Chapter 9. Framework Synthesis

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Key points
- Framework synthesis is a synthesis method which uses a selected, adapted or created theory, framework or model to guide data extraction, analysis and interpretation of findings from primary research. It has several variations including 'Best-fit framework' synthesis.
- Framework synthesis is a transparent method that offers flexibility, facilitates timeliness and provides an accessible route for the refinement and testing of theory.
- If a theory is selected, it may be tentative, emergent, refined or established. The theory can sometimes evolve over a period of time in order to fully accommodate the review question, phenomenon of interest and data collected during the review.
- 'Best fit' framework synthesis differs in how frameworks are selected and data indexed; it offers an explicit way to refine an existing theory based on review data.
- Stakeholders can contribute at all stages of framework synthesis.

9.1 Introduction
This chapter introduces framework synthesis, its variations and uses and considerations when selecting this method.   The stages of the framework synthesis method are outlined and the role of stakeholder engagement and involvement, equity diversity and inclusion and reflexivity are discussed.

Framework synthesis is a commonly used systematic review approach with several different variations that employ a selected, adapted or created theory, framework or model as a 'scaffold' on which to organise and understand research findings from multiple studies

(Carroll, Booth, and Cooper 2011). It has been advocated as a method that enables timely synthesis of existing research evidence. Framework methods can support development of a theoretical understanding of an issue and identify gaps in the associated research (Dixon-Woods 2011). This chapter should be read in conjunction with Chapter 3 (selecting and using theory) and chapter 4 (developing and using logic models).

This chapter is important because there are several different variations of framework synthesis and review authors need further methodological guidance as to which version is the most appropriate for their qualitative evidence synthesis (QES). Review authors most commonly use framework synthesis to synthesise qualitative evidence, or in a modified form to integrate the findings of a QES with the results of an intervention review using an a priori framework (see Chapter 14). When using a framework synthesis approach, review authors commonly do not describe the steps and processes with sufficient clarity, which causes confusion. Additional guidance is also required to ensure higher standards for conducting and reporting framework syntheses. More examples are needed to demonstrate the value of other types of framework synthesis (such as mixed-method framework synthesis) in a Cochrane and Campbell context.

9.2 Origins and overview of Framework approaches

Framework synthesis arose as an adaptation of framework analysis methods used in primary research (Ritchie and Spencer 1994). These methods were originally used to analyse health policy concerns. Framework analysis requires careful consideration of the research question and background theoretical and empirical literature to develop an understanding of the issue under study into an *a priori*, or initial framework. This initial framework may be developed by the research team, borrowed and employed in its existing form, or adapted from existing theories (see also chapter 3). The framework continues to develop iteratively as new data are incorporated and themes are derived from the data (Ritchie and Spencer 1994).

When synthesising research findings within a systematic review, the method is known as a 'framework synthesis' (Thomas et al. 2017; Carroll, Booth, and Cooper 2011). Examples of framework synthesis first appeared in the health and social sciences research literature in 2004 (Oliver et al. 2004; Lloyd Jones 2004). More recent examples are seen across education (Muchenje and Kelly 2021), criminology (Wong, Lee, and Beck 2023), and public policy (Waddington et al. 2019), Framework synthesis has been used to conduct clinically based QESs (Demain et al. 2015; Gallacher et al. 2013; Kruijsen-Terpstra et al. 2014), and to inform implementation science (Carroll 2017; Harden et al. 2018; Cargo et al. 2018), health systems, health policy and international development (Langlois et al. 2019; Kneale et al. 2018a; Oliver, Gough, and Copestake 2017), and health care guidelines (Carroll 2017; Flemming et al. 2019; Noyes et al. 2019). Framework synthesis is very versatile in employing frameworks within

research synthesis in diverse ways. It can be used by researchers to either generate, explore or test theory. The "Best-fit" framework variation of the method utilises a theory developed on a different but related population (Carroll et al. 2013). Framework synthesis can also be used sequentially to generate, explore and test theory in mixed-methods reviews (Muthee et al. 2020; Waddington et al. 2019). This latter use sets it apart from the many other approaches that employ frameworks within research synthesis (Carroll 2017; Harden et al. 2018; Cargo et al. 2018; Langlois et al. 2019; Kneale et al. 2018a; Oliver, Gough, and Copestake 2017).

Framework synthesis also allows some flexibility to synthesise diverse types of findings that are fit for the specific purpose and context of the review. For example, it has been used within mixed-methods (sometimes called mixed-studies) systematic reviews to combine findings from a QES with synthesised results from trials or trial sibling studies such as process evaluations (chapter 14) (Brunton 2017). A modified form of framework synthesis has also been used as an additional stage of a QES to create a matrix to integrate the findings from a Cochrane QES with the outcomes from a linked Cochrane intervention review on the same topic (chapter 14) (Houghton et al. 2020).

