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Physiotherapists' perspectives on the use of telehealth for children with developmental delays.

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TELEHEALTH PHYSIO AND CHILDREN WITH DEVELOPMENTAL DELAY

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Statement of the contribution of others

Associate professor Anne Jones and Doctor Helen Land provided supervision and contributed to the design of the study and systematic review. Doctor Michael Crowe contributed to questionnaire design and advised on descriptive statistics. Associate professor Anne Jones assisted with thematic analysis. Associate professor Anne Jones and Doctor Helen Land assisted with write up of publications and editing of the thesis.

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Publication	Contributions
Grant, C Jones, A Land, H. 'What are the perspectives of speech pathologists, occupational therapists and physiotherapists on using telehealth videoconferencing for service delivery to children with developmental delays? A systematic review of the literature.' 2021 *Manuscript under revision by The Australian Journal of Rural Health.*	Anne Jones – with the first author, conception and planning the systematic review and assisting with critical appraisal of articles. Helen Land – assistance with planning systematic review and editing final article.
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Abstract

Aims:

The aim of this two-part study was to determine physiotherapists' perspectives toward using telehealth for service delivery to children with developmental delays including understanding their perspectives toward usefulness, ease of use, barriers, facilitators and acceptability.

Method:

This is a mixed methods explanatory sequential design. Phase one utilised a quantitative survey method. Participants were recruited with a purposive sample and snowballing. They completed an online survey using a validated questionnaire. Descriptive statistics were used to analyse phase one data. Phase two utilised a qualitative semi structured interview and focus group method. Participants were recruited from the first phase using purposive sampling. A semi structured guide was used to facilitate discussion of shared experiences and to allow themes to emerge from the discussion. Thematic analysis was used to analyse the second phase data.

Results:

In phase one, there were 40 complete responses from 43 eligible responses. Participants were positive toward ease-of-use statements with 75% somewhat to strongly agreeing that it was easy to learn to use the telehealth system. Participants perceived telehealth was useful in improving access to services for clients and reducing travel time with 80% and 88% somewhat to strongly agreeing respectively. Sixty-three percent of participants responded that telehealth was acceptable to deliver services to children with developmental delays.

In phase two, thematic analysis was used to synthesise frequent and important themes. Ten participants took part in either a focus group (n=7) or interview (n=3). Ten main themes identified were split into barriers and facilitators. Facilitators were the right family, right child, adequate technology and space, and collaboration. Barriers were technology, time management, lack of physical touch, lack of organisational support, communication and work environment.

Conclusion:

Results suggest that physiotherapists find telehealth systems easy to use and useful, however they consider telehealth to be unsuitable to replace face-to-face therapy entirely. Physiotherapists are willing to use telehealth to provide follow up services to the right family and the right child.

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Physiotherapists were positive about telehealth's potential to improve services to children in rural areas. Physiotherapists said that physiotherapy specific telehealth training was currently lacking.

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Chapter 1: Contextualising the thesis

1.1 Introducing the thesis

1.1.1 Research background

Developmental delay occurs when children do not meet developmental milestones at the same time as their aged-matched peers (Choo et al., 2019).There may be a diagnosis that coincides with the delay, such as an intellectual disability or a neurological or chromosomal condition, or delay may occur with an absence of diagnosis (Choo et al., 2019). Delay in physical development is present in around 50,000 boys and 30,000 girls under 14 years old in Australia (Australian Institute of Health and Welfare, 2015). A total of 7.4% of Australian children are effected across all areas of delay (Australian Institute of Health and Welfare, 2015). The proportion of children with severe delay is highest in inner regional areas and the lowest in major cities (Australian Institute of Health and Welfare, 2015). Children with a developmental delay experience significant restrictions in participation and daily life roles (Hillier, 2007).

Telehealth is defined as the delivery of health services over a geographical distance using telecommunications technology (Snodgrass et al., 2017). Little is known about the perspectives of physiotherapists who use telehealth. A systematic review completed by the authors found only two physiotherapists who had been asked for their perspectives of using telehealth with children with developmental delay. These physiotherapists reported telehealth as a barrier to certain assessments and that it was most useful for pre- and post-operative physiotherapy for children with cerebral palsy (Edirippulige et al., 2016).

The reason for completing the thesis evolved from the author's experience working as a physiotherapist with children with developmental delays. When the Covid-19 pandemic began in Australia and lockdowns were subsequently introduced, the author noticed physiotherapists transitioned to using telehealth. This is supported by a 2021 report from Camden and Silva, who found that prior to the Covid-19 pandemic 4% of therapists (mostly occupational therapists and physiotherapists) reported using telehealth. This rose to 70% during the Covid-19 pandemic (Camden & Silva, 2021).

While the Covid-19 pandemic acted as a catalyst for the recent increase in use of telehealth, telehealth has long been studied in the hope it might reduce service gaps in rural Australia (Bradford et al., 2016). The reason for studying telehealth at this time is the availability of a new cohort of physiotherapists with experience in telehealth (Camden & Silva, 2021). These physiotherapists will

have a valuable perspective that could be used to guide future research and identify problems and solutions to better telehealth service provision in rural areas. It may be challenging for physiotherapists to shift from a hands-on model to working over telehealth.

1.1.2 Aims of the thesis

The aim of this research was to understand how physiotherapists perceive using telehealth to deliver services to children with developmental delays. The overall research question, addressed by phases one and two, was:

1. What are the perspectives of physiotherapists toward using telehealth for service delivery to children with developmental delay?

The research question was broken down in to six individual aims as follows:

Phase one:

1. Determine physiotherapists' opinions and perspectives on ease of use of videoconferencing systems
2. Determine physiotherapists' perspectives regarding the usefulness of telehealth videoconferencing.
3. Determine if physiotherapists find telehealth an acceptable way to deliver services to children with developmental delays.

Phase two:

1. Determine what barriers and facilitators physiotherapists perceive to using telehealth for service delivery to children with developmental delays.
2. Determine physiotherapists' willingness to use telehealth for service delivery to children with developmental delays.
3. Determine physiotherapists' perspectives on training in the use of telehealth for delivering services to children with developmental delays.

The aims of the thesis were met by using a mixed methods approach comprising of a survey in the first phase and qualitative focus groups or interviews in the second phase. The results were combined to develop recommendations for using telehealth for service delivery to children with developmental delay and areas for future research.

The current evidence in this area is limited, therefore an exploratory study was undertaken. Future research is essential to determine how telehealth could best be used to improve services to children in rural Australia.

1.1.3 Positioning the researcher

I am a physiotherapist with a background in paediatrics. Much of my caseload has recently been children with developmental delays. Physiotherapy interventions primarily address the physical aspect of the delay and can include perceptual motor therapy ("doing" tasks in context), exercise programs, weight bearing training, spatial training and parent facilitated exercises (Hillier, 2007). Physiotherapists provide equipment advice and fitting, assessment of muscle tone, range, and strength; all achieved through physical interaction (Mulligan & Wilmshurst, 2006). Physiotherapy sessions can vary depending on the challenges the child faces and the goals of the child and family, however, a session example is the physiotherapist helping the parent facilitate floor transitions by physically assisting a 10-month-old baby to roll. Another example is a physiotherapist assessing spasticity in a child with a suspected neurological condition using a standardised assessment like the Tardieu Scale (Gracies et al., 2010). This requires the physiotherapist to apply passive stretch to a joint. Telehealth services are inherently free from touch; therefore, I expected that physiotherapists would experience challenges in using telehealth with this population.

I experienced a feeling of dread when considering using telehealth for children with developmental delay. How would I see what I needed to see? How would I play with a child if I couldn't physically interact? How would I ensure the toys and equipment I wanted were on hand? How could I be sure what I was seeing was accurate? I immediately discarded some tasks. For example, the Tardieu Scale inherently requires manual handling (Gracies et al., 2010). I had no idea what outcome measures were standardised for use via telehealth. What could I use for my assessments? What training was available? I assumed this panic I felt was not unique. If I thought telehealth wasn't feasible for the short period of time my workplace in Canberra couldn't operate face-to-face due to Covid-19, how could it be suitable for plugging the rural health gaps?

My first physiotherapy job after university was in Berri, South Australia, about a three-hour drive from Adelaide. I worked on the paediatric rotation after only being at the job for three months, bringing only the skills from my six-week paediatric student placement. This lack of experience is not uncommon in rural towns, with a lack of speciality knowledge and poor staff retention resulting in a cycle of inexperienced staff attempting to service speciality areas (Adams et al., 2015). Children with

any complex need travelled to Adelaide. For example, we didn't have anyone with positioning expertise, so seating or sleep systems required a trip to Adelaide. Medical reviews took place at Adelaide's Women's and Children's Hospital, again resulting in a six-hour round trip. Regular travel is common for families in rural areas, with Edirippulige et al. finding that children in rural towns in Queensland travelled an average of five hours and 46 minutes to outreach clinics (Edirippulige et al., 2016).

Just as Adams et al. (2015) found that rural towns struggle with staff retention, I left my position after 12 months, taking my newly found knowledge of paediatrics with me. Berri never got to see the returns on the investment they made in me. I am well aware that I did not give the children in Berri the same service that they would have received from a more experienced clinician. If I had the support of someone remotely linking in, I wonder whether the care could have been better? It is possible that families may have avoided some travel to Adelaide and received a more comprehensive ongoing physiotherapy service. In understanding physiotherapists' perspectives when providing telehealth during the Covid-19 pandemic, lessons can be applied to support children in rural areas.

1.1.5 Thesis structure

The thesis is structured in six chapters:

1. Chapter one contextualises the thesis by providing background into telehealth and how it is used by physiotherapists in Australia. Background about developmental delay, is also covered. This chapter explores the research aims and justifies the choice of mixed methods to meet these aims.

2. Chapter two explores the literature gap by reporting a systematic review appraising the perspectives of speech pathologists, occupational therapists and physiotherapists regarding the use of using telehealth for service delivery to children with developmental delay. The professional groups of speech pathology and occupational therapy were added to the search due to the lack of literature in preliminary searches using only physiotherapists.

3. Chapter three explains the world view behind choosing the research methodology and justifies using a mixed methods design.

4. Chapter four explores the methods and findings of phase one, the survey. It covers the sampling, data collection, the characteristics of the sample group, data analysis and results from the quantitative arm.

5. Chapter five explores the methods and findings of phase two, focus groups and interviews. It covers the sampling, data collection, characteristics of the sample group, data analysis and results from the qualitative arm.

6. Chapter six discusses the main findings from both phases and integrates them to answer the research question. Limitations are acknowledged and discussed. Implications for future research and recommendations for future practice are discussed before summarising and concluding the thesis.

1.1.6 Style

I used the first person when talking about my own experiences and how they guided my choices. This choice was made to position myself as the researcher in the thesis. This occurs in chapter one. Later chapters are written in the third person. One of the purposes of choosing mixed methods was to provide a deeper understanding of the topic and therefore, participant quotes are included to provide context throughout the results and discussion in chapters four and five (Creswell, 2014).

1.1.7 Research contribution

This study was an exploratory study as there are no known studies which explore the perspectives of physiotherapists who use telehealth to treat children with developmental delays. This chapter discusses how Australian health services are often sparse in rural areas, leaving children who live outside of cities with poorer health outcomes (Australian Institue of Health and Welfare, 2015). Given that there is no research in this area, this study will act as a foundation to build the research body.

Having access to early intervention physiotherapy services is the gold standard for children with physical developmental delays (Early Childhood Intervention Australia, 2018). Children with developmental delays receive physiotherapy interventions to help them achieve sufficient mobility to participate in school and in age-appropriate socialisation and play with their peers (Lucas et al., 2016). It is hoped that by setting a foundation for the research, children with developmental delays will be supported to access early intervention physiotherapy services wherever in Australia they may live.

1.2 Background Telehealth

1.2.1 Definition of telehealth

Telehealth is the provision of health services remotely and can be via phone call, email, videoconferencing or video either in real time or asynchronously (Snodgrass et al., 2017). In the literature, terms used interchangeably with telehealth are telemedicine, mHealth, telerehabilitation,

e health and electronic health (Monaghesh & Hajizadeh, 2020; Schmeler et al., 2015). Schmeler et al. (2015) argue that telehealth is the umbrella term referring to:

"The use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health, and health administration."(Schmeler et al., 2015, p.12)

In this thesis, telehealth is defined as the provision of direct client services remotely via videoconferencing. This definition is supported by Jacobson & Hook (2015) in their study in children with haemophilia, Grona et al. (2017) in their systematic review in adults with musculoskeletal conditions and Bennell et al. (2021) in a mixed methods study of physiotherapists and patients using telehealth during the Covid-19 pandemic (Bennell et al., 2021; Grona et al., 2017; Jacobson & Hooke, 2015).

1.2.2 Impetus for telehealth

Telehealth has primarily been studied in Australia as a potential remedy to service inequities in rural locations (Bradford et al., 2016). Remote areas experience staff and equipment shortages that negatively affect both professionals and patients (Schmeler et al., 2015). Rural providers can lack the experience, equipment and staffing to provide comprehensive health services resulting in long travel distances for individuals who require specific treatments (Schmeler et al., 2015). For children, there is reduced access to early intervention services, mental health services, paediatricians and allied health services (Arefadib & Moore, 2017). In Australia, the mean travel time to a health appointment for children with cerebral palsy in remote areas of Queensland was reported at five hours and 46 minutes (Edirippulige et al., 2016).

Specific to physiotherapy, Adams et al. (2015) reported gaps in highly specialist areas of physiotherapy provision to rural and remote areas, with the example given of paediatrics (Adams et al., 2015). The reason for gaps in service was reported to be government policies, funding, recruitment and retention of staff with the clinical experience to fill service gaps (Adams et al., 2015).

Australians living in rural and remote areas have poorer health outcomes than their metropolitan counterparts (Australian Institute of Health and Welfare, 2019). They have higher levels of disease and injury, shorter lives and are more likely to report barriers to accessing health care (Australian Institute of Health and Welfare, 2019). As well as reduced physical access to healthcare, children in remote areas face further barriers to optimum health outcomes including higher rates of family violence, social isolation, and increased likelihood of living in a low income or single parent households (Arefadib & Moore, 2017). In addition, children in rural and remote areas are more likely

to be Indigenous than children in metropolitan areas and with that comes a higher risk of developmental delays and disability (Arefadib & Moore, 2017). Therefore, children in rural and remote areas of Australia are already at higher risk of not achieving optimum health outcomes.

1.2.3 Efficacy of telehealth

Telehealth has been studied as a potential solution to rural service gaps since the 1950s (Schmeler et al., 2015). Telehealth has been shown to improve social wellbeing, clinical outcomes and access to health services in remote areas of Australia, in particular for Aboriginal and Torres Strait Islander Australians (Caffery et al., 2017). Nevertheless, telehealth is sometimes considered unsuitable for children with developmental delays and disabilities (Arefadib & Moore, 2017). Prior to the Covid-19 pandemic uptake of telehealth services was reported at 4% by allied health professionals working with children (Camden & Silva, 2021).

Despite low uptake, the efficacy of physiotherapy delivered remotely is supported in studies of populations with strokes, cardiovascular disease, chronic physical conditions, musculoskeletal conditions, diabetes, chronic kidney conditions and osteoarthritis (Bal et al., 2016; Cottrell et al., 2017; Joiner et al., 2017; Laver et al., 2020; O'Brien et al., 2018; Stevenson et al., 2019). There is limited evidence to support using telehealth in children, but the studies so far have results supportive of telehealth (Hall et al., 2021; Iacono et al., 2016; Langkamp et al., 2015).

1:3 Background: Children with developmental delay
1.3.1 Defining developmental delay

There are three terms that should be understood when defining developmental delay: 'developmental delay', 'global development delay' and 'developmental disability'. *Developmental delay* means a failure to meet milestones at the same age as typically developing children (Choo et al., 2019). This is not a diagnosis but can be a symptom of various disorders that do warrant a diagnosis (Choo et al., 2019). Examples of such disorders include neurological conditions like cerebral palsy and autism and chromosomal abnormalities like Down syndrome or Fragile X syndrome (Choo et al., 2019). If a specific diagnosis is not warranted, children will sometimes receive a diagnosis of *Global Development Delay* (GDD) (Faruk et al., 2020). GDD occurs when a child has a delay in two or more developmental domains (gross motor, fine motor, cognition, speech/language, activities of daily living and social) (Mithyantha et al., 2017). The delay is considered significant if the child is more than two standard deviations below the mean age expected performance on standardised assessments (Mithyantha et al., 2017). The term *developmental disability* is used interchangeably with *developmental delay* by the Australian Institute of Health and Welfare (Australian Institute of Health

and Welfare, 2015). In this thesis, developmental delay is defined as a delay to a developmental domain for any reason. As the study is in physiotherapists, a delay in the physical domain is likely to be present.

