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Characteristics of effective parent-mediated interventions for parents of children with neurodevelopmental disorders in rural areas: a systematic review protocol

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ABSTRACT

Introduction Parent-mediated interventions are therapeutic approaches that use parent training to enable parents to provide primary support and intervention to their child through the development of necessary skills, knowledge, and resources.

Parent-mediated interventions can be broadly divided into two stages: (1) Clinicians educating, training and coaching parents in the implementation of an intervention and relevant information regarding their child's condition and (2) Parent(s) mediating and implementing the intervention based on the coaching and education received. These interventions can act as the primary intervention for children or supplement clinical interventions. This review will include both stages of the implementation process as well as both primary and supplementary interventions. Outcomes of parent-mediated interventions include long-term symptom reduction, improved prognosis for a wide range of behavioural and brain functions and enhanced parent–child dyadic social communication.

Methods and analysis This systematic review aims to synthesise existing evidence and identify the characteristics of effective parent-mediated intervention for parents of children with neurodevelopmental disorders residing in rural areas. Systematic searches of CINAHL, PsycINFO, ProQuest allied health and nursing database, Ebscohost Psych and Behavioural database and SocINDEX were conducted twice with the latest completed on 5 March 2024 using preidentified search terms. Citations will be imported into EndNote V.20.6 (Clarivate Analytics, Pennsylvania, USA) to organise and de-duplicate and then Covidence to complete screening and extraction. The articles will be screened and reviewed following the Joanna Briggs Institute (JBI) guidelines for systematic reviews of Mixed methods. The JBI appraisal tools for systematic reviews will be used to assess the trustworthiness, relevance and results of qualitative, quantitative and mixed-methods studies. The scope of the literature analysed will include articles published between 2013 and 2024 in English. Literature was limited to the last 10 years to ensure the relevance of results as the intention is to report on current evidence. The start date of the study was March 2023 and the planned completion date is October 2024.

Ethics and dissemination This study will neither involve human nor animal subjects and does not require ethics approval. Results will be disseminated to relevant groups in peer-reviewed journal(s) and at relevant children and parent health conferences or rural conferences. The key outcomes will also be shared on social media to support access for non-research audiences.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The inclusion of qualitative and quantitative literature will yield a clear set of characteristics, considering the lived experience of users and treatment outcomes.
⇒ The review will employ the Joanna Briggs Institute review methodology and appraisal tools to ensure the validity and reliability of results.
⇒ Examining literature focused on rural areas will provide more specific results than including both urban and rural populations.
⇒ Due to the vast nature of neurodevelopmental disorders, it is not viable to include all disorders as a search term.

INTRODUCTION

Parent-mediated interventions

Parent-mediated interventions, as outlined by Conrad *et al*,[1] are therapeutic approaches wherein healthcare practitioners use coaching and education to enable parents to support their child's development through the acquisition of necessary skills, knowledge and strategies aiming to improve parent and child outcomes. The delivery of these interventions involves healthcare practitioners or organisations educating and coaching parents to enhance the development of their child who has a disability by implementing interventions in the home environment.[2 3] Parent-mediated interventions are delivered through either telehealth and/or online

forums, or directly through face-to-face consults with healthcare practitioners.[4]

Parent-mediated interventions are effective for a range of children and families with contextual variations. These interventions are unique and advantageous as they bring the child's treatment into a familiar setting which in turn eases the transference of skills from the clinical setting into the home environment.[1] A study conducted by Manohar *et al*[5] in South India found that parent-mediated interventions were well received, feasible and had a positive impact on reducing parental stress while enhancing the socio-communicative skills of children with autism spectrum disorder (ASD). Systematic reviews completed by Althoff *et al*[6] and Conrad *et al*[1] found that parent-mediated interventions were effective in improving parental and child skills such as adaptive functioning, disruptive behaviour and occupational performance for children with various neurodevelopmental disorders such as ASD and attention deficit hyperactivity disorder (ADHD). Swanson[7] noted that parent-mediated interventions were effective in improving object exploration in infants with Down's syndrome. Koly *et al*'s[8] systematic review found that parent-mediated interventions were effective in improving parent–child interactions, child social and communication skills, learning ability and academic performance and parental knowledge when implemented with children with neurodevelopmental disorders in South Asia. Furthermore, Rooks-Ellis *et al*'s[9] feasibility study found that parent-mediated interventions were easily implementable for parents and had a positive impact on children's ASD symptomology when delivered through telehealth to rural families in North America. Parent-mediated interventions are a feasible and effective intervention when properly designed, implemented and evaluated[6 10 11] and have been noted to have promising potential as an intervention in low-resource settings.[12] These interventions have the potential to support parents of children with neurodevelopmental disorders living in rural areas by providing access to necessary early intervention. However, there is little exploration and no current consensus on the characteristics of effective parent-mediated interventions for parents of children with neurodevelopmental disorders living in rural areas. The outcomes of this systematic review can contribute to the effective implementation of parent-mediated interventions that account for specific cultural, geographical, social and demographic factors associated with rural areas.