9.3 Considerations when selecting Framework Synthesis

Framework synthesis possesses many inherent advantages. In performing framework synthesis, review authors first use the list of factors or concepts from a framework or reduce the selected model or theory to a list of factors or concepts – thus rendering it into an analytic framework – for the purpose of data extraction and synthesis. The terms 'framework', 'model' and 'theory' are often used interchangeably. Here we define these terms in the following manner: a **framework** is a list of explanatory factors or concepts relating to a phenomenon or behaviour. A **model** is a diagrammatic and textual representation of the relationships between a list of explanatory factors or concepts that relate to a phenomenon or behaviour. A **theory** is a systematic but higher-level explanation for a phenomenon or behaviour. Theory can be based on a framework of factors or on a model of relationships but it extends them. Theory does not just posit relationships between factors or concepts but encompasses both explanations for, and the implications, of the relationships identified. Because of the a priori framework inherent within the method, framework synthesis can be applied relatively efficiently and speedily (Dixon-Woods, 2011), it is flexible (Brunton, 2017; Gale 2013) and it engages with theory without requiring resource-intensive development of explanatory theory through interpretation (Macura et al, 2019). By explicitly coding data into an initial framework, framework synthesis offers a method that is well-suited to review authors who are relatively new to qualitative evidence synthesis (Oliver et al. 2008; Brunton 2017); however a qualitative methodologist will still be required (Gale et al. 2013). This use of the initial framework also

3

provides coding consistency, transparency and a potential time advantage to researchers and research commissioners seeking rapid evidence. Frameworks can handle large quantities of data, whether from numerous qualitative studies, quantitative and qualitative studies, or mixed-methods studies (Macura et al, 2019).

In contrast to thematic synthesis (Chapter 10), the use of an a priori framework developed independently from the data (or with a small group of well-fitting studies), facilitates mapping of research gaps (Houghton et al. 2017). Framework synthesis allows a robust examination of gaps by testing the internal and external rigour of the framework, model or theory. This is accomplished by using: 'gap analysis' to identify any substantive gaps in the framework (i.e. concepts with no identified research data); 'qualitative sensitivity analysis' (i.e removing data from a study to see if it makes a difference to the synthesis) to assess the impact of study quality on the frequency, richness and thickness of the contribution of data from a study to the framework (see also chapter 7); and 'dissonance assessment' to examine included data which do not fit the framework (Carroll et al. 2013; Oliver et al. 2008).

Framework synthesis also offers a vehicle for transparent communication (Brunton et al, 2020) because it brings an explicit method of theory incorporation into QES and can visually illustrate how theory develops as the review progresses (Brunton 2017; Brunton, Oliver, and Thomas 2020).

Framework synthesis offers a flexible yet structured approach to synthesis (Macura et al. 2019), and therefore proves an attractive method for those wanting to organise qualitative or mixed-methods studies in an efficient and transparent manner (Dixon-Woods 2011). The organising system or 'scaffold' could be based on, or take the form of, a theory, model or framework; or it may reflect the logical structure and/or process of a logic model (chapter 4), or a trajectory for a condition or an intervention pathway (e.g. a care pathway). The framework may also be used to organise data to fit an idealised conceptualisation or systematised version of a process as portrayed in a policy framework. This flexibility in application (Gale et al. 2013) results in the use of framework synthesis for organising and analysing qualitative studies or data, using framework analysis methods, originally developed for analysing primary qualitative research (Gale et al., 2013; Ritchie and Spencer, 1994). However, framework synthesis may also be used to code both qualitative and quantitative data and studies within a single common framework, whether generated by a review team (Lorenc et al. 2008; Brunton, Oliver, and Thomas 2020) or from the literature using a best-fit framework synthesis approach (Kane 2017). A matrix may be used to juxtapose results from an effectiveness review with findings from a qualitative synthesis; either at a review or individual study level. Such a process relies on "qualitising" data

from quantitative studies (Dixon-Woods et al. 2004); that is assigning qualitative themes or labels to quantitative variables or other study characteristics. In some cases, labels may translate reciprocally in a straightforward way – for example, "severity of pain" may relate to quantitative measures from a pain scale or to verbal expressions of extreme discomfort. Matrices have also been used to explore the integrity of qualitative findings by comparing findings against quality assessment ratings (Houghton et al. 2017). In cases where no obvious correspondence exists between quantitative and qualitative concepts, a review team may need to assign, or create, separate but related concepts or labels. A final, and most challenging, circumstance may relate to concepts that superficially describe the same phenomenon, such as the quantitatively precise "quality of life" from a scale and aspects of a "quality life" as described by an informant. Detailed exploration of context and meaning is required to resolve the last of these situations.

The use of framework synthesis also poses some limitations. Some commentators question the extent to which framework synthesis allows interpretive creativity, with suggestions that its structured approach may result in leaner insights because the selected framework is too constraining (Dixon-Woods 2011; Barnett-Page and Thomas 2009).

