Understanding the Role of Genetic Testing in Parental Adjustment to their Child's Developmental and Epileptic Encephalopathy or Treatment-Resistant Epilepsy Diagnosis

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Chapter 1

What is the psychological impact on parents of learning about SUDEP?

a mixed methods systematic review.

Prepared in accordance with the author requirements for Epilepsy & Behaviour (https://www.sciencedirect.com/journal/epilepsy-and-behavior/publish/guide-for-authors)

Abstract

Overview: This review aims to summarise parent reports of their responses to learning about SUDEP (Sudden Unexpected Death in Epilepsy) including cognitions/appraisals, emotions, and changes to parenting behaviour for their child with epilepsy. As there is little research in the area at present, a mixed methods systematic review approach was taken using guidance from the Joanna Briggs Institute (JBI).

Methods: EMBASE, MEDLINE, PsycARTICLES, PsycINFO, and PubMed were searched via EBSCOhost and Global Health was searched via Web of Science. Theses and dissertations were searched via Google Scholar. Risk of bias was assessed using Critical appraisal tools from the JBI. A total of 9 studies (4 qualitative and 5 quantitative studies) are included in the review with 677 participants across all studies. A convergent Integrated approach was used to synthesise and integrate the data.

Results: findings suggest parents generally want to know about SUDEP and value time to process information and follow-up with a healthcare professional. Parents want to be signposted to relevant organisations and sources of support. Parents report feeling anxious or stressed on learning about SUDEP, or angry that they had not been told. Parents report that the advantages of knowing about SUDEP outweigh disadvantages of knowing. Parents report making changes to caregiving after learning about SUDEP including increased monitoring and supervision, increased compliance with medication, and increased information sharing with others.

Limitations: There is significant heterogeneity in included studies in terms of samples and methodology. There is moderate to high risk of bias across included studies meaning caution is required when interpreting results.

Conclusions: Results indicate that SUDEP psychoeducation can result in increased anxiety in parents, and some changes to parenting behaviour, but the majority of parents report they want this information.

This review is registered on PROSPERO (Registration: CRD42024546466).

Keywords: SUDEP, Parents/Carers, Epilepsy, Information-provision

1. Introduction

Sudden Unexpected Death in Epilepsy (SUDEP) is the term used when an individual with epilepsy dies unexpectedly and without any other cause identified in a post-mortem. The definition endorsed by the NICE guidelines is that of Nashef et al. (2012) "Sudden, unexpected, witnessed or unwitnessed, non-traumatic and non-drowning death in patients with epilepsy, with or without evidence for a seizure and excluding documented status epilepticus, in which post-mortem examination does not reveal a toxicologic or anatomic cause for death." (Excellence, 2022).

SUDEP can be classified according to Annegers Criteria in which the certainty of the diagnosis is graded. Possible classifications as follows: Definite (a cause of death is not found with post-mortem), probable (No post-mortem has been performed but there is no known alternative explanation of death), and possible SUDEP (when there is a competing cause of death). According to the (Nashef et al., 2012) definition the category SUDEP Plus can also be used when there are co-morbid conditions which may be competing causes of death.

1.1 Incidence

The incidence rate for SUDEP is 23 times the incidence rate of sudden death in the general population matched for age. SUDEP is thought to be the most common cause of death related to epilepsy (Abdel-Mannan et al., 2022).

There is considerable variability in estimates of SUDEP in children. An incidence of 1.17 (95% confidence interval 0.68–1.88) per 1,000 paediatric epilepsy person-years was found by Keller et al. (2018), similar to the 1.11 (CI: 0.45 – 2.29) incidence rate calculated Sveinsson and colleagues (2017). This contrasts with the estimate by the American Academy of Neurology (AAN) which estimated the incidence of SUDEP as 0.22 per 1000 patient-years (CI: 0.16 – 0.31) (Harden et al., 2017). These estimates suggest that between 0.22 and 1.17 children per thousand with epilepsy will die each year from SUDEP.

1.2 Causes

Causes of SUDEP remain under investigation and are mainly theorised from adult and animal studies. Factors such as brain stem dysfunction, cardiac arrythmia and respiratory distress in the postictal phase, are thought to contribute to SUDEP (Devinsky et

al., 2016). Most deaths are unwitnessed and are thought to occur in sleep following a seizure (Sveinsson et al., 2020).

Studies looking at the contribution of genes to SUDEP have been inconclusive but have linked SUDEP to genetic mutations in genes responsible for regulation of ion-channels in the heart and brain, and genes associated with regulation of neurotransmitter function in the brain (Coll et al., 2019) It is recognised that it is likely that there are multiple genes associated with SUDEP and certain gene mutations may act as risk factors or biomarkers increasing the risk of SUDEP.

1.3 Risk Factors

The main known risk factors for SUDEP are frequent uncontrolled seizures, particularly generalized tonic clonic seizures (Walczak et al., 2001), those experiencing 3 or more seizures per year (DeGiorgio et al., 2017) and age of onset of epilepsy e.g. those with epilepsy onset at 0-15 years have 7.7 times greater risk of SUDEP than those with epilepsy onset after age 45 years (Nilsson et al., 1999). For those with drug-resistant focal epilepsy increased seizure frequency, nocturnal/sleep-related seizures, the presence of current or past depression, and a reduced ability to alert someone of an approaching seizure increased risk of SUDEP (Serrand et al., 2023)

Those with Epileptic Encephalopathies such as Dravet Syndrome have a particularly increased risk of SUDEP with Cooper et al. (2016) estimate an incidence of 9.32 per 1000-person years for this population.

1.4 Rationale for Review

As stated in the NICE guidelines (NICE, 2022) some modifiable causes of SUDEP have been identified and therefore access to appropriate information and counselling on SUDEP has been recommended for people with epilepsy and their families and carers. Despite this many parents and carers of children with epilepsy describe poor access to information and a wish to receive more information about SUDEP.

Research asking professionals about their experiences of providing SUDEP counselling indicate that they do not always offer this information to people with epilepsy

or their families, or if they do, it is to select groups e.g. those with generalised seizures (Asadi-Pooya et al., 2022).

An international survey of neurologists (no UK respondents) indicated that 15.7% of respondents provided SUDEP information to most or all their patients. Most felt that this was best done face-to-face (72.4%) rather than via information packs. Just under half of respondents indicated that this was best done once a trusting relationship had been formed or when there was poor adherence to medication or lifestyle habits. 9.4% indicated that they would only start this discussion once the patient asked directly for this information. When asked why they would provide information about SUDEP 50.4% stated that it was both to prevent SUDEP from happening and to prevent legal consequences if SUDEP occurred (Asadi-Pooya et al., 2022).

A survey of epileptologists in Italy found that there was some trepidation about generating and managing negative reactions and emotions in people with epilepsy and their families when raising the issue of SUDEP (Galli et al., 2017). A survey study by Keller et al. (2021) also found that respondents who agreed that discussing SUDEP could provoke "excessive worry" were less likely to have this discussion, while those who felt they had enough knowledge about SUDEP were more likely to discuss it. If SUDEP is not discussed as part of their child's clinical care, there is a risk that parents may learn about SUDEP through unreliable sources, and this may lead to accessing inaccurate information and increased distress.

The aim of this review is to synthesise the existing literature on SUDEP information provision for parents of children with epilepsy to understand the psychological impact of learning about SUDEP on parents. This includes attempting to understand how parents/caregivers make sense of the information they are given about SUDEP and any emotions they report on learning about SUDEP. The review also aims to outline any changes parents report making to their parenting or caregiving behaviour for their child with epilepsy as a result of learning about SUDEP.

1.5 Objectives:

To review the current literature to generate an understanding of the impact of information provision about SUDEP on parents' thoughts, feelings, and behaviours, in particular any changes reported in how they care for their child with epilepsy.

1.6 Research Questions:

The following questions will be addressed by the review:

a) What thoughts/cognitions/appraisals do parents report on learning about SUDEP?

b) What emotions do parents report on learning about SUDEP?

c) What changes to parenting/caregiving behaviour for their child with epilepsy do parents report on learning about SUDEP?

2. Methods

2.1 Eligibility Criteria:

2.1.1 Study types

- Quantitative studies including quantitative descriptive, cross sectional survey studies, observational studies.
- Qualitative studies; phenomenological studies, ethnography, grounded theory, narrative synthesis papers, descriptive and exploratory studies, thematic analysis of survey/questionnaire data.
- Mixed methods studies; descriptive exploratory studies e.g. survey studies reporting both quantitative data and qualitative data.

2.1.2 Participants:

- Parents of a child with epilepsy; where the participants are identified as caregivers or guardians of a child with epilepsy.
- No minimum age for the child will be set as long as the study includes parents/caregivers/guardians of a child with epilepsy.
- Studies where there are mixed populations will be included if the data on parents/carers/guardians of children are presented separately or can be extracted

separately, or if the proportion of parents/carers is greater than 50% of the overall sample.

2.1.3 Intervention/Phenomenon of Interest

- Studies looking at parents reports on their knowledge of, or access to, information on SUDEP and the impact on this on any/all of the following: feelings/emotions on learning about SUDEP, thoughts/cognitions/beliefs/appraisals about SUDEP, how they used information on SUDEP to inform/change/alter their behaviour in terms of parenting/caring for their child with epilepsy.

2.1.4 Report Characteristics

- English language papers
- Full text available (Authors will be contacted to request full text papers as appropriate).
- No date limits set.

2.1.5 Exclusion Criteria

- Full text not available
- Non-English language papers
- Qualitative: opinion pieces, newspaper articles,
- Meta-analyses, systematic reviews, narrative reviews, scoping reviews etc
- Conference abstracts
- Poster presentations
- Studies on epilepsy risk/deaths where SUDEP is not reported on specifically or as a separate topic.
- Studies with mixed populations (e.g. siblings or other relatives who are not identified as the main caregiver/guardian) where parent/carer/guardian data is not presented separately, or it is not possible to extract data on parents separately.
- Studies with mixed populations where the proportion of parents in the sample is less than 50%.
- Studies that do not report on the psychological impact of learning about SUDEP on parents/caregivers of children with epilepsy.

2.2 Information Sources

The following databases were searched:

EMBASE (EBSCOhost)

Global Health (Web of Science)

MEDLINE (EBSCOhost)

PsycARTICLES (EBSCOhost)

PsycINFO (EBSCOhost)

PubMed (EBSCOhost)

Theses and dissertations (Google Scholar)

Search strategies were developed in consultation with a university librarian. The search strategy was adapted for each database listed above using key subject headings and MeSH terms where appropriate. Grey literature and theses/dissertations were searched via Google Scholar. Hand searching of relevant papers was conducted to identify any relevant papers which were not found in database searches. Searches were conducted in September 2024.

Below is an example of a search strategy complete for Embase:

1. Sudden Unexpected Death in Epilepsy/
2. SUDEP.mp.
3. (death and epilepsy).mp.
4. 1 or 2 or 3
5. Legal Guardians/
6. exp Parents/
7. exp Caregivers/
8. 5 or 6 or 7
9. 4 and 8

2.3 Data Management and Selection Process

All records obtained from database searches transferred into reference management software EndNote (Clarivate Analytics, PA, USA). Duplicates were removed by the author. Titles and abstracts were then screened against the inclusion and exclusion criteria for the review using a tool developed for this purpose. A subset of obtained records were assessed independently by a second reviewer (MW). Any disagreements in inclusion/exclusion decisions were resolved through discussion with the second reviewer.

Full text articles were retrieved for potentially relevant studies and were assessed in detail against the inclusion/exclusion criteria using a form developed for this purpose. A subset of papers included for full text screening were independently reviewed by a second researcher (MW). Decisions for inclusion/exclusion of studies were discussed and disagreements were resolved through discussion. Reasons for exclusion of full text studies that do not meet the inclusion criteria was recorded (See Figure 1.1).

2.4 Data items

The following data items were extracted: information on the study including study type, methodology, number of participants and characteristics of the sample. The phenomena of interest reported on in the study were recorded which included any statements about emotions and feelings experienced in response to learning about SUDEP, and thoughts, beliefs, appraisals, or cognitions experienced by parents on learning about SUDEP. Parent reports of changes made to their caregiving behaviour for their child with epilepsy as a consequence of learning about SUDEP were included. Data items relating to the setting and context-related information were recorded.

2.5 Data Synthesis

A convergent integrated approach was used for integration and synthesis of quantitative and qualitative data from included studies as outlined in the Joanna Briggs Institute Evidence Synthesis manual (Stern et al., 2020). Extracted data were reviewed and quantitative data were identified for transformation into ‘qualitised data’. This involved transformation of quantitative data into textual descriptions or narrative interpretation of the quantitative results while preserving the methodological context of the study (Sandelowski et al., 2013). The qualitised and qualitative data were assembled based on

which research question the data corresponded to. NVivo (International, 2023) was used for line-by-line coding of the data. Coded data were then grouped together into categories. Data were synthesised using a narrative synthesis approach (Popay et al., 2006).

2.6 Risk of Bias in Individual Studies:

The JBI Critical Appraisal Tools were used to critically appraise the risk of bias of included studies. The appropriate JBI tool was used for each study design. The JBI critical appraisal tool for qualitative studies was used for qualitative study designs and the JBI Checklist for analytical cross-sectional studies was used for quantitative studies. Studies were independently appraised by a second reviewer (MW). Any discrepancies in ratings were addressed through discussion until a consensus was reached. All studies meeting inclusion criteria for the review were included in the results synthesis regardless of the risk of risk of bias.

3. Results

The Prisma Flow in Figure 1.1 outlines the records identified in each stage of the screening process. Database searches returned 3120 records and a search of google scholar for theses and dissertations found 1 record leaving a total of 3121 records which were screened. 752 duplicate records were removed. A total of 2369 records were screened by title and abstract leaving 2343 titles excluded. When the second reviewer screened a sample of 10% (n = 236) of titles and abstracts against study inclusion/exclusion criteria there was 92% agreement. 26 titles were available for full-text screening. 23% (n = 6) of these records were assessed by a second reviewer. There was 80% agreement between the author and second reviewer's decisions to include/exclude records.

A total of 9 studies were assessed to fit the inclusion criteria for the review and were therefore included in the next phase of the review. Reasons for excluding the other 19 records are reported in Figure 1.1 (Prisma Flow Diagram).