As these interventions are a relatively new form of treatment the development and trial of these interventions with varying populations is required to identify their acceptability and effectiveness. This is evidenced by the systematic review conducted by Law *et al*[13] that found parent-mediated interventions did not reduce the risk of ASD diagnosis when provided as an early intervention for children under 24 months of age at risk of neurodevelopmental disorder.[13]

Children with neurodevelopmental disorders

Neurodevelopmental disorders are defined in the Diagnostic and Statistical Manual of Mental Disorders, fifth Edition[14] as a spectrum of conditions characterised by developmental delays, which manifest as impairments in personal, social, physical, occupational and academic function with onset during the primary developmental period.[14] Neurodevelopmental disorders are often identified by family and healthcare professionals when children are not meeting their developmental milestones across five domains: gross motor, fine motor, language, cognition and socialemotional and behavioural skills.[15]

Neurodevelopmental disorders, such as ASD, ADHD, epilepsy, intellectual disability, developmental disability and cerebral palsy, are among the most prevalent paediatric disabilities.[16 17] ASD and ADHD are the most common[18 19] with 1 in 100 children globally estimated to be diagnosed with ASD[20] and ADHD having a global prevalence of 7.6% in children aged 3–12 and 5.6% in those aged 12–18.[21] Cerebral palsy is the most common cause of paediatric motor disability.[22] The global prevalence of paediatric neurodevelopmental disorders as a group is unknown with prevalence fluctuating globally depending on sociocontextual factors, diagnostic criteria and estimation procedures.[18] Risk factors of neurodevelopmental disorders include genetics,[23] preterm infants[24] and environmental factors such as economic vulnerability and access to healthcare services.[25] There is no significant difference in the prevalence of neurodevelopmental disorders among urban and rural populations despite the population sizes being vastly different.[26] The high prevalence of neurodevelopmental disorders in rural locations can be directly linked to psychosocial factors associated with these regions that impact health equity such as low socioeconomic status, lack of infrastructure and social deprivation.[27]

Families living in rural areas

The terms rural, remote and regional refer to geography, encompassing all areas outside of major cities.[28] For ease of understanding in this review, the term rural will be used to refer to regional, rural and remote areas. These areas are characterised by features such as low population density; however, recently, there has been increased emphasis on social characteristics such as a strong sense of community and connection to natural features defining these regions.[29] Rural regions have been traditionally perceived as homogeneous communities with low cultural diversity. However, this has altered dramatically in recent decades with these communities now being recognised as culturally diverse.[30 31]

Rural people experience unique barriers associated with isolated geographical location, poor policy development and implementations that neglect their unique populations, for instance, the high proportions of First Nations

communities in these areas, resulting in impacted health outcomes, reduced education level and employment opportunities and lower average income.[28] The cultural landscape of rural communities includes distinct social groups such as farmers and First Nations Peoples that require a distinctive approach to healthcare provision to ensure effectiveness. Due to the diverse characteristics of rural communities, parent-mediated interventions need to be tailored to the target population to increase the likelihood of success. Rural communities, experience significant barriers to effective, comprehensive healthcare resulting in disparities in health and well-being between rural and urban populations in most developed countries.[32] A key factor influencing these ongoing inequalities is the lack of primary healthcare research focusing on rural populations, a concept discussed extensively in existing literature.[33–35] The necessity of expanding the evidence base of primary healthcare for rural populations further demonstrates the need for this systematic review.