Certain precautions can be put in place to ensure rigour in framework synthesis. Double checking during qualitative coding and framework development can ensure rigour and dependability of the findings (Jagfeld et al, 2021). In addition to the use of coding books as mentioned previously, review authors can involve other researchers or stakeholders in challenging whether particular data extracts justify the code or label to which they have been assigned. Furthermore, when a framework is assembled or reconstituted into a model these external perspectives from other researchers or stakeholders can be helpful in exploring whether any interactions between components are described accurately.

9.4 Stages of Framework Synthesis
9.4.1 Overview of stages
Framework synthesis uses an *a priori* or initial framework, model or theory (the framework) as a lens through which to interpret the findings from studies identified for a QES. As noted above, a framework synthesis can also be used to synthesis the findings from quantitative and mixed-methods studies. The five stages of framework synthesis are: familiarisation, framework selection, indexing, charting, and mapping and interpretation. These stages of framework synthesis correspond to the systematic review process, as shown in Figure 1.

Figure 1. Stages of framework synthesis

Systematic review processes
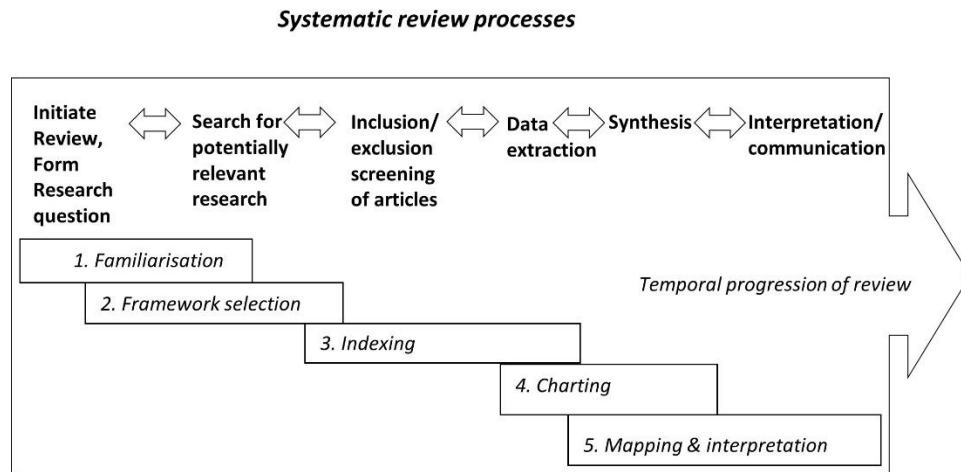
Stages of Framework synthesis method (Source: Brunton, 2017)

Regardless of review design, protocol development occurs iteratively during familiarisation, framework selection, and initial screening of articles. A modified version of this generic synthesis method has been published and widely-used: 'best fit' framework synthesis. Taken in its entirety 'best fit' framework synthesis (BFFS) represents a good match to the five stages outlined generically for framework synthesis. The terminology may not always make this relationship readily apparent given that 'best fit' is itemised by its procedures, whereas framework synthesis is characterised by its processes (Carroll et al. 2013). Otherwise, 'best fit' largely only differs from conventional framework synthesis in the procedures undertaken at two stages: framework selection and indexing. These differences are highlighted in Table 9.1.

Table 9.1. Framework Synthesis Processes and Best Fit Framework Synthesis Procedures

Framework Synthesis processes	Best fit Framework Synthesis procedures
Familiarisation	Define question and systematically identify published studies
Framework identification	Systematically identify candidate frameworks and generate coding framework
Indexing	Code evidence against framework
Charting	Create new themes using thematic synthesis
Mapping and Interpretation, during which themes can be further developed and refined	Produce new framework combining original and new themes
	Explore relationships within framework to create a model
	"Test" for dissonance and for quality of supporting studies

Framework synthesis and its variant, best-fit framework synthesis, both seek to exploit and develop the framework and can accommodate different types of evidence (see 9.3).

9.4.2 Familiarisation

Familiarisation requires that review authors become acquainted with the topic under study, current issues and ideas and their history. This knowledge is gained by considering a variety of sources, which can include findings from potentially relevant, and subsequently included, research, discussion pieces, researcher and prior knowledge of key stakeholders (Brunton 2017; Ritchie and Spencer 1994; Ritchie et al. 2014). This step corresponds to the background literature scoping stage of the systematic review in which the review boundaries are identified and the review questions are determined (Brunton 2017), and to the question definition stage of best fit framework synthesis (Carroll 2013, 2011).

9.4.3 Framework identification, evaluation and modification

Framework selection follows review author familiarisation with the topic. The initial framework selected by the review team may have been previously developed, adapted as a 'best fit' from previously existing theories, models or frameworks, or may be generated through the review process. This decision is informed by the familiarisation stage. The type of approach that a review team uses to work with a framework throughout the review depends on the extent of theory development that is required. This can be:

- *tentative*, where no overarching theory exists but patterns are identified from previous research or stakeholder knowledge and further organisation of knowledge into sets is required to understand those patterns (e.g. (Oliver et al. 2004; Oliver et al. 2008));
- *emergent*, where theory is generated by the research team (e.g. (Lloyd Jones 2004; Tierney et al. 2011));
- *refined*, where theory is systematically located and modified based on review data and stakeholder input, including best fit framework synthesis models (e.g. (Fishwick et al. 2012; Hamzeh et al. 2019)); or
- *established*, where theory is being operationalised and tested (e.g. (Aber et al. 2019; Pettigrew et al. 2019; Brunton, Oliver, and Thomas 2020).

