Chapter 12. Visual methods to support synthesis

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Key points:

- Visual methods can play a crucial role in helping review authors make sense of their data, synthesis and findings
- There is a wide range of visual methods to choose from which vary in complexity, costs and required level of expertise
- Many visual methods can be adapted to suit the context and setting (e.g. virtual or face to face work)
- Visual methods can be particularly useful for engaging and involving stakeholders, including patient and public representatives
- Equity, inclusion and diversity should be considered carefully when developing and using visual methods

12.1 Introduction

Irrespective of the underlying method of synthesis (or analysis in primary qualitative research), visual methods can play a crucial role in helping review authors, and readers, to make sense of the data they have collected from studies included in the review and their synthesis findings (Verdinelli & Scagnoli, 2013). Visual display of data can take many forms and various methods can be used depending on personal preference, team expertise, available resources and the specific requirements at a particular stage of synthesis. This chapter primarily focuses on the use of visual display methods and techniques in qualitative evidence synthesis (QES) and mixed-methods reviews with a qualitative component. The

visual methods presented in this chapter can also be used in most review types as well as in the analysis of primary qualitative data.

This chapter is important because of the underuse of the wide variety of visual display methods, tools and techniques available to further enhance a selected synthesis method. Some review authors can wrongly assume that their selected method of synthesis provides all the necessary supplemental methods, tools and processes to complete the synthesis. Further guidance is needed to help review authors make use of the visual methods that are available to support the synthesis, which in turn will help improve the standards of QES conduct and the quality of the overall product.

This chapter provides an overview of the most common visual methods to support the synthesis stages of a QES. Examples of these, and how they were used, are presented in the development of a Cochrane QES using meta-ethnography. The role of stakeholders, considerations about equity, diversity and inclusion and reflexivity in relation to selecting and using additional visual methods complete the chapter. Readers should also refer to other chapters that discuss the use of visual methods to support the synthesis of a QES (such as chapter 3 on selecting and using theory, chapter 4 on logic models, chapter 15 on realist synthesis and chapter 20 on reporting a protocol and review).

12.2 Overview of visual methods and their uses

The terms ‘qualitative data or evidence’ broadly refers to findings from primary qualitative studies (e.g. analysis of data from interviews, focus groups and the production of new theories or theoretical insights), or the qualitative data from of mixed-methods studies (such as narrative responses to open ended questions). Numerous methods can be used for data synthesis in a QES including, meta-ethnography (chapter 11), thematic synthesis (chapter 10), and framework synthesis (chapter 9) (Barnett-Page & Thomas, 2009). Table 1 presents an overview of visual methods according to their role (i.e. support and develop synthesis, facilitate stakeholder engagement, and record the synthesis process). As for primary qualitative research, visual methods can be used in different ways at various timepoints to support the synthesis of qualitative evidence, such as data display and management, initial exploration of data, and synthesis. Visual methods can help with the development of new insights from the data allowing a deeper understanding and construction of new knowledge (Verdinelli & Scagnoli, 2013).

Table 12.1. Visual methods to support review planning, conduct and synthesis

Category	Visual Method	Format available	Use	Strengths and limitations
Support and develop synthesis	Flipcharts (Glenton et al., 2013)	Physical (paper, pens of different colours) Virtual (Padlet)	Can be used at any stage to help with ideas development, concept clarification, and linking data and ideas. See also chapter 4 where a flip chart is used to develop an initial logic model	**Strengths** Easy and cheap to use **Limitations** Needs a facilitator and can only accommodate small scale and discrete clarification tasks. Paper version needs to be photographed for easy storage
	Labels (Burgess, 2021)	Physical (paper e.g. coloured post it notes) Virtual (Padlet, NVivo, EPPI reviewer)	Can be used at initial exploration of data to help with ideas development. Particularly useful for linking data. See also Chapter 4 where labels are used to develop an initial logic model	**Strengths** Allow interactive work with multiple researchers face-to-face in real time **Limitations** Physical version is more suitable to initial exploratory analysis. It might not allow in-depth analysis of the data. Paper version can be time

Category	Visual Method	Format available	Use	Strengths and limitations
				consuming to prepare and needs to be photographed for easy storage. Virtual version allows in-depth analysis but it might not allow interactive work with multiple researchers face-to-face in real time
	Diagrams (Campbell et al., 2011)	Physical (paper) Virtual (Microsoft Whiteboard)	Can be used at any stage to help with ideas development and concept clarification. Particularly useful for linking data. Causal loop diagrams are an approach to understanding and visualising systems and share parallels with logic models (Chapter 4)	**Strengths** Facilitates collaboration of multiple researchers face-to-face or virtually. Useful for small scale and clarification tasks. It can also be used to finalise and express the synthesis
				Limitations Not suitable for identification of themes or in-depth analysis of data

Category	Visual Method	Format available	Use	Strengths and limitations
	Whiteboard (Malpass et al., 2009)	Physical (paper or plastic), pens of different colours Virtual (Google Jamboard)	Can be used at any stage to help with ideas development and concept clarification. Particularly useful for linking data as it enables the creation of large conceptual maps	**Strengths** The virtual version allows interactive work in real time. Allow analysis of large amounts of data under different themes and categories. It is easy and cheap to use
				Limitations Better suited for a small team of researchers. The paper version needs a facilitator and accommodates smaller scale analysis in comparison to the virtual whiteboard. Paper/plastic version needs to be photographed for easy storage
	Logic models (see Chapter 4)	Physical (paper) Virtual (Microsoft Visio)	See chapter 4 for an example. Logic models can be used to show a programme theory of how an intervention or	**Strengths** Facilitates the analysis of complex interventions and programmes

Category	Visual Method	Format available	Use	Strengths and limitations
			system works. Can be used and further evolved at all review stages. See also Chapter 15 on Realist synthesis	**Limitations** Can be mechanistic and might not always represent the dynamic and non-linear nature of complex interventions
Facilitate stakeholder engagement	Cartoons (France, 2023)	Physical (paper) Virtual (virtual storyboard)	Helpful with ideas development and concept clarification. Particularly useful for stakeholder involvement and engagement	**Strengths** Allows accessible real-time interactive work. Helpful to display findings in an engaging and simple way, useful to engage with key stakeholders and patient and public representatives
				Limitations Needs a facilitator and it is time consuming
	PowerPoint slides (France, 2023)	Physical (printed on paper) Virtual (Microsoft Office PowerPoint)	Presentation of ideas and options for discussion	**Strengths** Easy and cheap to use. It can be useful to engage with key stakeholders and patient and public representatives

Category	Visual Method	Format available	Use	Strengths and limitations
				Limitations Needs a facilitator
	Drawing (Hendricks, 2022)	Physical (paper) Virtual (Adobe Fresco)	Can be used at any stage to help with ideas development, concept clarification, and linking data and ideas. Also helpful in conveying findings. Particularly useful for stakeholder engagement and involvement	**Strengths** Works as a visual aid and can be a helpful during interpretation of overarching storyline
				Limitations Not instrumental to data analysis. The artists who are not knowledgeable of the topic may misrepresent what is said. Paper/plastic version needs to be photographed for easy storage
	Collage (Butler-Kisber & Poldma, 2010)	Physical (real-time creation of a collage on paper or whiteboard) Virtual (Canva)	Can be used at any stage to help with ideas development, concept clarification, and linking data and ideas. The collage brings together ideas and interpretations in a visual format that can tell a story in an accessible way	**Strengths** Can help create positive, accessible and real time engagement and dialogue with key stakeholders and patient and public representatives
				Limitations

Category	Visual Method	Format available	Use	Strengths and limitations
				Expensive and time consuming. The artists who are not knowledgeable of the topic may misrepresent what is said, but the collage can be rubbed out and corrected. Paper/plastic version needs to be photographed for easy storage
	Infographic (Esther Mc et al., 2021)	Physical (paper) Virtual (Canva, Visme)	Used after idea or concept is developed but it can help with clarification of concepts and linking data and ideas. The infographic brings together ideas and interpretations in a visual format that can tell the key components of a story in an accessible way	**Strengths** Can help create positive, accessible engagement and dialogue with key stakeholders and patient and public representatives
				Limitations Expensive and time consuming. Requires skills or software for production. Paper version needs to be photographed for easy storage