As there are various diagnoses associated with developmental delay, including a complete lack of diagnosis, prevalence is difficult to determine. Prevalence of GDD varies in different countries, with 1-3% reported in Canada, 16-18% in the US and 1.5-2.5% in India (Majnemer & Shevell, 1995; Poon et al., 2010). It is reported that delay in physical development is present in around 50,000 boys and 30,000 girls under 14 years old in Australia (Australian Institute of Health and Welfare, 2015). A total of 7.4% of Australian children are effected across all areas of delay (Australian Institute of Health and Welfare, 2015). The proportion of children with severe delay is highest in inner regional areas and the lowest in major cities (Australian Institute of Health and Welfare, 2015).

1.3.2 Impact of developmental delay on the child and family

The Australian Institute of Health and Welfare reported that children with a physical delay were most commonly diagnosed with the following conditions (Australian Institute of Health and Welfare, 2015).

- Asthma 2.1%
- Heart Disease 0.9%
- Epilepsy 0.4%
- Cerebral Palsy 0.2%

In addition, the birth defects most commonly resulting in physical delays were:

- Neural tube defects (anencephalus, spina bifida and encephalocoele) 0.27%
- Down Syndrome 0.25%

The impact on the child of having a delay will vary considerably depending on the symptoms they experience. The International Classification of Functioning, Disability and Health (ICF) is a framework to conceptualise a person's function as an interaction between health conditions, environmental and personal factors (World Health Organisation, 2001). It helps create a whole picture around the dynamic factors that can influence how someone experiences their condition and guide appropriate assessments and interventions (World Health Organisation, 2001). The framework consists of six domains; health condition, body functions and structure, activity, participation, environmental factors and personal factors (World Health Organisation, 2001). An example of an ICF framework for a child with cerebral palsy is given in Figure 1.
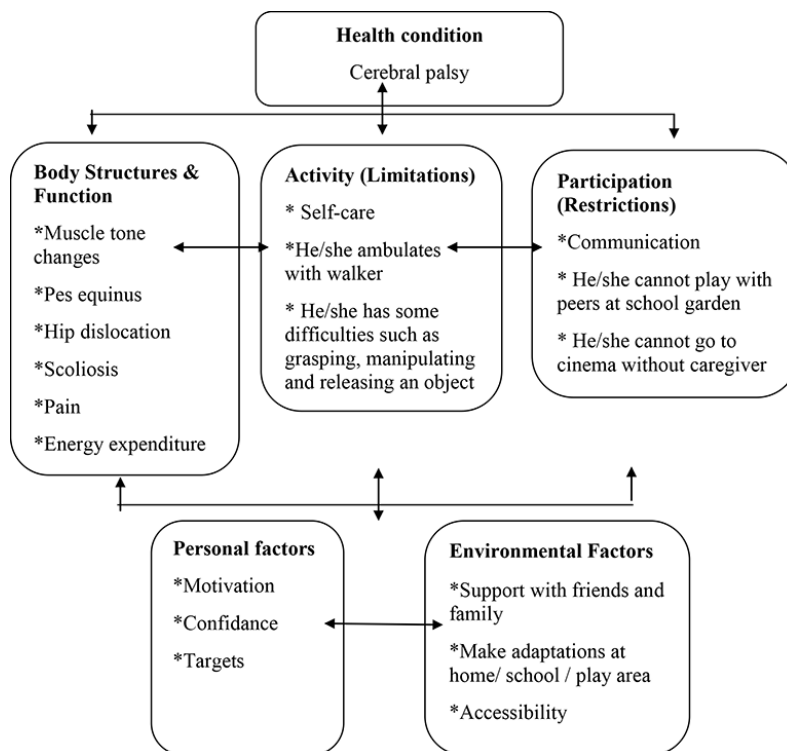
Figure 1

ICF-CY- three for cerebral palsy.(Çankaya & Seyhan, 2016)

When considering a child with cerebral palsy, the interaction between body structure and function and activity can lead to significant loss of participation at school and other social and play opportunities. A survey including 907,734 children found that children with delays and disabilities had reduced school participation and higher rates of severe illness than children without disabilities (Kuper et al., 2014). The impact on families includes reduced leisure time, reduced mental and physical health in parents, reduced social opportunities, problems with work and employment for the parent and problems with family relationships (Whiting, 2014).

1.3.3 Management of developmental delays

1.3.3.1 Early intervention

In Australia, the primary funding body for people with disabilities is the National Disability Insurance Scheme (NDIS) (National Disability Insurance Scheme, 2021a). The NDIS prioritises early intervention for children with developmental delays and provides funding in the absence of diagnosis for children under six years old based on the principles of early intervention (National Disability Insurance Scheme, 2021b). Interventions from birth to five years are considered early intervention (Center on the Developing Child, 2007). It is preferable to treatments started later in life as it is more efficient, has better outcomes and prepares children for transition to the school environment (Center

on the Developing Child, 2007). It works off the principles that children under five years old have greater neuroplasticity and higher capacity for learning than older children or adults whilst the most damage from the environment can also occur in this time period (Center on the Developing Child, 2007). The Best Practice in Early Childhood Intervention National Guidelines are used to guide early intervention in children with a disability and/or developmental delay (Early Childhood Intervention Australia, 2018).They advocate seven key principles for early intervention:

1. Infants and toddlers learn best through every-day experiences and interaction with familiar people and contexts
2. All families, with the right supports, can enhance their child's learning and development
3. The primary role of the service provider is to work with the family members and caregivers in a child's life.
4. The early intervention must be dynamic and individualized to the child's needs and family's preferences, learning styles and cultural beliefs.
5. Outcomes must be functional and based on children's and families' needs and priorities.
6. The family's priorities, needs and interests are addressed most appropriately by a primary provider who represents and receives team and community support.
7. Interventions must be based on explicit principles, validated practices, best available research and relevant laws and regulations.

Physiotherapy management should be in line with early intervention principles and delivered as part of a multidisciplinary team (Early Childhood Intervention Australia, 2018).

1.3.3.2 Physiotherapy management

Physiotherapy management of children with developmental delay is focused on acquisition of motor skills (Lucas et al., 2016). Developing optimal motor function is important for children to participate in school and leisure (Lucas et al., 2016). Gross motor skills like sitting, crawling, walking, running, climbing and jumping are the foundations of mobility and play and are important in being able to access opportunities for further cognitive and social development (Lucas et al., 2016). For example, a child who can walk has broader access to their environment than a child who crawls only; they have more opportunity to find and carry objects and to share those experiences with others (LeBarton & Iverson, 2016).

In infants with motor delay, physiotherapy involves encouraging a variety of positions to promote strength and control in different planes of movement, promoting prone play, educating carers on carrying and play positions and facilitating movements like rolling, hands to midline and sitting (Lekskulchai & Cole, 2001). A systematic review conducted in 2016 analysed physiotherapy interventions offered to children with neurodevelopmental delays (Lucas et al., 2016). The common thread of all interventions was that they were addressing a specific skill deficit and that they were fun

(Lucas et al., 2016). Interventions offered included balance training, hydrotherapy, sports skills and motor-based interventions. Assessments offered included the Movement Assessment Battery for Children, Motor Control Test, Gross Motor Function Measure, Bruininks Oseretsky Test of Motor Proficiency – Second Edition and Unilateral Stance Test (Lucas et al., 2016).

As has already been discussed, the mode of physiotherapy delivery is more frequently face-to-face than remote (Camden & Silva, 2021). When using the early intervention principles, families should be present and engaged in their child's therapy and understand their role in providing repetition in a familiar environment (Early Childhood Intervention Australia, 2018).

1.4 Chapter summary

The author has an interest in learning how physiotherapists perceive using telehealth to deliver services to children with developmental delays due a background as a physiotherapist working with children both in rural and metropolitan areas. Rural experience has led to a particular interest in how telehealth could be used for service delivery to children in rural areas which often experience gaps in services and reduced health outcomes (Bradford et al., 2016). Telehealth is the provision of health services remotely and is defined in this thesis as the provision of direct client services via videoconferencing. Developmental delay refers to a child not meeting age expected milestones, however it can be a marker that further investigation and diagnoses are warranted (Choo et al., 2019). In Australia, delays in one or more developmental domain effect a total of 7.4% of children with more children in rural areas effected than in major cities (Australian Institute of Health and Welfare, 2015). Physiotherapy management should be based on early intervention principles, be play based and usually involves physical assessments and treatments (Early Childhood Intervention Australia, 2018; Lucas et al., 2016). The research question is: What are the perspectives of physiotherapists on using telehealth for service delivery to children with developmental delays?

Chapter 2: Understanding the literature gap

2.1 Introduction

This chapter is a systematic review of the literature on the perspectives of how speech pathologists, occupational therapists and physiotherapists use telehealth videoconferencing for service delivery to children with developmental delays. The reason for inclusion of other professional groups in addition to physiotherapists was due to insufficient literature on physiotherapists alone with only one study included in the review with physiotherapists in its population (Edirippulige et al., 2016). Therefore, speech pathologists and occupational therapists were also included due to comparable interventions, similarities in practice and collaboration between these three professions (Mazer et al., 2006; McCoy et al., 2019; Raspa et al., 2010).

This chapter is adapted with some alterations for flow and to limit redundancy, from:

Grant, C Jones, A Land, H. 'What are the perspectives of speech pathologists, occupational therapists and physiotherapists on using telehealth videoconferencing for service delivery to children with developmental delays? A systematic review of the literature.' 2021 *Manuscript under revision by The Australian Journal of Rural Health.*

2.2 Method

The aim of this systematic literature review was to identify the attitudes and perspectives of speech pathologists, occupational therapists and physiotherapists toward using telehealth videoconferencing for service delivery to children with developmental delays. Narrative synthesis was chosen as the most appropriate way to analyse the diverse study designs and manage inconsistencies across outcomes measured (Mays et al., 2005).

2.2.1 Eligibility criteria

Inclusion criteria: (1) in English, (2) studies published from any year up until 2020, (3) studies including videoconferencing to deliver services to clients (4) empirical, quantitative, qualitative, mixed-method, original studies and (5) studies that included perspectives of allied health professionals who were of physiotherapy, occupational therapy or speech pathology disciplines and, (6) studies where the group receiving services were children with developmental delay.

Exclusion criteria: (1) not in English, (2) literature reviews, (3) pilot studies, (4) sought perspectives on telehealth that were not videoconferencing e.g. online exercise programs and web-based games, and (5) studies where interventions were provided only to adults.

2.2.2 Search strategy

An electronic search of databases Scopus, Medline, Science Direct, Physiotherapy Evidence Database (PEDro), OTseeker, Speechbite and Cumulative Index to Nursing and Allied Health Literature (CINAHL) was conducted on the 11th of October 2020 by the first author. The JCU library staff were consulted to develop search strategies for each database. The search strategy for Medline and Scopus used the following key search terms and Boolean operators:

("speech patholog*" OR "speech-language" AND "speech therap*" OR "speech and language" OR "physiotherap*" OR "physical therap*" OR "occupational therap*") AND (perspective* OR attitude*) AND (telehealth OR telepractice OR teletherapy OR telerehab* OR telemedicine) AND (child* OR paediatric OR pediatric).

Science Direct did not support enough Boolean phrases to replicate this search. Therefore, the keyword search terms were as follows:

(perspective OR attitude) AND (telehealth OR telepractice OR teletherapy OR telerehabilitation OR telemedicine) AND ("allied health") AND child

CINAHL was automatically searched for synonyms of the above key words as used in Science Direct. MESH headings and subject headings were checked.

PEDro was searched by selecting paediatrics as the subdiscipline and using the terms telepractice and telehealth in the abstract/title search bar. All search terms were matched with AND.

Speechbite was searched by entering 'telehealth' and 'telemedicine' as keywords and selecting children in the age option.

OTseeker was searched by searching using the terms 'telehealth' OR 'telemedicine' AND 'child*'.

All databases were limited to English only articles as the first author (CG) does not have a second language.

To minimise risk of missing relevant articles a search was conducted of citations and references of included articles. Systematic and literature reviews from database searches that appeared relevant were hand searched for articles meeting eligibility criteria.

2.2.3 Study selection

Articles were exported into Endnote and duplicates removed. The title and abstracts of the remaining articles were screened by the first author (CG). Full text assessment was then undertaken by the first author (CG) and confirmed by the second author (AJ).

2.2.4 Narrative synthesis

A narrative synthesis was used due to diversity of study design and outcomes.(Mays et al., 2005) The narrative approach seeks to use story-telling to gather evidence of why a change should be made and to provide a trustworthy synthesis (Popay et al., 2006).The four steps of narrative synthesis outlined by Popay et al. (2006) were followed:

1. Developing a theory of how the intervention works, why and for whom.

   This step was not appropriate for the data as the studies primarily explored perceptions and attitudes rather than an intervention.

2. Developing a preliminary synthesis of findings of included studies.

   Data was collated into a table, describing demographics, research design, analysis, and key findings.

3. Exploring relationships in the data.

   To allow the story to emerge from the quantitative and qualitative data, included articles were read and re read by both the first and second authors (CG & AJ). Organisation into themes was thought to be the best way to bring together the findings from each study (Popay et al., 2006). Quantitative data was transformed to qualitative to allow for coding and generation of themes. The first author (CG) lead the assignment of codes before meeting with the second author (AJ) via videoconferencing to discuss possible interpretations of the codes before agreeing upon them.

4. Assessing the robustness of the synthesis.

   Assessment of article quality was undertaken using the Crowe Critical Appraisal Tool (CCAT) (Crowe & Sheppard, 2011). This tool was chosen as it has been shown to be reliable for all research designs. It has an intra class correlation coefficient of 0.83 for consistency and 0.74 for total agreement (Crowe et al., 2012). It has significant weak to moderate positive correlations (Kendall's τ 0.33-0.55) when compared to other critical appraisal tools (Crowe et al., 2012). Two authors (CG & AJ) independently appraised the articles and any differences between results were discussed to reach a consensus. The CCAT was also used to identify any bias in the articles so that this was considered in

reviewing the findings. Studies were compared to the evidence hierarchy presented by Ackley et al. (2008). This hierarchy was chosen as it provides a level for survey and qualitative designs.

2.3 Results

Table 1: Search results

Database	Search Fields	Results
Scopus	Title, abstract and keywords	411
CINAHL	Subject headings	1
Medline	Title, abstract and keywords	12
PEDro	Title, abstract, subdiscipline	8
Speechbite	Title, abstract, keywords	14
OTseeker	Title, abstract, keywords	0
Science Direct	Title, abstract and keywords	156
Grey searching	Reference lists and citations	4

2.3.1 Study screening and selection

The initial electronic search yielded 606 studies. Following the removal of duplicates 598 articles remained. They were then screened by title and abstract with 558 being excluded due to irrelevance and the remaining 40 articles accessed in full text. Reasons for exclusion were not including videoconferencing, not discussing clinician perspectives, participants did not include speech pathologist, occupational therapists or physiotherapists or did not relate to children with development delays.