Tentative and emergent approaches use a framework derived from the review context and question and if appropriate the associated policy and clinical context, review author knowledge, background scoping of the literature, iterative engagement with stakeholders and initial familiarization with included studies (Brunton 2017; Oliver et al. 2004). In contrast, refined or established approaches identify candidate frameworks through literature searching. Frameworks are identified, evaluated or modified as appropriate to the purpose of the review (Booth and Carroll 2015b, 2015a). For example, the initial framework may be revised at intervals during the lifetime of the review, often with stakeholder involvement (Brunton et al. 2017). Rapid QES, or other syntheses where the protocol is already fixed, may privilege literature-based frameworks. In the absence of theories specific to prenatal maternal anxiety, one rapid review team used 11 dimensions, measured by prenatal maternal anxiety tools from a recent concept analysis, to construct their initial "best fit" framework (Bright et al. 2018). (Rapid review methods are further described in Chapter 15 - Time Sensitive Reviews). Some frameworks directly address the research question or topic while others are either further developed using a best fit approach or during synthesis. Regardless of the extent of framework development required, it is important to anticipate the credibility of a particular framework to its end user. A review team does not want to risk rejection of their findings because knowledge users see their chosen framework as controversial, discredited or outdated. For example, a medical model of disability may be less appropriate where a social model is deemed more credible.

Framework selection potentially involves three iterative stages: (i) Framework identification; (ii) Framework evaluation; and, where indicated (iii) Framework modification. **Framework identification** can prove challenging. Theories, models and frameworks are not always identified explicitly as such; the task is relatively easy if they self-identify as the "Theory of Planned Behaviour" but outside such areas as behavioural science, implementation science, public health and nursing, a theory may be advanced without using such words as theory or

framework (Booth and Carroll 2015b). Even if theories, models or frameworks are labelled, they may not be identified in the article title or abstract. However, where a suitable theory, model or framework is identified speedily and smoothly, time savings can be considerable.

Figure 9.1. Key search terms for models and frameworks

Full text facilities of Google Scholar, plus the Images facility of the main Google search engine, offer a speedy route either to references or to diagrams of frameworks or models.

Searching for models and frameworks

Terms such as *"theor* OR concept* OR model* OR framework*"* combined with the topic of interest can be effective (Booth and Carroll, 2015b).

Searching for programme theories (Booth, Wright, and Briscoe 2018)

Use a search string on Google Scholar such as *"("logic model" OR "theory of change" OR "theory of action" OR "outcomes chain" OR "program*theory" OR "program*logic" OR "logical framework") AND "postnatal depression")"* (Kneale, Thomas and Harris 2015).

In addition, compendia of theories, models and frameworks, such as those for behaviour change (Michie 2014) or implementation science (Rycroft-Malone and Bucknall 2010) can be used to inform selection. Where review authors favour a particular theory, model or framework, they can either combine the topic and the name of the theory, model or framework in a subject database or combine the source citation with a subject search in Web of Science. Alternatively, they can use the "Search within citing articles" for that specific reference on Google Scholar to find occurrences of a particular topic. For example, if a review team want to identify whether a framework based on a named theory of planned behaviour has been applied to their topic of interest they can conduct a sub-search within the citations referencing that particular theory. This can be demonstrated by searching for a framework *within* the almost 100,000 citations attributed to the "Theory of Planned Behavior" for the search terms "smoking cessation" AND "pregnant women".

Claims that framework synthesis results in 'time and labour savings', particularly during data extraction and synthesis tend to be accurate *on average*. (See also Chapter 15 for further information on additional adaptations when undertaking rapid framework synthesis). However, time saved later in the review process may be offset by time taken either to develop, search for, sift and identify suitable frameworks. Locating suitable theories, models and frameworks from the literature can be time-consuming. An appropriate theory, model or framework for use in the framework synthesis may be identified from the literature incidentally as a by-product of the search for relevant primary research, but more commonly theoretical and empirical literature inhabit different publication channels (e.g. commentaries versus research reports or book chapters versus journal articles etc.). It is helpful if the review team has already identified one or more candidate theories, models or frameworks that could be

used as the framework for their synthesis from their scoping search. Candidate theories, models or frameworks may be included in papers that might otherwise be discarded as not eligible for inclusion. Follow up of citations, full-text searching for words associated with theory or scanning documents for images of models may yield candidate theories and models. The BeHEMoTh approach acknowledges that theories, models and frameworks may be identified in different ways (Booth and Carroll 2015b). In addition to the use of keywords such as "theory", "concept", "model" and "framework" (and variants) the BeHEMoTh approach uses source books for named popular theories and combines citation searches for named theories with topic-based search terms.

