials, ROBINS-I for risk of bias in non-randomized studies.[16-23]

Data extraction

Data extraction is the process of extracting important information from the research that have been examined for eligibility in the systematic review and organising the information so that reviewer, may synthesise the studies and draw conclusions. This stage entitles the collection of data from included full texts in an Excel sheet in a structured format. Depending on the purpose of the review, the following data may need to be gathered from each included study: title, author, year, journal, research question and specific aims, research methodology or study type, key findings and limitations, tabulate the data collected (Table 4).

Table 4: Sample data extraction table.[24]

Reference	Study design/methodology	Sample population, age and country	Aim	Key findings	Limitations
Lee et al (2018)	Qualitative, interviews	Male and female over 60 years old in Chungcheongnam	To analyse age and sex differences within socio-demographics that may relate to suicidal ideation	Males and females in their 60s and 70s and females in their 80s were identified as risk factors. Negative perceptions of their health was identified as a significant risk factor.	It may not represent an entire population as it was set in one region. They only worked on a volunteer basis, so potentially healthier people put themselves forward. Used closed questions only

Continued.

Reference	Study design/methodology	Sample population, age and country	Aim	Key findings	Limitations
Yilmaz et al (2020)	Quantitative	Over 65 years, Turkey	To understand the prevalence of depressive symptoms and related factors and draw attention to the suicide probability in the elderly without evidence of a significant disabling disease	Females were at increased risk of suicide if they were bereaved/widowed. Negative perceptions of health were a significant risk factor for both sexes and most ages. Education of less than six years for males and females was a risk.	Cognitive function is not taken into account, which can have an impact on health; however, dementia was ruled out.

DATA SYNTHESIS

Synthesis of information is necessary for any research project. In this final step, the data collected should be summarised for presentation and synthesised the study findings. The nature of each type of review depends on the depth and amount of information to be synthesised from the selected studies. Synthesising information can be broadly classified into two categories based on whether the studies are quantitative or qualitative. Quantitative studies are analysed through a process called meta-analysis, while qualitative studies are processed through meta-synthesis.

Meta-analysis

This method is used for the synthesis of quantitative studies. If the studies and results are similar enough to be combined into a single numerical result, meta-analysis can be performed. In the process, the reviewer obtains pooled estimates through appropriate statistical methods after the summaries of selected studies.

Following that, it require assessing the heterogeneity of studies and publication bias in the studies. Finally, it needs reporting and interpreting the findings. Two graphical outputs of a meta-analysis are the Forest plot and Funnel plot (Figures 6 and 7).

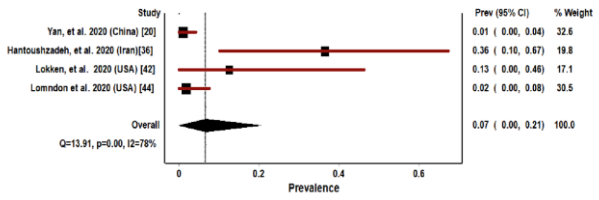

Figure 6: An example of a forest plot.[25]

Meta-analysis should be considered if the homogeneity was proved by the relevant test like I^2. Where I^2=0%, it means they are homogeneous.[26] When they appear to be heterogenous, then meta-analysis cannot be performed, and alternative analysis such as meta-synthesis should be considered.

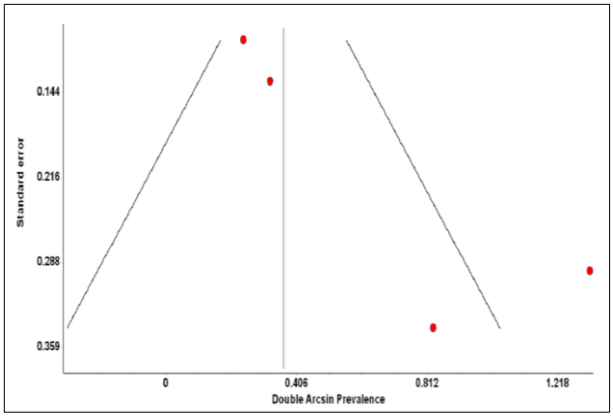

Figure 7: Funnel plot to assess for publication bias.[25]

Meta-synthesis

This method is used mainly for the synthesis of qualitative studies. Synthesising a group of qualitative studies and comparing and contrasting different aspects of a topic from different studies ultimately helps gain a deeper insight into and understanding of that topic. In this method, extract the data according to the meta-synthesis objective. Summarise and perform qualitative synthesis on selected studies through appropriate methods, and report and interpret the findings.

CONCLUSION

Conducting a systematic review is an important skill for postgraduate public health, allied health and healthcare students. This paper provides readers with a basic understanding of systematic review and how to synthesise and summarise information from multiple studies. The guidance presented here has been created for those with little prior experience in systematic reviewing, especially students looking to systematically synthesise a wide range of scientific information in their studies and practice.

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