3.1 Summary of Included Studies:

A total of nine studies were included in the systematic review following full-text screening (See Table 1.1 below, Tables 1.4 and 1.5 in appendices, P77, P79). These studies were from the US, UK, Canada, Malaysia, India, and Turkey. They were published between

2010 and 2023. Eight of the nine studies were papers published in journals and one was a doctoral thesis. Participants were recruited from a neurology clinic (Canada), a paediatric neurology outpatient department (Turkey), a paediatric neurology department (Malaysia), a regional epilepsy clinic (UK), two paediatric neurology services in Scotland (UK), a tertiary care referral epilepsy centre (India), a non-profit organisation (SUDEPAware.org, Canada), and The North American SUDEP Registry.

The review consists of a total of 677 participants ranging from 11 – 146 participants per study. A total of 612 (90.37%) participants were identified as parents, mothers, fathers, or legal guardians of children with epilepsy. 13 (1.92%) were identified as caregivers. 38 of the studies' participants (5.61%) were identified as a spouse, widow/widower, adult offspring, sibling, or another next-of-kin, Data was extracted separately for participants identified as parents, caregivers, or guardians in this study. 14/27 participants (2.07% of total participants in the review) in one study were identified as adults with epilepsy. This study was included in the review and data was extracted separately for caregivers. 132/677 (19.5%) of the participants included in the review were reported to have prior knowledge of SUDEP before taking part in the study. Two studies reported that they provided their participants with a leaflet on SUDEP in the days before taking part in the study which accounted for 69 participants (10.21%).

Data on the children/people with epilepsy varied by study. Ages are presented as Means, SDs, and ranges or Medians, IQRs. The studies referred to a mix of living and deceased children/people with epilepsy. Five studies related to children who were alive at the time of the study and accessing care, and the remaining four studies concerned people who had died due to SUDEP or epilepsy-related causes. The children and people with epilepsy ranged in age from 0 – 29 years.

In terms of methodology the method of data collection consisted of questionnaires completed by participants alone or in a face-to-face setting with researchers, structured measures (i.e. the DASS-21 used in 2 studies), focus groups, 1:1 semi-structured telephone interviews, and 1:1 semi-structured face-to-face interviews. Three studies involved the provision of information on SUDEP as part of the study, including presenting parents with an educational software programme about SUDEP, a leaflet about SUDEP, and a 1-hour

counselling session about SUDEP. Each of these studies collected repeated measures before the provision of information on SUDEP and at follow-up 1 – 6 months later.

Figure 1.1 *Prisma Flow Diagram*

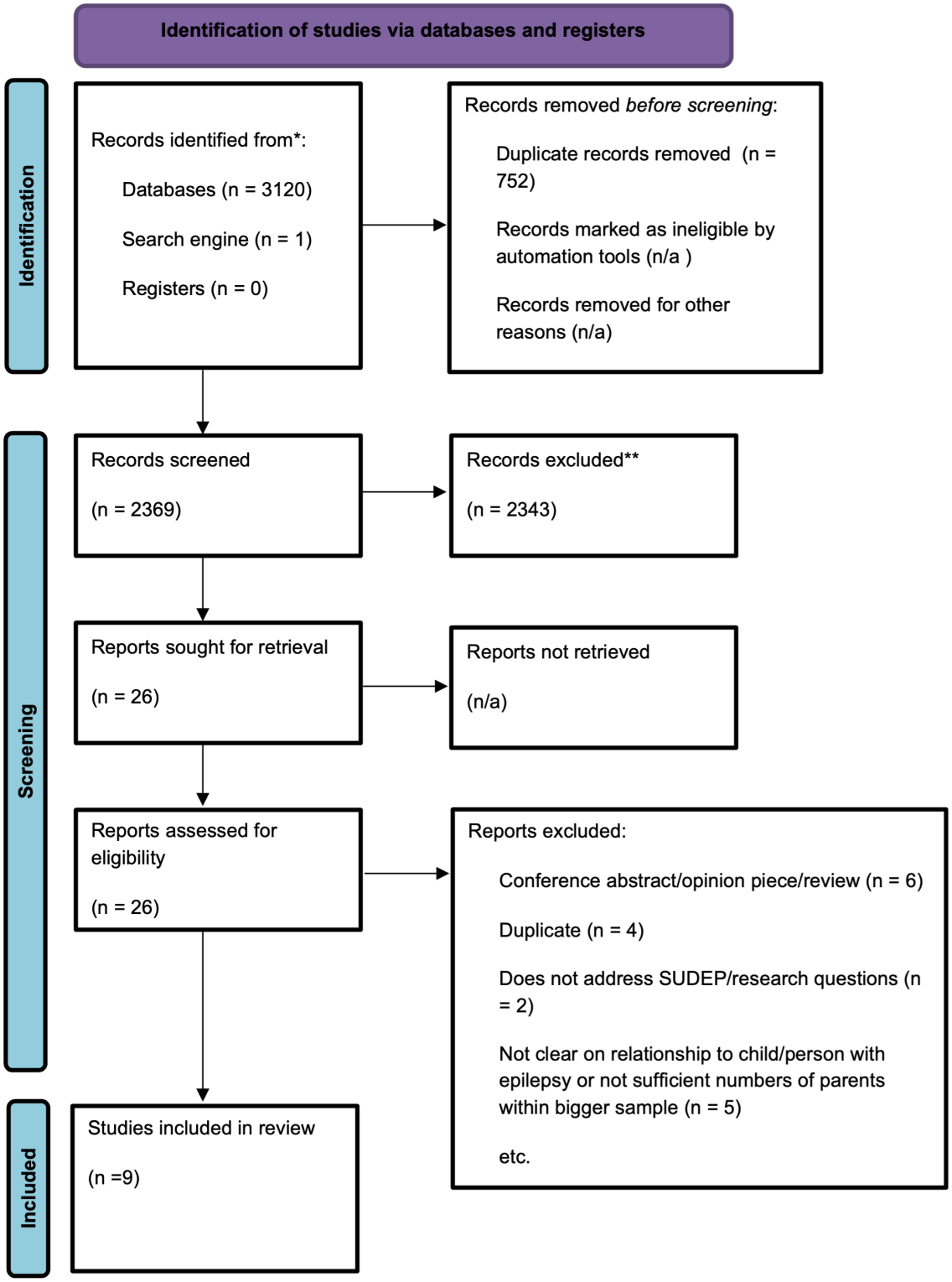

Table 1.1;

Characteristics of Included Studies

Record No	Author(s)	Year	Journal	Country	Study Setting
1	Aksoy, Karakaya, Turkdogan, Karakteir, & Save	2020	Epilepsy & Behavior	Turkey	Paediatric neurology outpatient department at Marmara University, school of medicine between May and September 2018.
2	Louik, Doumlele, Hussain, Crandall, Buchhalter, Hesdorffer, Donner, Devinsky, Friedman	2017	Epilepsy & Behavior	US	Participants were family members of deceased people with epilepsy enrolled in NASR (The §North American SUDEP Registry) between 27th October 2011 and 29th September 2016. People with epilepsy who died did so suddenly but not all deaths were determined to be related to SUDEP.
3	Fong, Lim, Kong, Lua, Ong	2017	Epilepsy & Behavior	Malaysia	all parents/guardians of CWE aged up to 18 years old who attended the University Malaya Medical Centre (UMMC) Kuala Lumpur paediatric neurology clinic between 1 June 2014 and 31 May 2015. Participants were recruited in the study if their child had an established diagnosis of epilepsy.
4	Gayatri, Morrall, Jain, Kashyape, Pysden, & Ferrie	2010	Epilepsia	UK	UK, regional epilepsy clinic, data collected over a 5 month period. A physician questionnaire was completed alongside

5	Kumari, Garg, Sharma, & pende	2022	Epilepsy Research	India	India, Government-sponsored, tertiary care referral epilepsy center and teaching hospital in India. The study was conducted between 1st November 2019 and 31st October 2021.
6	RamachandranNair, Jack, & Strohm	2016	Epilepsy and Behaviour	Canada	Recruited from SUDEP Aware organisation. Data from 6 bereaved parents from a previous study were included. Participants were Canadian/US residents.
7	RamachandranNair, Jack, Meaney, & Ronen	2013	Epilepsy & Behavior	Canada	The Neurology Clinic at McMaster Children's Hospital (Ontario, Canada). Some recruitment was through a lay organization, SudepAware (www. sudepaware.org). Data gathered in the Summer of 2011.
8	Whitney, Strohm, Jeffs, Jones, Jack, & RamachandranNair	2023	Epilepsy Research	Canada	An online advertisement about the study was posted on the website of a Canadian non-profit agency, SUDEP Aware (www.sudepaware.org).
9	Galliard	2018	Thesis (DClinPsy) University of Edinburgh	UK	Paediatric neurology services in the NHS in Scotland.

3.2 Critical Appraisal of Included Studies

For the purposes of this review criteria for categorising the risk of bias of included studies were as follows: where 0 – 39% of appraisal items were present this was judged to be indicative of high risk of bias, where between 40 and 69% of criteria were met, this was taken to indicate moderate risk of bias, and where 70 – 100% of items were met, this was judged to be a low risk of bias. (See Tables 1.4 and 1.5 in appendices, pages 75 and 76)

3.2.1. Cross sectional studies

Five studies were assessed using the JBI Checklist for Analytical Cross-Sectional Studies. 4/5 studies were found to have a high risk of bias (Doumlele et al., 2017; Fong et al., 2017; Gayatri et al., 2010; Kumari et al., 2022) and one study had a moderate risk of bias (Aksoy et al., 2020). Studies generally employed unvalidated questionnaires or semi-structured interviews to assess beliefs/responses to SUDEP information. Insufficient detail was provided about SUDEP information provision when this was part of the study design. There was no evidence of attempts to account for parents with prior knowledge of SUDEP or other confounding factors in statistical analysis, with one study reporting that they did not assess this as part of their study (Gayatri et al., 2010). No studies provided details of how previous knowledge of SUDEP was assessed. There was no evidence of use of standardised measures of SUDEP knowledge, beliefs, childcare practices. Two studies used the DASS-21 as a measure of anxiety, depression, and stress in parents.

3.2.2 Qualitative studies

Four studies were assessed for risk of bias using the JBI checklist for qualitative research. Three studies (RamachandranNair et al., 2013a; RamachandranNair et al., 2016; Whitney et al., 2023) reported using the same methods including data collections, interview and analysis approach. These studies presented a similar risk of bias in terms of a lack of congruity between the methodology employed and the research questions/study objectives. No statements were included highlighting the authors' own influence on the research. It was judged that there was congruity between the methodology and representation, analysis, and interpretation of the data across studies. It was judged that participants voices were adequately represented across studies with evidence of direct quotes to represent themes/findings. 3/ 4 studies here were judged to be of moderate risk

of bias (Ramachandrannair et al., 2013b; RamachandranNair et al., 2016; Whitney et al., 2023) with one study being judged as low risk of bias (Galliard, 2018).

There was a moderate to high risk of bias within the included studies, except one study which was judged to have a low risk of bias. This indicates caution is needed when interpreting the findings.

3.3.1 What thoughts/cognitions/appraisals do parents report on learning about SUDEP? (See table 1.6 in appendices p. 82 for representation of each subtheme by study)

A majority of parents want to know about SUDEP. The majority of parents reported they want information on SUDEP, reported qualitatively (Galliard, 2018; RamachandranNair et al., 2013a; RamachandranNair et al., 2016) and quantitatively; 87.4% - 95.8% of samples (Fong et al., 2017; Gayatri et al., 2010; Kumari et al., 2022). Some parents reported that they also thought other families should be given information on SUDEP (Gayatri et al., 2010; RamachandranNair et al., 2016) It was reported that parents felt it was their right to know about SUDEP and that it should not be a healthcare providers role to decide whether they get information on SUDEP or not (RamachandranNair et al., 2016). There were small minorities that reported either not wanting the information or being unsure about whether they wanted it (Galliard, 2018; Gayatri et al., 2010).

'No, no, I've not looked any further into any of that. I just dread kind of looking further...' (Participant quote, Galliard; 2018).

Studies which assessed parent and child epilepsy variables directly did not find an association between parent or child demographics and willingness to be provided with information on SUDEP information (Fong et al., 2017).

Parents have preferences about what SUDEP information they want. Parents report wanting information relating to incidence rates, general information on SUDEP, what SUDEP entails, what the risk factors associated with SUDEP are, preventive measures, and the importance of anti-seizure medicine (ASM) adherence (Doumlele et al., 2017; RamachandranNair et al., 2016). Parents across studies reported that it may be helpful to share how rare SUDEP is. Parents and caregivers also indicated that they want information on supports available e.g. third sector organisations, foundations, professional associations, research institutes focusing on neurology or epilepsy, and support groups related to SUDEP

(RamachandranNair et al., 2016; Whitney et al., 2023). In one study, participants were noted to be quite critical of information provided by advocacy groups:

"The perception was that information on these groups' websites was more anecdotal and not necessarily evidence-informed, thus limiting the potential applicability of the information to more general situations". Author quote; RamachandranNair et al. (2016)

It was also highlighted that information provision on SUDEP needs to be tailored to the needs of individuals and informed by their existing level of understanding and knowledge (Galliard, 2018).

Parents articulate how they want SUDEP information to be delivered and by whom. Parents reported that multi-modal methods of sharing information on SUDEP is important e.g. a meeting with a healthcare professional, internet sources, pamphlets (Fong et al., 2017; Kumari et al., 2022), but noted that it would not be helpful to learn about SUDEP through a pamphlet or the internet only (Ramachandrannair et al., 2013b). It was specifically reported that they would like to learn about SUDEP from their treating physician (Aksoy et al., 2020), doctor (Kumari et al., 2022), neurologist or professionals working in the field of neurology (RamachandranNair et al., 2016), or paediatric neurologist (Fong et al., 2017; RamachandranNair et al., 2016). Parents expressed that they would like a follow-up appointment with an epilepsy nurse or clinical social worker, or at a particular location e.g. epilepsy resource centre where their questions could be answered (Galliard, 2018; Ramachandrannair et al., 2013b; Whitney et al., 2023).