Fourteen of these articles met the eligibility criteria and were included in the review. The PRISMA flowchart used for study selection is shown below (Page et al., 2021).
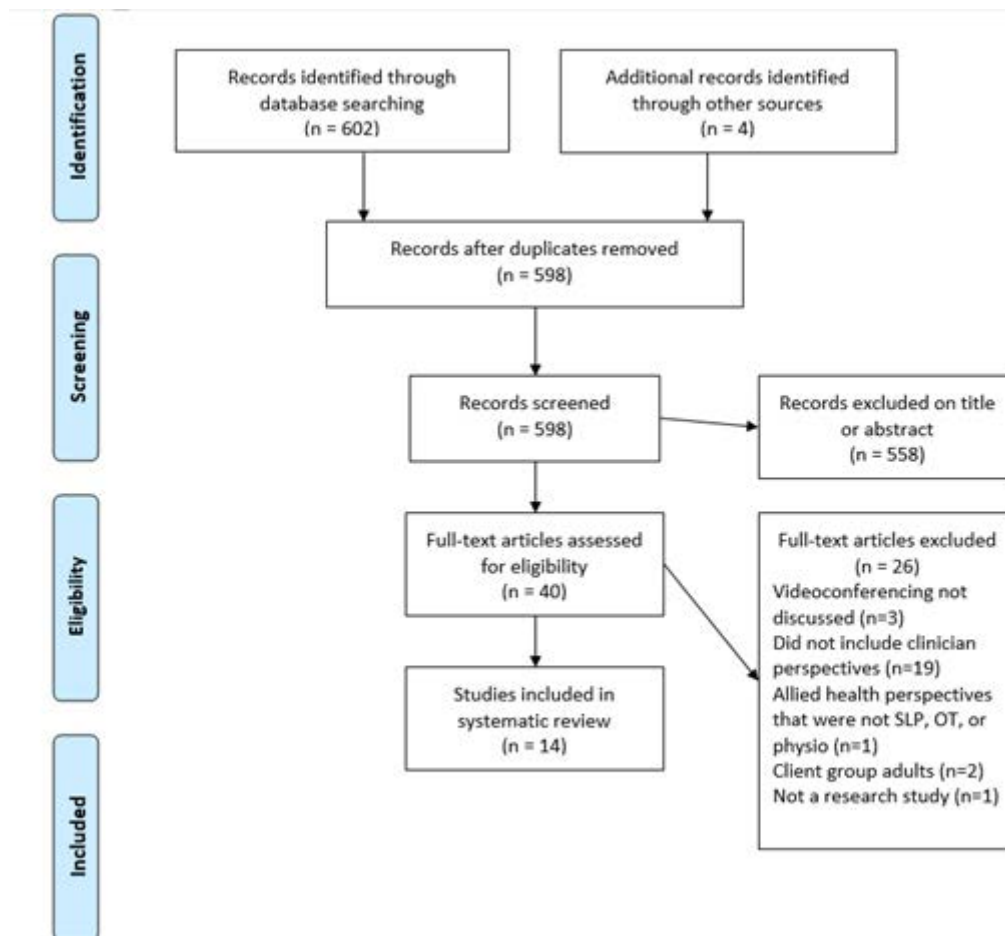
Figure 2

PRISMA flowchart

2.3.2 Study characteristics

Five studies used a mixed methods design (Edirippulige et al., 2016; Hill & Miller, 2012; Iacono et al., 2016; Raatz et al., 2020; Rortvedt & Jacobs, 2019). Hill and Miller (2012), Raatz et al. (2020) and Rortvedt and Jacobs (2019) used a cross sectional survey design with some open-ended questions for thematic analysis. Iacono et al. (2016) used both cross sectional survey and semi structured interviews using descriptive statistics and thematic analysis respectively and Edirippulige et al. (2016) used a qualitative interview and described locations using geomapping. The geomapping component has not been analysed in this systematic review.

Seven studies used a qualitative design employing semi structured interviews (Akamoglu et al., 2018; Ashburner et al., 2016; Campbell et al., 2019; Hines et al. 2015 ; Johnsson et al., 2019; McAllister et al., 2008; Tucker, 2012b). The two remaining studies used cross sectional survey design

(Dunkley et al., 2010; Tucker, 2012a). All studies were level VI on the evidence hierarchy (Ackley et al., 2008).

2.3.3 Risk of bias

Bias was assessed using the CCAT (Crowe & Sheppard, 2011). There is a high risk that bias in data collection instruments was present in 12 out of 14 studies as only Tucker (2012a;2012b) pilot tested surveys and interviews prior to data collection. Akamoglu et al. (2018) acknowledged lack of validity and reliability of their survey as a limitation of their study. Bias in sampling was acknowledged by three studies (Ashburner et al., 2016; Campbell et al., 2019; Raatz et al., 2020). Campbell et al. (2019) reported that they had no indigenous respondents and that this did not reflect the population. While the above three studies considered sampling bias a risk, it appears that while it went unacknowledged it was also a risk in the other studies as none of the included studies had a random sample. Raatz et al. (2020) reported risk of selection bias as they considered it possible that their sample may have an interest in telehealth and therefore chose to respond to the survey. Akamoglu et al. (2018) and Tucker (2012a;2012b) required their participants to be experienced in telehealth; consequently, clinicians who deliberately avoided telehealth were excluded. This may lead to a bias in under reporting of barriers to the use of telehealth. Ashburner et al. (2016) discussed that since the telehealth program was at no cost to the families that respondents may have been swayed to respond positively. Reporting bias was a risk in at least four studies who reported receiving funding from telehealth motivated organisations (Ashburner et al., 2016; Campbell et al., 2019; Hines et al.; Johnsson et al., 2019). Studies that acknowledged bias generally scored higher using the CCAT than those that did not.

2.3.4 Participant characteristics

All studies included participants that were either speech pathologists, occupational therapists or physiotherapists as required by the eligibility criteria. Speech pathologists made up most participants (n=412). Occupational therapists were less well represented than speech pathologists (n=25) and physiotherapists had the smallest representation (n=2). The studies by Dunkley et al., (2010) and McAllister et al. (2008) shared a participant pool. Age ranges and genders of participants was not consistently reported. Studies that did report gender found that participants were more than 90% female (Akamoglu et al., 2018; Campbell et al., 2019). Familiarity with telehealth was reported for some but not all studies. Reported familiarity ranged from 25% by McAllister et al. (2008) to 100% by Akamoglu et al. (2018). Clinical experience was not consistently reported. While participant characteristics reporting varied widely it is certain that most participants were speech pathologists.

2.3.5 Patient demographics

Patient groups varied and details were not always given consistently. Three studies reported a mix of paediatric and adult caseload (Dunkley et al., 2010; Hill & Miller, 2012; McAllister et al., 2008). Five studies reported that children were mainly seen in a school setting (Akamoglu et al., 2018; Hines et al. 2015; Rortvedt & Jacobs, 2019; Tucker, 2012a; Tucker, 2012b). Three studies report that children had autism spectrum disorder (ASD) (Ashburner et al., 2016; Iacono et al., 2016; Johnsson et al., 2019). One study described the client group as children with cerebral palsy.(Edirippulige et al., 2016) The patient group for Raatz et al. (2020) all had feeding difficulties. Finally, Campbell et al. (2019) sought perceptions from therapists involved in a remote health scheme with services for both indigenous and non-indigenous children. All studies included some children requiring non acute services for developmental delays.

2.3.6 Themes

Themes identified related either to allied health professionals or families receiving the service. Allied health professional themes included technology, self-efficacy, face-to-face services, time management and relationships. Themes identified for families included access, and family centered care. Each of these themes was seen as both a potential barrier or facilitator when trying to provide services via telehealth.

Allied health professionals

2.3.6.1 Technology

Technology failure or lack of technology infrastructure was identified in seven studies as a barrier to the provision of services via telehealth (Ashburner et al., 2016; Campbell et al., 2019; Hill & Miller, 2012; Iacono et al., 2016; McAllister et al., 2008; Raatz et al., 2020; Tucker, 2012a). Whilst one study identified appropriate access to support and technology as a facilitator to providing services via telehealth (Johnsson et al., 2019).

Technology failure was specified as internet drop out by Iacono et al. (2016), a lack of telehealth infrastructure by McAllister et al. (2008) and time lag, computer crashing and screen freezing by Tucker (2012b). Dunkley et al. (2010) reported that clinicians held the belief that families did not have the computer literacy or access to use telehealth. However, this belief was shown to be unsupported by family's perceptions (Dunkley et al., 2010). One resident commented *"'like everyone else, we've got a fax and a computer and the internet [satellite connection] and all that''* (Dunkley et al., 2010, p.339). Three studies reported that technology did not negatively impact the use of telehealth as clinicians found that issues could be worked through, that technology was not an issue

and in one case technology facilitated telehealth (Campbell et al., 2019; Johnsson et al., 2019; Hines et al., 2015).

2.3.6.2 Self-efficacy

Participants in six studies identified lack of self-efficacy related to poor confidence or inadequate training as a barrier to service delivery via telehealth (Campbell et al., 2019; Dunkley et al., 2010; Hill & Miller, 2012; Iacono et al., 2016; McAllister et al., 2008; Tucker, 2012b). Adequate training, facilitating improved self-efficacy, was identified by three studies, resulting in easier use of telehealth as a service delivery method (Edirippulige et al., 2016; Hill & Miller, 2012; Johnsson et al., 2019).

Self-efficacy and training are closely linked; training improves self-efficacy in whichever skill is trained (Ammentorp et al., 2007). Raatz et al. (2020) reported that 27% of its participants had received training in telehealth. Three studies included in the review identified support and training as facilitators to the use of telehealth (Edirippulige et al., 2016; Hill & Miller, 2012; Johnsson et al., 2019). Johnsson et al. (2019) reported that training built clinician confidence. Hill and Miller (2012) reported that 79% of respondents recommended further professional development and 66% recommended demonstrations by clinicians to enable skills in telehealth to be developed.

2.3.6.3 Replacement for face-to-face services

The inadequacy of telehealth to replace face-to-face therapy was reported as a barrier in ten studies (Akamoglu et al., 2018; Ashburner et al., 2016; Campbell et al., 2019; Dunkley et al., 2010; Edirippulige et al., 2016; Iacono et al., 2016; Johnsson et al., 2019; Raatz et al., 2020; Rortvedt & Jacobs, 2019; Tucker, 2012b). Two reasons reported for this. Firstly, the inappropriateness for certain client groups (Akamoglu et al., 2018; Iacono et al., 2016; Raatz et al., 2020; Tucker, 2012b). Secondly, the lack of physical touch available in a telehealth appointment (Akamoglu et al., 2018; Campbell et al., 2019; Johnsson et al., 2019; Rortvedt & Jacobs, 2019; Tucker, 2012b). Three studies simply referred to unsuitability of telehealth as a replacement to face-to-face therapy (Ashburner et al., 2016; Dunkley et al., 2010; Edirippulige et al., 2016).

This theme was predominantly reported as a barrier (Akamoglu et al., 2018; Ashburner et al., 2016; Campbell et al., 2019; Dunkley et al., 2010; Edirippulige et al., 2016; Iacono et al., 2016; Johnsson et al., 2019; Raatz et al., 2020; Rortvedt & Jacobs, 2019; Tucker, 2012b). However, there were some positive perceptions. Two studies reported participant views that telehealth was similar to or even better than face-to-face services in some situations (Edirippulige et al., 2016; Johnsson et al., 2019). Edirippulige et al. (2016) reported views that telehealth was facilitative of pre and post operation

planning for children with cerebral palsy and that telehealth was an effective adjunct to face-to-face services.

The four studies that found clinicians perceived that some client groups could not be provided services via telehealth specified those client groups as children with profound disabilities, those with ASD and other communication disorders and children with feeding difficulties (Akamoglu et al., 2018; Iacono et al., 2016; Raatz et al., 2020; Tucker, 2012b). Clinicians were concerned that children with profound disabilities would not physically be able to use the videoconferencing technology and that children with communication difficulties could not engage through the screen (Akamoglu et al., 2018; Iacono et al., 2016; Tucker, 2012b). Raatz et al. (2020) also reported clinicians concerns around efficacy and safety of telehealth for children with feeding difficulties.

2.3.6.4 Time management

Participants in four studies reported beliefs that telehealth negatively impacted time management as they did not have time to implement a telehealth service (Akamoglu et al., 2018; Edirippulige et al., 2016; McAllister et al., 2008; Rortvedt & Jacobs, 2019). Whilst four studies reported beliefs that telehealth positively impacted time management by reducing clinician travel time (Ashburner et al., 2016; Hill & Miller, 2012; McAllister et al., 2008; Raatz et al., 2020).

Organising and scheduling telehealth was thought to be a burden on already heavy workloads due to preparation of materials and technology (Edirippulige et al., 2016). Clinicians also believed that without sufficient support by their organisation time costs would fall to the individual clinician (McAllister et al., 2008). Two further studies reported perceptions that school-based appointments would have to be set up and supervised by a support person within the school and that this introduced logistical difficulties dependent on the priority the school placed on therapy (Akamoglu et al., 2018; Rortvedt & Jacobs, 2019).

2.3.6.5 Relationships

Participants in four studies reported that telehealth negatively impacted their therapeutic relationship with the child (Campbell et al., 2019; Edirippulige et al., 2016; Iacono et al., 2016; Rortvedt & Jacobs, 2019). Whilst relationships and collaboration with parents and educators were reported to be improved in seven studies (Akamoglu et al., 2018; Ashburner et al., 2016; Campbell et al., 2019; Edirippulige et al., 2016; Hines et al.; Johnsson et al., 2019; Rortvedt & Jacobs, 2019).

Allied health professionals perceived that they had an improved collaboration with teachers and improved relationships and upskilling of parents when using telehealth (Akamoglu et al., 2018;

Ashburner et al., 2016; Hines et al., 2015). Another study reported perceptions that telehealth was more successful when it was supported by local providers and other stakeholders like parents and teachers (Campbell et al., 2019).

2.3.6.6 Minor themes

Other allied health professional themes were logistics, local staff changes and safety and efficacy of a feeding service acting as barriers to using telehealth for service delivery (Johnsson et al., 2019; Raatz et al., 2020; Rortvedt & Jacobs, 2019).

Families

2.3.6.7 Access

Reduced access for families was reported by one study, with allied health professionals believing families did not have sufficient technology or finances to access a telehealth service; however this was not supported by family perceptions (Dunkley et al., 2010). Improved access for families was identified by allied health professionals in seven studies, reporting reduced travel and time as one reason for this increase in access (Ashburner et al., 2016; Campbell et al., 2019; Hill & Miller, 2012; Johnsson et al., 2019; McAllister et al., 2008; Rortvedt & Jacobs, 2019; Tucker, 2012b). Reducing gaps in regional services was identified as another reason for the perceived increase in access (Ashburner et al., 2016; Johnsson et al., 2019).

2.3.6.8 Family centred care

Three studies reported beliefs by allied health professionals that family centred care would be negatively impacted by telehealth (Campbell et al., 2019; Raatz et al., 2020; Rortvedt & Jacobs, 2019). Participants believed children would not participate in telehealth appointments and that family privacy would be compromised (Campbell et al.,2019; Raatz et al., 2020 & Rortvedt & Jacobs, 2019). Two studies reported participant beliefs that telehealth would improve privacy for families as they would not be seen attending the clinic (Campbell et al., 2019; Edirippulige et al., 2016). Seven studies reported perceptions that family centred care would improve as families could access services when it suited their needs (Ashburner et al., 2016; Campbell et al., 2019; Hill & Miller, 2012; Iacono et al., 2016; McAllister et al., 2008; Raatz et al., 2020; Tucker, 2012a) .

Telehealth was generally seen to be more convenient and less disruptive to child and family schedules than attending a physical appointment. Reasons included facilitating academic learning as the appointment was easier to fit around the school day, improved carer engagement and flexible for families (Tucker, 2012b; Campbell et al., 2019; Raatz et al., 2020; Ashburner et al. 2016). It was also

reported that children and parents were more relaxed in their own familiar environment (Ashburner et al., 2016; Iacono et al., 2016; Raatz et al., 2020). Families reported they were supported to implement therapy strategies at home when therapy took place in the home context (Ashburner et al., 2016). Importantly, it was perceived that families for whom attending physical appointments was inconvenient due to the complexity of the child's disability, responsibilities for other children or parent work could still access interventions (Ashburner et al., 2016; Raatz et al., 2020).

2.4 Discussion

2.4.1 Key findings

Perspectives of speech pathologists, occupational therapists and physiotherapists toward using telehealth videoconferencing in children with developmental delays can be summarised into seven main themes. Clinician themes were technology, self-efficacy, replacement of face-face services, time management and relationships. Family themes were access and family centred care. These themes give an insight into the capacity of telehealth to manage service gaps in rural areas past the necessities of the Covid-19 pandemic.

2.4.2 Potential solutions

Participants identified solutions in relation to technology issues, self-efficacy and time management.

2.4.2.1 Technology

Two studies published in 2019 reported positive perceptions of technology (Campbell et al., 2019; Johnsson et al., 2019). The studies reporting technology as a barrier varied from 2008-2020 in year of publication (Ashburner et al., 2016; Campbell et al., 2019; Hill & Miller, 2012; Iacono et al., 2016; McAllister et al., 2008; Raatz et al., 2020; Tucker, 2012b). While no conclusions can be drawn from this, it is encouraging that recent studies have some positive perceptions of telehealth and report beliefs that technological issues can we worked through (Johnsson et al., 2019). A potential solution is prioritising personal technological equipment upgrades (e.g. laptop with suitable processing) and readily available technology support to reduce technological difficulties (Bradford et al., 2016).