Category	Visual Method	Format available	Use	Strengths and limitations
	Performance (Hare, 2005)	Physical (facilitator or actors telling a story)	Can be used at any stage to help with ideas development, concept clarification, and linking data and ideas. Particularly useful for stakeholder engagement and involvement	**Strengths** Allows accessible real-time interactive work. Helpful to display findings in an engaging and simple way, useful to engage with key stakeholders and patient and public representatives
				Limitations Needs a facilitator and it is time consuming
Recording synthesis process	Video (France, 2023)	Physical (Digital camera) Virtual (Zoom or Microsoft Teams)	Helpful for storage and organisation of visual data	**Strengths** Works as a visual aid and can help to record analysis and manage data
				Limitations Not instrumental to data analysis
	Photography (France, 2023)	Physical (Digital camera) Virtual (Print Screen)	Helpful for storage and organisation of visual data. Can be useful for stakeholder	**Strengths** Works as a visual aid and it is helpful to record analytical processes done

Category	Visual Method	Format available	Use	Strengths and limitations
			engagement and involvement	on paper (e.g. configuration of data using paper labels)
				Limitations Not instrumental to data analysis

12.3 Considerations when selecting a visual method to support the synthesis

The selection of visual methods should be a strategic decision based on whether it can add value to facilitating the synthesis or be used as integral part of the analytical process (e.g. use of diagrams to develop and visualise the synthesis). All of the visual methods listed in Table 1 are flexible and adaptable to different tasks and the creativity of the review team. The resources available are an important consideration when selecting visual methods. For instance, if implementing the methods remotely, a stable internet connection, relevant hardware (e.g. computers, tablets) and software (e.g. Microsoft Teams, Microsoft Whiteboard) are required. In addition, remote working may demand a specific skill set from the research team. Visual methods involving a group of researchers (e.g. an analysis meeting) whether in person or remotely also involves high cost and preparation and it usually requires the presence of a facilitator to help lead the meeting. The preparation of materials and a plan for the use of the visual method in advance is a key consideration for group meetings (e.g. paper labels, coloured Post-it® notes and flipcharts if in person, a paper or virtual whiteboard). If using arts or performance, the presence of an artist or actors might be required.

12.4 Example of the use of visual methods to support the development of a meta-ethnography

To illustrate the use of visual methods to support a synthesis, a worked example of a recent QES using meta-ethnography is used (France et al. 2023). The review authors investigated how children and young people with chronic non-cancer pain and their families experience and understand their condition, pain services and treatments (Bianchim, 2023). A wide variety of health conditions that involve chronic pain were included in the review including those which have chronic pain as a major symptom such as juvenile idiopathic arthritis and sickle cell disease. The meta-ethnography also included children and young people who have primarily chronic pain conditions like complex regional pain syndrome and fibromyalgia. The meta-ethnography was conducted by a geographically-dispersed, multidisciplinary academic team of nine who met regularly online. The research team only met once face-to-face during the project, due to restrictions imposed related to the COVID-19 pandemic. The team comprised members with professional backgrounds in nursing children with chronic pain, psychology, health psychology, sociology, family therapy and physiotherapy with children with chronic pain, children's pain research, occupational therapy and health services research (all). The whole team was involved in conducting the analytic synthesis with two members leading on and carrying out the majority of the analytic synthesis. They produced three line of arguments, a model and a theory of chronic pain management. The line of arguments were named 'the journey of living with chronic pain' which expressed the experiences of children and young people with chronic pain and their families from the onset of chronic pain; their struggle to navigate health services

seeking a cure, and to have their needs and expectations met; and the outcome, moving on either to prioritise living well with pain or give up hope (Bianchim, 2023).

The review also involved a diverse stakeholder group of health professionals, third sector organisations, policy makers, academics and the public as well as a patient and public involvement (PPI) group of children and young people with chronic pain aged 8 to 20 years old and parents from across the United Kingdom. The PPI and stakeholder groups were involved throughout the entire review including making decisions about which studies to include in the synthesis and how to group studies in order to analyse and synthesise them, and the analysis and interpretation of findings from primary studies and of preliminary synthesis findings. The review authors conducted all PPI and stakeholder meetings online due to COVID-19 restrictions. Visual methods were used throughout the meta-ethnography[1] to facilitate the involvement and engagement of PPI members in the analytic synthesis.
France (2023) used a variety of visual data display methods (Figure 1) at different stages of their meta-ethnography. The review authors worked mainly remotely as a dispersed team with few opportunities to meet face-to face due to the COVID-19 pandemic, hence they developed and delivered most of their visual methods virtually. In the absence of guidance on the selection of visual methods, the review authors drew on high-quality relevant qualitative evidence synthesis reports that used visual display methods successfully (Campbell et al., 2011; Malpass et al., 2009). Once the review team gained confidence and found that these visual methods were highly valuable, they selected visual methods to further enhance the synthesis process (Figure 1).

[1] In order to familiarise readers with meta-ethnography it is recommended that chapter 9 on meta-ethnography is read first which outlines the stages of a meta-ethnography.

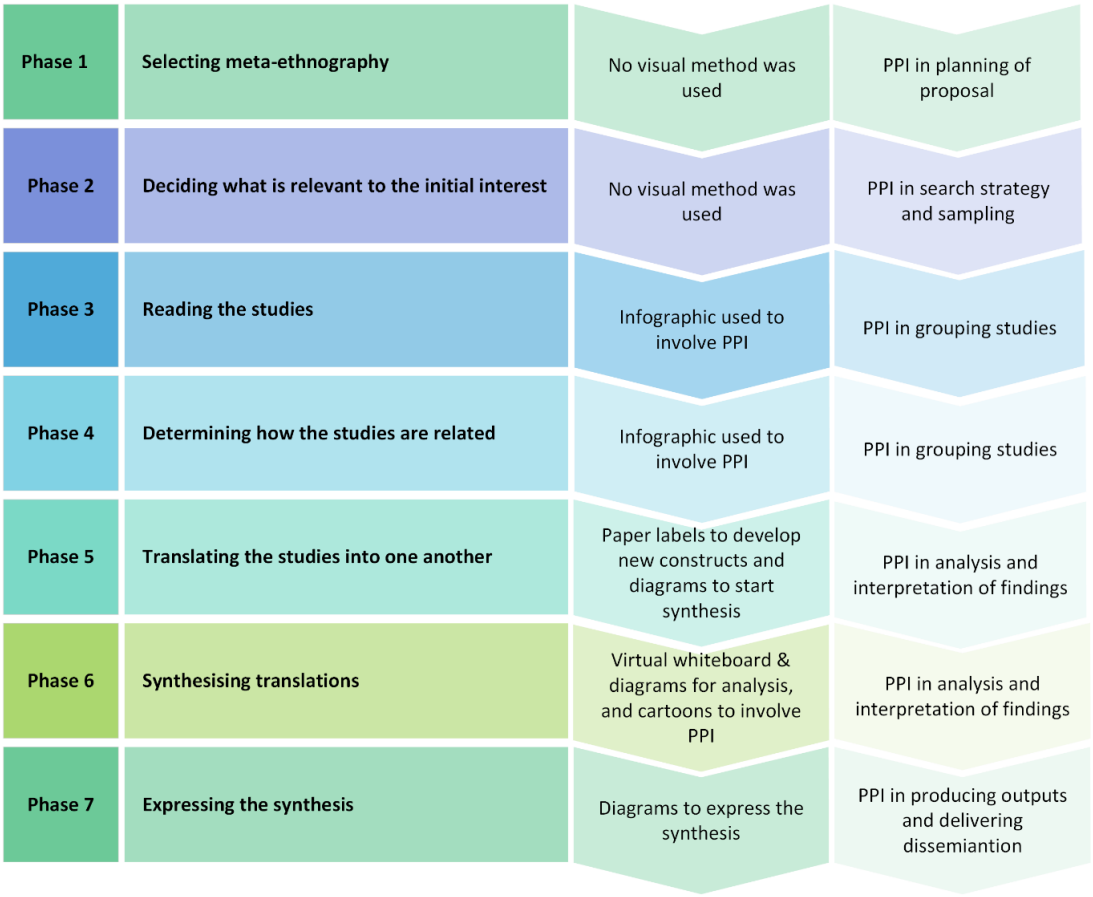

Figure 12.1. Meta-ethnography stages and visual methods used at each stage. Key: PPI – Patient and Public Involvement

In the following sections, each method used in the meta-ethnography is presented and evaluated as to its contribution.