Parents have preferences regarding timing and circumstances under which they should receive SUDEP information. Most (54 – 72%) of participants wanted to know about SUDEP at the time of diagnosis (Aksoy et al., 2020; Fong et al., 2017; Gayatri et al., 2010). Some parents reported wanting information after diagnosis when they had time to process this information first (Galliard, 2018), or when they felt comfortable with their child's epilepsy diagnosis (Kumari et al., 2022). Mothers in one study reported that information should be given at the least "emotionally difficult" stage but acknowledged that there would not be a "good" time to tell a parent about SUDEP although earlier was considered better (Galliard, 2018).

Other circumstances in which parents felt SUDEP should be discussed were when there were specific risk factors present (RamachandranNair et al., 2016) and when seizures were poorly controlled(Gayatri et al., 2010). However, another study reported parents wanted SUDEP discussed regardless of seizure control (Kumari et al., 2022).

Parents attempt to make meaning of SUDEP information after receiving it. Some parents reported believing their children were at risk of SUDEP after receiving information (Aksoy et al., 2020) and mothers in another study felt fearful their child might die (Galliard, 2018).

Parents reported that their knowledge of SUDEP was sufficient after receiving information as part of the study (Aksoy et al., 2020). In one study 18% (13 bereaved parents) reported feeling dissatisfied as they felt misinformed by their healthcare provider about the existence or risk of SUDEP:

"Her [the decedent's] doctors were at ... a top institution, so we thought we had received all of the information that we needed. Knowledge is power. When you don't inform, you take away the power of the family and the patient." Participant Quote, Doumlele et al. (2017)

Some parents reported that they did not feel SUDEP counselling would increase their anxiety but reassure them if they had information about the rarity of it (Kumari et al., 2022). One study mentioned that there was a worry that the person with epilepsy would die, although this was reported by adults with epilepsy and their carers (RamachandranNair et al., 2016). Another study found that a small number of participants reported a belief that telling them about SUDEP would increase worry due to the lack of information about how to prevent it (RamachandranNair et al., 2016). Another study found that parents felt the benefits of knowing about SUDEP outweighed the drawbacks (Whitney et al., 2023).

There was also evidence of shifts in perspective as a result of SUDEP knowledge such as a "live life to the fullest perspective" (Whitney et al., 2023), generating a sense of preparedness for the possibility of future loss (RamachandranNair et al., 2013a), and having tried to enjoy their time with their loved one more in the case of those bereaved by SUDEP (RamachandranNair et al., 2016).

There were also reports of having learned about SUDEP reducing a sense of guilt or blame about the death of a loved one (RamachandranNair et al., 2016).

"One mother of a NASR registrant who was never made aware of SUDEP prior to her son's passing thought she "had let her son suffocate and die" for several weeks and "blamed [her]self" for his death." (Doumlele et al., 2017).

Parents make appraisals of the impact of SUDEP information on themselves and their children. When asked immediately after the written SUDEP information was provided whether this had an effect on the parent's life, there were small increases in parents reporting that there was a negative impact on their physical, emotional, social, and employment functioning after the SUDEP information was provided to them. However these differences were not statistically significant (Gayatri et al., 2010). Fong et al. (2017) reported that most parents did not think that SUDEP discussion made an impact on their physical, emotional, social functioning, and employment either immediately after SUDEP information provision or at 3-6 months after information provision.

Parents initially reported that they believed that their child's life was not affected by the SUDEP information given as part of the study, however when questioned 3-6 months later there was a statistically significant increase in the number of parents who thought that the information had impacted their child's physical, emotional, and social functioning and schooling (Fong et al., 2017). They did not elaborate on the nature of the impacts i.e. positive/negative. In another study two thirds of parents responded that they believed the information had no effect on their child's physical, social, and emotional functioning and schooling, and there was no significant difference between questionnaire responses at 0 and 3 months (Gayatri et al., 2010).

It was reported that caregivers spent more time than people with epilepsy thinking about SUDEP (Whitney et al., 2023), and there were reports in other studies of increased fear and worry that the person with epilepsy would die (RamachandranNair et al., 2016). Other sources of worry were that people did not know how to prevent SUDEP (RamachandranNair et al., 2016).

Bereaved parents reported that had they known about SUDEP before their loved one died, they believed they may have increased supervision and limited the independence of

the person with epilepsy, but acknowledged that this may not have been welcomed by the person they were caring for (RamachandranNair et al., 2016).

Parents indicated that they thought there were benefits to knowing about SUDEP, including making changes to management of their child's condition, lifestyle changes, and medication adherence (Kumari et al., 2022; RamachandranNair et al., 2016; Whitney et al., 2023).

3.3.2 What emotions do parents report on learning about SUDEP? (See table 1.7, appendices p.83 for representation of each subtheme by study)

Parents reported feeling anger when learning about SUDEP in the context of having a loved one with epilepsy who had died, or when thinking about this as a possibility. Bereaved parents and relatives noted that parents' anger came from not being told that this was a potential outcome while the person with epilepsy was alive while other parents reported feeling angry that it wasn't previously talked about (Doumlele et al., 2017). Parents' anger was directed at the medical community for not telling them earlier about SUDEP (RamachandranNair et al., 2016), while another study reported that parents were dissatisfied due to feeling misinformed by healthcare providers regarding the existence of SUDEP (Doumlele et al., 2017).

Anger was also reported by parents if they were not informed about SUDEP and then their child subsequently experienced SUDEP, as they would feel guilty that there might have been more that they could do (Ramachandrannair et al., 2013b). Anger was also described in the context of feeling 'blindsided' that SUDEP wasn't discussed with them and feeling that they had not spoken to the 'right people' about their loved one's care (Doumlele et al., 2017).

Descriptions of initial reactions to learning about SUDEP. Initial reactions to SUDEP include descriptions such as 'overwhelming sadness' (Whitney et al., 2023), and the information received as having an immediate and negative impact on the individual with the experience described as "emotional" and "stressful" (Galliard, 2018). Feelings of regret and guilt were reported by people bereaved by SUDEP who learned about SUDEP after their loved one died (RamachandranNair et al., 2016).

Some reactions to learning about SUDEP were described as positive. Reports of positive feelings such as appreciating having had the discussion (Aksoy et al., 2020), and feeling encouraged, reassured, and calm in response to SUDEP information (Fong et al., 2017).

There were reports of anxiety, shock, worry, and fear on learning about SUDEP. There were reports that learning about SUDEP increased stress and feelings of anxiety in caregivers who learned about the potential for SUDEP (Whitney et al., 2023). In another study 21.3% of participants reported negative feelings in response to learning about SUDEP including worried, shocked, and angry (Fong et al., 2017). Parents reported feeling overwhelmed, worried, and increasingly anxious when the risk of SUDEP was explained to them (Ramachandrannair et al., 2013b). Some reports of worry and shock were in relation to not learning about SUDEP sooner (Gayatri et al., 2010). Other reactions were described as 'scared' or frightened (Aksoy et al., 2020; Galliard, 2018), shock or surprise (Fong et al., 2017; Galliard, 2018; Gayatri et al., 2010; RamachandranNair et al., 2013a; RamachandranNair et al., 2016; Whitney et al., 2023), stress (Fong et al., 2017; Galliard, 2018; Kumari et al., 2022; RamachandranNair et al., 2016; Whitney et al., 2023), and anxiety (RamachandranNair et al., 2013a; RamachandranNair et al., 2016). One study noted that parents reported feeling shocked in response to learning about SUDEP because it challenged pre-existing beliefs that individuals couldn't die from epilepsy (RamachandranNair et al., 2016).

"In my own experience as a parent it was really terrifying at first. It really filled me with a lot of anxiety and worry um, thinking about the very real possibility that it [SUDEP] could happen to us even if the risk was really small". Participant quote, Whitney et al. (2023)

Some parents reported feeling uncertain or mixed feelings in relation to SUDEP. Half of those who stated they were glad SUDEP had not been discussed by a healthcare provider or epilepsy support resource cited a possible increase in anxiety about SUDEP had this discussion occurred (Doumlele et al., 2017). Smaller percentages of participants reported mixed feelings i.e. both positive and negative on learning about SUDEP (Fong et al., 2017).

One study specifically reported on the reactions of fathers to SUDEP information as 'uneasy, uncertain, and frustrated' because of a lack of measures they could implement to

prevent SUDEP (RamachandranNair et al., 2013a). Another study reported that not knowing about the possibility of SUDEP would be worse than knowing (RamachandranNair et al., 2013a)

3.3.3 What changes to parenting/caregiving behaviour for their child with epilepsy do parents report on learning about SUDEP? (See table 1.10, appendices P.84 for representation of each subtheme by study)

Parents report making changes to their child's healthcare treatments/interventions as a result of learning about SUDEP. Parents reported making changes to their child's healthcare or changes to clinical care such as chewing and swallowing therapy and physiotherapy (Aksoy et al., 2020).

Parents report making lifestyle changes as a result of learning about SUDEP. Parents with previous knowledge of SUDEP and who received information in relation to SUDEP as part of the study reported that people could make changes such as adopting a regular sleep schedule for their child (Aksoy et al., 2020), avoiding their children's epileptic seizure-triggering behaviors (Aksoy et al., 2020). One parent who lost a child to SUDEP explained that by understanding the risks for SUDEP, parents and their children may be more likely to make changes to their child's care such as getting appropriate amounts of sleep (RamachandranNair et al., 2013a). Another study found that one month after receiving SUDEP counselling, there was a significant improvement in the number of parents who were encouraging regular exercise for their child (Kumari et al., 2022). In two studies parents noted that they did not plan to restrict their child's activities as a result of learning about SUDEP (Fong et al., 2017; Gayatri et al., 2010). Some parents reported that they would plan to prevent high fever or vomiting in their child to reduce the risk of SUDEP although no further details are given (Aksoy et al., 2020).

Parents report making changes to their child's medication/ASMs as a result of learning about SUDEP. References to medication noted that parents thought monitoring their child's medication (Gayatri et al., 2010), administering medications at fixed times (Kumari et al., 2022), regular use of ASMs (Aksoy et al., 2020), and having a seizure action plan with details of rescue medications as ways to manage the risk of SUDEP (Kumari et al., 2022).

Parents report changes to monitoring and supervision of their child as a result of learning about SUDEP. Efforts to use monitoring and supervision to manage their child's seizures included the use of audio-visual devices to monitor seizures (Aksoy et al., 2020), placing monitoring devices in their child's room (RamachandranNair et al., 2013a), increasing supervision of their child (Fong et al., 2017; Gayatri et al., 2010), monitoring their child during sleep e.g. the use of video, a mattress alarm, or co-sleeping with their child (Galliard, 2018; Whitney et al., 2023). Other reports were that parents were reluctant to let their child spend the night anywhere but their home (Whitney et al., 2023), and the use of monitoring equipment to monitor their child's every movement (Whitney et al., 2023). One study reported that there would be no increase in monitoring their child as they felt that there was already a degree of monitoring and vigilance (Ramachandrannair et al., 2013b).

"I'm more worried about supervision during sleep than I am during awake, and it used to be the other way around." Participant Quote, Whitney et al. (2023)

Parents report changes to information sharing with others as a result of learning about SUDEP. Parents reported that they had discussions with their child about SUDEP as a result of their own awareness increasing. One mother reported that their child was more receptive to being monitored during sleep and another mother reported that she was able to have a conversation with her child about being more compliant with wearing a wrist monitor (Whitney et al., 2023). Parents also reported that they did not plan to decrease the amount of information given to their child about epilepsy as a result of learning about SUDEP (Fong et al., 2017).

There was an increase in the number of parents who said they would share information about their child's epilepsy with 'others' (Fong et al., 2017; Gayatri et al., 2010) including their child's school including emergency contact numbers and a seizure action plan one month after receiving SUDEP counselling (Kumari et al., 2022).

4. Discussion

This review found that most parents want to know about SUDEP. Whilst some parents reported not wanting to know about SUDEP there was little information about why this was the case, or how these parents might differ from the majority who do want more information. In cases where parents reported wanting to know about SUDEP, it was

perceived that knowing was better than not knowing and the benefits outweighed the disadvantages of knowing i.e. feeling stressed and worried. It is possible that parents who reported not wanting more information about SUDEP wanted to maintain uncertainty to generate feelings of hope or optimism, which can be adaptive (Brashers, 2006). If parents appraise the risk of SUDEP for their child as high, then they may prefer to maintain uncertainty through avoidance than reduce it by seeking further information (Mishel, 1990).

Findings indicated that parents tried to make sense of the SUDEP information given to them and reported concerns that their loved one/child would die, others reported that they were concerned that there was nothing they could do to prevent SUDEP while others reported that understanding the risk of SUDEP is low could mitigate some of the worry they felt. These findings indicate that there may be individual differences in how people interpret and appraise information provided.

These findings may also be a consequence of differences in the type and quality of information provided to people e.g. individual counselling with a Healthcare Professional vs leaflet. According to Brashers (2006) knowledge does not need to be accurate to increase certainty, it only needs to create the 'perception of coherence'. This suggests that there are risks associated with parents learning about SUDEP from sources other than healthcare professionals/providers e.g. inaccurate information from an online forum which appears coherent and therefore believable or trustworthy but leading to anxiety and worry.

Information seeking can be a coping strategy to manage uncertainty, as it reduces ambiguities and allows parents to appraise information i.e. SUDEP information in terms of what it means for their child. This review indicates that parents prefer to learn about SUDEP from a healthcare professional (neurologist, treating physician) as they are perceived as credible sources of information, which can help to reduce uncertainty and facilitate reappraisals of information e.g. information related to their child's risk of SUDEP. In a study of parents of children with cancer, they were more likely to rate information received as high quality if they also rated clinician communication as high quality, rated in terms of clinician listening and sensitivity (Kaye & Mack, 2013). In addition to these characteristics such as transparency and honesty in communication were linked with the concept of trust in clinicians by parents of children with rare diseases (Gómez-Zúñiga et al., 2019).

Despite this finding, a recent review found a high prevalence of internet use to access health-related information by parents for their child motivated by a wish to be actively involved in their child's care (Kubb & Foran, 2020). This review found that parents reported difficulty in ascertaining the trustworthiness of information accessed online which may increase feeling of uncertainty. Studies identify that parents of children with epilepsy have information needs that are associated with increased stress when not met (Nevin et al., 2020).

4.1 Limitations

A mixed methods approach was used to this review with the aim of capturing a rich set of data from diverse studies to adequately answer the research questions. However, this resulted in heterogeneity between included studies e.g. different geographical locations and samples e.g. based on socioeconomic variables and possibly differing health information needs. There are also significant methodological differences between studies.