2.4.2.2 Self-efficacy

There was frequent reporting of lack of self-efficacy linked to training throughout the review (Campbell et al., 2019; Dunkley et al., 2010; Hill & Miller, 2012; Iacono et al., 2016; McAllister et al., 2008; Tucker, 2012b). Lack of self-efficacy is potentially rectified by providing training and support prior to and during implementation of telehealth programs (Ammentorp et al., 2007). Indeed, the participants in the review recognised this need themselves (Edirippulige et al., 2016; Hill & Miller,

2012; Johnsson et al., 2019). Allied health professionals in rural areas have been shown to be time poor, therefore the initial time investment in telehealth training to reduce time cost in future should be impressed upon clinicians (Adams et al., 2015).

2.4.2.3 Time management

Given the significant time cost of travel for rural health appointments, negative perceptions toward time management were unexpected. There were concerns around logistics of setting up a telehealth appointment and time wasted on managing technological difficulties (Edirippulige et al., 2016; Akamoglu et al., 2018; Rortvedt & Jacobs, 2019). Potential solutions are adequate training and technology, along with contingency plans for when unavoidable technological failures occur. In addition, improved relationships with stakeholder groups may help with time spent organising appointments around opposing schedules (Hines et al., 2015). Lastly, the onus should be placed on the organisation implementing telehealth to ensure policies and procedures are in place to support efficient use of telehealth (Bradford et al., 2016).

2.4.3 Implications for future research

2.4.3.1 Replacement of face-to-face services

When considering telehealth as a replacement to face-to-face services, there was a lack of consistent reporting in what sub-groups of children with developmental delay and different interventions were being considered in responses. Edirippulige et al. (2016) specified that speech pathologists felt telehealth should not replace face-to-face therapy for children with cerebral palsy while occupational therapists believed it was similar to face-to-face therapy. Physiotherapists in this study believed telehealth was useful for pre and post operation planning for children with cerebral palsy (Edirippulige et al., 2016). It is possible that therapies historically requiring less physical touch, for example post-surgical follow up, would be seen as more acceptable via telehealth than a therapy with high risk like a swallowing assessment (Edirippulige et al., 2016; Raatz et al., 2020). However, as reasons were not clearly identified it is only possible to speculate. In future, detailed data pertaining to intervention and patient group would provide clarity and make targeting solutions more plausible.

2.4.3.2 Relationships

When considering relationships, clinicians were unsure how to build relationships with children over the screen (Campbell et al., 2019; Edirippulige et al., 2016; Iacono et al., 2016; Rortvedt & Jacobs, 2019). Further studies should explore building rapport with children via telehealth. In addition, training programs should include this to increase clinician confidence with building rapport via telehealth videoconferencing.

2.4.3.3 Access and family centred care

Access was largely seen as a positive with perceptions that there was reduced burden of travel and travel related costs for families (Ashburner et al., 2016; Campbell et al., 2019; Hill & Miller, 2012; Johnsson et al., 2019; McAllister et al., 2008; Rortvedt & Jacobs, 2019; Tucker, 2012b). Travel for healthcare by both providers and families is a major financial and environmental issue in rural Australia (Cheek et al., 2014). One study in rural Queensland reported mean travel times for each family for a child's outreach visit was five hours and 46 minutes for each visit to and from a central hub (Edirippulige et al., 2016). The petrol cost of such a journey, along with the impact of that time from the day on a family, cannot be overlooked. Should future research find telehealth videoconferencing to have efficacy for children with developmental delay, the benefit to rural families could be significant.

These benefits to access were recognised by speech pathologists, occupational therapists and physiotherapists in this review. Should families be able to use telehealth for their services, thereby reducing time taken, travel cost and logistical burden of physically attending an appointment, telehealth has the potential to be a solution to the service provision problem in rural areas. Research to determine the importance of a service that is perceived as a poor or unsuitable replacement to the face-to-face version, versus no or low frequency service in rural areas is needed. The perceived importance of themes in relation with one another was not discussed by any study in the review and should be researched in the future.

While access has been considered a 'family' theme in this review, it also has some potential to increase buy in from allied health professionals. Reduced costs due to telehealth have been reported in other areas of health provision (in this case oncology) due to avoidance of clinician travel costs (Thacker et al, 2013). This research is yet to be emulated in the children's physiotherapy field. Organisational cost savings could redirect funding to allied health staffing in rural areas thereby improving access to allied health services for families and reduced staffing pressures for organisations (Bradford et al., 2016). Future research needs to investigate cost benefits in the use of telehealth for paediatric therapy services.

2.4.4 Limitations

Limitations of this systematic review method are that only peer reviewed databases were searched and only English language articles included. Grey searching was used in an attempt to control this. Limitations identified in the included studies include two studies sharing data sets (Dunkley et al., 2010; McAllister et al., 2008). Clinician characteristics were not consistently reported throughout the

studies leaving doubt as to how well the samples represented the general population. Speech pathologists made up the majority of the clinicians across the studies which makes generalisation of the findings to other disciplines difficult. Patient group characteristics were inconsistently described thus conclusions on which patient populations are suitable for telehealth are unable to be drawn. Study design was a further limitation with only Johnsson et al. (2019) using a comparison group and this study was appraised to be of poor quality (Crowe & Sheppard, 2011). No study was any higher than VI on the evidence hierarchy (Ackley et al., 2008). Thus, the poor quality and lower level of evidence means that the findings of this review need to be treated with caution. While reduced cost was commonly mentioned by studies in the review none of them analysed cost against benefit. Cost benefits analyses are required to determine whether telehealth is truly cost effective.

2.5 Conclusion

This systematic review investigated speech pathologists', occupational therapists' and physiotherapists' perspectives on using telehealth to deliver interventions to children with developmental delays. Synthesis of this literature identified that there are both facilitators and barriers to adoption of telehealth videoconferencing for allied health service delivery in children with developmental delay. Facilitators included improved access to services, family centred care and collaboration with stakeholders. Barriers identified were the belief that telehealth cannot replace face-to-face therapy, technology failure, lack of self-efficacy, lack of time to implement telehealth service and interference with therapeutic relationships.

Evidence quality was limited by study design with only studies with low-quality evidence identified and high risk of bias present within studies. The low-quality evidence means that the results should be treated with caution. Generalisability of findings is limited due to sampling methods, small sample sizes and low response rates. Occupational therapists and physiotherapists were under-represented in the populations included in this review.

This review highlights that many barriers are perceived but solutions and work arounds to these barriers can also be identified. These findings need to be corroborated by higher quality studies. Further studies should consider the cost versus benefits of allied health videoconferencing services for children with developmental delays and include adequate representation of the views of occupational therapists and physiotherapists.

2.6 Chapter summary

A systematic review with narrative analysis was completed in October 2020 with the aim to identify the attitudes and perspectives of speech pathologists, occupational therapists and

physiotherapists toward using telehealth videoconferencing for service delivery to children with developmental delays. The reason for inclusion of other professional groups in addition to physiotherapists was due to insufficient literature on physiotherapists alone with only one study included in the review including physiotherapists in its population (Edirippulige et al., 2016). Therefore, speech pathologists and occupational therapists were also included due to comparable interventions, similarities in practice and collaboration between these three professions (Mazer et al., 2006; McCoy et al., 2019; Raspa et al., 2010). Narrative synthesis resulted in the following seven themes. Clinician themes are technology, self-efficacy, replacement of face-to-face services, time management and relationships. Family themes are access and family centred care. Evidence quality was generally low with a high risk of bias in included studies. These findings need to be corroborated by higher quality studies.

Chapter 3: Justifying the research design

3.1 Choosing the design

The methodology behind this project was chosen as the most appropriate means to answer the research question:

What are the perspectives of physiotherapists toward using telehealth for service delivery to children with developmental delay?

The framework presented by Creswell was used to guide decisions on how was best to answer the research question (Creswell, 2014). This framework (Figure 3) presents world view, research approach, research design and research methods as being interconnected (Creswell, 2014).
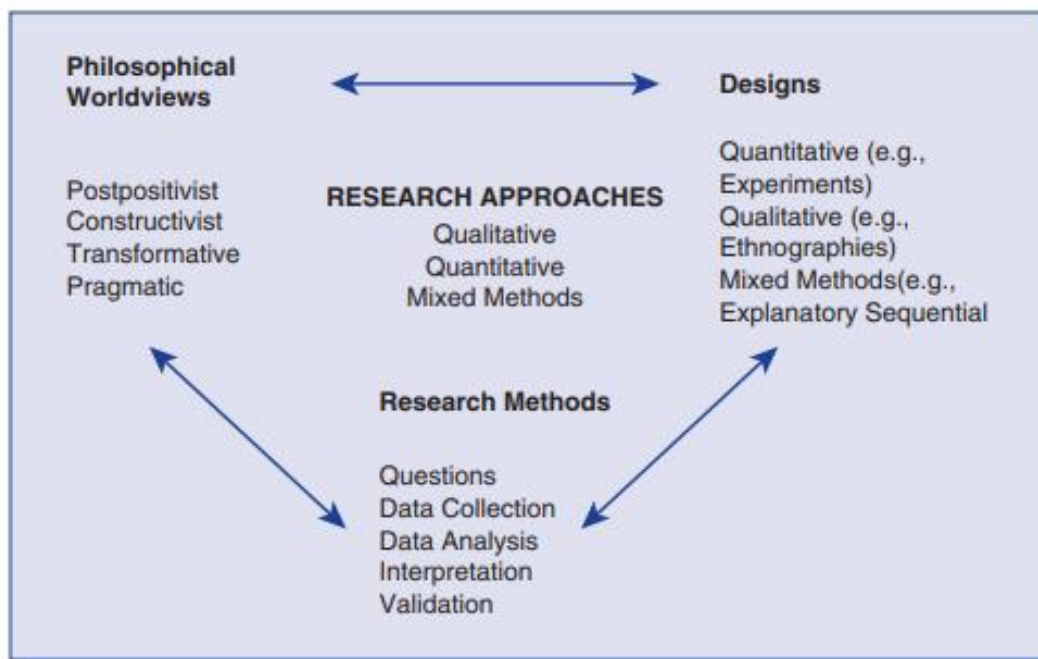
Figure 3

A framework for research - the interconnection of worldviews, design and research methods

The first consideration was world view. Creswell argued that one of four philosophical worldviews underpins a research approach; post-positivism, constructivism, transformative and pragmatic (Creswell, 2014). According to Creswell (2014, p.6) a 'world view' is *'the general philosophical orientation about the world and the nature of research that a researcher brings to a study.'* The pragmatic world view best underpins the approach that I as the researcher brought to this

study. The pragmatic view point arises out of actions, situations and consequence with a focus on solutions to problems (Creswell, 2014). Under the pragmatic viewpoint, there was the freedom to choose whichever research design best fits the problem; in this case both quantitative and qualitative.

Greene et al., (1989) described five reasons one might choose mixed methods research; triangulation, complementarity, development, initiation and expansion. A qualitative survey and a qualitative focus group were combined into mixed methods. The survey was chosen for practical reasons as a questionnaire and for ease of dissemination across Australia (Kesmodel, 2018). As discussed in chapter two, there is a current lack of understanding of physiotherapists' perspectives on telehealth for children. Therefore, questions could not be based on previous questions asked of physiotherapists so it was possible that in not knowing what to ask, important knowledge might be missed (Johnson & Onwuegbuzie, 2004). The survey design served as the starting point to get basic information about attitudes and perspectives and to provide a suitable sample to move to the qualitative arm. The qualitative design elaborated upon and gave depth to the answers in the survey (Johnson & Onwuegbuzie, 2004). Thus, three of the reasons described by Greene et al., (1989) apply to the study design choice. The two methods achieve triangulation by offsetting the weaknesses of the individual methods, in this instance the inflexibility and lack of depth of the survey and risk of moderator bias in the focus groups (Greene et al., 1989; Johnson & Onwuegbuzie, 2004). The mixed design achieved complementarity by using the qualitative stage to fill in gaps in the questionnaire to reduce the likelihood of important knowledge being missed (Greene et al., 1989; Johnson & Onwuegbuzie, 2004). Finally, expansion was achieved by using survey and focus group design together to add a breadth and range of understanding to the results, thereby giving the most complete answer possible to the study questions (Greene et al., 1989; Johnson & Onwuegbuzie, 2004).

The two research methods were integrated at the sampling phase, where a purposive sample from the survey arm was taken for the qualitative arm, and at the results stage, where results were combined using a joint display (Creswell, 2014). Due to the manner and order of interaction between the two arms, the resultant mixed methods is explanatory sequential; where the qualitative arm follows and adds explanation to the quantitative arm (Creswell, 2014).

3.2 Phase one: quantitative survey design

Phase one, comprised of a survey design, provided a numeric descriptor of perspectives of physiotherapists toward using telehealth for service delivery to children with developmental delays. The cohort of interest was physiotherapists who work with children at least one day a week or more on average. The characteristics and size of this population were unknown, as there is no specific

registration or education requirement other than general physiotherapy registration through the Australian Health Practitioner Regulation Agency (AHPRA). There is also a significant literature gap around this cohort as discussed in chapter two (Grant et al., 2021b). A survey was an appropriate start point for a large or unknown cohort and a largely unstudied phenomenon (Grant et al., 2021b; Kesmodel, 2018). The analysis style chosen was descriptive statistics as this is commonly accepted as suitable to analyse survey data. Univariate analysis of the frequency, central tendency and dispersion of each variable was undertaken. Bivariate analysis of variables of interest was undertaken on variables with associations in previous research to attempt to understand relationships between variables (Sandilands, 2014).

3.3 Phase two: qualitative focus group design

Focus groups are widely used in healthcare when attempting to understand perspectives of providers and patients and to interpret survey results in mixed methods (Tausch & Menold, 2016). Thus, a focus group was fitting to meet the aims of the study. Focus groups were preferable to interviews due to opportunity for discussion which can lead to new themes emerging and prioritisation of themes (Gill et al., 2008). In interviews, the researcher takes on an 'investigator' role where they control the discussion, while in focus groups the researcher simply moderates while the participants lead the discussion (O.Nyumba et al., 2018).

The researcher role was comparatively active conducting qualitative analysis compared to the survey arm. As a relatively novice researcher with limited experience in qualitative analysis, it was important that the analysis method was straightforward and fit reasonably within scope (Nowell et al., 2017). It was also important for the author to understand the analysis in enough detail prior to conducting the focus groups to make informed decisions on data saturation (Nowell et al., 2017). The analysis method chosen was inductive thematic analysis as it was relatively straightforward and could be broken down into simple steps to follow (Nowell et al., 2017).

Thematic analysis is a method for identifying, analysing, organising, describing and reporting themes found in data (Clarke & Braun, 2013). Thematic analysis is useful for analysing qualitative data as it can examine the perspectives of participants while highlighting similarities, differences and generating unexpected insights (Clarke & Braun, 2013). A 'theme' is '*an abstract entity that brings meaning and identity to a recurrent experience and its variant manifestations. As such, a theme captures and unifies the nature or basis of the experience into a meaningful whole*.'(DeSantis & Ugarriza, 2000, p.362). A code is a section of text labelled and categorised to relate to an overall theme (Nowell et al., 2017). An inductive code, as used in an inductive thematic analysis, is a code generated from the data without a having a predetermined framework or preconception that the code must fit

(Nowell et al., 2017). Inductive codes were appropriate in this instance as so little was known about the topic (Nowell et al., 2017).

To develop competence as a researcher and achieve immersion in the data, the author moderated the focus groups (Nowell et al., 2017). Being a physiotherapist who works with children, there was concern that bias might be introduced to the focus groups. Steps taken to limit this risk of bias are described in chapter four (O.Nyumba et al., 2018). Conversely, the author's position as a physiotherapist working with children meant there was a sufficient familiarity with the topic to probe and guide discussion (O.Nyumba et al., 2018). In preparation, the author followed the recommendations for facilitators of focus group discussions described by O.Nyumba et al. (2018). Recommendations included staying relaxed, creating a rapport, probe for discussion but maintain naivete to encourage participants to elaborate, remain impartial and be flexible with discussion flow (O.Nyumba et al., 2018). A semi structured guide was used to maximise participant lead discussion (DeJonckheere & Vaughn, 2019).