12.4.1 Paper labels

This method was used between phases 5 and 6 to translate the studies into one another and in synthesising translations. The review authors used paper labels to initiate the process of synthesising translations which involved further thematic analysis of primary study findings to start developing novel insights (Figure 2). In a previous step, at least two review authors interpreted the meaning of every relevant finding, concept, or theme from the studies using NVivo (version 12, QSR International, 2020). The authors then compared the meanings within and across studies to identify common or unique concepts. Where possible, the common concepts were then matched, merged and further interpreted by two review authors and discussed with the wider team of review authors to develop new interpretations. The common concepts and the new interpretations were summarised on paper labels. Unlike NVivo, paper labels provided the necessary visual and textual components needed to allow a larger number of researchers to work together during in-person analysis. For instance, labels included a title and a short summary explaining the

specific finding and the contributing studies. All labels were colour coded according to health condition and whose interpretation was presented (i.e., that of the primary study author or the review team). Paper labels were also numbered to match the structure of an accompanying detailed Word (Microsoft Corporation, 2022b) document which gave the full details of the primary study data underpinning the short summary of the findings. This strategy of visually displaying all findings helped the review authors to iteratively test different ways of thematically grouping the findings. It also helped to conduct a thematic analysis with the creation of new themes signposted using Post-it® notes. Photos were taken to record different versions (e.g. version 1, version 2 etc) so that the review authors could follow the development of their analysis and subsequent synthesis.

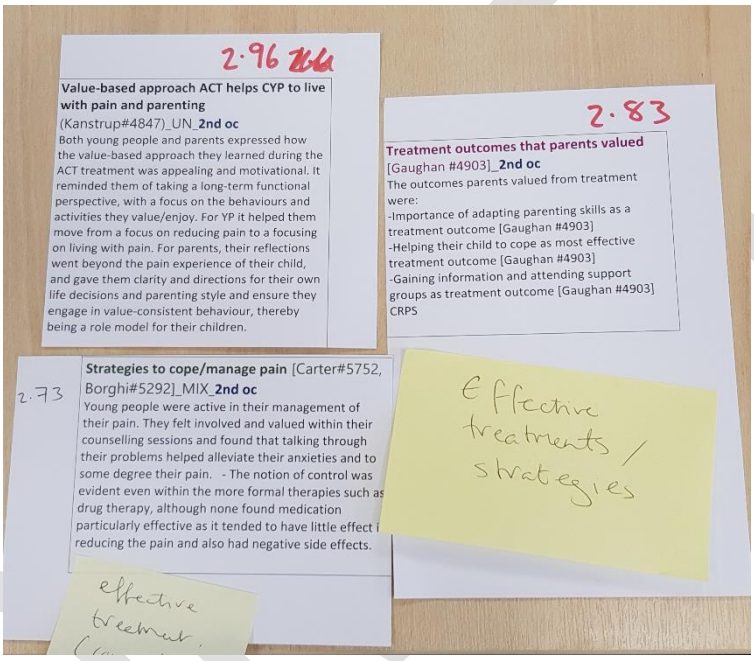

Figure 12.2. Paper labels used to initiate the process of synthesising translations during a team meeting

The use of paper labels supported the development of new themes and an initial draft of thematic groupings. The labels helped the review authors to efficiently analyse a large volume of rich data and findings as a team. Paper labels enabled teamwork in the identification of overarching concepts and creation of new understandings or concepts during a synthesis meeting.

When working remotely, the review authors adapted the method by recreating all paper labels virtually using Padlet (Padlet, 2022) (Figure 3), a real-time collaborative web platform. Padlet virtual labels were colour coded according to whose interpretation was presented (i.e., whether it was the interpretation of the primary study author or of the

review team) and included a title and description of the construct (see chapter 11 for detailed explanation of interpretation in meta-ethnographies). Both physical (Figure 2) and virtual labels were used together during the team meeting. The idea was that members joining remotely via Microsoft Teams (Microsoft Corporation, 2022a) could participate in the thematic synthesis in real time using the virtual labels. However, the review authors learned that constantly updating Padlet (Padlet, 2022) to match the thematic analysis in real time was challenging and time-consuming and it could have worked better with the presence of a facilitator. As a result, the review authors that were joining the meeting online were updated verbally regarding the changes in the configurations of labels and Padlet was used only as a visual aid. At the end of the meeting, photos showing the labels that were used to create 'new constructs' or understandings were uploaded on Padlet to facilitate discussion with the whole team and to provide a record of the analysis (Supplementary 12.1).

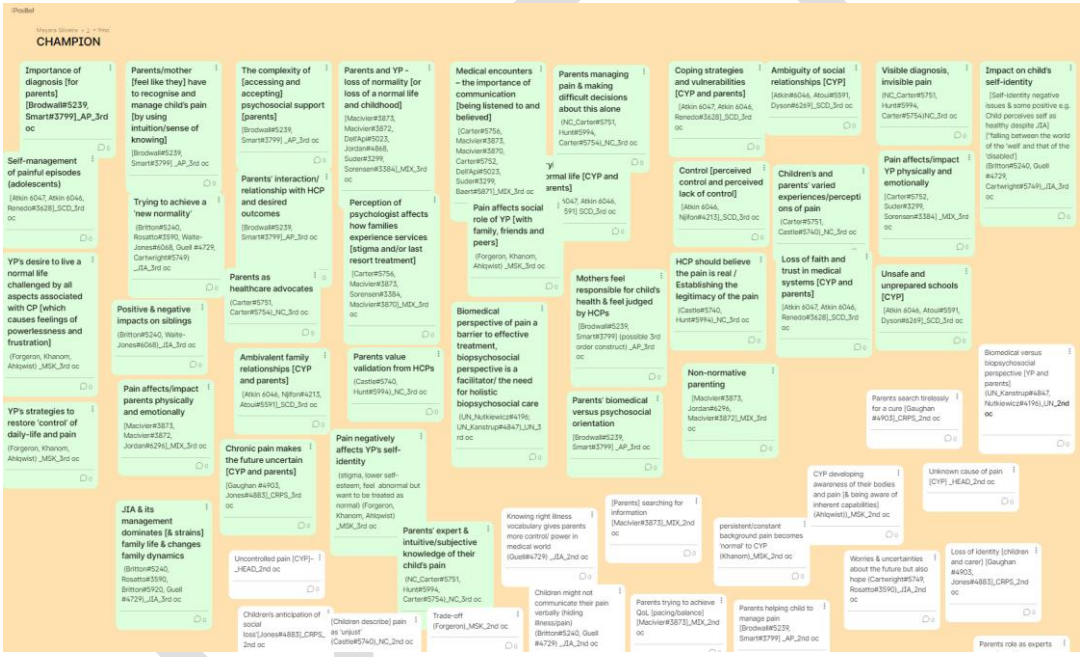

Figure 12.3. Virtual labels created on Padlet to allow online collaboration on data analysis during a team meeting

12.4.2 Interactive whiteboard – Google Jamboard

This method was used during phase 6 in synthesising translations to display data and develop analytic categories. Google Jamboard (Google Workspace, 2022) was used to progress the synthesis (phase 6 of meta-ethnography) remotely. The Google Jamboard is a digital interactive whiteboard composed by different frames. The authors used each frame to analyse a specific cluster of related themes, which were grouped together into a broader 'analytic category,' for instance, as shown in the frame in Figure 4 the cluster of themes including 'adapted parenting', 'family systemic impact', 'impact on siblings', 'parents

longing for others to understand', and 'support from peers and family' were grouped under the analytic category of 'impact of chronic pain on family systems'. All findings were recreated as notes that were colour coded according to the 'analytic category' to which they belonged. All notes included a title, the contributing studies, the health condition, and whose interpretation was presented (i.e., that of the primary study authors or the review team). The 'analytic categories,' themes and their constituent findings and all notes were numbered to match the same structure of the textual synthesis. This strategy allowed the authors to easily translate any changes or new interpretations into the textual synthesis document. Google Jamboard (Google Workspace, 2022) also facilitated tracking of how the themes were organised according to the different interpretations from the team and discuss it during meetings.