The included studies lacked clear definitions of some constructs e.g. defining prior knowledge of SUDEP and the nature of information provided on SUDEP. Some studies may be over-represented in the results i.e. there is a greater volume of data from qualitative studies compared with qualitised data from quantitative studies. This is a source of bias within this review.

The critical appraisal also indicated moderate to high risk of bias across studies. Studies were categorised based on low, moderate, or high risk of bias as determined by the author. These categories were assigned to aid interpreting the results, but it needs to be highlighted that methodological differences between studies make direct comparisons difficult and therefore caution is needed when interpreting the evidence presented in this review. Four of the studies (quantitative) were judged to be at high risk of bias but were included in the review. This was due to the limited number of studies available addressing the research questions and the potential value in this review for clinicians to influence practice in this area. Certainty/confidence in the evidence is not assessed as recommended by the Joanna Briggs Institute due to the heterogeneity between studies, which is also a limitation.

The inclusion criteria for the study were parents and caregivers of children with epilepsy which included adult children with epilepsy. The age range of included studies was 0-29 years, it is possible that parent experiences of caring for a child with epilepsy differs across this age range as they may have less control over their child's care as they get older.

The data in the study is based on information generated from interviews and questionnaires with pre-defined questions, therefore data is shaped by what participants are asked rather than being representative of appraisals and feelings experienced by parents. There is also limited capacity from the included studies to assess meaning-making of parents receiving information about SUDEP.

4.2 Strengths

This review offers some insight into the emotional responses and appraisals/reactions of parents on learning about SUDEP, as well as changes made to caregiving and parenting their child with epilepsy. This supports existing research by clarifying parents' views and experiences of SUDEP information provision and organises a heterogenous set of studies.

4.3 Conclusions

This review has found that a majority of parents of children with epilepsy want information on SUDEP and prefer this information to come from their child's treating physician despite finding the information distressing. There was evidence that parents use SUDEP information to adjust their caregiving e.g. increasing monitoring and supervision or communicating relevant information about their child's epilepsy to others e.g. their child's school. Parents may make different appraisals of SUDEP information e.g. perception of their child's risk of SUDEP and clinicians can play a role in identifying and supporting the re-appraisal of unhelpful or inaccurate beliefs and supporting parents to identify trustworthy sources of information about SUDEP. This may in turn mitigate the distress associated with receiving information on SUDEP.

Competing Interests

The author has no competing interests to declare.

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Chapter 2

Parent Experiences of Genetic Testing in Their Adjustment to their Child's Developmental and Epileptic Encephalopathy or Treatment-Resistant Epilepsy Diagnosis; A Grounded Theory Study.

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*This Chapter has a greater word count than recommended by the Journal Epilepsy & Behaviour for the purposes of the thesis examination process.

Plain Language Summary

Background

Developmental and epileptic encephalopathy (DEE) refers to a group of conditions typically diagnosed in childhood or infancy. They are characterised by severe recurrent seizures and seizure activity which affects brain development and functioning. They can result in significant problems as the child develops such as learning disabilities and behavioural problems. Often these conditions are found to be linked to a single gene abnormality or mutation (Scheffer et al., 2017).

Genetic testing has become a valuable tool for identifying the cause and type of DEE which can provide key information with implications for treatment and prognosis. The research available to date provides a description of parents' experiences of genetic testing and suggests it may be helpful for supporting parents to adapt to and accept their child's diagnosis but does not provide an explanation of the processes by which genetic testing contributes to this adjustment (Hayeems, Luca, Assamad, Bhatt, & Ungar, 2021).

Aims & Research Questions:

To determine the role of early/timely genetic testing of children with DEE and treatment resistant epilepsy on parental adjustment to their child's diagnosis

What is the impact of genetic testing on how parents think about and perceive their child's diagnosis?

If genetic testing contributes to changes in thinking about their child's diagnosis; do these changes facilitate psychological adjustment to and acceptance of their child's condition?

Methods

Participants included 9 parents who had undergone genetic testing for their child with DEE or treatment-resistant epilepsy. Participants engaged in intensive interviews via Microsoft Teams or phone with the main researcher. These interviews were transcribed word for word and analysed using qualitative research methods. The methods employed for this study

were grounded theory (Charmaz, 2014). This involves systematically gathering and analysing qualitative data to generate a theory that explains processes or people's behaviour and perspectives.

Results

The results are presented in the form of a substantive theory which highlights that managing uncertainty is a strong focus for parents when their child first becomes unwell or when they notice differences in their development. Parents then embark on a journey to reduce this uncertainty by getting answers for their child with the hope that they will access a treatment or change to medical management of their child's condition. Parents often find that this is not possible, and they begin the process of shifting and changing their expectations of themselves as parents (parental role consolidation), their child, the diagnosis or genetic testing outcome, and the future. Results indicate that parents have enormous capacity for adjustment, and this is a subjective process influenced by pre-testing hopes and expectations and appraisals made about the meaning of the genetic testing outcome for their child.

Ethical Issues

Relevant ethical approvals were in place before data collection began. Participants were provided with study information and gave informed consent before participating in interviews. Data was stored safely and securely in line with University and NHS policies and procedures in line with the research protocol.

Practical Applications and Dissemination

This study brings a valuable psychological perspective to this area of research which could support the development of resources for parents to support adjustment to their child's diagnosis.

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Abstract

Background: Genetic testing can identify pathogenic variants associated with epilepsy in around 45% of cases. Diagnosis does not always lead to changes to medical management for children with DEEs, however there is evidence of personal utility for parents of these children. The published literature suggests a possible role for genetic testing in adjustment to their child's condition.

Purpose: To clarify how engaging in genetic testing can lead to parental adjustment to their child's condition, and to understand why genetic testing may facilitate changes in parental roles and attributions.

Methods: Grounded theory methodology was used to inform data collection and analysis to construct a theory grounded in the data to explain the role of genetic testing in parents' adjustment to their child's condition.

Results: The substantive theory presented suggests that perceived uncertainty, parental relationship with uncertainty, and parental role consolidation undergo shifts across the process of genetic testing i.e. pre-testing, receiving results, and post-test adjustment. Genetic testing acts a precipitating event for a shift in appraisals and expectations by parents which facilitate adjustment. Results are discussed in the context of existing theories of uncertainty in illness and meaning making in the context of stressful or traumatic events.

Conclusions: Genetic testing acts as a precipitating event in parental adjustment to their child's diagnosis. More research is needed to determine the utility of the substantive theory for parents of different backgrounds and with different genetic testing outcomes i.e. no finding.

Keywords: Genetic testing, epilepsy, Developmenal and Epileptic Encephalopathy, adjustment

1. Introduction

Developmental and Epileptic Encephalopathy (DEE) was formally recognised and classified by the International League Against Epilepsy (ILAE) in 2017 and refers to early onset epileptic seizures often with an underlying mono-genetic basis, as well as developmental and cognitive impairment or regression due to frequent epileptiform activity or seizure activity associated with the disorder (Scheffer et al., 2017). Approximately 30% of children with epilepsy are resistant to anti-epileptic drug treatment (Kumar, 2021), and are more likely to experience developmental delay (Jakobsen et al., 2020). Spontaneous mutations (de novo) are thought to contribute significantly to DEEs.

1.1 Genetic Testing

Genome sequencing has become a widely used and valuable clinical tool in paediatric care (Wynn et al., 2018). The anticipated benefits of genome sequencing and diagnostics include definitive diagnosis and the accurate detection of risks, early intervention, and the use of a precision medicine approach to patient care to reduce morbidity and improve quality of life (Hayeems et al., 2021).

A recent meta-analysis suggests that the diagnostic yield of genetic tests for children with epilepsy vary by test, with highest diagnostic yields for whole exome sequencing (WES) estimated to be 0.45 (95% CI: 0.33 – 0.57) followed by epilepsy panel (EP) at 0.23 (95% CI: 0.22 – 0.44), and chromosomal microarray 0.08 (95% CI: 0.06 – 0.12) (Sánchez Fernández et al., 2019). These results indicate that for whole exome sequencing there is a 45% detection rate of a definitively pathogenic or likely pathogenic genetic variant associated with the condition.

1.2 Personal Utility of Genetic Testing

Personal utility in genetic testing has become increasingly discussed in the literature although the construct is poorly defined. A systematic review by Hayeems et al. (2021) adapted findings from a previous review of personal utility of individuals engaging in genetic testing (Kohler et al., 2017) to define personal utility for parents of children undergoing genetic testing. They found several overlapping themes with the addition of some factors within each theme as well as the addition of a ‘medical management’ theme. Findings were

organised by affective factors e.g. feelings of relief, hope, and feelings about competence as a parent, cognitive factors e.g. increased knowledge of the condition and prompting information seeking, behavioural e.g. future planning, and social e.g. accessing social support. In relation to medical management findings indicated parents used genetic testing outcomes to alter treatment for their child, and to reduce unnecessary testing and surveillance of their child.

Using a measure developed for the study Stenshorne et al. (2025) found that 91% of parents of a child with DEE reported that knowing the aetiology of their child's condition was important, with 71% stating that they worried about the cause of their child's DEE before getting a genetic diagnosis and 67% of parents reported worrying that their child's DEE resulted from something that occurred in pregnancy or birth. There was a significant reduction in parental guilt following testing (24% ever feeling guilt vs 8.6% feeling guilt after receiving genetic test outcome)

Some parents report relief when they receive a negative genetic result reducing a subjective sense of having possibly influenced or caused their child's illness (Krabbenborg et al., 2016), but often disappointment when results do not change or significantly improve their child's care (Donohue et al., 2021). In one study parents reported perceived benefits of undergoing genetic testing for their child were to relieve distress associated with parental feelings of guilt, stress, and self-blame in relation to their child's illness e.g. when a de novo mutation is identified (Smith et al., 2022). However, it is unclear from the available literature to what extent exposure to accurate genetic information correlates with parental attributions and affect around familial transmission and heritable clinical disorders.

Jeffrey et al. (2021) found that parents of children with DEEs attributed utility of genetic testing to reduced psychological distress by removing uncertainty, providing information about their child's condition, and instilling some hope for the future, allowing families to move forward and adjust to their child's condition. However, this study also reported that increasing time from seizure onset to genetic testing results decreased the personal utility for parents presumably by extending the period of uncertainty.

1.3 Theories of Coping in Chronic Health Conditions

Illness uncertainty was conceptualised by Mishel (1990) as a cognitive experience occurring when the meaning of illness-related events is ambiguous, and illness outcomes are unpredictable due to insufficient information. Mishel developed a four-stage model of uncertainty in illness which includes a) the antecedents generating uncertainty b) the appraisal of uncertainty as a danger or as an opportunity c) Attempts to cope focus on either reducing uncertainty appraised as a danger or to maintain uncertainty appraised as an opportunity and d) the state of adaptation resulting from effective coping (Mishel, 1990).

Lazarus' Stress and Coping theory proposes that how an individual views their disease is a fundamental determinant of how they cope and adjust. This theory proposes primary and secondary appraisals in which people make an evaluation of the potential harm and benefits of their illness and then secondary to that make a judgement about the perceived control they have over the illness, and their coping resources (Lazarus, 1966). A study by Nguyen et al. (2015) found that mothers of children diagnosed with epilepsy engaged in appraisal processes of their situation including normalising their experiences, maintaining a positive focus, taking one day at a time, and finding meaning in their adverse experiences e.g. by helping other people supporting a child with epilepsy for the first time. This study also found that participants engaged in an acceptance of the inevitability of seizures and the lack of control that they have over this which appeared to be supportive of adjustment to their child's diagnosis.

Genetic testing may be an attempt by parents to reduce uncertainty associated with their child's illness to facilitate adaptive coping responses. This is consistent with an approach oriented/active coping style which includes problem solving and seeking social support. It may be that parents use genetic testing as a way of gleaning more information about their child's condition to make adaptive appraisals which facilitate coping. Reducing uncertainty about the illness and gathering information may be a first step in this process and may also increase a sense of control and self-efficacy.

1.4 Rationale For Current Study

The existing literature on parents' experiences of genetic testing is largely descriptive in terms of parent reports of why they engaged in genetic testing and highlights possible discrepancies between expected versus actual outcomes. There is not currently an explanatory model for how genetic testing impacts parents' psychological adjustment to their child's diagnosis or outlining specifically the role of genetic testing in supporting adjustment. Some of the data have produced contradictory findings in terms of parents' appraisal of the meaning of the outcome which is not explained by current studies.

Grounded theory approaches can contribute a richness to our understanding of parent's experiences across time following genetic testing and the impact of this on their subsequent psychological adjustment.

1.5 Aims and Research Questions

The aim of the current study is to clarify the role of genetic testing in parents' adjustment to their child's diagnosis of DEE or treatment-resistant epilepsy.

- What is the impact of genetic testing on parents' appraisals and perceptions of their child's illness?
- In the context of genetic testing, what factors facilitate better psychological adjustment to their child's condition?
- What role does early/timely genetic testing of children with DEE and treatment resistant epilepsy have on parental adjustment to their child's diagnosis illness?

2. METHODS

2.1 Design

A qualitative approach using grounded theory (GT) methodology was used to determine the role of genetic testing in the process of parents' psychological adjustment to their child's condition. This methodology is helpful when applied to a phenomenon that is poorly understood and aims to construct an explanatory theory which reveals intrinsic processes in the phenomenon being studied. Current research on the role and utility of genetic testing for parents of children with epilepsies does not provide a model with explanatory power for the function of genetic testing in parental adjustment to their child's illness.

Charmaz's social constructivist approach to grounded theory was judged to be the most appropriate for this study (Charmaz, 2014). Constructivist grounded theory methodology focuses on the meaning constructed by participants in relation to the research topic i.e. genetic testing for their child. The researcher co-constructs experience and meanings alongside participants and considers multiple perspectives in the construction of meaning allowing a detailed and nuanced understanding of parents' experiences of genetic testing.

Grounded theory has philosophical underpinnings based on symbolic interactionism which offers a theoretical perspective on how individuals construct meaning in an active and dynamic way, continuously redefining and updating the meanings they give situations and events and renegotiating their understanding of their role in given circumstances. Symbolic interactionism pays attention to the language people use, and the social context which shapes the meanings constructed by the person, revealing deeper social meanings ascribed to events (Charmaz, 2014).