Families living rurally raising a child with a neurodevelopmental disorder demonstrate intersectional disadvantage.[36] Intersectional disadvantage refers to individuals or communities experiencing two or more different demographic categories of disadvantage, such as rurality and disability, and the way in which the intersection of these disadvantages contributes to the overall negative impact on the population. These communities experience significant barriers to access, coordination and navigation of healthcare services, along with limited infrastructure and increased distance.[37 38] These barriers reduce the accessibility of direct healthcare provision and ongoing specialist interventions provided by allied and other health professionals,[39] interventions that are recommended as part of best practice for children with neurodevelopmental disorders.[40] Due to the reduced access to health services rural populations may benefit from well-designed effective parent-mediated interventions to enhance healthcare networks and services.

From general to specific parent-mediated intervention characteristics: a research gap

Parent-mediated interventions have been more frequently implemented over the last 10 years, particularly since the COVID-19 pandemic.[41] The increased implementation of parent-mediated interventions has led to extensive analysis regarding their effectiveness.[2 11 42 43] Despite the extensive research published on parent-mediated interventions there does not appear to be a consensus on what characterises an effective parent-mediated intervention for parents of children with neurodevelopmental disorders in rural areas, exploring the interplay of the intervention characteristics such as mode of delivery, duration, intensity and primary aim and population demographics, cultural and social factors.[44–47]

The analysis of the characteristics of an effective parent-mediated intervention for children with neurodevelopmental disorders over the past 10 years is the focus of this systematic review. A pilot study analysing the effectiveness of parent-mediated interventions for children with neurodevelopmental disorders recommended the generalisation of parent-mediated/carer-mediated interventions as they were proven to be effective for both children and caregivers in the homogeneous urban sample in which they were analysed.[48] This recommendation for the generalisation of a mode of healthcare intervention for all populations following analysis with a homogeneous urban sample is problematic as there are population demographics, social and cultural factors associated with specific populations that require consideration for effective intervention implementation. These include factors such as education level, language, socioeconomic status, and cultural and religious beliefs that may vary depending on geographical location. The impact of population characteristics on the effectiveness of a parent-mediated intervention is explored by Trembath *et al*[47] who noted factors such as parental education levels, language and cultural norms impact the broad generalisability of parent-mediated interventions, highlighting the necessity of parent-mediated interventions being specific to the community in which they are being implemented. This is further supported in a randomised clinical trial conducted by Roberts *et al*[49] who identified the necessity of the individualisation of parent-mediated interventions so that the characteristics of the intervention match population contextual factors, to ensure effectiveness, as treatment effect is susceptible to the factors mentioned above.

Parsons *et al*[46] noted that there was a need for exploration of the characteristics of effective parent-mediated interventions for specific populations and Kuravackel *et al*[45] discussed the need for evidence-based interventions for rural populations that are effective and culturally responsive. Furthermore, Trembath *et al*[47] noted that further research is needed to identify for whom parent-mediated interventions work best and why, considering the interplay of parent-mediated intervention characteristics and participant contextual factors.

OBJECTIVE

This systematic review aims to synthesise the existing evidence regarding parent-mediated interventions delivered to parents of children with neurodevelopmental disorders residing in rural areas to identify the characteristics that need consideration for the effective design, implementation and evaluation of these interventions.

REVIEW QUESTION

What are the characteristics of effective parent-mediated interventions for parents of children with neurodevelopmental disorders living in rural areas?