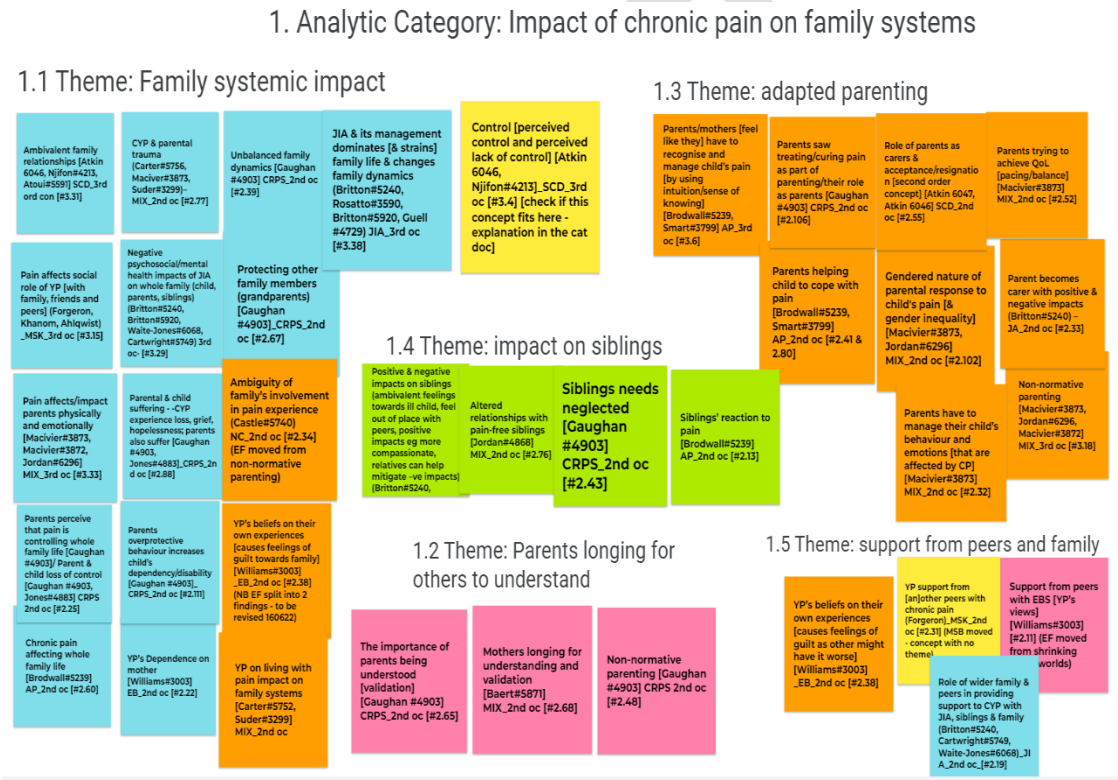

Figure 12.4. Virtual Post-it® notes on Google Jamboard to allow online collaboration on data analysis during a team meeting.

The output from using Google Jamboard (Google Workspace, 2022) to display the analytic categories, themes and their constituent findings was the creation of five analytic categories that organised the whole textual synthesis. The initial categories were: (1) impact of chronic pain on family systems, (2) the process of reconfiguring life and identity, (3) families navigating health and social care services, (4) families managing pain outside of services, and (5) experiences and perceptions of specific interventions.

This visual method was crucial to allow interactive online analytic synthesis meetings using all the different perspectives and expertise from the whole research team (Figure 4). Google Jamboard facilitated collaboration with the wider team as it was more accessible and interactive compared to the textual synthesis (i.e. a Word (Microsoft Corporation, 2022b) document containing the full details of the primary study data underpinning the findings, themes, and analytic categories). The use of Google Jamboard (Google Workspace, 2022) helped the review authors to continually evolve the thematic analysis and synthesis as a team. While the Google Jamboard (Google Workspace, 2022) allowed collaboration with the wider team, it did not allow the analysis of a large amount of data. For instance, each frame could only cope with one main analytic category and required the mediation of the core research team.

A paper or plastic whiteboard could also be used to visualize and develop the meta-ethnography synthesis (Figure 5). Colour-coded paper labels describing the concepts could be used instead of the virtual Post-it® notes during an analysis meeting with the mediation of a facilitator. This method allows interaction in real time but is not suitable for remote collaboration. Video recording and photography can help with data management and recording following the analysis. Preparation in advance is essential and the materials can be costly.

Figure 12.5. Example of how the virtual Google Jamboard could be adapted for a face-to-face analysis meeting

12.4.3 Interactive whiteboard – Microsoft Whiteboard

This method was used during phase 6 of the meta-ethnography to visualize and develop the synthesis. The Microsoft Whiteboard (Microsoft Corporation, 2022a) is a multi-platform application which simulates a virtual whiteboard and enables real-time collaboration. The review authors used Microsoft Whiteboard to express and understand how findings were connected to one another creating a coherent 'storyline' [line of arguments] (see section 7.4). Initially, the authors included all themes under their respective category as text boxes in Whiteboard. All text boxes were colour coded according to context (i.e., different colours were used to indicate starting points, potential links with other categories and findings representing a positive impact). The authors used arrows to indicate when findings/themes were related, and the final result was a large diagram linking all five categories (Supplementary 12.2). Short descriptions for each analytic category were created based on the diagrams and these were discussed during an analysis meeting with the research team. At this point, the review authors focused on creating a better understanding of each analytic category. Subsequently, the diagram was further developed incorporating different interpretations and perceptions from the multidisciplinary team, resulting in major modifications to allow a more in-depth exploration of the data and common patterns and the combination of two analytic categories (Supplementary 12.3).

At this stage, the visual representation of all analytic categories in the form of diagrams allowed the team to develop their understanding of and start developing the initial 'overarching storylines' or line of arguments. The initial interpretations and hypotheses were inserted in the diagram as virtual notes. The final step was the creation of a further simplified version of the diagram (Figure 6) that displayed how all four final analytic categories and constructs were connected. The researchers used this last version of the diagram to further develop the description of the diagram to include how all categories and themes/findings were related which was used to create an initial textual synthesis.

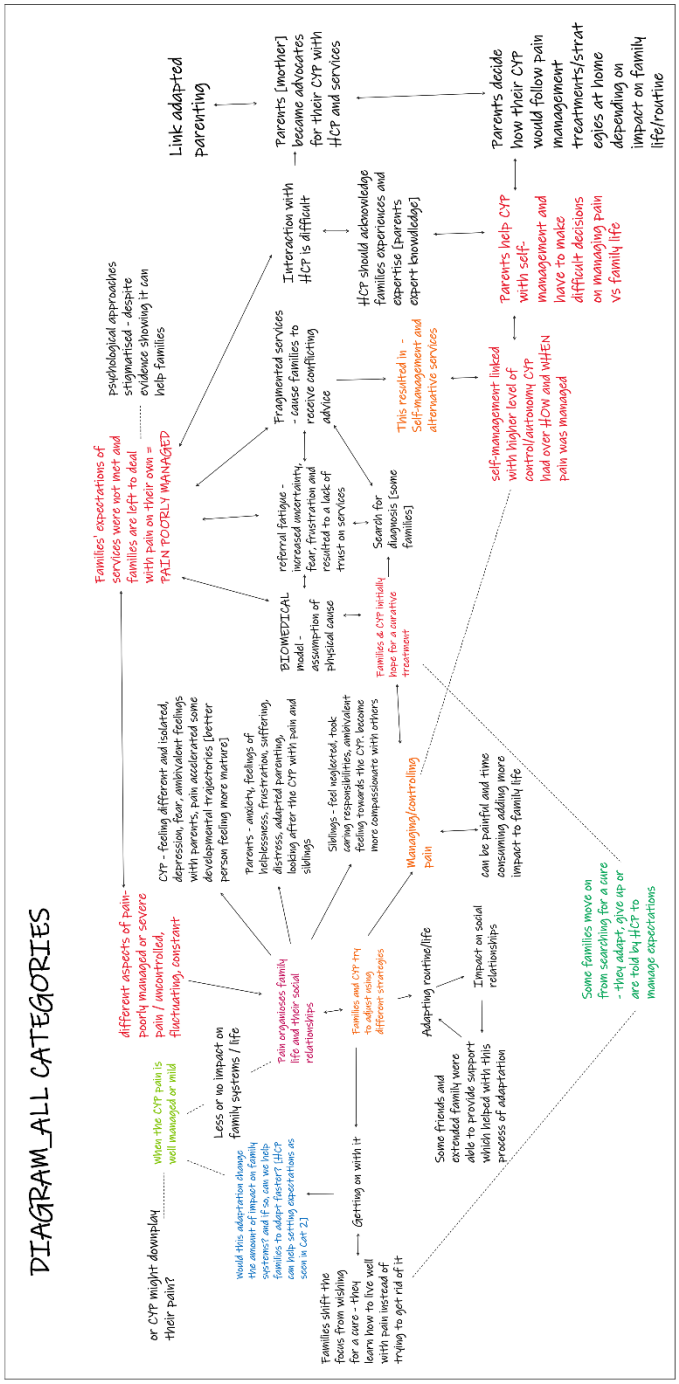

Figure 12.6. Final diagram developed from the process of interpreting findings using MS Whiteboard

The whiteboard was used to develop the overarching storylines which culminated in the development of three line of arguments. This process also resulted in the development of four analytic categories and the initial textual synthesis. One of the major benefits of using the Whiteboard is that it allowed real-time collaboration and facilitated teamwork. The Microsoft Whiteboard (Microsoft Corporation, 2022a) only worked well with the core

research team as it was hard for the wider team to keep track or readily interpret the large and complex diagrams.