Challenges might also arise in selecting between competing theories, models and frameworks. The creation of a meta-framework might be appropriate if multiple, equally relevant, candidate theories, models and frameworks are identified from the literature, removing the need to select only one (see **Framework modification**). Furthermore, an ill-chosen theory, model or framework selected to serve as the framework for the synthesis that later proves unsuitable may present a false start (see chapter 3 for deselection criteria) requiring either changing to thematic synthesis (See chapter 10) or going back to identify, select and use a suitable alternative. Published accounts of false starts are understandably difficult to identify with review authors choosing to focus on their replacement framework for the synthesis or on the substituted method. Worked examples which include detail of false start would make a useful contribution to the methodological literature on framework synthesis. Use of "best fit", rather than an ideal framework for the synthesis mitigates some of this risk and, by comparison, alternatives involving extended stakeholder engagement (to create a framework) or thematic coding (for thematic synthesis) are themselves time intensive. Review authors and information specialists also become increasingly proficient in searching for and selecting theories, models and frameworks to use as the framework in the synthesis.

Requirements persist to document the identification and selection of the framework (Booth and Carroll 2015a; Carroll et al. 2013) and its evolution with stakeholders more comprehensively and more meaningfully (Brunton 2017). Techniques for retrieving diagrammatic representations of frameworks and theories may be enhanced by the further development of Google indexing to include figures and illustrations. The relationship between initial and ultimate theory should also be made transparent (Brunton 2017).

Framework evaluation involves assessing whether the theory, model or framework selected for use as the synthesis framework is sufficiently rigorous to sustain the synthesis. In some circumstances, the rigour of a framework may be largely irrelevant if it is only being used as a

lens through which to organise the data. In this scenario, data may lend credibility to the framework, and reveal any weaknesses or gaps. However, in other cases, for example where causality is being explored (Kneale et al. 2018b), the rigour of the framework itself must be established (Booth and Carroll 2015a). A limited number of checklists exist for evaluating theories, models and frameworks that are used as the synthesis framework (2006; Damschroder et al. 2009). All frameworks, irrespective of their specific type, should be evaluated for utility by piloting them with four or five candidate papers. Frameworks that accommodate over half of the data are likely to achieve relative time-saving advantage over thematic synthesis. Frameworks, models or theories selected as the synthesis framework that explain an even higher proportion of the data are very likely to achieve significant time and labour savings. However, no empirical basis supports these assumptions, and methodological work is needed on this issue.

Framework modification follows piloting of data extraction. Modification may involve adding additional components or subcomponents to the existing theory, model or framework selected as the synthesis framework or merging two or more theories, models or frameworks together within a meta-framework (Carroll et al. 2013). This process can include reciprocal translation which involves identifying and translating similar components across two or more potentially relevant theories, models or frameworks in order to produce a meta-framework, combining both the 'translated' common components, and the distinct components (Booth & Carroll 2015a, Carroll 2013). This option is most common where interventions or conditions operate at multiple levels that extend beyond the explanation of a single theory, model or framework. In the case of a best fit framework synthesis approach, the created synthesis framework is then "frozen" until the review authors have completed initial deductive data extraction. It is then "unfrozen" to allow addition of further components or subcomponents through an inductive process of thematic synthesis (Carroll et al. 2013). This two-stage process helps to preserve version control for both the selected synthesis framework and for the data extraction form, thereby enhancing transparency. In another example, Pluye and colleagues coded qualitative and quantitative data against an initial framework to produce a revised framework combining two commonly cited theories from different disciplines (Pluye et al. 2019). Using "harmonisation", a process rooted in the discipline of information science and therefore congruent with their review, they suggest that the process is "applicable for any systematic mixed studies review that uses qualitative synthesis and is aimed to build a typology or developing a theory" (p. 655).

11

Other framework synthesis approaches which build a theoretical framework may evolve iteratively over the course of the systematic review process, as stakeholders reflect on the emerging framework.

As noted above, occasionally, a theory, model or framework used as the synthesis framework is subsequently revealed as unsuitable for its intended purpose. Very rarely, the review authors may need to select an alternative synthesis framework or even revert to thematic synthesis. For example, a selected synthesis framework for *treatment* of postnatal depression proved unsuitable for a review on *prevention* of postnatal depression (Scope et al. 2017). A synthesis framework selected for prevention of another affective disorder may have been more suitable; matching the framework temporally or to an appropriate point of a care pathway may well be more meaningful than simply a shared target condition. Theoretically, prevention is demonstrably different from treatment and anticipation is different from experience. Selected synthesis frameworks that relate to mechanisms (i.e. how people respond) are likely to be more transferable than those built around a specific intervention that may become outdated or superseded (Chen et al. 2016; Sohanpal et al. 2015). For example, "receiving bad news" applies regardless of whether the context is face to face, via telephone, or via video consultation. Further information on the use of theory as the synthesis framework in QES can be found in Chapter 3**.**