METHODS

Overview

A systematic review adhering to the Joanna Briggs Institute (JBI) guidelines for evidence synthesis for reviews of mixed methods will be adopted.[50] The JBI critical appraisal tools will be used to assess the study quality of included articles.[51] The results will be presented using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) checklist (online supplemental appendix II).[52] The PRISMA flow diagram will be completed to present the literature screening method, illustrating the screening, inclusion and exclusion processes conducted by the reviewers at each stage of the review.[52] Five databases, CINAHL, PsycINFO, ProQuest allied health and nursing database, Ebscohost psych and behavioural collection and SocINDEX, were searched twice with the most recent search occurring on 5 March 2024 using predefined search terms with the limiters of full texts, published in English, after 2013. The articles will be exported to EndNote V.20.6 (Clarivate Analytics, Pennsylvania, USA) to deduplicate and organise and then Covidence[53] to assist with the screening and extraction. The review will encompass an analysis of qualitative, quantitative and mixed-methods literature to capture outcomes from a broad range of research methodologies, investigating a breadth of participant experiences and perspectives and intervention strategies and outcomes.[5]

Patient and public involvement

None.

Authors' contributions

- Librarian: The librarian played a central role in the construction of search syntax and selection of databases. The librarian oversaw the searches and exportation to EndNote and Covidence.
- First reviewer (JC): The first reviewer will complete the initial screenings providing the first vote on inclusion/exclusion and contact authors as required.
- Second reviewer (VDS): The second reviewer will complete the second round of screenings casting a second vote on all literature in Covidence. The utilisation of two reviewers ensures the reliability and validity of the screening process. VDS is the project guarantor.
- Third reviewer (MC): The third reviewer will complete mediation and conflict resolution as required.

Eligibility criteria

Participants

Children and adolescents diagnosed with a neurodevelopmental disorder who live rurally and who are the recipients of a parent-mediated intervention.

Parents or caregivers of a child or adolescent diagnosed with a neurodevelopmental disorder who live rurally and who participate in a parent-mediated programme.

Concept

All publications that discuss parent-mediated programmes for parents of children and adolescents with neurodevelopmental disorders in rural areas will be included. This will include face-to-face, telehealth, online courses, individual or group-based parent-mediated programmes.

Context

Parent-mediated interventions run for parents/caregivers who live rurally and who have a child/adolescent diagnosed with a neurodevelopmental disorder.

Types of sources

Qualitative, quantitative and mixed-methods research published in English from 2013 to 2024 which refers to parents' or children's outcomes.

Search strategy

Two searches were conducted with the latest being completed on 5 March 2024 using preidentified search terms (online supplemental appendix I). Query strings were translated for each interface using the Systematic Review Accelerator polyglot search tool.[54]

Information sources

CINAHL, PsycINFO, ProQuest allied health and nursing database, Ebscohost psych and behavioural collection and SocINDEX have been selected as these databases contain research relevant to the research question.

- CINAHL Complete Plus with Full Text (EBSCOHost) publishes 4000+ nursing and allied health journals.
- PsycINFO is the leading database for behavioural and social science-related literature with more than 5 000 000 peer-reviewed bibliographic records.
- ProQuest allied health and nursing database provides content within the fields of nursing and allied health as well as other complementary disciplines, this database is appropriate for students and has nearly 900 full-text articles as well as training videos and reference materials.
- Ebscohost Psych and behavioural collection is a database that provides access to extensive literature on child and adolescent psychology and behaviour with hundreds of full-text journals.
- SocINDEX is a database that specialises in sociology research with 3104 active indexed and abstracted journals and 2983 active peer-reviewed indexed and abstracted journals.

Study records

Data management

Following the search all identified citations will be exported to EndNote V.20.6 (Clarivate Analytics) for deduplication and organisation and to the systematic review tool Covidence[53] for screening and extraction.

Selection process

Title and abstract screening will be conducted independently and cross-checked by two reviewers from the research team against the inclusion criteria. If an article is deemed eligible or potentially eligible, full texts will

be obtained and further reviewed. Any article for which there is uncertainty regarding its inclusion or exclusion will remain in the review. Any conflicts will be mediated and resolved by a third reviewer. Full-text articles that meet the inclusion criteria will be included in the review. A PRISMA-P flow diagram[52] will be used to present the data collection procedure and outcomes.

Data collection process

Data will be extracted using the Covidence extraction tool and literature will be populated with notes. The data to be extracted are outlined in the extraction tool developed by the review team (online supplemental appendix III).

Data items

The data extracted will include specific details such as authors, year of publication, study design, population characteristics, intervention characterises and outcomes as outlined in online supplemental appendix III.