A flipchart (Figure 7) or a large whiteboard could be used to adapt this method for a face-to-face analysis meeting. Coloured pens can be useful to highlight connections within the data and to create a conceptual map with the mediation of a facilitator. Video recording and photography can help with data management and recording following the analysis. This method is not suitable for remote collaboration, and it can be time consuming warranting preparation in advance but it allows real time interaction of a larger group of researchers.

Figure 12.7. Example of how the virtual Microsoft Whiteboard could be adapted for a face-to-face analysis meeting using flipcharts

12.4.4 Cartoons and infographic

This method was used during phase 6 (synthesising translations) of the meta-ethnography to engage stakeholders and develop the synthesis findings. PPI was fundamental to help clarify ambiguous or unclear findings. The review authors delivered two two-hour virtual workshops with parents and young people to discuss, clarify and interpret preliminary findings of the synthesis. Storyboard (www.storyboardthat.com) software was used to create cartoons (Figure 8) to convey ambiguous and unclear findings to prompt discussion among the PPI members and a scenario was created for each cartoon to facilitate this process. A few questions were provided along each cartoon to help guide the discussion. The cartoons were representative, including people of different ethnicity and genders.

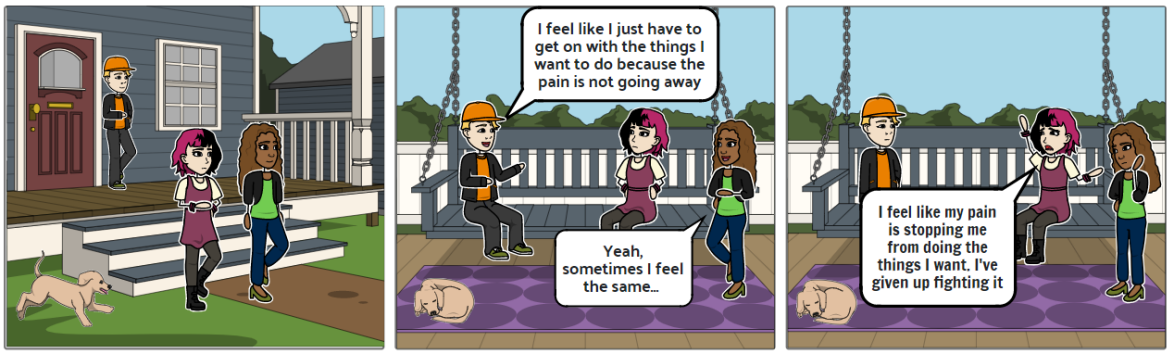

Figure 12.8. Cartoon – Title: Different ways of thinking about pain. Aaron invited his friends Louise and Chloe for a catch-up in his house. They all have chronic pain

The language used in the cartoons was tailored to be accessible and engaging for children around eight to nine years of age. In addition, an engaging visual scenario was used, and the dialogue was formulated using the language and terminology from children and parents' quotations in the included studies. Patient and public members received the cartoons along with an infographic (Figure 9) explaining the review's preliminary findings a week prior to the workshop. The workshop was recorded with the members permission and notes were produced from the discussions of the cartoons. Subsequently, new data and insights were incorporated into the analytic synthesis.

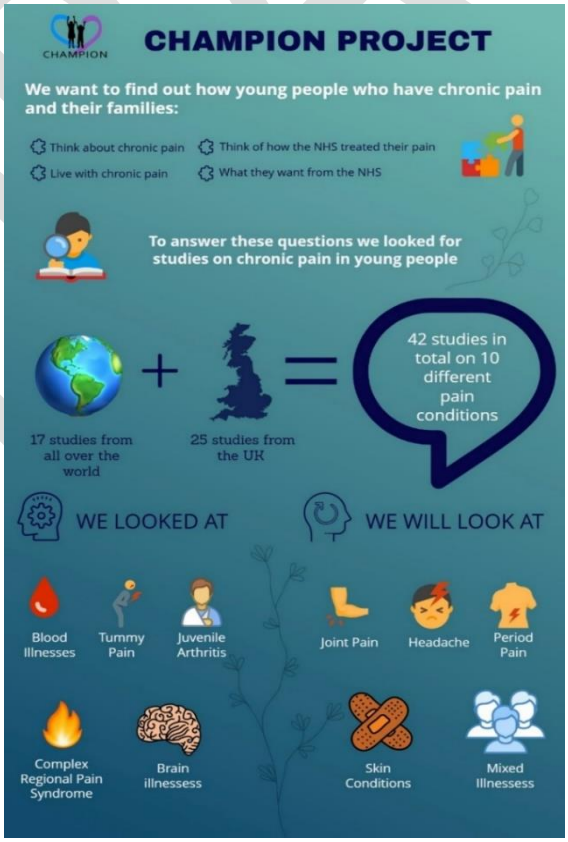

Figure 12.9. Infographic summarising study progress

The insights and feedback from the PPI members were used to further refine and develop interpretation of the findings. The discussion with PPI members using cartoons also helped fill gaps in the data and clarify terminologies that were used differently across the primary studies included in the review (e.g., 'control' and 'resignation'). The use of cartoons and infographic to facilitate PPI involvement helped to provide perspective and added nuance to the interpretation of some of the findings. The use of cartoons to engage PPI members facilitated discussions on what some terms and concepts would mean to parents and young people, providing context based on lived experience to some of the findings.

This method can be adapted to a face-to-face meeting using hand produced drawings (Figure 10) created in real time to express findings and help with interpretation of data and facilitate stakeholder involvement. Cartoons or whole storyboards created, in real time, by professional artists can be used to illustrate face-to-face meetings to help researchers and members of the public to visualise and engage with interpretation of the findings and overall synthesis. One important consideration is that all drawings created in real time by the artist cannot be moderated by the research team and will likely also contain the views and perspectives of the artist. This approach is also expensive and time consuming and is not suitable for remote collaboration. More examples of how drawings and storyboards can be used in QES are available in Table 1.

Figure 12.10. Example of how cartoons can be adapted to engage stakeholder for data analysis

12.4.5 Diagrams to express the synthesis findings

This method was used during phase 6 and 7 to develop and express the synthesis findings. The review authors used diagrams to further understand and express how the three line of arguments they developed were related. They used the final diagram produced using Microsoft Whiteboard (Microsoft Corporation, 2022a) (Figure 6), data from the PPI workshop, and the textual synthesis, to create an initial version of a visual model to refine and represent the findings of the synthesis connecting all line of arguments on Microsoft Word (Microsoft Corporation, 2022b). The initial synthesis model was developed following feedback from the whole research team and depicted the non-linear nature of the phenomenon of interest (i.e., families' journeys living with chronic pain and how they are affected by services). Subsequently, the researchers used Drawio (Jgraph Ltd, England) software to draw and refine the model with the inclusion of more context and nuance. This process of further refining the model consisted of rich interpretative discussions among the core members of the research team until an intuitive final version was constructed (Figure 11). The synthesis model expressed the concept of a journey families are navigating while they deal with chronic pain and access services. To express the concept of the journey and time, the researchers used rounded arrows to create an illusion of a cycle and described (text in red) where families might stay 'stuck'. Different background colours (i.e., red and blue) were used to identify different pathways families might take. Arrows of different shapes and colours were used to indicate context and direction. Two text boxes between both pathways indicated how families might navigate between these distinct pathways.