9.4.5 Indexing

The indexing stage corresponds to the eligibility screening and data extraction stages of the systematic review. Here, studies are retrieved and assessed for their relevance to the research questions using previously determined eligibility criteria. Chapters 5 and 6 describe the screening stage in detail. Data from included studies are further 'indexed' by being extracted into a data extraction form such as a spreadsheet, matrix or table This data extraction form is derived from the synthesis framework, the study characteristics and the research questions (Carroll et al. 2013). For example, one review team conducted a Cochrane review examining the factors affecting implementation of lay health worker programmes (Glenton et al. 2013). The review authors independently extracted data from studies into the SURE framework, agreeing the scope and definition of each theme as it developed. This is a deductive process. However, not all relevant data within included studies might fit within the initial framework. In such cases, the best fit approach recommends inductive thematic synthesis to index these data under new themes, creating potential new components to be added to the synthesis framework (Carroll 2013, Carroll 2011). **Framework modification** can be seen as a response to the evidence from included studies.

Concepts or labels from the initially selected framework are assigned either to data fragments from one or more sentences, or are assigned to meaningful data fragments which could be a few words, a whole sentence or several sentences (see Chapter 9). It can be helpful to use a list of definitions from the source article for the framework or agree a brief codebook to ensure that labels are assigned consistently. In order to prevent the tendency to "squeeze" data into an existing category, review authors should put certain precautions in place. These include easy "parking" of uncoded data for later consideration and potential creation of new themes to be added into the initial framework, in line with the best fit process. Other precautions include regular team discussions to ensure broad conceptual consideration and shared understanding (Pluye et al. 2019); and exposure of the data and coding to multiple and divergent disciplines and perspectives (Booth et al, 2013).

9.4.6 Charting

During the charting stage, data from across included studies are examined more critically by undertaking quality assessment and to "build up a picture of the data as a whole…lifted from their original context and rearranged according to the appropriate thematic reference" (p.182) (Ritchie and Spencer 1994). For example, Glenton et al. (2019) created 'distilled summaries' of evidence derived from data that were rearranged into the relevant section of their initial framework. Similarities and differences in textual accounts were charted between the type of participant, type of activity, age, gender and sociodemographic status. This stage therefore involves further reflection on, and development of, the evidence-based synthesis framework.

Charting also involves the critical assessment of review evidence. Once the review team has charted data against the synthesis framework they are in a position to formulate initial reflections on the amount of data assigned to each theme, whether it supports or subverts each specific theme and whether it is sustained by high quality or poor quality studies (Carroll, Booth, and Lloyd-Jones 2012).

Software for qualitative data analysis, such as NVivo, may be harnessed for charting and the subsequent stages of framework synthesis (Houghton et al. 2017). Nodes are organised into a hierarchical thematic structure that is critical when structuring the data within the chosen framework. In addition to facilitating the framework synthesis, NVivo, or alternatives such as Atlas Ti or MaxQDA may offer a clear audit trail by which to enhance confidence in synthesis findings (Houghton et al. 2017).

9.4.7 Mapping and Interpretation

At the mapping and interpretation stage, higher order knowledge is derived from the charting stage. 'Higher order knowledge' includes defined concepts, phenomenon scope, typologies and relationships (Glenton et al. 2013). This stage often involves a more inductive approach with further development, collapsing, re-naming and refining of themes and developing new 'higher order themes' using principles of thematic synthesis (see chapter 10). Review authors can also use extracted data to build explanations that go beyond descriptions of *what* works or happens to *why* it works or happens (mechanisms). In the previous example QES examining the implementation of lay health worker programmes in maternal-child health, the review authors identified mechanisms related to the relationships between lay health workers and recipients and professionals; their motivation and incentives; training, supervision and working conditions; and patient flow processes (Glenton et al. 2013). Where data or theoretical concepts are numerous, diverse or otherwise complex and would benefit from further refinement to aid understanding, stakeholder engagement at this stage can be beneficial (Brunton 2017). This represents another potential stage of framework development.

Whilst acknowledging that the terminology of theories, models and frameworks is broad (Davidoff et al. 2015; Booth and Carroll 2015b), the best fit approach does maintain a distinction between frameworks and models. A **framework** - the product of the indexing and charting stages - is essentially a categorical or hierarchical *list* of concepts or themes. By contrast, a **model** goes further: it seeks to convey the *relationships* between these concepts or themes, whether synergistic or antagonistic, parallel or sequential or involving iterations and/or feedback loops. In order to explore and identify the presence or absence of a relationship, and its nature, the review team must revisit and reflect on the details of the evidence (Booth & Carroll 2015a, Carroll 2013).

9.4.8 Reporting a Framework/Best Fit Framework Synthesis

Many considerations for reporting framework synthesis are covered within the eMERGe (France et al, 2019) and ENTREQ reporting guidelines (Tong et al, 2012). However, alongside the need to report methods for identifying, assessing and synthesising included studies framework syntheses specifically require reporting of decisions relating to justification, selection, use and utility of the chosen framework together with conduct of the synthesis.