2.2 Reflexivity Statement

The researcher considered the impact of their own experiences, beliefs, and ideas in an ongoing process throughout the research. The researcher acknowledges their position as a novice qualitative researcher with previous research experiences being with quantitative data. The epistemological and ontological underpinnings of grounded theory represented a shift in perspective from a positivist paradigm. Individual supervision was used throughout to maintain a reflexive stance ensuring the credibility of the findings.

However, the researcher also acknowledged their current and prior roles in mental health services delivering psychological therapies. The epistemological and ontological underpinnings of GT align with the researcher's experiences of delivering therapy, acknowledging the interpretive nature of therapeutic work i.e. accessing the meanings people construct from their experiences of events rather than assuming one objective 'reality' and the use of psychological formulations to develop shared understandings of distress through co-construction of meaning by therapist and service user.

The researcher recognised their role as a trainee who had no prior experience working with families who have children with a chronic illness or who had experienced genetic testing and their role as the parent of a child with no health conditions. There are inherent power imbalances in the relationship between a researcher and participant however the researcher reflected that their entry into the topic area without prior experience allowed participants to occupy their 'expert' roles as parents in the study by sharing their experiences.

2.3 Sampling & Recruitment

Consistent with a grounded theory approach data collection and analysis was conducted simultaneously in an iterative process to facilitate theoretical and data adequacy.

Data adequacy is a concept that can be used by researchers to judge that they have recruited adequately in qualitative research. It encourages consideration of 5 different dimensions; study aims, specificity, dialogue, analysis, and theory (Malterud et al., 2016). The current research concerns a specific issue (genetic testing and adjustment to child's illness) in a specific population (parents of children with DEE/treatment-resistant epilepsy) and the researcher was able to draw on their existing skills and training to generate rich interview data with adequate information power(Malterud et al., 2016). There are existing theories which informed the researcher's development of the study and appropriate literature was consulted at planning, data collection, and analysis stages.

Ethical considerations were also part of decision-making as interviews often placed a high emotional burden on participants so ceasing recruitment once data and theoretical adequacy was achieved i.e. when the data were sufficient to allow adequate interpretation and theory development.

2.4 Participants

Participants were parents of a child with treatment-resistant epilepsy or Developmental and Epileptic Encephalopathy (DEE) who had agreed to undertake genetic testing for their child recruited from the genetic epilepsy clinic at the Royal Hospital for Children in Glasgow. Children and families from Glasgow and the West of Scotland attend the clinic. 46 participants were identified as meeting the study inclusion criteria by a specialist epilepsy nurse working in the department:

- Inclusion Criteria:
    - Parents of a child with DEE or treatment resistant seizures aged 18 years and over
    - Who have undertaken genetic testing for their child
    - English speaking
    - Consenting to take part in the study
- Exclusion Criteria:

- Non-English speaking
- Unable to give consent to participate in the study i.e. any difficulties which might impact ability to give informed consent such as cognitive issues or learning disability.
- Foster carers
- Aged under 18 years

Of these, Nine declined to participate or have further contact from the researcher, 11 did not answer or respond to initial phone calls and 26 consented to receive study information and to have further contact from the researcher about the study. Eight of the 26 participants who consented to further contact about the study subsequently declined due to life circumstances (i.e. too busy, child's illness, preferred to complete a questionnaire rather than interview).

A total of 18 parents consented for their details to be shared with the main researcher by the specialist nurse at the clinical genetics clinic or received the study information and proactively got in touch with the researcher by email (Change to study protocol in November 2024, see Appendix 2.3, P87). Participants were contacted by email with additional study information. A total of three declined to participate after initial contact with the researcher due to changes to their circumstances. A further six did not respond to correspondence and nine agreed and subsequently participated in interviews.

2.5 Materials and measures

A semi-structured interview schedule (Appendix 2.11 , P99) was developed in collaboration with clinical and university research supervisors with open-ended questions and additional probe questions to generate further discussion. Open-ended questions were used to facilitate a relaxed and conversational tone and allowed the researcher to follow up on areas that warranted further exploration. Broad question topics also allowed for flexibility and adjustments to the schedule as the interviews proceeded consistent with a constant comparative approach.

The interview schedule was shared in a consultation with a manager and parent at Dravet Syndrome UK (a UK based charity for parents and carers of children with Dravet Syndrome)

prior to data collection to check for acceptability and sensitivity of questions and language used. This consultation did not result in any changes to the interview schedule.

Participants completed demographic questionnaires (Appendix 2.10, P98) and were provided with written information about the study i.e. consent form (Appendix 2.9, P97) and participant information sheet (Appendix 2.8, P96). This information was provided via an introductory email from the main researcher once consent to be contacted was obtained.

2.6 Research procedures

Appropriate ethical approvals were obtained from NHS Research Ethics Committee (Appendix 2.4 – 2.7, PP 90 - 97).

Data was gathered through individual interviews held between November 2024 and February 2025. Seven interviews were conducted on Microsoft Teams and two interviews were conducted by phone, dependent on participant preference. MS Teams interviews were transcribed verbatim using the live transcription function. The transcript was re-read and checked as part of the process of familiarisation with the data. Phone interview data was audio-recorded and transcribed verbatim by the main researcher. Interviews were between 37 – 58 minutes in length. Transcripts were pseudonymised and uploaded to NVivo as Microsoft Word documents for all coding and analysis.

To maintain reflexivity and aid analysis memoing was used throughout data collection and analysis. This allowed for emerging concepts and categories to be identified as well as understanding the relationships between them as interviews progressed.

To support the development of the emerging narrative and concepts in the data, meetings with research supervisors and clinicians with experience of working with children and families with epilepsy and DEEs were consulted. This process allowed the researcher to gain an understanding of how the theory emerging from the data compared with clinician experiences of working with families and encouraged the researcher to remain reflexive by considering other perspectives on the data.

2.7 Data Analysis

Grounded theory uses an iterative process where data is gathered and analysed at the same time until theoretical saturation is reached. Demographic data were summarised along with information about the child undergoing genetic testing. Coding of data followed the approach outlined by Charmaz (2014) which involved initial (line-by-line) coding, followed by focused coding, and theoretical coding.

Line-by-line coding involved using gerunds or 'in-vivo' codes where appropriate. Memos were used to record researcher's impressions of emerging themes and to support subsequent analysis. Line-by-line coding was used for initial interviews which informed updating of the interview schedule to reflect areas that the researcher wanted to expand on in later interviews.

Additional interviews were conducted and line-by-line coded. Using a constant comparative approach to analysis, similarities and differences between codes and the underlying observations in the interview data could be identified and patterns in the data emerged which aided the construction of focused codes. Data were sorted and organised into focused codes using NVivo hierarchies (i.e. parent and child nodes). To aid more detailed analysis hand drawn concept maps were used to identify core concepts and theoretical codes which supported an understanding of the relationships and interactions between codes, focused codes, and core concepts.

In keeping with a constructivist orientation to grounded theory, results are presented as a narrative allowing participants to 'tell their story' (Charmaz, 2014). The journey of parents through the process of genetic testing is presented in terms of experiences before testing, getting results, and post-test adjustment.

3. RESULTS

3.1 Participants

9 parents took part in the study (n = 8 mothers and n = 1 father). Parents all identified as white Scottish and were based in the West of Scotland. One parent did not provide demographic information or respond to the researcher's attempts to contact them for this information (see Table 1).

Table 2.1

Participant Demographic Information

	Relationship to the child	Age	Ethnicity	Education	Employment status
Participant 1	Mother	26 - 35	Scottish, Mixed multiple ethnic group	National 3/4/5	Not currently employed
Participant 2	Mother	36 - 47	Scottish, white	University (post grad)	Employed – full time
Participant 3	Mother	36 - 47	Scottish, white	University (post grad)	Employed – part time/full time carer
Participant 4	Mother	36 - 47	Scottish, white	University (post grad)	Employed – part time
Participant 5	Father	36 - 47	Scottish, white	University (undergrad)	Employed – full-time
Participant 6	Mother	Information not Provided			
Participant 7	Mother	36 - 47	Scottish, white	University (undergrad)	Employed - Part-time
Participant 8	Mother	36 - 47	Scottish, white	University (undergrad)	Employed – part-time
Participant 9	Mother	36 - 47	Scottish, white	University (Undergrad)	Employed – full time

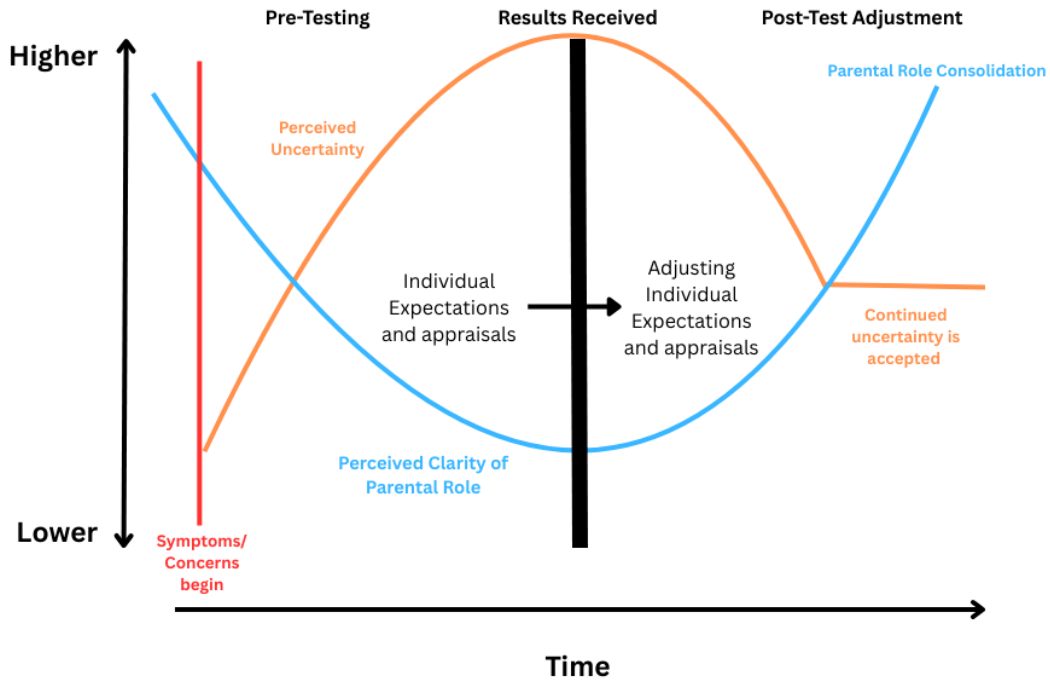
Data on participants are presented in narrative summary to protect their identities and those of the participants as the diagnosis of a rare genetic syndrome alongside geographical information may compromise anonymity. Children were aged between 20 months and 9 years old at the time of the study. Children were diagnosed with epilepsy between 2 weeks and 3 years old. In all but one case a genetic diagnosis was given. The length of time between symptoms starting and getting an outcome from testing was between 3 months and 6 years.

Theoretical codes emerging from the data were related to the theme of uncertainty, with a particular focus on parents' changing relationship with uncertainty across time. Another theme emerged relating to parents' role being threatened by uncertainty and resulted in adjustments to expectations and appraisals by parents of themselves, their child, professionals, and the future. These adjustments led to increased clarity of parental role and role consolidation as they updated their understanding of their parenting role following the outcome of genetic testing being shared with them. Genetic testing results acted as a precipitating event for the re-appraisal of expectations and the beginning of a process

focused on reducing uncertainty and consolidating their role as a parent (See figure 1 below).

Figure 2.1

The Process of Adjustment for Parents with Genetic Testing as a Precipitating Event



Higher and Lower Indicate Higher and Lower Levels of Uncertainty or Perceived Parental Role Clarity

3.2.1 Pre-testing

Parents described distressing experiences when first observing symptoms in their child e.g. noticing developmental delays, behavioural difficulties, frequent visits to A&E, signs latterly attributed to seizures e.g. twitches, seizure activity happening cyclically, and finding their child unresponsive in their cot then being rushed to hospital.

> *When we first began having symptoms, we were in and out, it felt like we were in an out of A&E. Every few weeks. It was continuous and they were saying, oh, its febrile convulsions, you know, he will grow out of it. (P6[1])*

[1] P6 refers to Participant 6

Parents also described that genetic testing was suggested or mentioned first in the context of being in hospital with their child who was experiencing seizures, having experienced a difficult birth, being in Neonatal Intensive Care Unit (NICU), or trying to get seizures under control in the community. They reported feeling stressed and being "sleep deprived", "shell shocked", "in the thick of it" and at times going through several other tests when genetic testing was introduced. Two of the parents had already had some previous genetic testing for their child which did not result in diagnosis.

This creates a context for decision making about engaging with genetic testing in which it takes place as one of possibly many tests the child is having, and in which parents are keen for answers and so are willing to accept any opportunities to understand what is happening for their child. They also described seizures as being uncontrolled and progressing in the time before and while testing was suggested which may have increased feelings of distress and motivation to reduce uncertainty by getting answers for why seizures were happening; *"But then while we were waiting for the genetic testing and in that sort of eight months, we were having, he was having two seizures a week. It was just ramping up, really progressing". (P6)*

Another finding reported by parents was that they had a "gut feeling" and intuitively felt that something was 'wrong' with their child when they noticed symptoms; *"I had a gut feeling that there was more to it than that" (P3)*. They described knowing something wasn't right, that something would be found (not necessarily through genetic testing) and having a sense that their child was 'different'. Some participants reported gathering evidence of seizures/symptoms through videos to show professionals as they felt that they weren't being heard when raising concerns about their baby's symptoms; "I said you've seen it yourself in the clinic with him, I says. But I've been taking videos" (P3). This also influenced later reactions to genetic testing results and diagnosis and how they made meaning of the results.

Parents described not knowing much about genetic testing or genetic conditions when they agreed to testing and some reported "going through the motions" (P8: "So kind of felt like like, yeah, let's go through the motions. Let's, like, rule out everything") and "going in with blinkers on" as they agreed to testing without a complete understanding of the possible

outcomes: “So as I say, we didn't know anything about genetic testing. So we were going in literally with the blinkers are not knowing what the outcome could be or what it was or what was kind of going on” (P3).