Outcomes and prioritisation

The main outcome for which data will be sought is to identify specific characteristics that make a parent-mediated intervention suitable for the parents of children with neurodevelopmental disorders residing in rural areas. This is the outcome of interest as it is hypothesised that characteristics relate directly to effectiveness.

Bias(es)

The JBI critical appraisal tools will be used to identify bias across various methodologies. Identified studies bias will be reported in the presentation of data/results.

Data synthesis

Descriptive analysis will include study type, study location, participant profile and the timing/type of educational strategy. The extracted data will be presented in diagrammatic and/or tabular form which demonstrates these variables. A summary will accompany the tabulated and/or charted results and will describe how the results relate to the review's objective and question/s.

Thematic analysis will be used for qualitative data analysis. This analysis has been selected to assist with reviewing and categorising the literature and providing a framework for interpretation.[55] Thematic synthesis will occur in three stages: (1) text coding, (2) descriptive themes and (3) analytical themes. However, if there are too few articles included in the review, a narrative synthesis approach will be used as it allows for a more in-depth analysis of each article compared with a thematic analysis. Therefore, the review may combine a thematic and narrative approach for data analysis.

ETHICS AND DISSEMINATION

This study will neither involve human nor animal subjects and does not require ethics approval. Results will be disseminated to relevant groups in peer-reviewed journal(s) and at relevant children and parent health conferences or rural conferences. The key outcomes will also be shared on social media to support access for non-research audiences.

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Contributors JC, MC and VDS contributed to the conception, design, methods and approach of this systematic review protocol. JC drafted the manuscript with significant input and critical revision from MC and VDS. JC, MC and VDS approved the submitted version and agreed to be accountable for all aspects of the work, ensuring that questions related to the accuracy or integrity of any part of the work.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

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Supplementary materials

Appendix I: Search Terms

Data Base	Search Term
CINAHL	(parent mediated OR parent* based or care* or guardian) AND (intervention* OR program* OR treatment* OR capacity building OR deliver* OR involvement OR implement*) AND (paediatric OR child* OR adolescent* OR youth) AND (neurodevelopmental disorders OR autism OR autism spectrum disorders OR asd OR attention deficit hyperactivity disorder OR adhd OR intellectual disability OR specific learning disorder OR motor disorders OR communication disorders) AND (rural* OR remote* OR regional* OR non-urban OR non metropolitan)
Psychinfo	("Parents"[MeSH Terms]) OR (“Caregivers” [MeSH Terms]) OR (“Guardians” [All Terms]) AND (“Parent-mediated” [All Fields]) OR (“Parent Training” [MeSH Terms]) OR (“Intervention” [MeSH Terms]) OR ("Program"[All Fields]) OR (“Collaboration” [MeSH Terms]) OR (“Training” [MeSH Terms) AND (“Pediatrics” [MeSH Term]) OR (“Paediatrics” [All Fields]) OR ("Child"[All Fields]) OR "Children"[All Fields]) OR (“Adolescent” [All Fields]) OR (“Youth” [All Fields]) AND (“Neurodevelopmental Disorders [MeSH Term]) OR (“Autism Spectrum Disorders” [MeSH terms]) OR (“Attention Deficit Disorder with Hyperactivity” [MeSH terms]) OR (“Intellectual Disability” [All Fields]) OR (“Intellectual Development