Familiarisation - Review authors should clearly explain how they identified their initial framework and justify its relevance to the research question. For example, did authors describe the use of formal methods for searching for the framework such as those described by the BeHeMoTh procedures (Booth & Carroll, 2015b)? Did they conduct a "double sift" of retrieved

references, i.e. simultaneously looking for studies for inclusion and for candidate frameworks? Alternatively, was the chosen framework pre-identified and therefore already pre-specified by name in the review protocol? For example, one protocol outlines:

"…*Relevant located models will be chosen using an adaptation of …the best fit framework method {with reference} and the BeHEMoTH search strategy {with reference} As with the original best fit framework approach, we will conduct systematic searches to locate relevant models. However, we will expand the search with controlled vocabulary terms, add key papers suggested by the research team and…purposively select final included models to increase variation in concepts and to represent the different levels of delivery…" (Modi et al, 2021).*
Some authors find it helpful to adapt the two-path diagram from the original best fit framework article to illustrate the parallel searching that the method may require (Carroll et al, 2011)".

Framework selection - Reporting on the selection of the candidate framework(s) is similarly important. Review authors should describe the process of selecting an initial framework as fully as possible, including whether formal criteria were used in selecting the framework. Alternatively, was the framework chosen for its perceived utility for accommodating a sample of the data? Authors should also report on who made the decision, e.g. the review team or a wider group including knowledge users. Was there an obvious front-runner or were competing alternatives identified? If so what were they? For example, one team wrote:

"…*the MCAP Framework ….is the most recent and fully validated framework on health service managers…{with reference} and the framework includes behaviour items that can measure each of the core management competencies" (Kakemam et al, 2020)".*

Framework modification - If a chosen initial framework was modified or adapted prior to its application in the review, the rationale and process behind these changes should be explained. This is particularly important if the review authors have chosen a meta-model that uses multiple models to cover different domains of the phenomenon of interest or different levels within the review (e.g. individual level and organisational level).

Indexing - Clear description is needed of the ways in which data were extracted into the initial framework. This means that the process of tabulating the study characteristics should be described. Review authors should clearly identify the type of data being extracted (i.e. first and/or second order constructs). They should also specify whether data were extracted against a form that was designed and structured around framework headings, and whether data were

15

coded within a qualitative analysis package? Clear descriptions of who extracted data, and the process of data checking, validation and/or agreement should be provided.

Charting - At the charting stage, review authors group characteristics before analysing them within third order constructs. They should describe the process of developing these constructs. For example, authors should clarify whether they undertook deductive methods using the framework and/or inductive methods for new theme generation using first and/or second order constructs. As in the indexing stage, authors should report on the process of charting, how constructs were developed, validated and agreed, and who was involved. They could provide an audit trail to illustrate how final framework themes or third order constructs have been derived from the evidence (Jakimowicz et al, 2017).

If a conceptual model has been developed from an initial framework, it is important that readers can understand the extent to which the review team went beyond the original framework. Thus, authors should provide evidence of the relationships between the concepts. One review team describes how:

"an a priori framework…provided a structure to the coding and analysis. The framework was developed and translated into nodes and subnodes in NVivo qualitative data analysis software…. Each subnode represented facilitators of and barriers to CPAMS identified during full-text screening. To ensure consistency between the 2 reviewers, pilot coding was conducted and areas of disagreement discussed. Participant quotations and author synthesis were coded." (Egunsola et al, 2022)".

It is particularly important to be transparent about any revisions or modifications made to the initial framework during the indexing and charting stages. Best-fit synthesis was devised to engineer a clear separation between extraction against the original framework and new categories created inductively. Reporting should capture this.

Mapping and Interpretation - To display and interpret data, review authors should consider opportunities for visualisation. Frameworks and models offer a ready entry point for addition of tables, charts, or diagrams, to help readers understand the framework and the findings. Similarities and differences between the initial framework and the final framework or model should be discussed. Methods of critical appraisal of studies should be included, including the tools and process utilised, who conducted critical appraisal and how appraisal were validated and agreed.

Readers and future review teams will find it helpful if a review team assesses the limitations of the chosen framework and their impact on the findings. Candid recognition of "false starts" with inappropriate frameworks, or when a previously rejected framework might have offered a better fit, contribute to development of the methodology. Review authors should be reflexive about their biases and assumptions and how these might influence selection of the framework and interpretation of the data. Frameworks and models are not value-free. The team may be carrying forward assumptions from the original source of the framework. As one team recognises:

"Another limitation is…subjectivity for the research team in the selection of relevant theories or models for the building of the a priori framework, against which the data will be later synthesised {with reference}….As a partial countermeasure, we will involve a set of experts, not part of the research team and with varying backgrounds, in the refinements of that a priori framework, before the data synthesis.…" (Jesus et al, 2019)".