Parents described being in a particular “mindset” i.e. focused on getting an answer or ruling things out, as they were having other tests at the same time. Parents reported believing that their child would not get a genetic diagnosis from testing; “Although he was taking seizures in between. He's so well, he's not a poorly child, so I wasn't concerned” (P6), and reported having their hopes for an answer from genetic testing tempered by professionals who advised that the results would take some time to come back and being advised they may not find anything; “obviously they said that we might not find anything. It could just be completely it's epilepsy. That's it…ehm and not to have our hopes up” (P3).

Some parents had been through previous genetic testing which had not returned positive results “To be honest, I think because see that the first ones came back negative, we didn't really have much expectation. I think we were thinking oh, that nothing will come back or again” (P9), so this shaped parents pre-testing expectations as they did not expect the current testing to return anything; “I think that in our heart of hearts, we always had a funny feeling. We weren’t going to get anything back anyway” (P7).

Despite the belief that nothing would be found, many parents reported that they held some hope that they would find a cause to access a treatment or medication that could improve things for their child. Parents described hoping to know what they were “dealing with” in order to ‘manage it’ i.e. their child’s seizures and symptoms:

> *If we find out why is there maybe you know we'll maybe find the right medication. Is there something else we can do to help or try and prevent these is there… you're constantly always looking for the reason why (P9).*

3.2.2 Results Received

Parents described their initial emotional response when they got the genetic testing results, which was mainly shock and relief (“Yeah, I think like getting the diagnosis was. It's bittersweet, isn't it? Because we wanted to know” P8). Another participant described feeling disappointed to learn how rare their child’s condition was. They also spoke about

holding conflicting emotions i.e. shock and relief and feeling a weight off their shoulders, although one parent acknowledged that they were unsure why they felt relief from the diagnosis as they understood before getting the results that this would not likely change anything for their child's treatment. Another parent described the experience of receiving a diagnosis as leaving them feeling numb. Other possible diagnoses had been suggested to them while they did genetic testing and waited for the results:

> *So then you're then you're hit like a tonne of bricks again because you're… you're told what this means and you go away and Google and yeah… You're a little bit numb. I think it's a little bit of a surreal experience (P8)*

Parents who felt that they needed to gather evidence to substantiate initial concerns about their child's presentation reported feeling validated once they got the genetic testing results; "so I couldn't believe- I thought the relief, like I said, and I thought, I'm not going crazy" (P6). Parents also reacted by questioning why this illness had happened to them and their child; "why? why us? where's it came from? What is happening?" (P3). They stated that they expected or hoped for an answer but not the one they got: "By getting these genetic testing done, we thought we would maybe get an answer. I know we have got an answer, but obviously not one that we were expecting" (P9).

Parents learned that their child's diagnosis was rare and began to understand that this left them with more questions than answers and limited information; "But because it was so rare. They couldn't really tell us much about it" (P2). They also learned that professionals were often uncertain about the diagnosis and could not provide them with all the information they wanted. They were often directed to information from limited sources e.g. websites or forums for parents of children with their diagnosis: "It's learning for the doctors, who you think would be able to give you the answers and their learning, that I think you were like, right, OK, we're really still back at square one" (P3)

Parents then responded to this by seeking information to support their processing which was aimed at applying general information to their own child and circumstances in order to make meaning of it and reduce uncertainties and ambiguities that they were facing. This was described as a confronting experience for parents as they explained that the information difficult to read and "harrowing" (P8). This initial information seeking and

processing allowed parents to begin to make meaning of the results; “As well as trying to understand what it's actually going to mean in reality, how is it going to affect your day-to-day life?” (P4). Parents leave this stage of the process with a “basic medical outline” of their child’s condition and a general direction to go in.

They began to consider the future in the context of information available to them and unanswered questions; “We were given a diagnosis, but the path for us was still dark. We didn't know what the future was going to be and when it was going to look like” (P4).

3.2.3 Post-test Adjustment

The substantive theory identifies adjustment specifically in terms of adjustment to uncertainty with an acceptance that uncertainty will remain a constant in their journey. Parents positively reframe uncertainty e.g. by putting their hopes in future research and possible medical advances. Parents also adjust by clarifying and consolidating their role as a parent with a new understanding of the challenges they will face and gathering the resources they need to face these challenges i.e. information, social support; “nothing comes with a manual, and we've just literally had to learn in our feet” (P3).

Once parents receive a diagnosis, they have a starting point from which they can begin their journey to reduce and accept uncertainty. As one parent stated: “You feel more equipped, and you feel more sure of yourself once you've got the diagnosis and you've seen what's available. And you've talked to other families who have been impacted by this” (P8). For the parent whose child did not get an outcome from genetic testing, they were left with continued uncertainty about the underlying cause of their child’s illness: “What more could be going wrong? Yeah. Do you know what? And each year in another… another added layer of complex complexity and challenge. So yeah, I feel like it is important for us to. To know what just to know what, what, what's what is going….” (P7), but appeared to be able to generate a sense of certainty from having had a definitive answer from testing:

> *So it's just that you just desire, an answer really. And it's just something that kind of…. Just want an answer, but we have an answer and the answer is that there's absolutely no genetic cause and there's no structural cause as to why she is the way she is and nobody can really tell you I suppose. (P7)*

This participant also addressed the preference for definitive and certain information:

> *Do you know what? I would rather have no information. And there's nothing to do. There's no evidence. There's nothing. There's just nothing. Or I'd rather have all the information and be a full answer. I would hate to have bits and pieces and just be more confused. (P7)*

Parents attributed getting a diagnosis (an 'answer') with regaining a sense of control in a situation that otherwise made them feel powerless:

> *I think the sooner you can get to the root cause. The better because you're no one likes to be left in limbo and people like to have that, you know, have it clarified and have that sense of. Like control given back to them I suppose of then being able to go in and look at what might help. (P8)*

Parents described a process of becoming increasingly knowledgeable and skilled at managing their child's illness (i.e. parental role consolidation), which appeared to facilitate adjustment: "We are the experts in [CHILD], and we know her better than anyone" (P5). There was a sense that parents engaged in a continuing process of attempting to reduce or resolve as much uncertainty about the diagnosis as possible; "You just you just absolutely immerse yourself in it and you read up everything that you need to know. You just want answers, and you just need to know everything" (P7). This process also included identifying unmet needs and ensuring these are met, sometimes this process was conceptualised as advocating for their child.

> *I definitely feel like there's a need to fight because I don't. I don't want him to be written off. Every child has their own potential, and he deserves care just as much with any other child because we don't know what's going to happen. (P8)*

They reported having to make complex medical decisions about their child and using their parental judgement to do this:

> *And everyone puts in advice and helps us, and we're willing to take on advice from everyone. But we are also willing to say no, we're not doing that because that's going to cause her distress or that's going to kind of impact on her enjoyment of the world. (P5)*

Parents valued their relationship with professionals and considered them as being on the journey with them, which may suggest there is a function of isolation reduction from this; “But we're doing this together. We're all on the same path” (P6). They also reported putting their trust in healthcare professionals and relying on them communicating with them about their child’s care and being transparent, including when they were uncertain or did not have all the information:

> *And you do put a lot of trust in the doctors to know that, that’s the medicine that she should be on or that she needs this part of the equipment and she needs this and that, but the, the decision is still ours in a way… (P1)*

Parents reported using cognitive avoidance to cope with continued uncertainties about the future and about their child’s life expectancy: “it’s still there, it’s always in my mind I think for my sake more than anything it’s easier just to.. bury it away and try not to think about it too much.” (P1) Parents instead reported needing to focus on the ‘here-and-now’; “So we don't know what the future holds basically, we have to kind of take things as they come.”

Parents reported that accessing ‘avenues of support’ as a result of the diagnosis was helpful and offered them some hope; “there's still that wee glimmer of hope that there's that wee community there” (P3). They reported valuing access to other families with the same rare diagnosis in order to reduce uncertainty about the future or support others to do the same, obtain another perspective to aid decision-making, and reduce the sense of isolation they felt:

…if there's something, something else comes up and see. Oh. Has this happened with your children and how have you dealt with dealt with it? What have you done to support them and things like that? So it's… it's a good support to have. (P2)

However, barriers to linking up with specific families was highlighted, including knowing there may be a small number of other families in Scotland but not being in a position to reach out and make contact with them; “But I think it's a shame that there's not enough groups out there or people to share your experience with” (P6), “And a lot, as I say, most of them are based in England and England and Scotland are completely different when it comes to health” (P3).

Adjusting expectations

Parents expressed concerns in terms of contrasting views on adjusting expectations of the child and what they can do based on differences between age and developmental stage: “Do you know that expectation of; Come on, [CHILD], this is day-to-day life. You need to fit in. You need to get up. Get ready for school” (P4).

> *Or maybe I should? Should I be treating her differently? Should I be giving her more help when it she struggles like sometimes to climb stairs or so should I be giving her more help on the stairs? Or should I, you know, don't want to waste away our muscles so you know, make sure she does climb the stairs on her own. (P9)*

Some parents did not have expectations of professionals to know about their child’s condition, reasoning that it was rare and only a small number of others in the world had the same diagnosis: “I had no kind of preconceptions. I had no I wasn't going in and being like, right, this this guy should have all the answers. He's the doctor” (P5). Other parents did report the belief that professionals should have more knowledge and answers and were surprised to learn that they did not once they were given a diagnosis; “it was hard to deal with at the start for when you just expect people to have answers, now if that’s your job, you should have an answer for it…” (P1). The same parent later commented the following, indicating that they had adjusted expectations of healthcare professionals:

> *Until you actually go through it and you find out that nobody really has any answers for everything.. you can be qualified in your field as much as you want, it does nae, it doesn’t necessarily mean that you’re going to have every answer, to every question. (P1)*

Parents spoke about the lack of change to their child’s care as a result of diagnosis, possibly indicating an adjustment of expectations of what a diagnosis means i.e. diagnosis functions differently to what parents hoped for when they agreed to undergo testing: “I think we would still been going through the same process even if we hadn't had that. The diagnosis that we would still be kind of in the same the same boat” (P2).

Parents discussed the grief they experienced when adjusting their expectations of the future for their child. They discussed the loss of the life they imagined for their child and the sense

of uncertainty about what the future would hold: “It's a bit mad. It's almost like….It's like a death…..It's like a death” (P4).

> *You know, [CHILDs] going to need care at all times. So yeah, it's completely life changing. I suppose all your hopes and dreams that you've got for your children and things like that, that's never going to happen for [CHILD] (P9).*

> *you want to be able to give them everything that you hope that they can have for their life for their future. And when you have so little control over that from a genetic quirk of fate that has taken a lot from her, then any control that you do have over. Our lives as well is is. Yeah. Gives you a little bit of hope… (P5).*

Parents drew from experiences of other families to reduce some of this uncertainty by building a new model of the future for their child e.g. by asking questions in online groups and meeting families who have older children: “And in the last meet up it was a lot of older children older kids teenagers with the condition and you were able to see do you know what that will be us” (P3).

Illness Appraisals and Perceptions

Parents reported a change in how they thought about their child as a result of genetic testing in terms of an acceptance of the child’s illness or developmental stage: “We looked at her differently after the diagnosis because you're- you're like, I mean and really blunt and not very nice terms. There's something wrong with you now and we need to watch out for these things” (P4). One parent made a distinction between her child and the illness in expressing a desire for things to be different: “I would change what [CHILD’s NAME] has got, I would nae change her” (P1).

Parents also reported sharing information about their child and the diagnosis they received with others involved in the child’s life e.g. school/education, family members, and other healthcare professionals e.g. A&E doctors. Parents reported using the child’s diagnosis as a tool to support a shift in other people’s appraisals of their child: “So, I feel as if because I've got that as evidence, I can say no. He's got a rare genetic condition and this is what it is” (P6).

Another parent reported that sharing the diagnosis helped to mobilise the system around the child to put appropriate supports in place in school and empowered the parent to attend an in-service day at her son's school to share information with the staff about the diagnosis:

> *Because when this came out that he had, it was a specialised, a different epilepsy too. I had to deliver to his class teachers, to- had to go down in service Day and tell the support staff in the school all about him. (P6)*

For the parent who did not receive a diagnosis, it appeared that there was a greater uncertainty around understanding her child and who she is without a diagnosis to explain or account for her symptoms and presentation:

> *And I think…. I think it's taken us quite a long time to actually understand [CHILD] to [CHILD] is. And I think we're still understanding who [CHILD] is? To be honest, it's taking us a long time to actually get to know who she is. (P7)*

To contrast with an acceptance of the child for who they are, there was some difficulty in accepting a child when contrasted with where their peers were and an acknowledgement of the deviation from expected developmental trajectories; "And even now it can be a little bit difficult to. Accept her for who she is and not try to fit her into the mould of quotation marks. Normal" (P4).

Parents begin the process of adjusting their expectations of their role as parents, of their child, medical professionals, diagnosis, and their future, as well as experiencing the grief associated with the loss of the life imagined for them and their child. Genetic testing outcome functions as a precipitating event for this process. There appeared to be a motivation initially of reducing uncertainty completely i.e. 'getting answers' followed by an acceptance that some uncertainty will be a constant and that parents have enough information available to them to support consolidation of their role as a parent.

4. Discussion

This study aimed to explore the role of genetic testing in parental adjustment to their child's DEE or treatment-resistant epilepsy and the impact of genetic testing on parental appraisals of their child's condition. Pre-testing hopes and expectations have an impact on subsequent

adjustment e.g. if the diagnosis was anticipated or not, in addition to the context in which genetic testing was undertaken i.e. high levels of stress with uncontrolled seizures.

Receiving test results was conceptualised as a precipitating event and turning point for parents as they achieved some certainty around the 'cause' and were then able to proceed to access information about diagnosis and understand the meaning of this information for themselves, their child, and their future. The parent who did not receive an outcome from genetic testing conceptualised this as a form of certainty as they "had an answer", which was perceived as more 'black and white' information and preferable to unclear or uncertain information.

Uncertainty emerged as a theme present at each stage of parents' journeys through genetic testing. Adjustment was observed as an acceptance of uncertainty remaining present as a constant throughout their journey. Illness uncertainty was conceptualised by Mishel (1990) as a cognitive experience occurring when the meaning of illness-related events is ambiguous, and illness outcomes are unpredictable due to insufficient information. Mishel developed a four-stage model of uncertainty in illness including a) the antecedents generating uncertainty b) the appraisal of uncertainty as a danger or an opportunity c) Attempts to cope focus on either reducing uncertainty appraised as a danger or to maintain uncertainty appraised as an opportunity and d) the state of adaptation resulting from effective coping (Mishel, 1990).