3.4 Chapter summary

The pragmatist world view underpins the choice of mixed methods design. Mixed methods is suitable for this type of research question. It was chosen for the purposes of triangulation, complementarity, and expansion. A survey was chosen for phase one and a focus group was chosen for phase two. Descriptive statistics and inductive thematic analysis were used to analyse phase one and phase two data respectively.

Chapter 4: Method and results: phase one

4.1 Introduction

This chapter details the methods and analyses used to achieve the survey aims which were (1) determine physiotherapists' opinions and perspectives on ease of use of videoconferencing systems, (2) to determine perspectives regarding the usefulness of telehealth videoconferencing and (3) to determine if physiotherapists find telehealth an acceptable way to deliver services to children with developmental delays. The design chosen was cross sectional survey design. The data collection method was an online questionnaire sent by email link to a purposive sample of physiotherapists who work with children with developmental delay. Descriptive statistics were used to analyse results.

This chapter is adapted with modifications to reduce redundancy from:

Grant, C Jones, A Land, H 'Physiotherapists' perspectives on the use of telehealth for service delivery to children with developmental delays: a quantitative cross-sectional survey.' 2021 *Manuscript under revision by the Internet Journal of Allied Health Science and Practice*.

4.2 Method

4.2.1 Sampling and recruitment

The target population was registered physiotherapists working with children from 0-18 years with developmental delays within Australia. All physiotherapists working within Australia must be registered with the Australian Health Practitioner Regulation Agency (AHPRA), however there are no additional registration requirements to work with children with developmental delay. A probability sample could not be used as the characteristics and size of the target population were unknown. Purposive sampling was chosen as the primary sampling method to allow researchers to identify participants who may be eligible along with snowballing to allow potential participants to identify others who may be eligible (Naderifar et al., 2017).

Recruitment took place by distributing an online survey link to known contacts by email and through Facebook groups known to specifically reach physiotherapists working with children in Australia. Physiotherapists eligible for inclusion in the survey were required to work with children, on average, at least one day a week, implying they would respond to the questions based on their current experience. The information sheet was distributed with the survey encouraged potential participants to pass the survey on to their potential eligible contacts.

4.2.2 EtHuman research is defined by the National Health and Medical Research Council (NHMRC) as *'research that is conducted with or about people, their data or tissue'*(NHMRC, 2007). Since this study

is conducted with people and is thus human research, appropriate ethics approval was required. Ethical approval for this study was granted by the JCU Ethics Committee: H8256. Actions of the researchers to ensure that the study could be approved by the JCU Ethics Committee included attaching information sheets to the questionnaire, using an anonymous questionnaire link and keeping data collected on a secure and password protected device. The questionnaire did ask for contact details for those participants who wanted to partake in the qualitative arm. The information sheet stipulated those responses could no longer be anonymous but would be confidential.

4.2.3 Data collection

A questionnaire was presented in Qualtrics and distributed to participants via electronic link and open for six weeks during February and March 2021 (Qualtrics, 2005).

The questionnaire had eight questions on the demographics of participants (clinical experience and experience using telehealth). This was followed by an existing instrument; the Telehealth Usability Questionnaire (Parmanto et al., 2016). Lastly, participants were asked if they would participate in a second stage of the study involving focus groups or interview which is reported on elsewhere.

The Telehealth Usability Questionnaire (TUQ) measures perceptions of telehealth consisting of 20 questions with responses given on a seven point Likert scale (Parmanto et al., 2016). It was chosen to meet the aims of the survey and because there is data available on its validity and reliability. Parmanto et al. (2016) used the Cronbach Coefficient Alpha to measure internal consistency for each construct: usefulness (0.83), ease of use (0.92) effectiveness (0.86), reliability (0.79) and satisfaction (0.91). Construct validity was investigated by Bakken et al., (2006). Component factor analysis extracted two factors: video visits (alpha = .96) and use/impact (alpha = .92), explaining 63.6% of variance in scores (Bakken et al., 2006).

The TUQ required some modifications to wording suitable for the target population of interest. The resultant questionnaire was checked for face validity using five people with experience in survey design or physiotherapists working with children with developmental delay. The feedback from this check was used to adjust the questions. These same participants reported on question flow, readability, logical question sequencing and that all components of the questionnaire were working on the chosen web platform.

The Qualtrics platform used an anonymous link to distribute the survey to potential participants; this link could be forwarded on to other potential participants (Qualtrics, 2005). The

information sheet was distributed in the initial correspondence to all potential respondents. Completion of the on-line questionnaire was taken as implied consent.

Using an anonymous link meant that multiple participation could not be prevented (Qualtrics, 2005). Given that there was no incentive to complete the questionnaire, the author considered the risk of multiple submissions to be low (McGovern, et al., 2018). Unauthorised access to the questionnaire could not be eliminated as snowballing was permitted. In addition, the author did not directly control who had access to the Facebook groups. However, it was attempted to control unauthorised access by stating the eligibility criteria in the information sheet and using the first question of the survey to screen out ineligible persons. This question asked participants if they were a physiotherapist working with children with developmental delays on average one day a week or more. If they selected 'no', the survey closed

The questionnaire was open for six weeks between February and March, 2021. To minimise non-response bias, the first author sent reminders to the original email contacts and posted in the Facebook groups two weeks and four weeks into the survey opening time (McGovern, et al., 2018). The administration for one Facebook group did not approve the reminder posts until after the survey was closed. Questionnaire respondents resided in four Australian States being South Australia, Queensland, Victoria and New South Wales.

Both Parmanto et al.'s (2016) TUQ and the version of the questionnaire used in this study are attached as appendices (Appendix A and Appendix B).

4.3.4 Statistical analysis

Survey responses were exported from Qualtrics to SPSS statistics and Microsoft Excel (Qualtrics, 2005; IBM, 2017; Microsoft Corporation, 2018). They were analysed using descriptive statistics.

4.3.5 Cleaning up the data

There were seven ineligible responses where participants had selected 'no' to the eligibility criteria question, indicating they did not work with children with developmental delays at least one day a week on average. These responses were deleted prior to analysis. While there were 43 eligible responses, three participants did not continue on from the demographics portion of the questionnaire. It was not compulsory to complete all demographic data questions. All demographic data from eligible participants was included in participant characteristics. Blank cells were deleted in individual question analysis to allow the statistical analysis to run smoothly. One participant missed a

question from the TUQ portion; this question related to whether they could hear the families clearly on telehealth. It appears that the missed response was likely accidental as the participant completed the rest of the questions.

4.4 Results

There were 40 complete responses from 43 eligible responses and seven ineligible responses.

4.4.1 Participant characteristics

Participants were mostly aged between 22 and 34 (n=22, 51%) and had a range of experience from less than two years to more than 11 years, with the most frequently reported being more than 11 years (n=14, 33%). The most frequently reported work setting was physiotherapy only private practice (n=13, 30%). The most frequently reported location was New South Wales including Australian Capital Territory (n=16, 37%). Postcode data was transformed to a measure of rurality using the Modified Monash Scale (MMS) (Australian Government Department of Health, 2015). This scale gives postcodes a classification corresponding to the rurality of the location with MM1 being a major city, through to MM7 being a very remote community. MM5 was the most rural location reported in this study, with the most frequently reported being MM1 (n=15, 33%). Two participants did not include valid postcode data and their response could not be converted to the MMS (Australian Government Department of Health, 2015).

Table 2: Participant characteristics and response rate (RR)

	Frequency	Percentage
Years of experience working with children with developmental delays RR 40/43		
<2	9	20%
2-5	12	28%
6-10	8	19%
11+	14	33%
Age RR 43/43		
<24	5	12%
24-34	22	52%
35-44	9	20%
45-54	3	7%
55-64	4	9%
Work setting RR 40/43		
School based	1	3%
Public hospital	6	15%
Private practice – physiotherapy only	13	32%
Private practice – multidisciplinary	6	15%
Public community health	9	23%
Other	5	12%
Location RR 40/43		
NSW/ACT	16	40%
VIC	4	10%
QLD	14	35%
SA	5	12%
WA	1	3%
Rurality (MMS) RR 38/43		
MM1	15	39%
MM2	11	29%
MM3	6	16%
MM4	0	0%
MM5	6	16%
Training in telehealth RR 40/43		
Received	17	43%
Neutral	4	10%
Not received	19	47%

4.4.2 Descriptive results:

The TUQ measures five constructs: usefulness, ease of use, effectiveness, reliability, and acceptability (Parmanto et al., 2016). The constructs of usefulness, ease of use and acceptability directly relate to the aims of this study. The Likert scale consisted of seven possible responses ranging from one, indicating strong disagreement, to seven, indicating strong agreement. The mean, standard deviation and range of responses to each question are reported in Table 3 as per previous studies that

used the TUQ (Layfield et al., 2020; Serwe, 2018). A mean of, for example, 5.5 indicates a central tendency between somewhat agree and agree. Frequency of responses are reported in groupings of agreed (somewhat, agree, strongly), disagreed (somewhat, disagree, strongly) and neutral (neither agree nor disagree). Frequency graphs for each TUQ statement and receipt of training (Figure 23) appear below.
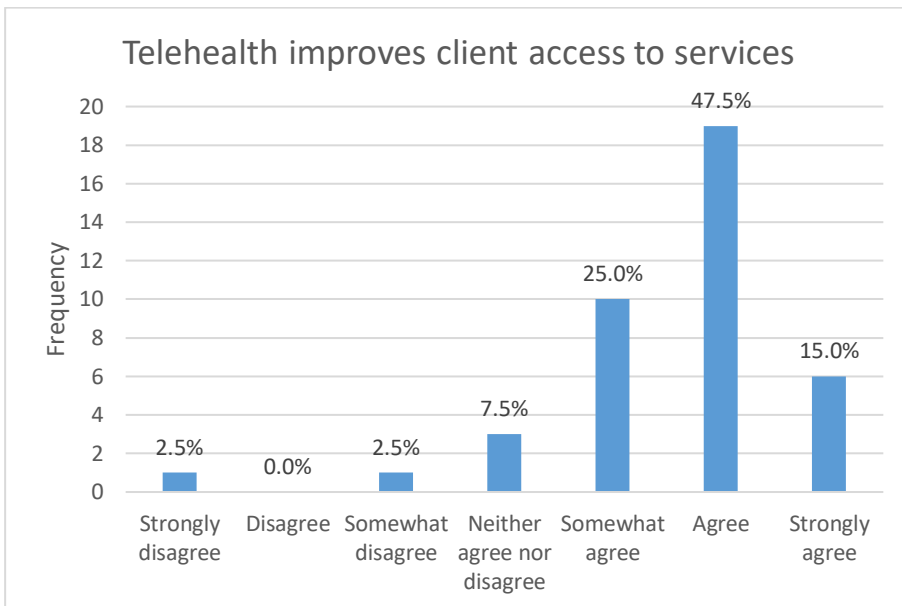
Figure 4

Telehealth improves access to services
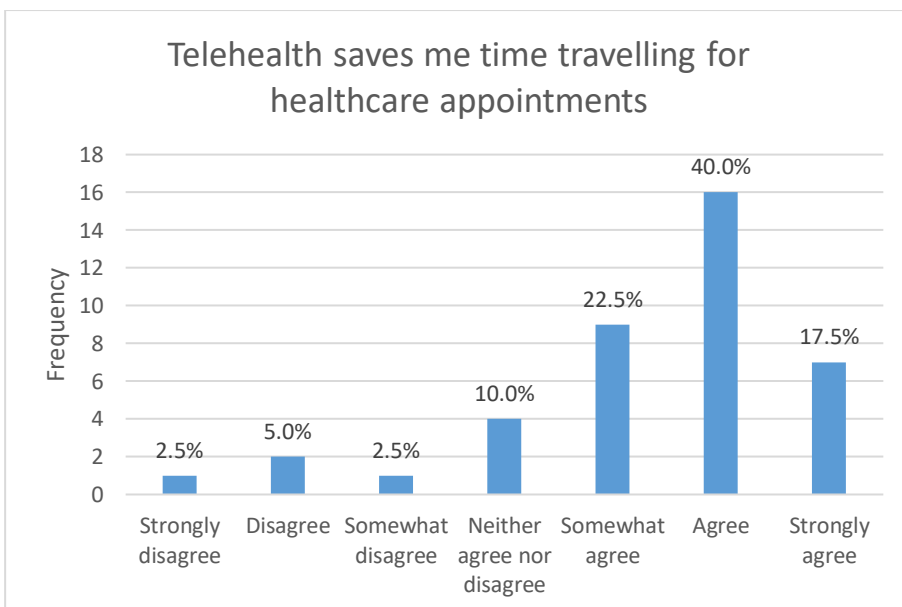
Figure 5

Telehealth saves me time travelling for healthcare appointments
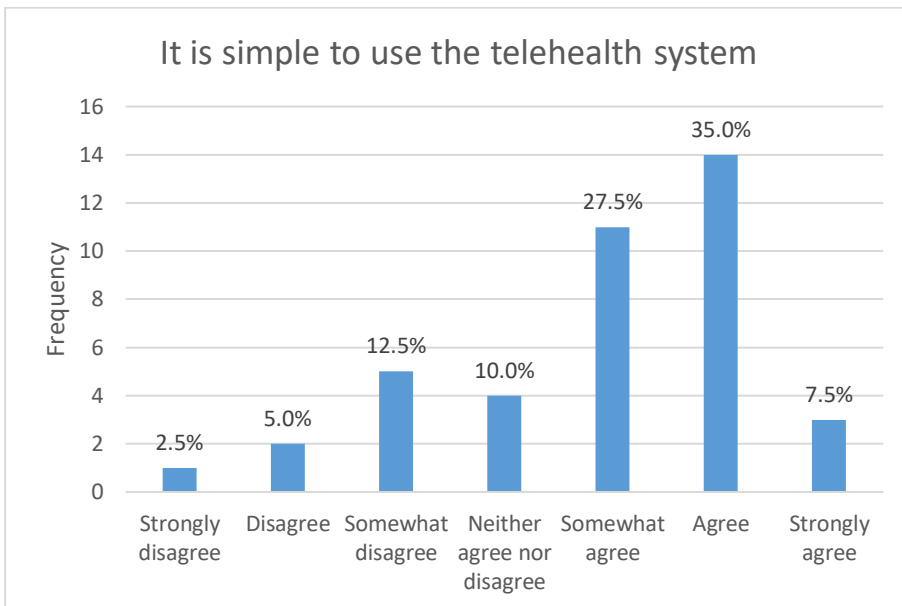
Figure 6

It is simple to use the telehealth system
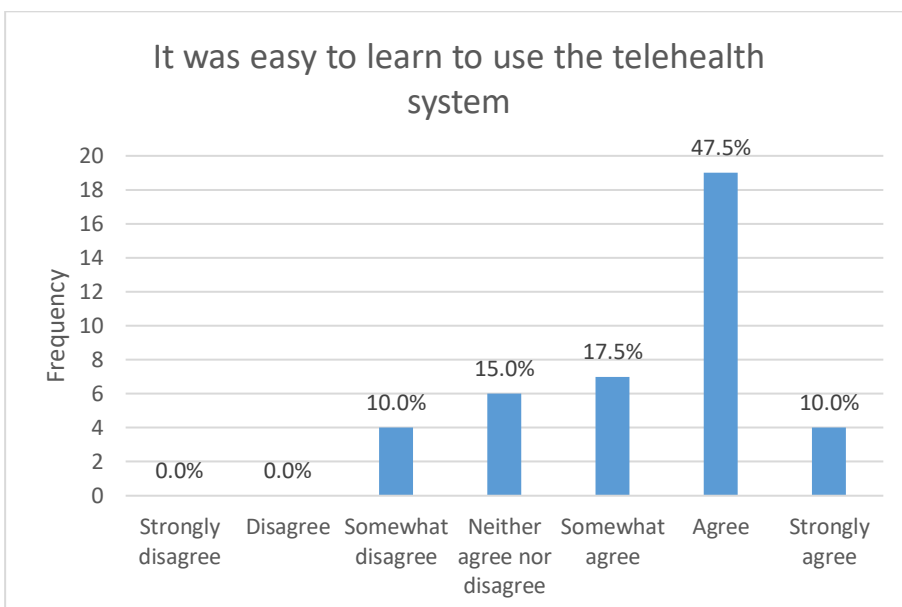
Figure 7