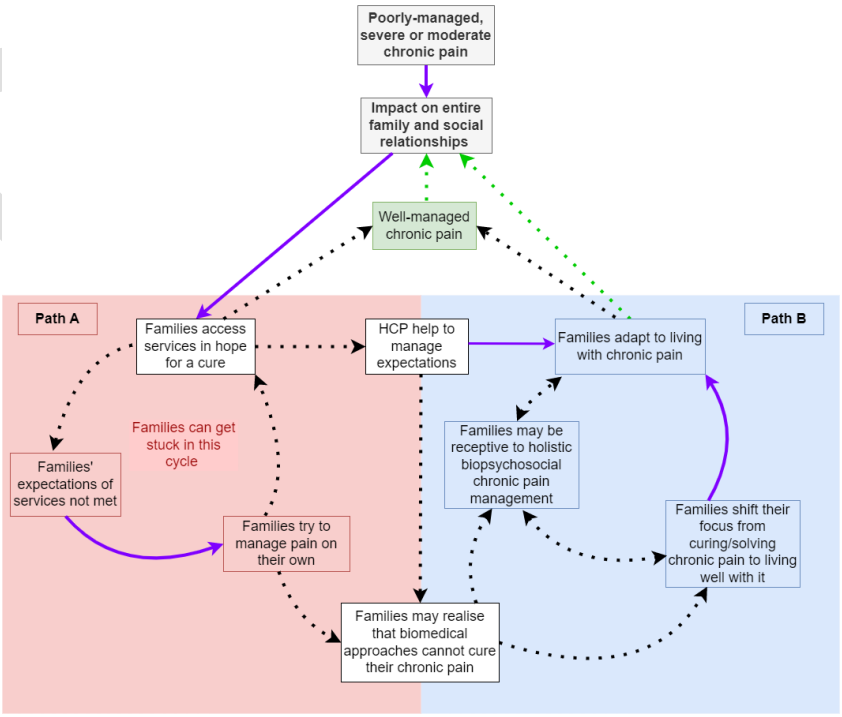

Figure 12.11. Model expressing the connections between all three lines of argument; Key: HCP – healthcare professionals

The output was the final development and expression of the synthesis with a model produced initially on Microsoft Word (Microsoft Corporation, 2022b) and finalized on Drawio. The model was fundamental to finalizing the synthesis, as it allowed remote teamwork and the incorporation of nuances and context provided during the PPI workshop. The model also enabled the expression of the overarching storyline connecting all line of arguments and the visualization of a complex non-linear phenomenon.

12.4.6 Diagrams to develop and express theory

This method was used during phase 6 and 7 – synthesising the translations and expressing the synthesis. The review authors produced a theory explaining their phenomenon of interest (i.e., theory of good chronic pain management). This process included multiple analysis meetings with the core review authors and it also integrated insights from PPI lived experience and the key findings from synthesis of findings of the studies included in the review data. The authors used two of their main analytic categories (i.e. 1 and 2) to construct the initial structure for the theory in the centre of the diagram on Microsoft Whiteboard (Microsoft Corporation, 2022a). These two analytic categories included constructs related to family life and their social relationships and their experiences navigating health services. The review authors then placed all factors that had a positive impact on family life in the right side of the diagram, and factors with a negative impact on the left side. They used arrows to indicate when an aspect could be modified by the factors placed on each side of the diagram. The final version of the diagram mapped all factors that had the potential to 'modulate' families' experiences with chronic pain (Supplementary 12.4). Figure 12 shows the simplified version of the diagram.

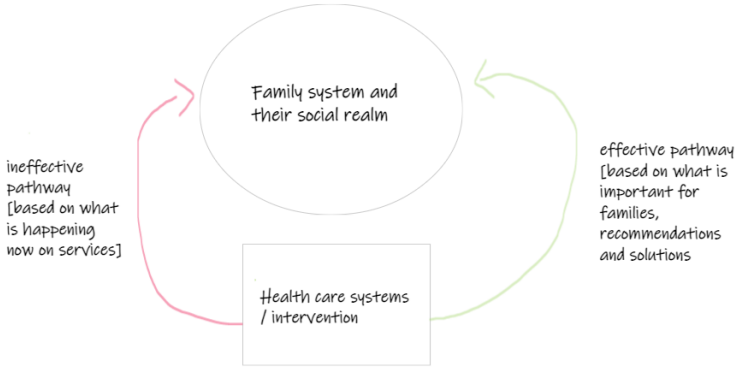

Figure 12.12. Conceptualization of the theory of good chronic pain management

The factors that impacted family life and their experiences with services in a positive manner were then developed into actions in a whole systems biopsychosocial theory. This was achieved with further interpretation of the key findings (i.e. key outcomes families consider as important) while drawing from expertise from the research team and PPI lived experiences. The Drawio software was used to continue developing the theory, as it enabled a clear visualization of the processes and facilitated discussions with the core research

team. The final product expressed the whole systems approach underpinning the theory through different background colours indicating different environments within the system (Figure 13). For instance, family life was depicted in green, health care services in yellow and the community and schools in purple. These different environments were all arranged around families' desired outcomes highlighting the family-centred approach. The diagram was colour coded according to the source of the evidence, to indicate gaps in the evidence, and to provide context. Different arrow and boxes colours were used to indicate the team's hypothesis based on evidence (i.e., blue and black), and evidence corroborated by PPI input (orange). Gaps in the evidence were indicated using red colours and circles, and blue arrows and boxes were used to signpost the need for intervention and resources/training.

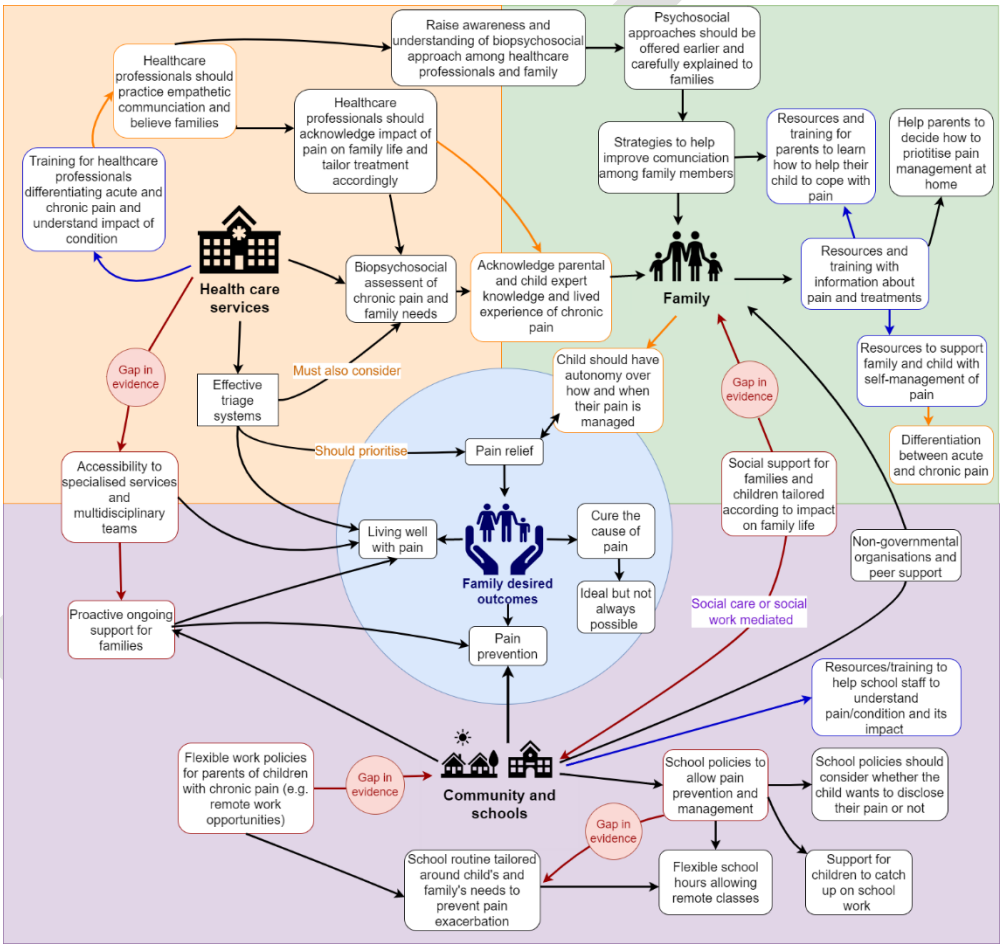

Figure 12.13. Diagram depicting theory of good chronic pain management developed by France (2023)

The output was the conceptualization and expression of a theory produced initially on MS Whiteboard and finalized on Drawio. The diagrams were fundamental to developing the theory as they allowed remote teamwork and the mapping of all factors modulating the phenomena of interest. The expression of the theory through the diagram also allowed a

clear visualization of gaps in the data, and where the evidence was based on lived experiences or on the research team' hypothesis. The use of the diagrams enabled this level of complex analysis and supported the convergence of evidence from different sources into a detailed theory. More examples illustrating the use of diagrams in QES are available in Table 1.

12.5 Stakeholder involvement and engagement

Visual methods can be a powerful instrument to help translate research into a language accessible to stakeholders including policy makers and members of the public. This can be achieved by shaping the visual method to fit the context for the specific audience. For instance, in France's (2023) meta ethnography example, the review authors used different visual methods to engage with children and young people with chronic pain and parents by using cartoons and infographics. The review authors also created specifically tailored cartoons depicting different clinical scenarios for a stakeholder engagement session to help clarify ambiguous or unclear findings.