Engaging in genetic testing may be an attempt by parents to reduce uncertainty and obtain more information about their child's condition which could facilitate better coping and adjustment over time e.g. reduced uncertainty may support parents in clarifying and consolidating their role as the parent of a child with a complex medical condition while maintaining some uncertainty allows parents to maintain hope for the future i.e. advances in medicine and research leading to improved treatments. This increased sense of certainty may function to reduce distress for parents.

Research indicates that parents without a diagnosis for their child are left without a 'roadmap' to navigate services e.g. Aldiss et al. (2021) found that parents of a child with an undiagnosed genetic condition experienced distress resulting from uncertainty about their child's future and not knowing what to expect. Uncertainty about prognosis and life

expectancy left parents anxious e.g. they described difficulties interpreting new symptoms as being part of a minor ailment or something more serious. Results from this study expand on these findings as parents described a much broader sense of uncertainty about navigating the future more generally in terms of what day-to-day life will look like for their child, themselves, and the wider family.

There was evidence that parents went on to adjust pre-testing hopes and expectations after they received genetic testing results. This appears consistent with a model of meaning making in the context of stressful life events and conditions proposed by Park and Folkman (1997). This model proposes that events (i.e. receiving an outcome from genetic testing) which threaten an individual's valued commitments (i.e. being a 'good' parent) and valued goals (i.e. ensuring the best quality of life and life experiences for their child) are appraised as a threat to their global belief system. The individual then responds to this threat by making secondary appraisals in terms of their abilities to cope with the threat and updating either global beliefs or situation-specific beliefs to accommodate their experiences (i.e. updating illness appraisals and parent role appraisals).

(McConkie-Rosell et al., 2018) found similar levels of healthcare engagement, tolerance of uncertainty, and rates of depression and anxiety in their sample of parents of children with an undiagnosed condition compared with those managing a known diagnosis. However, their sample was noted to have higher rates of coping self-efficacy compared with other parents of children without a diagnosis. This finding may indicate that higher coping self-efficacy is linked with secondary appraisals of one's perceived capacity and resource to cope with a health-related threat, as in Mishel's theory of Uncertainty in Illness (Mishel, 1990) and in meaning-making in the context of stress and coping in Park and Folkman (1997). This research suggests that there are possible individual differences in how parents adjust to their child's diagnosis or health condition. In this study the parent whose child did not get a diagnosis from genetic testing used this as information which ruled out conditions thus reducing some uncertainty. This parent also focused on what was known about their child i.e. that they had a diagnosis of epilepsy and highlighted her and her partner's confidence in managing this well.

4.1 Limitations

Although there are limitations to the generalisability of grounded theory findings generally, the sample in this study was fairly homogenous in terms of gender, ethnicity, age, education and employment status, which limits the generalisability of the study findings. Furthermore, the sample only included one father and one parent whose child did not get a diagnosis from genetic testing. This warrants further exploration in future studies as it is not known whether the current theory can explain the experience of parents from other backgrounds. Given that current methods of genetic testing identify a cause of epilepsy in under 50% of cases, there is a need to understand the experiences of parents of a child who do not receive a genetic diagnosis.

However, as detailed in this study, appraisals have been acknowledged as being important for making meaning of an event or outcome, therefore it is possible that parents make individual appraisals of their results based on prior global beliefs and situation-specific beliefs. Subsequent adjustment may be linked to the capacity to reduce uncertainty and discrepancy between their global beliefs and situation specific beliefs regardless of genetic testing outcome.

Although genetic testing is proposed to be a precipitating event for the process of adjustment through re-appraisal of events and meaning-making, it is unclear if parents may have eventually undergone these processes anyway without genetic testing or diagnosis. Other factors such as family functioning and phenotypes associated with increased emotional and behavioural challenges in children have also been found to have an impact on parental cognitive appraisals of illness, adjustment, and stress (Fitzgerald & Gallagher, 2022). It is possible that genetic testing functions to add momentum to the adjustment process which parents may undergo anyway.

4.2 Strengths

This study contributes an understanding of parents' appraisals of their experience of genetic testing for their child, allowing for an increased understanding of personal utility of genetic testing for parents of a child with DEE or treatment-resistant epilepsy. The study indicates that genetic testing and the outcome can lead to re-appraisals by parents in a process of adjustment to their child's diagnosis. The use of grounded theory to illustrate the process sheds light on the role of genetic testing as a precipitating event in subsequent adjustment

processes and provides rich data which may complement existing research exploring genetic testing utility for parents.

4.3 Clinical implications

There is evidence from the current study and the wider published literature that pre-testing hopes and expectations can influence appraisals made of the outcome of genetic testing (Donohue et al., 2021). Gaining clarity about parents hopes and expectations pre-testing means that genetic counselling offered after results is tailored to individual needs. Parents' adjustment to their child's condition can be facilitated by offering additional time with professionals to support the process of updating appraisals and understanding the meaning of the outcome for them and their child. Parents benefit from good relationships with professionals involved in their child's care which were based on trust, good communication, empathy and sensitivity. This suggests an important role for clinicians not just as an information source but as a valued partner working alongside parents as they navigate the path ahead of them.

Parents benefit from social support to reduce isolation but parents in this study identified barriers to accessing other local families with the same diagnosis as them, which may reduce opportunities to access invaluable peer support. A recent study by (Cook et al., 2023) identified that healthcare professionals reported that parents of children with epilepsy often reported feeling isolated and it was acknowledged that there was a lack of resource or funding available to provide social interventions which would encourage networking and connection. It was also noted that there was often a lack of community-based activities to access which are under-resourced. Fragmented services with poor integration between health and social care may hamper efforts to find and provide adequate support for parents.

Finally, parents described an emotionally taxing and distressing experience going through the process of understanding and developing their parental role in managing their child's complex healthcare needs. However, parents also described valuing this role and finding great personal meaning in being able to enact this role. Increased recognition of this process by clinicians and other agencies e.g. social care and third sector organisations is required in order to support and facilitate role development. Part of this recognition may involve identifying unmet support needs i.e. for respite and breaks.

Evidence suggests that carers are at times unaware of the support available to them or the offer of respite not being suitable for their child with DEE due to their complex care needs i.e. use of agency workers and lack of continuity of care. There are wider issues associated with staff shortages or lack of available staff in remote/rural area. This may be an issue affecting parents in the West of Scotland. Navigating the complex and beaurocratic system currently in place in Scotland (e.g. self-directed support) can be a source of distress for parents(Minic & Smith, 2022). This burden could be reduced through additional support from social care, including simplified processes and increased flexibility for people and their families/carers accessing this support.

4.4 Conclusions

Genetic testing outcomes may reduce a sense of uncertainty for parents of a child with DEE or treatment-resistant epilepsy, leading to increased ability to clarify and consolidate their role as a parent. Parents may experience reduced uncertainty as a decrease in subjective distress and increased efficacy in enacting their parenting role. Future studies may explore individual differences in parents of children with DEE/treatment-resistant epilepsy to determine their role in adjustment e.g. tolerance of uncertainty as well exploring any differences in meaning generated from different testing outcome.

Competing Interests

No competing interests to declare.

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Appendices

Appendix 1.1

PRISMA Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	10
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	11
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	14
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	15
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	15 - 16
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	17
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	17 - 18
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	18 - 19
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	18 - 19
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	18
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	18

Section and Topic	Item #	Checklist item	Location where item is reported
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	19
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	n/a
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	n/a
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	19
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	19
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	19
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	n/a
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	n/a
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	19
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	n/a
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	19 - 20
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	n/a
Study characteristics	17	Cite each included study and present its characteristics.	19 – 20 22 - 23
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	24
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	n/a
Results of	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	n/a

Section and Topic	Item #	Checklist item	Location where item is reported
syntheses	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	25 - 32
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	n/a
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	n/a
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	n/a
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	n/a
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	32 - 33
	23b	Discuss any limitations of the evidence included in the review.	34
	23c	Discuss any limitations of the review processes used.	34
	23d	Discuss implications of the results for practice, policy, and future research.	35
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	11
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	11
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	n/a
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	n/a
Competing interests	26	Declare any competing interests of review authors.	35
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	n/a

Appendix 1.2

Systematic Review Data Extraction Tool

https://osf.io/8wjbr

Appendix 1.3

Data Qualitisation

https://osf.io/arp5v

Appendix 1.4

Critical Appraisal Tool for Analytical for Cross-sectional Studies

Table 1.2;
JBI Critical Appraisal Tool for Analytical Cross-Sectional Studies

Record no.	Study	Were the criteria for inclusion in the sample clearly defined?	Were the study subjects and the setting described in detail?	Was the exposure measured in a valid and reliable way?	Were objective, standard criteria used for measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes measured in a valid and reliable way?	Was appropriate statistical analysis used?	**Overall Risk of Bias Judgement**
1	Aksoy, Karakaya, Turkdogan, Karakteir, & Save	Yes	Yes	Not Applicable	Yes	No	No	No	Yes	**Moderate**
2	Louik, Doumlele, Hussain, Crandall, Buchhalter, Hesdorffer, Donner, Devinsky, Friedman	Yes	Yes	No	No	No	No	Unclear	Unclear	**High**
3	Fong, Lim, Kong, Lua, Ong	Unclear	Yes	No	No	No	No	Yes	Yes	**High**
4	Gayatri, Morrall, Jain, Kashyape, Pysden, & Ferrie	No	No	Unclear	No	No	No	No	Yes	**High**
5	Kumari, Garg, Sharma, & pende	No	No	No	No	No	No	No	Yes	**High**

Appendix 1.5

Critical Appraisal Tools for Qualitative Research

Table 1.3;
JBI Checklist for Qualitative Research

Record No.	Study	Is there congruity between the stated philosophical perspective and the research methodology?	Is there congruity between the research methodology and the research question or objectives?	Is there congruity between the research methodology and the methods used to collect data?	Is there congruity between the research methodology and the representation and analysis of data?	Is there congruity between the research methodology and the interpretation of results?	Is there a statement locating the researcher culturally or theoretically?	Is the influence of the researcher on the research, and vice-versa, addressed?	Are participants, and their voices, adequately represented?	Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	**Overall Risk of Bias Judgement**
6	RamachandranNair, Jack, & Strohm	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Moderate
7	RamachandranNair, Jack, Meaney, & Ronen	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Moderate
8	Whitney, Strohm, Jeffs, Jones, Jack, & RamachandranNair	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Moderate
9	Galliard	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low

Appendix 1.6

Table 1.4; Included Study Methodology Characteristics

Record Number	Author(s)	Study Design	Methods/Measures	SUDEP Intervention/Information offered as part of the study?
1	Aksoy, Karakaya, Turkdogan, Karakteir, & Save	Descriptive Questionnaire-based study	31 item multiple choice questionnaire and a survey, questionnaires were administered by reading questions out loud in a face-to-face interview with parents	No
2	Louik, Doumlele, Hussain, Crandall, Buchhalter, Hesdorffer, Donner, Devinsky, Friedman	Exploratory analysis of semi-structured interview data and file review	Semi-structured interviews by phone. Interview data, autopsy report, medical record review to determine final cause of death by 2 epileptologists	No
3	Fong, Lim, Kong, Lua, Ong	Descriptive Questionnaire-based study	Clinical data gathered on demographic information and information related to child's epilepsy. DASS-21 (Depression Anxiety Stress Scales–Short Form). Questionnaire assessing beliefs about SUDEP and reactions to learning about SUDEP. 2 time points for questionnaires; immediately after SUDEP information provision and at 3-6 months after.	Information on SUDEP was delivered as part of an epilepsy educational program to the parents using the validated Interactive Epilepsy Education Programme (IAEEP), an epilepsy educational software program developed by the Institute for Community Development and Quality of Life, University Sultan Zainal Abidin, Malaysia, that was further revised by the Division of Paediatric Neurology, University Malaya [12]. The IAEEP software program gave participants clear and concise information regarding SUDEP. Prior to the study, clinicians in UMMC would not routinely discuss SUDEP with families of CWE.

4	Gayatri, Morrall, Jain, Kashyape, Pysden, & Ferrie	Prospective repeared-measures design	A questionnaire completed immediately after and at 3-6 months after participants were given a leaflet on SUDEP in clinic.	An information leaflet on SUDEP: The leaflet gave participants clear and concise information regarding what SUDEP is, its rarity, risk factors, possible preventative measures, and additional sources of information.
5	Kumari, Garg, Sharma, & pende	pre/post intervention single arm study design/quasi-experimental	Demographic details of participants, clinical details of the child, and prior knowledge of SUDEP was recorded using a proforma. DASS-21 (Depression, Anxiety and Stress Scale-21), epilepsy-related childcare behaviour and practices questionnaire (developed by researchers and not validated). Measures done at baseline and 1 month after SUDEP counselling.	One-hour counselling session. In the first stage, parents were provided with written information about SUDEP in Hindi or English, as per language preference and comfort. In the second stage, an educational five-minute video was shown to the parents, detailing information on SUDEP. In the third stage, face-to-face interaction with the treating physician enabled parents to raise queries, clarify doubts, and discuss preventative measures. The video and interactive sessions were done in groups, up to a maximum of five parents.
6	RamachandranNair, Jack, & Strohm	Descriptive and exploratory qualitative	Semi-structured 1:1 telephone interviews.	No
7	RamachandranNair, Jack, Meaney, & Ronen	Descriptive and exploratory qualitative	Data gathered via 6 focus groups and an additional 6 1:1 interviews were conducted with parents bereaved by SUDEP.	No
8	Whitney, Strohm, Jeffs, Jones, Jack, & RamachandranNair	Descriptive and exploratory qualitative	Demographic data collected during screening eligibility and consent phone call. Semi-structured telephone interviews 1:1.	No
9	Galliard	Interpretive Phenomenological Analysis	Data gathered via semi-structured 1:1 interviews, F2F	No

Appendix 1.7

Table 1.5, Included Study Sample Characteristics

Record Number	Author(s)	Number of Participants	Characteristics of participants (Parents, caregivers)	Characteristics of Children/People with epilepsy	Prior Knowledge of SUDEP?
1	Aksoy, Karakaya, Turkdogan, Karakteir, & Save	146	Parents of Children with Epilepsy attending an outpatient clinic with their child in Turkey, 75% female, Median age 34 years (range: 19 - 55). 46.5% had primary education or less. 55.7% recorded "expenses are equal to my revenue or less". 63.9% recorded as "unemployed".	Children were 0 - 22 years old (mean age: 7.73 years, SD; 5.01), 54.8% were female. Duration of epilepsy median; 3 (range: 0 - 18 years).	24 (16%) had prior knowledge of SUDEP.
2	Louik, Doumlele, Hussain, Crandall, Buchhalter, Hesdorffer, Donner, Devinsky, Friedman	138	Family members of 138 deceased individuals enrolled in NASR, 79% (109) interviews were conducted with at least one parent. (the remainder were conducted with 14 (10.1%) were conducted with a widow/widower, and 15 (10.9%) were conducted with an adult offspring, sibling, or another next-of-kin.	38.4% of decedents were female, 89.9% were white, Age at epilepsy onset: median = 9 years (IQR: 14.9), epilepsy duration Median = 11, IQR = 16.5, Age at death = 24 (IQR = 24).	18.1% (25 participants) of the sample reported SUDEP being discussed with them prior to the study.
3	Fong, Lim, Kong, Lua, Ong	127	42 (33.1%) were fathers, 84 (66.1%) were mothers and one participant was a female guardian. Highest education received by both the fathers and mothers of CWE showed similar distributions [fathers' education level: primary (2.4%), secondary (63.8%), tertiary (33.8%); mothers' education level: primary (3.9%), secondary (65.4%), tertiary (30.7%)].	The mean age of the CWE was 9.6 years (standard deviation 4.7 years), and 75 (59.1%) were males. The CWE were of three different ethnic groups: 48 Malays (37.8%), 38 Chinese (29.9%) and 41 Indians (32.3%). Most (96 of 127, 75.6%) of the CWE had no comorbidities, while 31 (24.4%) had one of the following comorbidities: physical disability (n = 7), learning difficulty (n = 18), or other comorbidities (n = 6).	Forty (31.5%) of the participants had heard of SUDEP prior to the study.