It was easy to learn to use the telehealth system
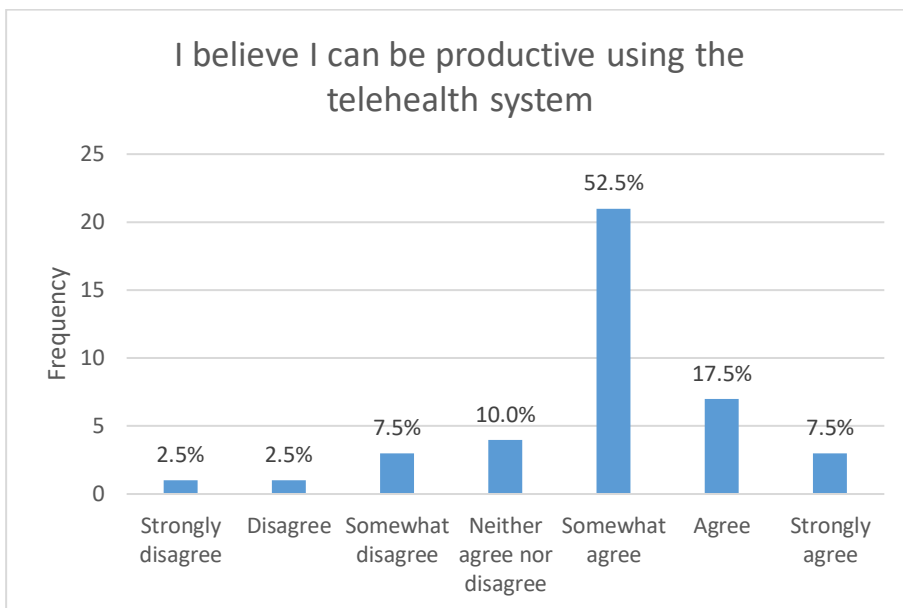
Figure 8

I believe I can be productive using the telehealth system
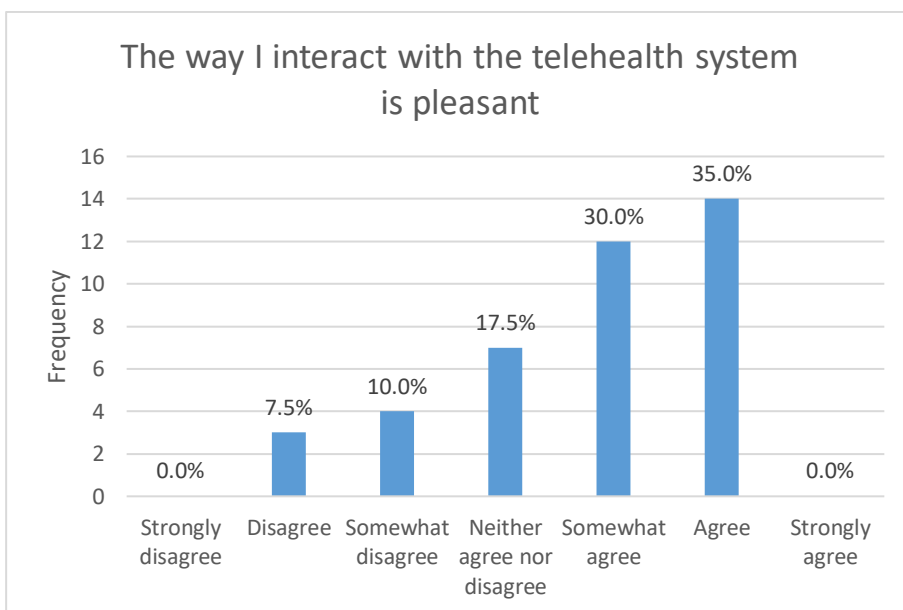
Figure 9

The way I interact with the telehealth system is pleasant
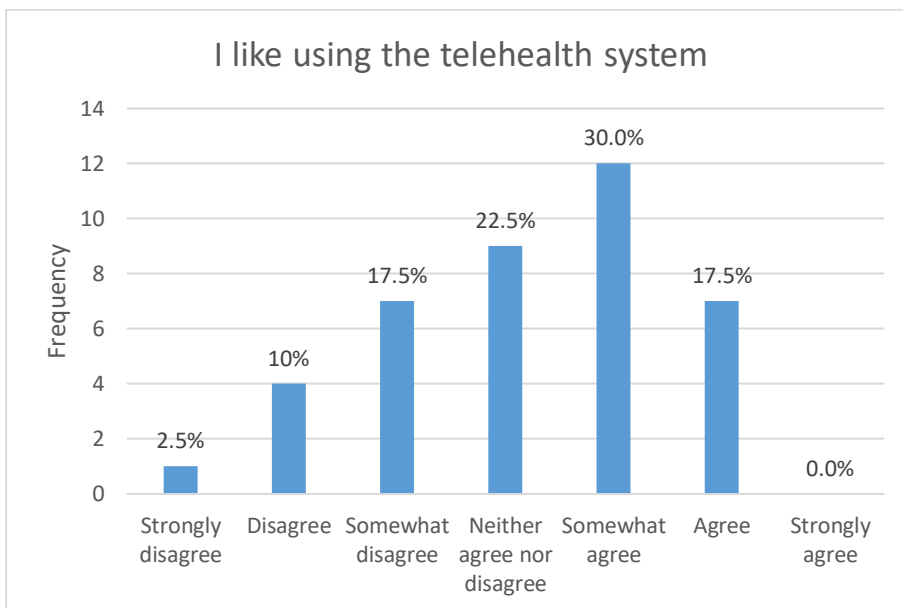
Figure 10

I like using the telehealth system
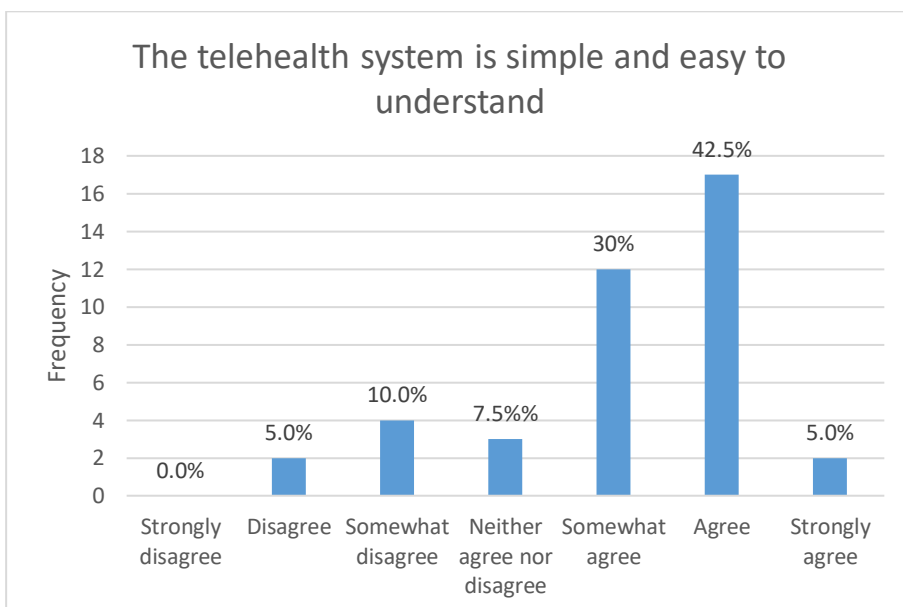
Figure 11

The telehealth system is simple and easy to use
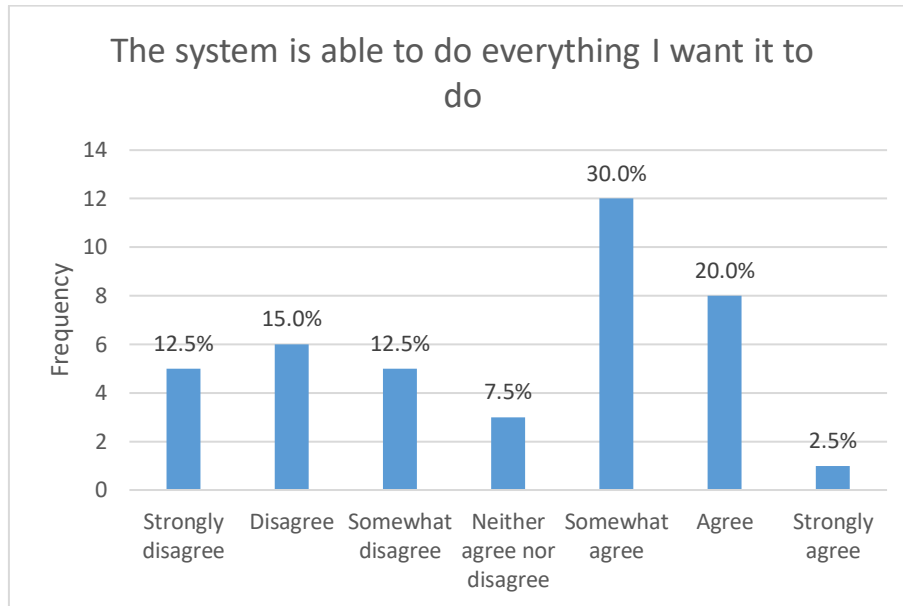
Figure 12

The system is able to do everything I want to do
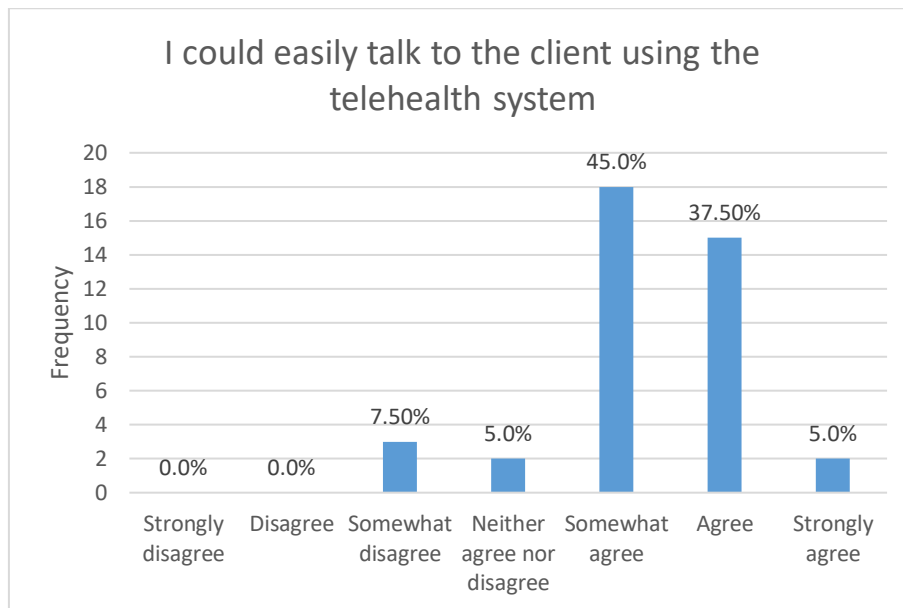
Figure 13

I could easily talk to the client using the telehealth system
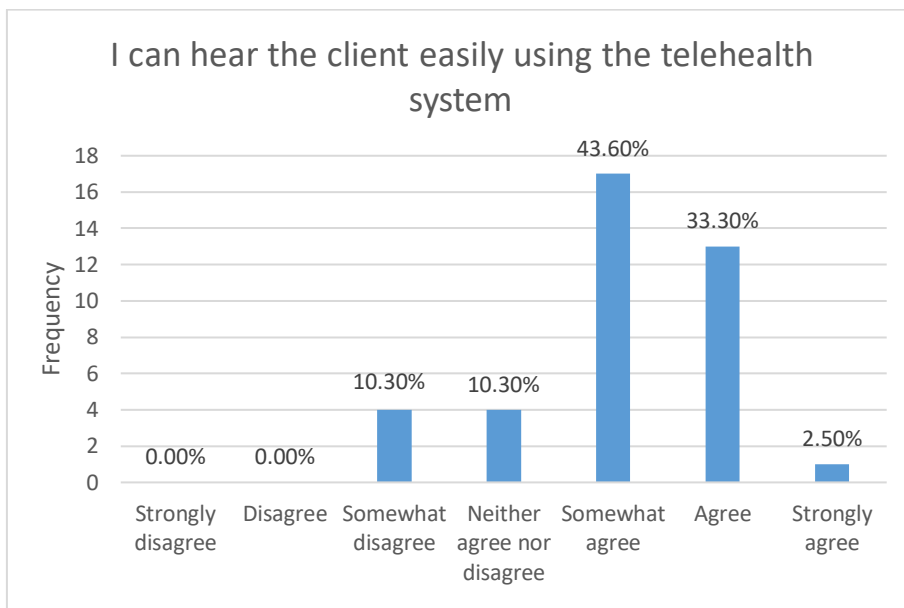
Figure 14

I can hear the client easily using the telehealth system
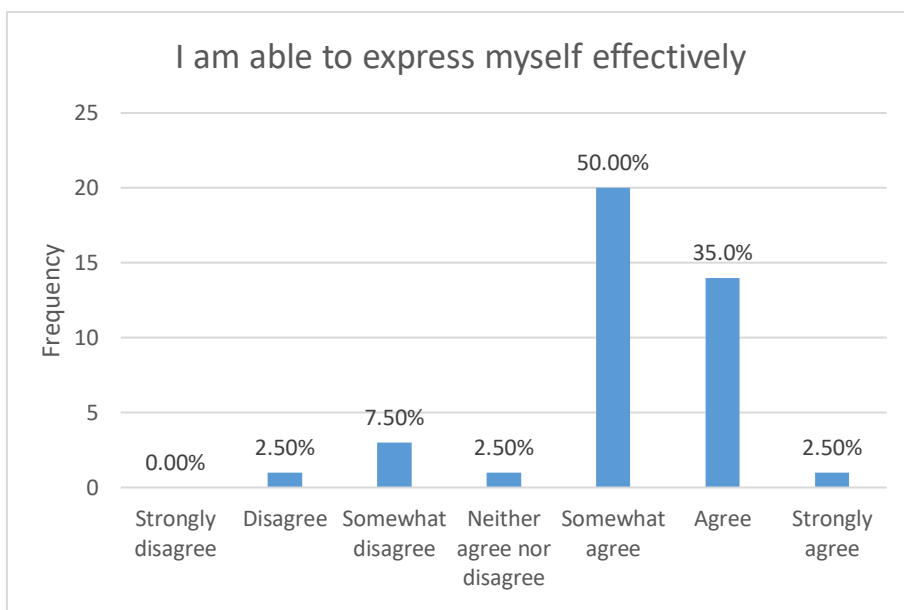
Figure 15

I am able to express myself effectively
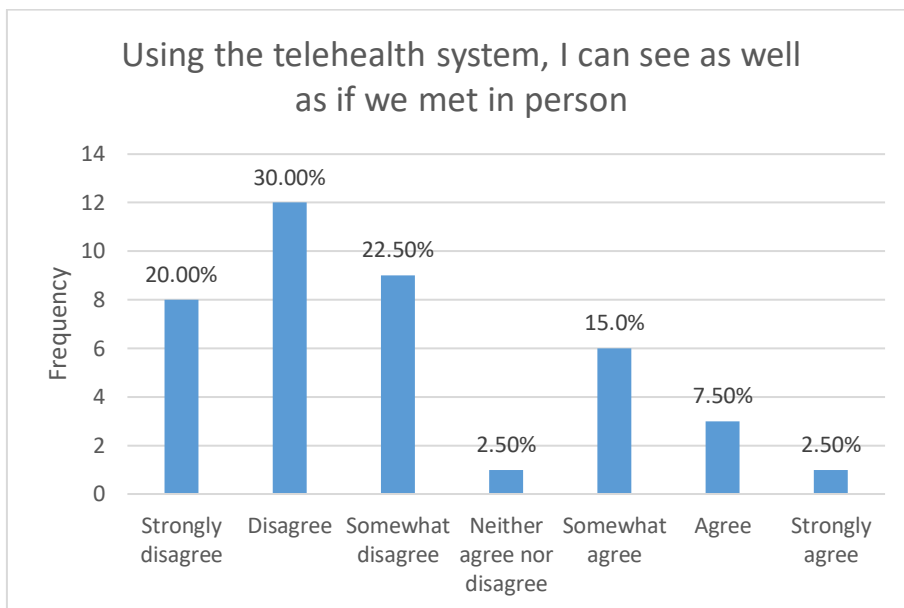
Figure 16