12.6 Equity, diversity and inclusion

When representing different people and environments through images it is essential to consider representativity, age-appropriate content and scenario. For instance, in France's (2023) meta ethnography, when using cartoons to engage with children with chronic pain and parents, the review authors were careful to plan the scenario and context of each cartoon so it could be relatable to their audience. All scenarios were informed by the evidence so they would be familiar for the stakeholders (e.g. home environment, school, hospital) and engaging. The language used was accessible and engaging for children around eight to nine years of age and all dialogues were developed based on terminology from children and parents' quotations in the included studies. The review authors were also careful that all cartoons were representative of all ethnicities, genders and did not promote an idealised context. For example, the cartoons were carefully planned to show a plain doctor's surgery and non-descript hospital settings so as not to disenfranchise children who experienced inequity.

Accessibility is an important consideration given that visual methods might exclude people with visual impairments or without adequate screen size in the case of virtual methods. The review authors offered to describe the scenario and context of the cartoon and read out loud all the dialogues to make sure it was accessible to everyone.

12.7 Reflexivity

When developing and tailoring all virtual methods or outputs, the review authors need to carefully consider their personal biases and professional perspectives and positioning concerning what they would choose to present visually and how they interpret it. In France's (2023) meta-ethnography, the PPI group had a vital role steering the review authors' direction based on their lived experiences. When producing the diagram expressing the theory, two review authors with extensive expertise in children's pain research were opposed to using the term 'cure' that was in the parent narrative in relation to chronic pain treatments. The review authors advised us to use terms like 'alleviate' or 'reduce' pain which were more scientifically accurate and better aligned with their professional perspectives and positioning. However, following advice from the PPI group, the review authors decided to retain the term 'cure' in the final theory diagram and findings as the concept best represented the meaning to the research participants and the PPI representatives.

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Declarations of interest

Noyes and France are convenors of the Qualitative and Implementation Methods Group and Bianchim is a Cochrane Qualitative and Implementation Methods Group intern. Noyes is a member of the Cochrane Methods Executive and Editorial Board. The authors declare no other potential conflicts of interest relevant to the topic of this chapter.

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References

Barnett-Page, E., & Thomas, J. (2009). Methods for the synthesis of qualitative research: a critical review. *BMC Medical Research Methodology*, *9*(1), 59. https://doi.org/10.1186/1471-2288-9-59

Bianchim, M. S., Caes, L. , Forbat, L., Jordan, A., Noyes, J. Thomson, K., Turley, R., Uny, I., France, E. (2023). *A meta-ethnography of how children and young people with chronic*

non-cancer pain and their families experience and understand their condition, pain services and treatments.

Butler-Kisber, L., & Poldma, T. (2010). The power of visual approaches in qualitative inquiry: The use of collage making and concept mapping in experiential research. *Journal of Research Practice*, *6*(2), M18-M18.

Campbell, R., Pound, P., Morgan, M., Daker-White, G., Britten, N., Pill, R., Yardley, L., Pope, C., & Donovan, J. (2011). Evaluating meta-ethnography: systematic analysis and synthesis of qualitative research. *15*, 43. https://doi.org/10.3310/hta15430

Esther Mc, S.-C., Catherine, C., Amandine, F., Trisha, S., & Christian, D. (2021). Use of infographics as a health-related knowledge translation tool: protocol for a scoping review. *BMJ OPEN*, *11*(6), e046117. https://doi.org/10.1136/bmjopen-2020-046117

France, E., Noyes, J., Forbat, L., Uny, D.I., Jordan, A., Caes, L., Turley, R.., Thomson, K., Bianchim, M.S. (2023). A meta-ethnography of how children and young people with chronic non-cancer pain and their families experience and understand their condition, pain services and treatments. *Cochrane Pain, Palliative and Supportive Care (under review)*.

Glenton, C., Colvin, C. J., Carlsen, B., Swartz, A., Lewin, S., Noyes, J., & Rashidian, A. (2013). Barriers and facilitators to the implementation of lay health worker programmes to improve access to maternal and child health: qualitative evidence synthesis. *Cochrane Database Syst Rev*, *2013*(10), Cd010414. https://doi.org/10.1002/14651858.CD010414.pub2

Google Workspace. (2022). *Jamboard: a digital interactive whiteboard*. https://workspace.google.com/products/jamboard/

Hare, J. R. (2005). Review: Johnny Saldaña (2005). Ethnodrama: An Anthology of Reality Theatre. *Forum: Qualitative Social Research*, *9*(2), Art. 1.

Malpass, A., Shaw, A., Sharp, D., Walter, F., Feder, G., Ridd, M., & Kessler, D. (2009). "Medication career" or "moral career"? The two sides of managing antidepressants: a meta-ethnography of patients' experience of antidepressants. *Soc Sci Med*, *68*(1), 154-168. https://doi.org/10.1016/j.socscimed.2008.09.068. Epub 2008 Nov 17.

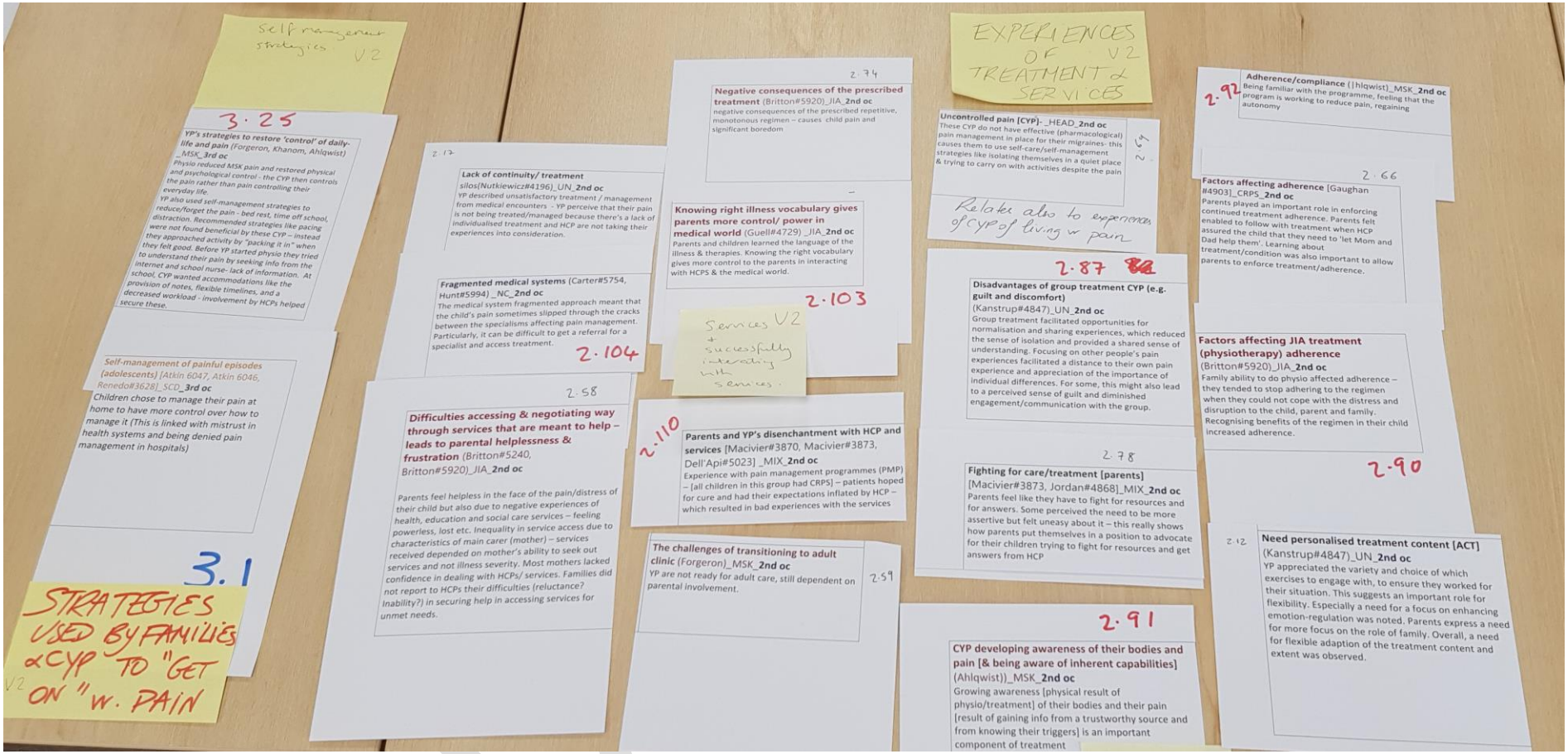
Microsoft Corporation. (2022a). *Microsoft Team Whiteboard* https://learn.microsoft.com/en-us/microsoftteams/manage-whiteboard