	Disorder"[MeSH Terms]) OR ("Communication Disorders" [MeSH Terms]) OR ("Learning Disorders" [MeSH Terms]) OR ("Movement Disorders" [MeSH Terms]) AND ("Rural Environments" [MeSH Terms]) OR ("Rural Health" [MeSH Terms]) OR ("Rural" [All Fields]) OR ("Remote"[All Fields]) OR ("Regional" [All Fields)
ProQuest nursing and allied health database	(parent mediated OR parent* based or care* or guardian) AND (intervention* OR program* OR treatment* OR capacity building OR deliver* OR involvement OR implement*) AND (paediatric OR child* OR adolescent* OR youth) AND (neurodevelopmental disorders OR autism OR autism spectrum disorders OR asd OR attention deficit hyperactivity disorder OR adhd OR intellectual disability OR specific learning disorder OR motor disorders OR communication disorders) AND (rural* OR remote* OR regional* OR non-urban OR non metropolitan)
Ebscohost Psycholohy and behavioural sciences collection	(parent mediated OR parent* based or care* or guardian) AND (intervention* OR program* OR treatment* OR capacity building OR deliver* OR involvement OR implement*) AND (paediatric OR child* OR adolescent* OR youth) AND (neurodevelopmental disorders OR autism OR autism spectrum disorders OR asd OR attention deficit hyperactivity disorder OR adhd OR intellectual disability OR specific learning disorder OR motor disorders OR communication disorders) AND (rural* OR remote* OR regional* OR non-urban OR non metropolitan)
SocINDEX	(parent mediated OR parent* based or care* or guardian) AND (intervention* OR program* OR treatment* OR capacity building OR deliver* OR involvement OR implement*) AND (paediatric OR child* OR adolescent* OR youth) AND (neurodevelopmental disorders OR autism OR autism spectrum disorders OR asd OR attention deficit hyperactivity disorder OR adhd OR intellectual disability OR specific learning disorder OR motor disorders OR communication disorders) AND (rural* OR remote* OR regional* OR non-urban OR non metropolitan)

Appendix II: PRISMA-P

Characteristics of Effective Parent-Mediated Interventions for Parents of Children with Neurodevelopmental Disorders in Rural Areas: A Systematic Review Protocol

PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol*

Section and topic	Item No	Checklist item	Page
ADMINISTRATIVE INFORMATION			
Title:			**Page 1**
Identification -	1a	Identify the report as a protocol of a systematic review	
Update -	1b	If the protocol is for an update of a previous systematic review, identify as such	**Not applicable**
Registration.	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	
Authors:			
Contact -	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	**Page 1**
Contributions. –	3b	Describe contributions of protocol authors and identify the guarantor of the review	**Page 14**
Amendments – **Page 2**	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	
Support:			
Sources –	5a	Indicate sources of financial or other support for the review	**Page 14**
Sponsor –	5b	Provide name for the review funder and/or sponsor	**Page 14**
Role of sponsor or funder-	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	**NA**
INTRODUCTION			

Rationale –	6	Describe the rationale for the review in the context of what is already known	**Page 4**
Objectives –	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	**Page 9**
METHODS			
Eligibility criteria –	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	**Page 10**
Information sources –	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	**Page 11**
Search strategy –	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	**Page 11**
Study records:			
Data management –	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	**Page 12**
Selection process –	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	**Page 13**
Data collection process -	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	**Page 12 and Appendix II**
Data items –	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	**Page 13 and appendix II**
Outcomes and prioritization –	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	**Page 13**
Risk of bias in individual studies –	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	**Page 13**
Data synthesis –	15a	Describe criteria under which study data will be quantitatively synthesised	**Page 14**
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I^2, Kendall's τ)	
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	
Meta-bias(es) –	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	**Page 13**

Confidence in cumulative evidence –	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	**NA as not completing a meta-analysis**

*** It is strongly recommended that this checklist be read in conjunction with the PRISMA-P Explanation and Elaboration (cite when available) for important clarification on the items. Amendments to a review protocol should be tracked and dated. The copyright for PRISMA-P (including checklist) is held by the PRISMA-P Group and is distributed under a Creative Commons Attribution Licence 4.0.**

From: Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart L, PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. BMJ. 2015 Jan 2;349(jan02 1):g7647.

Appendix III: Data extraction tool

Systematic review details:	
Systematic Review title:	*Characteristics of effective parent-mediated interventions for parents of children with neurodevelopmental disorders in rural areas: A systematic review*
Review objective:	*Examine the characteristics of effective parent-mediated interventions for parents of children with neurodevelopmental disorders residing in rural areas.*
Review question/s:	*What are the characteristics of effective parent-mediated interventions for parents of children with neurodevelopmental disorders living in rural areas?*
Inclusion/Exclusion Criteria	
Participants:	*All publications will be included which present parent or children qualitative or quantitative outcomes.*
Concept:	*All publications that discuss parent-mediated programs for parents of children and adolescent with neurodevelopmental disorders in rural areas will be included. This will include face to face, telehealth, educational or group-based parent mediated programs.*
Context:	*The review will consider publications with participants living outside of urban spaces. The program provider could still be located in an urban area, via telehealth, for instance, but the participants (outcome) will be living in rural areas.*
Types of evidence:	*We will include all qualitative, quantitative, and mixed methods research referring to parents or children's outcomes.* *Literature published in English will be included.* *Studies published from 2013 to 2024*
Evidence source characteristics	
Citation details:	Author(s): Year: Title: Publication/Journal: DOI/URL:
Language:	English
Publication type:	Journal | Report | Book | Chapter