Using the telehealth system, I can see as well as if we met in person
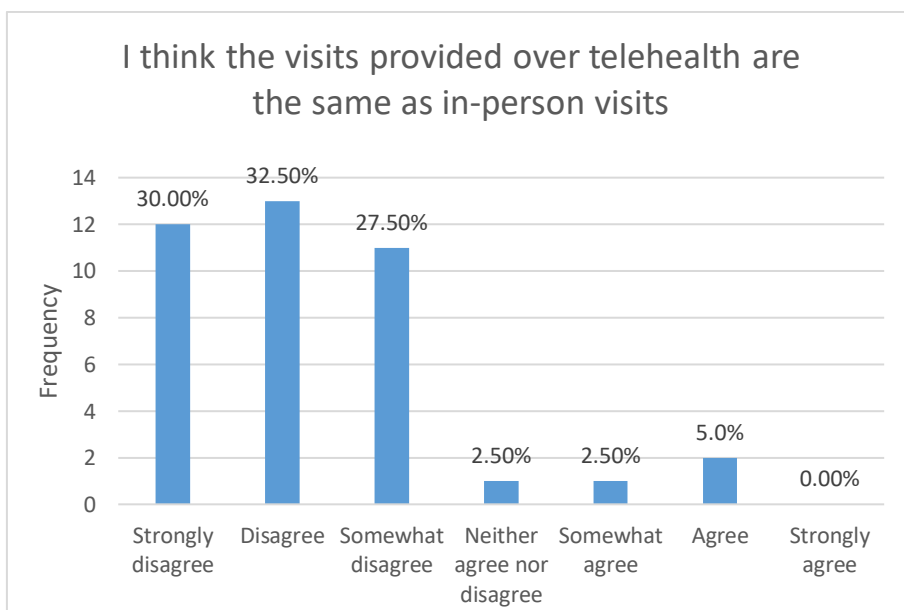
Figure 17

I think the visits provided over telehealth are same as in-person visits

Whenever I make a mistake using the system, I can recover quickly and easily
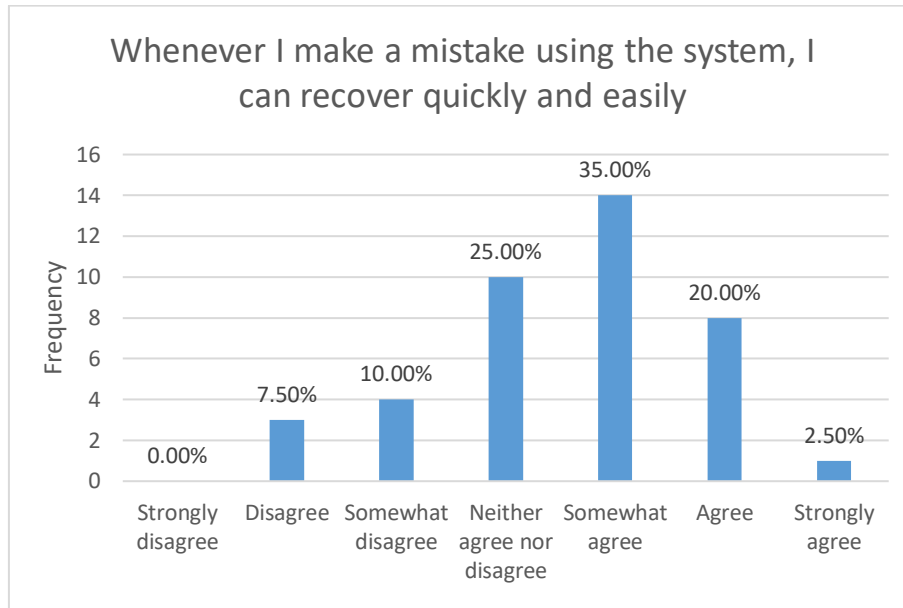
Figure 18

Whenever I make a mistake using the system, I can recover quickly and easily

The system gives error messages that clearly tell me how to fix the problem
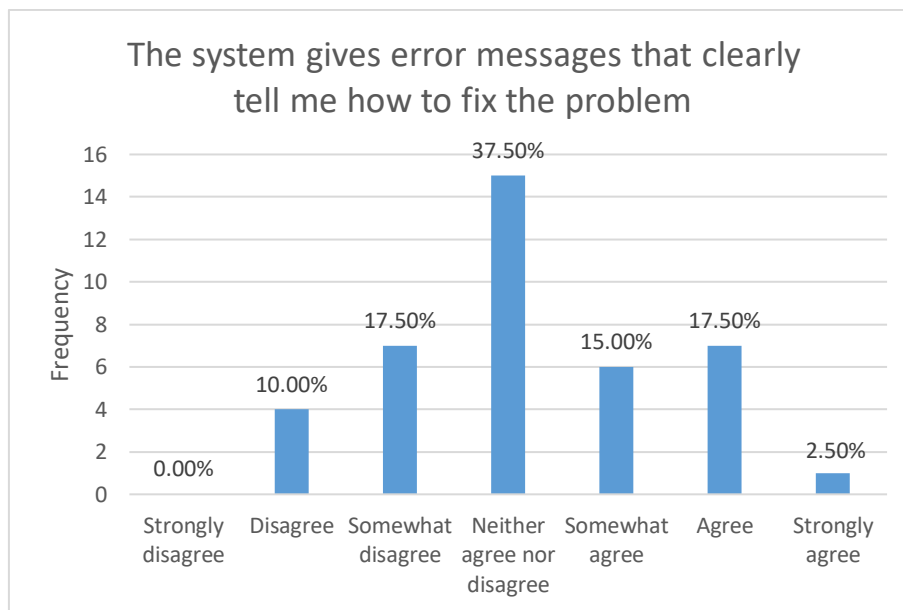
Figure 19

The system gives error messages that clearly tell me how to fix the problem
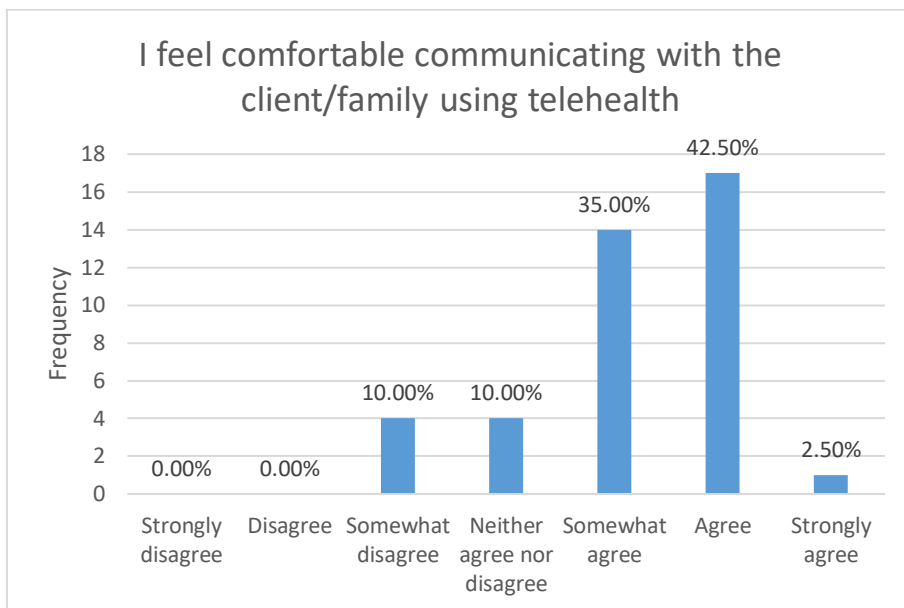
Figure 20

I feel comfortable communicating with the client/family using telehealth
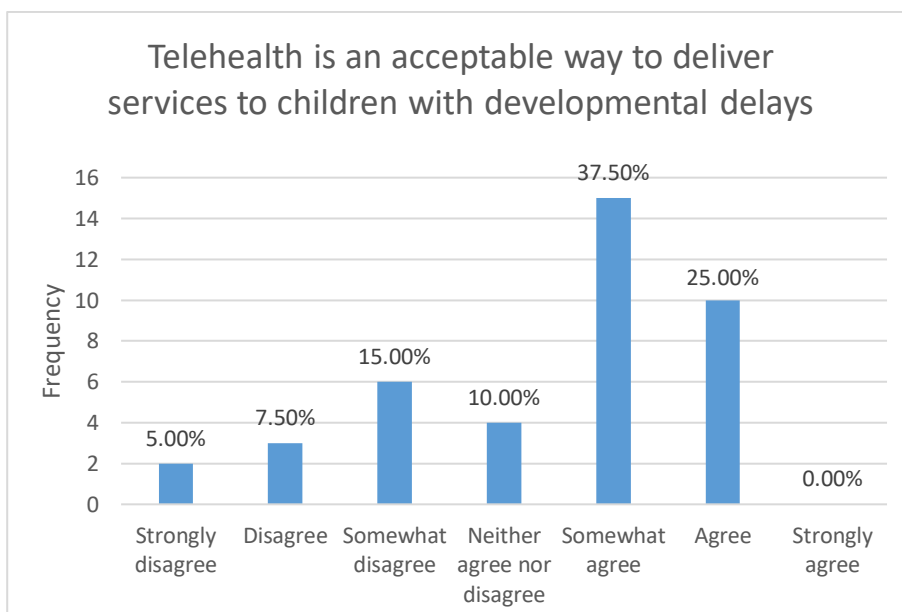
Figure 21

Telehealth is an acceptable way to deliver services to children with developmental delays
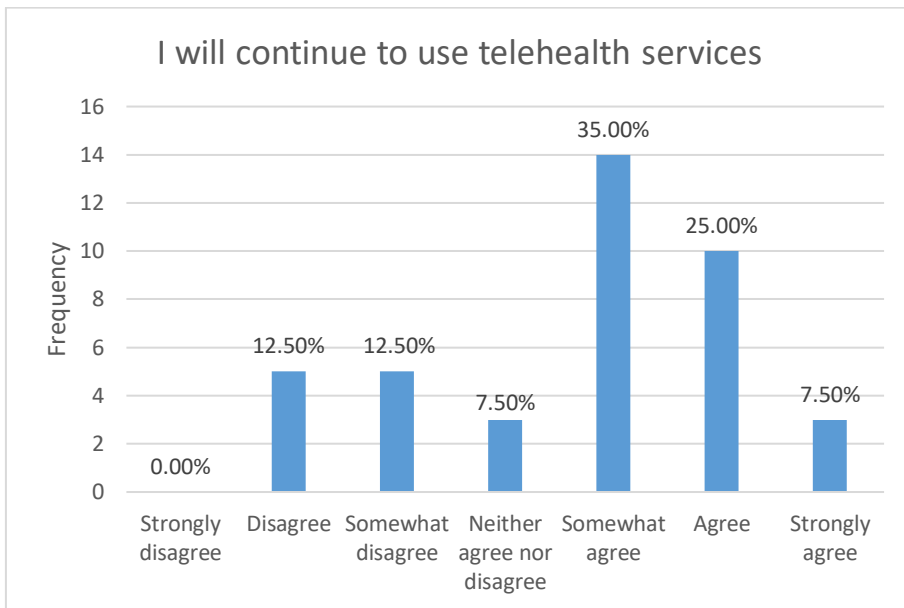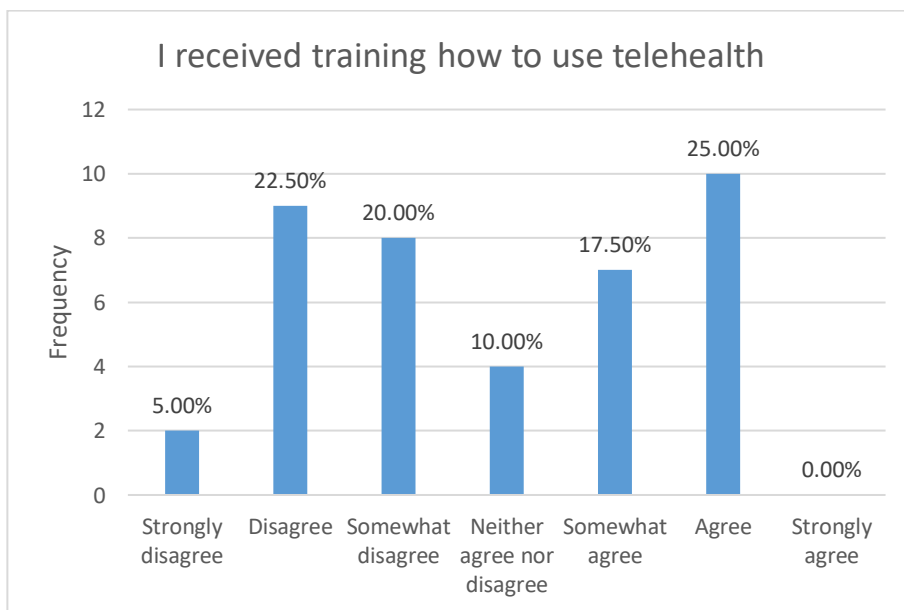
Figure 22

Figure 23

I received training how to use telehealth

Table 3: Telehealth Usability Questionnaire responses

Question	Mean	Standard Deviation	Range
Telehealth improves client access to services	5.6	1.2	1-7
Telehealth saves me time travelling for healthcare appointments	5.4	1.4	1-7
Usefulness summary	5.5	1.3	
It is simple to use the telehealth system	4.9	1.5	1-7
It was easy to learn to use the telehealth system	5.3	1.2	3-7
I believe I can be productive using the telehealth system	4.9	1.2	1-7
The way I interact with the telehealth system is pleasant	4.8	1.2	2-6
I like using the telehealth system	4.2	1.3	1-6
The telehealth system is simple and easy to understand	5.1	1.2	2-7
Ease of use summary	4.9	1.3	
The system is able to do everything I want it to do	4.0	1.8	1-7
I could easily talk to the client using the telehealth system	5.3	0.9	3-7
I can hear the client easily using the telehealth system	5.1	1.0	3-7
I am able to express myself effectively	5.2	1.0	2-7
Using the telehealth system, I can see as well as if we met in person	3.0	1.7	1-7
Effectiveness summary	4.5	1.3	
I think the visits provided over telehealth are the same as in-person visits	2.3	1.3	1-6

Whenever I make a mistake using the system I can recover quickly and easily	4.6	1.2	2-7
The system gives error messages that clearly tell me how to fix the problem	4.2	1.3	2-7
Reliability summary	3.7	1.3	
I feel comfortable communicating with the client/family using telehealth	5.2	1.0	3-7
Telehealth is an acceptable way to deliver services to children with developmental delays	4.4	1.5	1-6
I will continue to use telehealth services	4.7	1.5	2-7
Acceptability summary	4.8	1.3	

4.4.2.1 Perspectives of usefulness

Participants overall agreed that telehealth was useful for providing services to children with developmental delays with a mean summary score of 5.5. Eighty eight percent (n=35) of participants agreed telehealth improved client access to services and 80% (n=32) agreed telehealth saved travel time.

4.4.2.2 Perspectives of ease of use

Participants generally agreed to ease-of-use statements, with a mean summary score of 4.9. Seventy five percent (n=30) agreed it was easy to learn to use the system. Seventy eight percent (n=31) reported the telehealth system was simple and easy to understand. Seventy eight percent (n=31) felt they could be productive using the system. Responses to liking using the system and finding the system pleasant to use were lower, with 48% (n=19) and 40% (n=16) of participants respectively agreeing to these statements.

4.4.2.3 Perspectives of effectiveness

Participants generally agreed to effectiveness statements with a mean summary score of 4.5. Fifty three percent (n=21) agreed that the system was able to do everything they wanted. Eighty eight percent (n=35) agreed they could easily talk to the client using the telehealth system. Seventy nine

percent (n=31) agreed they could hear the client easily using the telehealth system. Twenty five percent (n=10) agreed they could see the client as well as if they met in person.

4.4.2.4 Perspectives of reliability

Participants generally disagreed to reliability statements with a mean summary score of 3.7. Ninety percent (n=36) disagreed that telehealth is the same in person visits. The mean score for this question was 2.9. Agreeance was higher for the remainder of reliability questions. Fifty eight percent (n=23) agreed they could recover quickly and easily when they made a mistake. Thirty five percent (n=14) agreed that telehealth system gave error messages that told them quickly and easily how to fix problems.