Microsoft Corporation. (2022b). *Microsoft Word*. https://www.microsoft.com/en-us/microsoft-365/word?activetab=tabs%3afaqheaderregion3

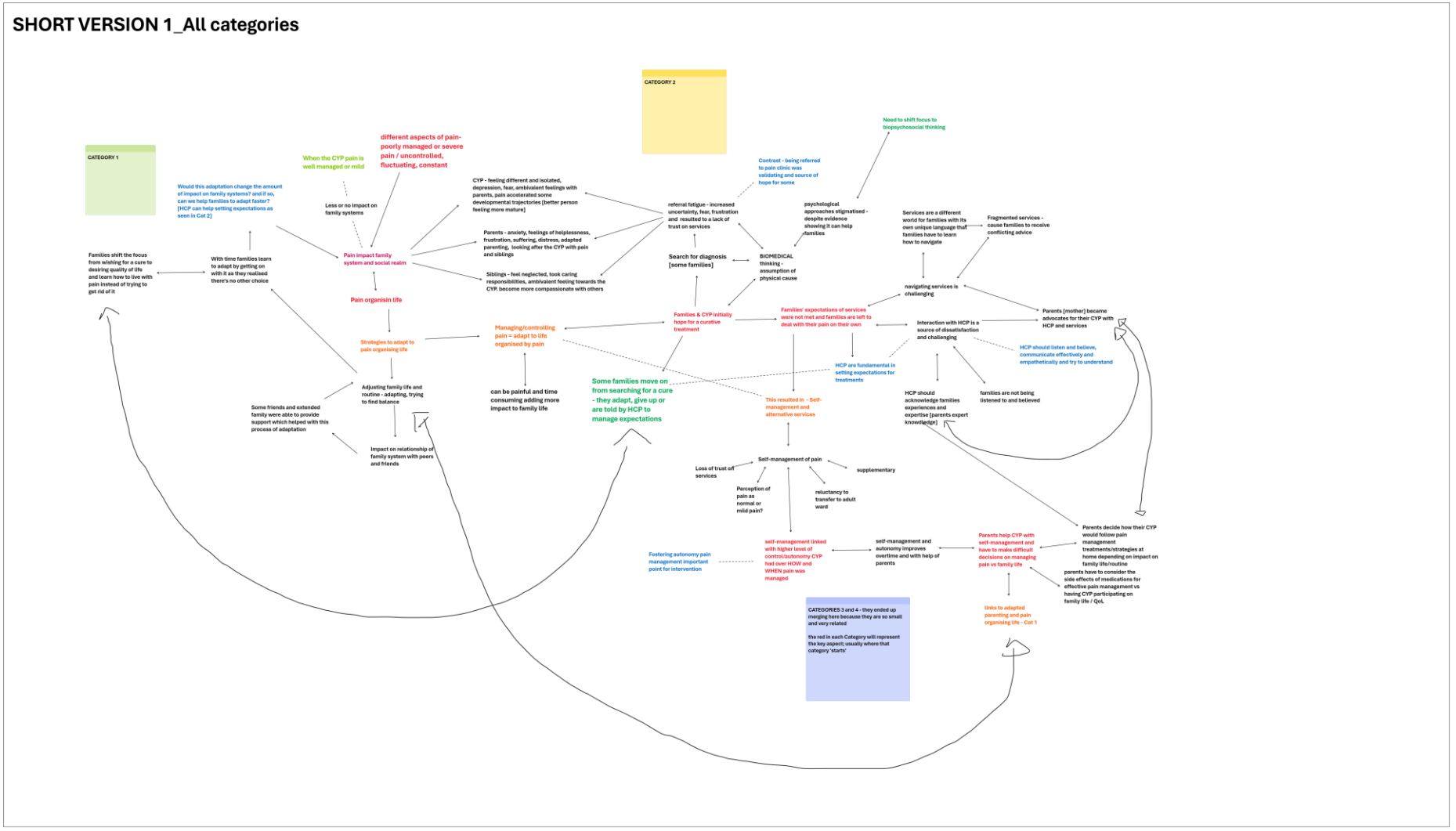
Padlet. (2022). *Padlet: a real-time collaborative web platform used to share and organise content* https://en-gb.padlet.com/

Verdinelli, S., & Scagnoli, N. I. (2013). Data Display in Qualitative Research. *INTERNATIONAL JOURNAL OF QUALITATIVE METHODS*, *12*(1), 359-381. https://doi.org/10.1177/160940691301200117

Chapter 12 Supplementary 12.1



Chapter 12 Supplementary 12.2



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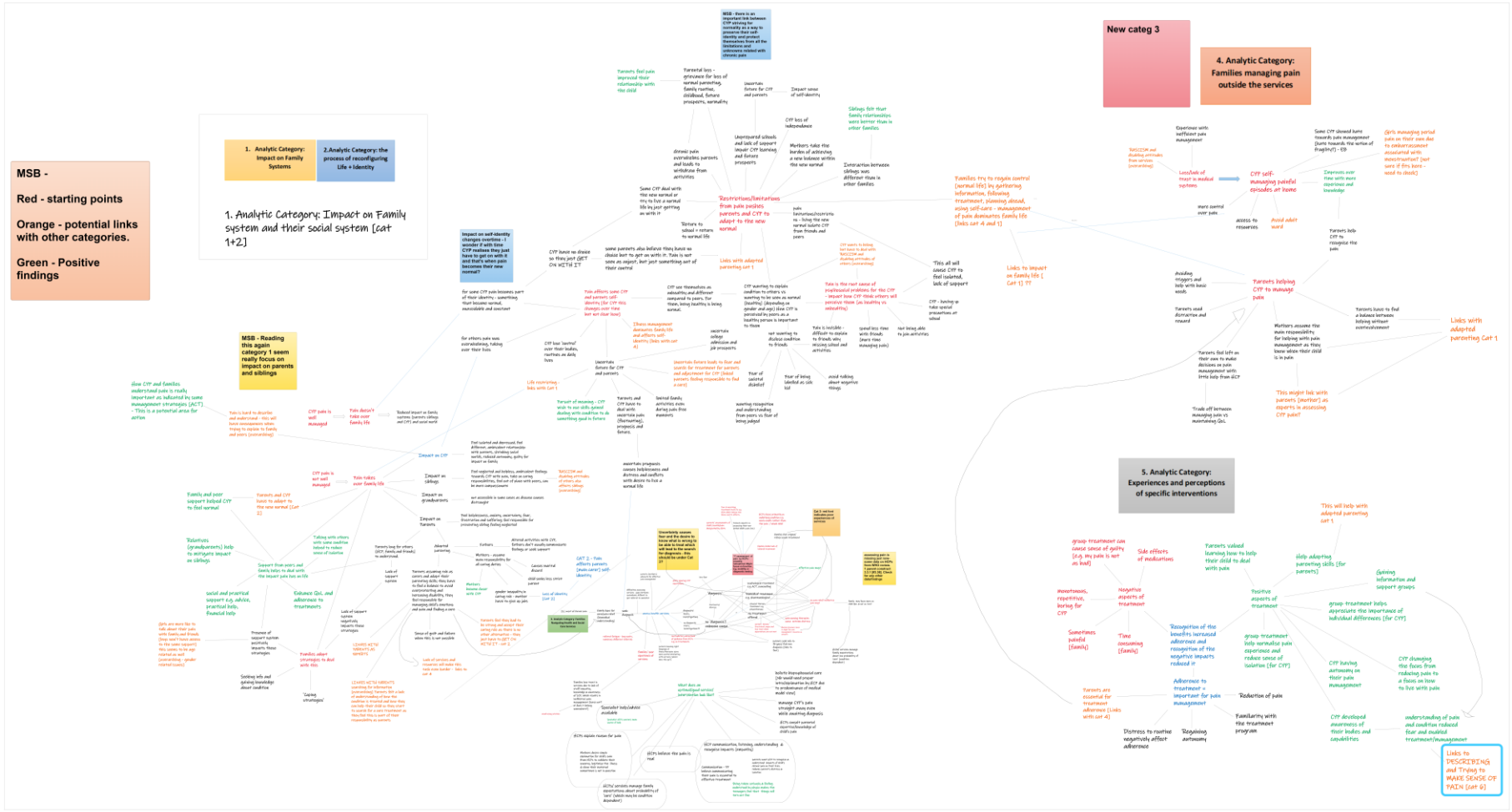

Chapter 12 supplementary 12.4