Study/publication method:	Analytical cross-sectional study	Case control study	Case report	Case series	Cohort study
	Diagnostic test accuracy study	Economic evaluation	Qualitative research	Quasi-experimental study	Randomised control trial
Ethics:	☐Approval stated ☐No approval stated				
Aim of the study:					
Study funding sources:					
Possible conflicts of interest for study authors:					
Parent Program details:					
Country:					
Country classification (by income level)	☐Low ☐Lower-middle ☐Upper-middle ☐High				
Participants details:					
Population description:					
Inclusion criteria:					
Exclusion criteria:					
Method of recruitment of participants:	☐Phone ☐Mail ☐Clinic patient s ☐Voluntary ☐Other				
Total number of participants:					
Program age range (children)	_____ to _____years of age.		☐ Not stated	Mean age (Years) ± SD	
Program age range (parent)	_____ to _____years of age.		☐ Not stated	Mean age (Years) ± SD	
Gender distribution (child):	Male (____%)	Female (____%)	Non-binary (____%)	Not stated	
Socioeconomic status:	High (____%)	Middle (____%)	Low (____%)	Not stated	

Children neurodevelopmental disorders:	ASD	ADHD	Intellectual disability	Specific learning disorder
	Motor disorder	Communication disorder	Other	
Parental level of education:				
Socioeconomic status:	☐ High ☐ Medium ☐ Low ☐ Not stated			
Number of withdrawals:				
Reason for withdrawals:				
Strategy details:				
Mode of delivery	☐ Face to face ☐ Online ☐ telehealth ☐ Mixed mode			
Setting	☐ Home ☐ Clinic ☐ community ☐ Other			
Professionals	☐ Occupational therapists ☐ Nurse ☐ Speech pathologist ☐ Physiotherapist ☐ Psychologist ☐ Doctor ☐ Multidisciplinary ☐ others			
Duration (weeks)	☐ <1 week (less than a week) ☐ 1-4 weeks (Less than a month) ☐ 4-16 weeks (1-4 months) ☐ 16-26 weeks (Within 6 months) ☐ 26-34 weeks (6-8 months) ☐ 34-52 weeks (8 months to a year) ☐ >52 weeks (more than a year)			
Frequency (sessions per week)	☐ 1 ☐ 2-3 ☐ 3-5 ☐ 5-7			

Intensity (minutes per session)	☐ Up to 30 minutes ☐ 30 minutes – 60 minutes ☐ 60 – 90 minutes ☐ 90-120 minutes
Format of intervention	☐ Individual (one parent) ☐ Individual (both parents) ☐ Group based
Detail description of strategy:	
Number of withdrawals:	
Reason for withdrawals:	
Outcomes:	
Primary outcome(s) measured:	Child ☐ Behaviour ☐ Social functioning ☐ Communication ☐ Adaptive functioning ☐ Other: _____ Parent ☐ Education ☐ Communication ☐ Parent-child relationship ☐ Other: _____
Secondary outcome(s) measured:	Child ☐ Behaviour ☐ Social functioning ☐ Communication ☐ Adaptive functioning ☐ Other: _____ Parent ☐ Education ☐ Communication ☐ Parent-child relationship ☐ Other: _____
Source of outcome data	☐ Direct assessment of children with standardised measures ☐ Direct assessment of children without standardised measures ☐ Parent report using standardised measures. ☐ Parent report without standardised measures
Casual effect	☐ Effective: description of treatment effect ☐ Ineffective: description of treatment null effect ☐ Other: _____
Key findings:	