4	Gayatri, Morrall, Jain, Kashyape, Pysden, & Ferrie	39	parents/legal guardians of children attending a regional paediatric epilepsy clinic. 67 parents completed and returned the first questionnaire, 47 completed and returned the second, 39 completed both. No information on parent demographics provided.	children had mean age 10.55 (SD: 3.57, range 1.9 - 17.4 years).	Prior knowledge about SUDEP not assessed as part of the study.
5	Kumari, Garg, Sharma, & pende	120	parents of children with epilepsy attending an epilepsy clinic for at least 3 months prior to enrolment (India). 70 (58.3%) of the sample were mothers and 50 (41.6%) were fathers. 37.5% of the sample had education up to middle school, 36.7% received education up to High School, 16.7% intermediate, 7.5% graduates, 1.9% postgraduates. It is largely accessed by patients belonging to the lower and lower-middle socioeconomic class, who do not have health insurance.	Median age of children with epilepsy was 4.66 (2.31 - 10.18 years). Median duration of epilepsy was 1.95 (1.02 - 3.59 years). 60.8% of the sample were male. Generalised onset seizures constituted 69.1 %, focal onset 24.2 %, focal to bilateral tonic-clonic 4.2 %, and unknown onset 2.5 %. Sixty percent had associated comorbidities, including developmental delay (55.8 %), vision abnormalities (24.1 %), and cerebral palsy (17.5 %).	Prior knowledge of SUDEP 5 (4.2%) participants.
6	Ramachandran Nair, Jack, & Strohm	27	27 bereaved relatives of 21 patients, 21 female, 6 male. 18 parents, 4 siblings, 5 spouses.	No information provided.	Pamphlet on SUDEP provided days before the interview took place.

7	Ramachandran Nair, Jack, Meaney, & Ronen	42	21 mothers and 15 fathers, sample included 6 parents bereaved by SUDEP. 6 parents who lost children to SUDEP, new-onset epilepsy: 5, mild epilepsy: 9, and moderate–severe epilepsy: 7)	Children who had a death caused by SUDEP, Children with moderate to severe epilepsy, Children with mild epilepsy, and Children with new-onset epilepsy.	Pamphlet on SUDEP provided days before the interview took place.
8	Whitney, Strohm, Jeffs, Jones, Jack, & Ramachandran Nair	27	10 female caregivers, 3 male caregivers of people with epilepsy, 8 adult females with epilepsy and 6 adult males with epilepsy.	people with epilepsy with a mean age of 13.9 years (range: 4 - 29 years).	the individuals or PWE and primary caregivers were aware of the risk of SUDEP at least 12 months before the interview.
9	Galliard	11	11 mothers of children with epilepsy aged 7-12 years.	Children aged 7-12 years old with epilepsy, 7 male and 4 female	All had prior knowledge of SUDEP. Most learned from HCPs or internet.

Appendix 1.8

Table 1.6 Themes for Research Question 1 – Thoughts, Cognitions. Appraisals Reported after Learning about SUDEP

Table 1.6;

Themes for Research Question 1 – Thoughts/Cognitions/Appraisals

STUDY	A majority of parents want to know about SUDEP	What information parents want	How they want this delivered and by whom	Timing of the information	Effect of the information	Appraisals of the impact of SUDEP information on parents and children
1. Aksoy		X	X	X	X	
2. Louik	X	X	X	X	X	X
3. Fong		X	X	X		X
4. Gayatri	X			X		X
5. Kumari	X			X	X	X
6. Ramachandrannair	X	X	X	X	X	X
7. Ramachandrannair	X				X	X
8. Whitney		X	X			X
9. Galliard	X	X	X	X	X	X

Appendix 1.9

Table 1.7; Themes for Research Question 2 – Emotions/Feelings after Learning about SUDEP

Table 1.7;

Themes for Question 2 – Emotions/Feelings reported on learning about SUDEP

STUDY	Anger	Sadness/ Depression	Regret/Guilt	Anxiety/Worry/ Fear/Stress	Shock/ Surprise	Uncertainty/ Mixed feelings	Dissatisfied/Did not appreciate	Positive feelings/ satisfied
1. Aksoy				X				
2. Louik	X			X		X	X	X
3. Fong		X*		X*	X	X		X
4. Gayatri				X	X			
5. Kumari		X*		X*				
6. Ramachandrannair								
7. Ramachandrannair	X		X	X	X	X		
8. Whitney		X		X	X			
9. Galliard				X	X			

*Reported by the DASS-21

Appendix 1.10

Table 1.8; Themes for Research Question 3 – Changes to Caregiving Behaviour after Learning about SUDEP

Table 1.8;

Themes for Question 3 – Changes to caregiving behaviour on learning about SUDEP

STUDY	Healthcare/ Clinical	Lifestyle	Medication	Monitoring/ Supervision	Sharing information with others
1. Aksoy	X	X	X	X	
2. Louik					
3. Fong		X	X	X	X
4. Gayatri		X	X	X	X
5. Kumari		X	X	X	X
6. Ramachandrannair					
7. Ramachandrannair		X		X	
8. Whitney				X	X
9. Galliard		X		X	

Appendix 2.1
Standards for Reporting Qualitative Research (SRQR)

Standards for Reporting Qualitative Research (SRQR)*

http://www.equator-network.org/reporting-guidelines/srqr/

Page/line no(s).

Title and abstract

Title - Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	39
Abstract - Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	43

Introduction

Problem formulation - Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	46
Purpose or research question - Purpose of the study and specific objectives or questions	46

Methods

Qualitative approach and research paradigm - Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/ interpretivist) is also recommended; rationale**	46
Researcher characteristics and reflexivity - Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	47
Context - Setting/site and salient contextual factors; rationale**	46 – 47, 48 - 49
Sampling strategy - How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale**	48 - 49
Ethical issues pertaining to human subjects - Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	50
Data collection methods - Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale**	50 - 51

Data collection instruments and technologies - Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	50 - 52
Units of study - Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	48 – 49, 52
Data processing - Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/de-identification of excerpts	50 - 52
Data analysis - Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale**	51 - 52
Techniques to enhance trustworthiness - Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale**	51

Results/findings

Synthesis and interpretation - Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	52 - 63
Links to empirical data - Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	52 - 63

Discussion

Integration with prior work, implications, transferability, and contribution(s) to the field - Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/generalizability; identification of unique contribution(s) to scholarship in a discipline or field	63 - 67
Limitations - Trustworthiness and limitations of findings	65

Other

Conflicts of interest - Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed	67
Funding - Sources of funding and other support; role of funders in data collection, interpretation, and reporting	n/a

*The authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research.

**The rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.

Reference:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. **Standards for reporting qualitative research: a synthesis of recommendations.** *Academic Medicine*, Vol. 89, No. 9 / Sept 2014
DOI: 10.1097/ACM.0000000000000388

Appendix 2.2

Major Research Project Proposal September 2023

https://osf.io/4hu5f

Appendix 2.3

Major Research Project Proposal Amended November 2024

https://osf.io/654x3

Appendix 2.4

Ethics Letter of Approval June 2024

Text has been removed due to copyright restrictions

Appendix 2.5

NHS R&D Management Approval Letter June 2024

Text has been removed due to copyright restrictions

Appendix 2.6

Ethics Approval of Substantial Amendment Letter November 2024

Text has been removed due to copyright restrictions

Appendix 2.7

NHS R&D Management Approval Amendment November 2024 Email

Text has been removed due to copyright restrictions

Appendix 2.8

Participant Information Sheet

https://osf.io/v9thk

Appendix 2.9

Consent Form

https://osf.io/u8qfs

Appendix 2.10

Demographic Questionnaire

https://osf.io/nj5b2

Appendix 2.11

Semi-Structured Interview Schedule

https://osf.io/4fs5e

Appendix 2.12

Data Analysis: Transcript Line-by-line Coding

Kiely, Siobhan 13:47
Yeah.

P9 13:48
Before, ehm you automatically go to.
Oh, what can you do to help her?
And for your answers to be nothing, that's difficult.

Line-by-Line coding – this text (observation) was assigned the Gerund: "asking what you can do to help her"

Kiely, Siobhan 14:01
Yeah. And is that basically what you've been told, that they they don't know how to help based on those results?

P9 14:09
Yeah[redacted]So it's. Yeah, they don't know. They've never seen that case like CHILDs before. There's [redacted].

Kiely, Siobhan 14:21
OK.

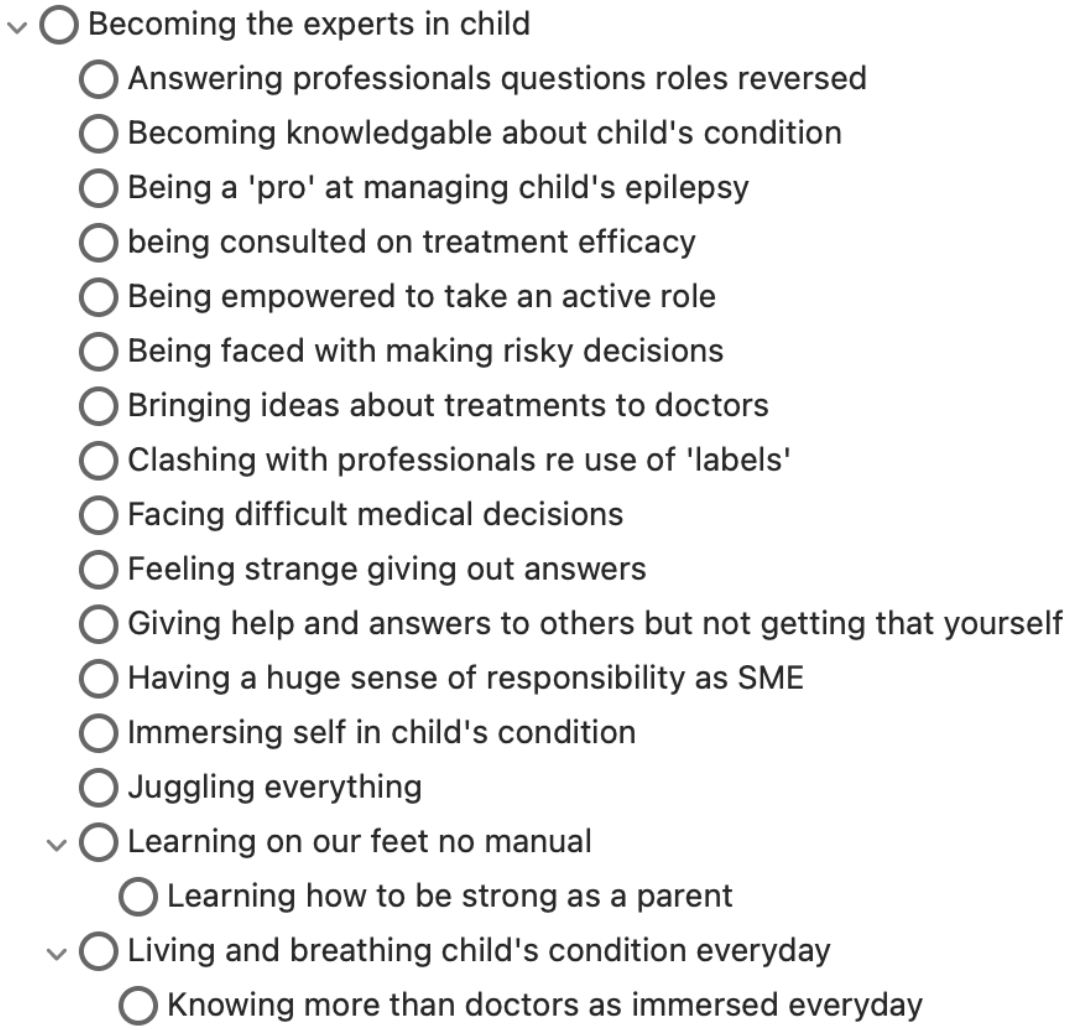
P9 14:22
That professor was going to get in contact with.
But they can only go with what the Google and what's on the website and that's basically what they told us to do at the time.

Line-by-line coding: In-Vivo Code assigned: A genetic quirk of fate has taken something from my child

Appendix 2.13

Data Analysis: Focused Codes (NVivo)

Initial codes placed under the focused code ‘Becoming the experts in child’:



Appendix 2.14

Data Analysis: Concept Map and Grounded Theory Development