Finally, as with any qualitative evidence synthesis, findings should be interpreted using GRADE CERQual (see Chapter 13) and incorporating equity considerations (see below).

Above all, framework synthesis offers a way to spotlight the contribution of the new review and its findings. By emphasising, through the reporting, how findings not covered by the initial framework were identified by their synthesis, a review team opens the way for recognising contextual nuance and difference and creates an opportunity to propose a refined or extended version of the model itself.

9.5 Reflexivity
In relation to use of theories, models and frameworks as the synthesis framework, reflexivity carries two implications. First, a synthesis framework may in itself offer a vehicle for reflexivity; not only might concepts within the framework prompt reflexivity on review decisions made but also the absence of data may reveal review author "blind spots". So, if for example, a review author carries the assumption that well-educated women articulate concerns about mistreatment during childbirth when others may not, then a framework "label" of "educational factors" may prompt the researcher to pay closer attention to this aspect of the phenomenon. Furthermore, the absence of data against that specific label may prompt the review author to retrace their steps to see if the team had only focused on accounts from less-well-educated women.

Contrasting with its potential value in raising consciousness or awareness, review authors must also recognise that a framework based on a theory or model is rarely value-neutral. Has the review team chosen a specific theory, model or framework for reasons other than the closeness of its "fit"? Could either the wording or theoretical underpinning of a chosen synthesis framework be perceived to demonstrate an allegiance to a particular discipline, profession, policy or world view. For example, a label such as "not wanting to fit in" may convey unwanted connotations about an immigrant needing to suppress their identity, rather than moving to a position of mutual understanding and respect. In the context of framework synthesis, the review team should collectively consider whether they have tended to "squeeze" data to match the pre-existing labels or whether they have felt empowered to challenge these labels and/or create new labels inductively (Booth et al, 2013). In all cases the review team should use the structures suggested in the protocol and review template developed for QESs conducted within the former Effective Practice and Organisation of Care Cochrane Review Group (Glenton et al, 2022 and posted on the handbook website) to generate prospective reflexivity, at the beginning of the review process (as when choosing the framework) and retrospectively, upon completion of the review (in giving prominence to findings).

9.6 Equity, Diversity and Inclusion

Chapter 1 introduces a number of different equity principles, models and frameworks that can be incorporated into a single synthesis framework or can be used as a secondary framework in parallel to a selected synthesis framework. By incorporating equity considerations in a systematic way (Maden 2018), framework synthesis can offer a new equity-specific consideration of a topic, even if previously well-explored in the absence of such a lens. For example, PROGRESS PLUS equity indicators can be used to understand how social determinants of health influence barriers, facilitators or satisfaction with care (Kelly et al. 2020). The PROGRESS PLUS equity indicators (Chapter 1) can also be used as an additional framework to organize and interpret evidence.

9.7 Stakeholder engagement and involvement

Framework synthesis methods can also utilise stakeholder engagement and involvement, to potentially strengthen systematic reviews, moving towards transdisciplinary working (Oliver et al. 2008; Brunton et al. 2020). Stakeholder involvement in the systematic review process is important. It ensures that the research is democratic, appropriately focused and ultimately useful for those who are affected by the condition, circumstances or intervention under study (Coon et al. 2016; Cottrell et al. 2014; Tricco et al. 2018). When a framework synthesis approach is used, stakeholder involvement considerably improves the systematic review process when theory development is tentative or emergent (Brunton 2017; Brunton, Oliver and Thomas

18

2020). For example, a systematic review sought to understand transdisciplinary stakeholder involvement in health research (Oliver et al. 2004; Oliver et al. 2008). Here, iterative consultations with research and policy stakeholders took place to shape and refine the initial framework. In this example, the framework emerged during stakeholder consultations early in the review process. Other review teams have utilised similar approaches (O'Mara-Eves et al. 2013; Brunton 2017; Pluye et al. 2019; Brunton et al. 2014).

In another example, one review team utilised stakeholder engagement to conduct a rapid "Best-Fit" for framework synthesis. Given their time constraints they chose not to select an existing theory, model or framework but, instead, to use the research objectives as a prototypical framework (Shaw et al. 2021). Therefore, rather than privileging either the literature or the perspectives of stakeholders, they clearly align with the needs of the review commissioners. Subsequently, they developed their rapid best-fit model using themes from those primary studies that contributed the most relevant data to the research objectives and thematic synthesis. The review authors concluded that close collaboration with the policy customer in setting the research objectives facilitated the rapid incorporation of qualitative data while ensuring that the final output was useful and relevant for the commissioners of the review. More details and examples of time sensitive reviews are provided in **Chapter 15.**

Chapter Information
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Brunton was a lead researcher on research which developed framework synthesis methods for qualitative studies and mixed-methods studies. Booth and Carroll developed best fit framework synthesis. Booth is co-convener of the Cochrane Qualitative and Implementation Methods Group. The authors declare no other conflicts of interest in relation to the topic of this chapter.

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