4.4.2.5 Perspectives of acceptability

Participants generally agreed that that telehealth was an acceptable service delivery method for children with developmental delay with a mean summary score of 4.8. Eighty percent of (n=32) participants agreed to feeling comfortable communicating with the client over telehealth. Sixty three percent (n=25) agreed that telehealth is an acceptable to deliver services to children with development delay. Sixty percent (n=24) agreed that they will continue to use telehealth services.

4.4.3 Associations between variables

There were no strong correlations (Pearson's r>0.7) between demographic variables and survey responses. Variables that have associations in previous research are reported in Table 4 (Grant et al., 2021b).

Table 4: Associations between variables

Demographic variable	Agree that telehealth is easy to learn to use	Agree that telehealth is an acceptable way to deliver services	Frequency of use
Age	r = -0.2	r = -0.2	r = 0.2
Training	r = 0.03	r = 0.2	r = -0.3
Rurality	r = 0.01	r = 0.2	r = -0.1

4.4.4 Covid -19 and use of telehealth by participants

Participants generally reported that their use of telehealth had increased since the beginning of the Covid-19 pandemic with free text comments giving lockdowns and impacts of physical distancing as reasons (n=30, 75%) although nine of the 30 (30%) free text comments reported a decrease in telehealth when Covid-19 restrictions and lockdowns eased.

Table 5: Telehealth use of participants

	Frequency	Percentage
Use of telehealth (February/March 2021) Response Rate 43/43		
Once a week, or more, on average	5	12%
One to three times a month, on average	10	23%
Less than once a month, on average	20	45%
Never	8	20%
Changes to telehealth use throughout Covid-19 Response Rate 39/43		
Decreased	3	8%
Increased	30	77%
Remained Unchanged	6	15%

4.5 Discussion

4.5.1 The Telehealth Acceptance Model

The Telehealth Acceptance Model (TAM) is a framework with which to consider the constructs of ease of use and perceived usefulness on user acceptance of a technology (Davis, 1989). The TAM defines acceptance as actual use of the technology (Davis, 1989). Other models define acceptance differently, for example the Unified Theory of Acceptance and Use of Technology (UTAUT) defines acceptance as behavioural intent (Vanneste et al., 2013). However, the TAM was reported to be the most used model to predict acceptance of telemedicine in a systematic review conducted in 2019 (Harst et al., 2019). Therefore, acceptance and actual use are considered interchangeably in this study.

Real life applications of the TAM support perceived ease of use and usefulness as predictors of acceptability or actual use, with examples in wearable technology and mental health interventions via telehealth (Blumenthal et al., 2018; Bunnell et al., 2020). It should be noted that these examples are lacking the complicating factor of the Covid-19 pandemic. The 30 participants (77%) who reported an increased use of telehealth since the Covid-19 pandemic all reported in free text responses that the increase was due to characteristics of Australia's Covid-19 response, such as lock downs, restrictions and physical distancing (Storen & Corrigan, 2020). According to the participants, Covid-19 was the main motivator for actual use of telehealth, rather than perceived usefulness and ease of use as described in the TAM. Rather, the significance of the TAM is likely for participants' perceptions of their future use of telehealth where Covid-19 is removed as a motivator.

4.5.2 Aim 1: Determine perspectives of ease of use of videoconferencing systems

Participants generally agreed that it was easy to use the telehealth platforms with a mean summary score of 4.9. This is expected as videoconferencing platforms like Zoom have previously been described as easy to use by health practitioners (Archibald et al., 2019). Participants generally agreed it was easy to learn to use the system with a mean score of 5.3 while only 43% (n=17) agreed they had received training. This was not a significant correlation (r=0.03); however, this is not surprising given the small sample size. It seems participants did not require training in how to actually use videoconferencing systems. Training in telehealth has been shown to improve self-efficacy in nursing populations, however it seems that the training must be more specific to the tasks undertaken with the telehealth platform rather than the platform itself (van Houwelingen et al., 2021).

4.5.3 Aim 2: Determine perspectives of usefulness of videoconferencing systems

Participants perceived telehealth as useful with a mean summary score of 5.5. Eighty eight percent (n=35) agreed telehealth improved access to health services and 80% (n=32) agreed that telehealth reduced their travel time. This is in agreeance with previous research that showed improved access and reduced travel time for both clinicians and patients are facilitators of telehealth adoption (Edirippulige et al., 2016; Hill & Miller, 2012; Iacono et al., 2016). The primary focus of Australian telehealth research has been on its role for service improvement in rural locations (Campbell et al., 2019; Dunkley et al., 2010; Edirippulige et al., 2016; Johnsson et al., 2019). In this study, there was a weak correlation between rurality and frequency of use (r= -0.1) which is not surprising due to the sample size. A larger scale study could be beneficial in determining the usefulness of telehealth in areas of different classifications on the Modified Monash Scale (Australian Government Department of Health, 2015).

4.5.4 Aim 3: Determine perspectives of acceptability of videoconferencing systems

Acceptance of telehealth by the clinicians using telehealth is a key factor in an effective and sustainable service (Wade et al., 2014). Participants agreed to the statement that telehealth is an acceptable way to deliver services to children with developmental delays with a summary score for acceptability of 4.8.

The TUQ also reported on reliability of telehealth systems. Reliability, defined as the confidence and trust of users in the proper and accurate functioning of a technology, is a predictor of intent to use, but has not been documented as a predictor of actual use (Kim et al., 2015). The TAM proposes intent to use as a precursor to actual use (Davis, 1989). The reliability summary score was the lowest of all the constructs with a summary score of 3.7. To the statement that telehealth is the

same as in person visits, there was a mean response of 2.3 which is a Likert response between disagree and somewhat disagree. This response concurs with a systematic review of speech pathologists, occupational therapists and physiotherapists where seven of 14 studies reported concerns that telehealth was not the same as in person services for children with developmental delays (Grant et al., 2021b). It should be noted that previous research with physiotherapists is lacking, therefore perceptions of other allied health professional groups are the best available as a comparison.

Previous research has shown that clinicians are more willing to use telehealth for collaboration and professional development than for service delivery (Iacono et al., 2016; Rortvedt & Jacobs, 2019). Sixty eight percent (n=27) of participants in this study reported that they would use telehealth in the future with a mean score of 4.7. In future studies, it would be useful to differentiate whether they intend to use it for service delivery or for other aspects of their work like collaboration and professional development.

Perceptions of acceptability of telehealth may be dependent on what other options are available. At the time of the survey, participants were dealing with the Covid-19 pandemic, with 77% (n=30) of respondents reporting an increase in telehealth when lockdown restrictions were enforced. Participants reported that as restrictions eased, allowing face-to-face sessions, telehealth sessions were reduced. These free text responses indicate that while participants accepted telehealth in lieu of an alternative, it is not the preferred method when face-to-face is available.

4.6 Chapter summary

Data collection was via an online questionnaire. The questionnaire included demographic questions followed by a validated instrument, the Telehealth Usability Questionnaire. Participants had a range of clinical experience, a range of experience with telehealth and were located across WA, NSW, VIC, SA and the ACT. Participants reported their use of telehealth had increased during the Covid-19 pandemic. The TUQ measures five constructs: usefulness, ease of use, effectiveness, reliability, and acceptability. There were 40 complete responses to the online questionnaire. The responses were analysed using descriptive statistics. Mean response for each construct was recorded as follows. Usefulness was recorded at 5.5, ease of use at 4.9, effectiveness at 4.5, reliability at 3.7 and acceptability at 4.8. The sample was purposive and results could not be generalised, however scores indicate an overall agreeance in all constructs except for reliability.

Chapter 5: Methods and results: phase two

5.1 Introduction

Phase two was used to expand on and understand physiotherapists' perspectives on using telehealth for service delivery to children with developmental delays. This chapter details the method and analysis used to achieve the aims of the arm which were to (1) determine what barriers and facilitators physiotherapists perceive to using telehealth, (2) to determine willingness to use and (3) to determine perspectives on training in the use of telehealth. This chapter also reports on the results. Data was collected in three focus groups and three interviews where the participant was unable to attend at the predetermined focus group times. A semi structured format was used to guide discussion. Semi structured guidelines were used to moderate focus group discussions and interviews. Data was recorded via transcriptions as well as visual observation of participants and moderator notes. An inductive thematic analysis was undertaken with seven resultant themes found. These themes were then used to guide recommendations for future implementation of telehealth services for children with developmental delays and for areas for future research.

This chapter is adapted with modifications to reduce redundancy from:

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5.2 Ethical considerations

Ethics approval for this study was granted by the JCU Ethics Committee: H8256. Participants were read a statement at the beginning of the focus groups and interviews outlining the focus group/interview process and that responses would be kept confidential. Participants were informed they could leave at any time. Any information given in response that may have breached patient or participant confidentiality were removed from transcriptions before being shared with other researchers for data analysis.

5.3 Method

A qualitative focus group design with semi structured questioning allowed flexibility to explore thoughts and beliefs and to add depth and meaning to the data from the survey arm of the study (Gill et al., 2008).

5.3.1 Recruitment

A purposive sample was taken from the participant pool of the survey arm of the larger mixed methods study (Grant et al., 2021a). The target group was physiotherapists registered with the

Australian Health Practitioner Regulation Agency (AHPRA) working with children aged between 0-18 at least one day a week, on average. The survey participant group was recruited through purposive sampling and snowballing as the characteristics of the target group were unknown and difficult to reach (Ames, et al., 2019).

On completion of the survey, participants were asked if they would like to participate in focus groups or interviews. As explained in the survey arm information sheet, if they chose to provide contact details for focus groups, their survey responses were no longer anonymous, but would remain confidential. Twenty participants provided contact details for the qualitative arm. Purposive sampling was used to take a sample with a diverse range of characteristics including age, experience level, location, rurality and frequency of use of telehealth (Ames et al., 2019).

5.3.2 Sample

Ten participants took part in focus groups or interviews. Focus groups and interviews ceased once data saturation was achieved (Saunders et al., 2018).

5.3.3 Data collection

The interview guide was written to meet the research aims and supported by themes identified in the systematic review conducted by the authors (Grant et al., 2021b). The interview guide included questions about experiences with telehealth, training received, barriers, facilitators and feelings around future use (Appendix C). Five physiotherapists with paediatric experience reviewed the guide for face validity. Three focus groups were conducted over Zoom in May 2021. Three interviews also took place over Zoom to accommodate participants who could not attend the focus groups. Consent was gained to record and transcribe the discussions. Participants were not anonymous, but their answers were kept confidential. Participants could leave the focus groups at any time. The moderator (first author) took field notes and summarised back to the participants for confirmation at the end of each focus group or interview (Rauf, et al., 2014). The second author listened to focus group recordings to control bias introduced by the moderator (Rauf et al., 2014). Focus groups took between 45 minutes to an hour and interviews took between 30 minutes to 45 minutes. A semi structured format was used to elicit discussion around perspectives of participants toward using telehealth for service delivery to children with developmental delays (DeJonckheere & Vaughn, 2019).

Moderator field notes from Focus Group One are provided below as an example (Table 6). Field notes were taken for all focus groups and interviews.

Table 6: Moderator field notes

Speaker	Notes	Reflections
P4	• Works in palliative care, completely telehealth last two years, mainly palliation but some developmental milestones when appropriate. They do orthotics, equipment measuring, pressure care, accessing home environment. • Multi D team, office is set up for telehealth with admin support and camera/computer set up. • 'Picking the right family' parent coaching role. • Families appreciate not having to travel so much. • Doesn't remember having training. • Would have initially liked training in which platforms to use, but has lots of support from admin team. They book appointments and trouble shoot connection issues for her. • Finds telehealth works best when family is prepared and they know how to use the camera, not constantly turning/switching it. Motion sickness. • Good internet connection on both ends really important. • Preparing the families before the session with a questionnaire guided the session. • Positive about using it in the future, less stigma attached now.	Various platforms came up. Seems to be okay once they're familiar with them. Issues with direction around which platforms to use rather than inherent issue with the platform. Interesting point about parents having to engage more in their child's therapy on telehealth. Reduces that passivity some parents have. – counterpoint from another speaker was that those more passive parents won't be competent on telehealth. P6 seemed really frustrated at lack of training and direction from her organisation. Seemed to feel thrown under the bus. P6 also very hopeful about telehealth in the future.
P5	• Works in community health, either state funded developmental delay or NDIS. Has used telehealth to liaise with experts in Adelaide. • More of a parent coaching role but some parents don't want to do that. Some families really struggle so it depends on the parents if parent coaching is successful. • Training previously received from a central team who had rolled out an adult telehealth program. Went to Adelaide and looked at the telehealth system. Lent out devices and	

	internet dongles which seemed to work well. That didn't match up timewise with when Covid-19 forced telehealth.	Covid pushing telehealth makes more liaison with central sites possible. Changed the attitude.
	• Would have liked platform specific training and training on how to work with children of different ages on telehealth and interactive games, how to keep kids on track. Short on time to develop those resources herself.	
	• Good to have tech savvy, motivated parents who took initiative to set up the space.	Parent capacity!! Some parents really struggle.
	• Able to liaise with central teams. Due to Covid, now seen as an option instead of in 'too hard' basket. Not an issue to just connect in with a child's appointment in Adelaide.	Devices – both for the therapist having a device and space that are suitable but also the family.
	• Need access to mobile devices to take out to patient's houses to facilitate liaising with central team.	
	• Room with a computer in it which is suitable for telehealth.	
	• Issues around parent capacity and comfort.	Internet connection – most relevant for rural sites, particularly if future use leans toward fixing service gaps in rural areas. How can we fix that issue?
	• Parents don't always have the right device or know how to use it.	
	• Client factors – child might run away or not engage with the screen. Hard to see good images of a child that keeps moving. Easier with an older child that can engage with the computer.	
	• Think about how you communicate so the parent can facilitate what you're after.	
	• Had a successful equipment fitting session with a childcare. 'It was quite fun'.	Organisation guidance – organisations need to guide platform selection, give clear policies around privacy and confidentiality and provide training on platforms and how to engage kids on telehealth.
	• When face-to-face possible, face-to-face likely to continue.	
	• Would like to see telehealth continue in 3 areas. First, as an adjunct to a face-to-face service to reduce travel. Second to support less experienced therapists. Third to link in with central sites to work in collaboration e.g. medical team.	
P6	• Works a mix of private and QLD health. Uses Cliniko with private clients and Cisco Jabber with QLD health. Issues with Cisco.	
	• Used telehealth in various settings like growth and development clinics or to support regional centres with a less experienced children's physio on site. Privately used it for	Client factors – some kids are easier than others.

		ongoing therapy but not for assessment. Can save travel and bridge gaps between services.	Preparation – You and the parents need to be prepared. Prepared with resources, how to keep the child entertained but also so the parent knows how to set up, what to have ready and that they need to be there. THE PARENT MUST BE THERE
		• Likes that when the parent is there the parent are the hands. It takes away that passive, 'I bring my kid to you and you fix them.' The parent has to be more active in their child's care.	
		• Technological issues, especially internet access at high flow times. Okay at end of the day.	
		• Didn't receive training. Troubleshooting and practice with other staff. Would have liked training in how to use the platforms.	
		• Logistical issues with platforms, which ones to use, how to get parents up on the platforms, confidentiality with the platforms as P6 had to close the room. Red tape and policies. Start up and connection issues. Found less red tape privately, just able to use Cliniko, get on with it. In public found people would just walk into telehealth sessions, not aware session was going on.	
		• Would like more IT support when issues arise.	
		• Covid gave a push to telehealth. Has previously been underutilized. Made people see it's not impossible.	
		• We shouldn't completely give it up. It has its place.	
		• We get better with practice. We can make little changes and learn from mistakes.	
		• Even with the challenges, lots of benefits to telehealth, can use it with other stakeholders, for meetings and handovers, discharge planning, Multi D communication. Helping remote services.	

5.3.4 Data analysis

Inductive thematic analysis was chosen to allow themes to emerge from the data and because it was a simple method for the novice researcher to follow (Nowell et al., 2017). Data was analysed using a seven-step thematic approach described by Clarke and Braun (2013). Step 1) Transcribing, was completed by an external service. Transcriptions were then de-identified by the researcher, before being shared with the primary advisor for Step 2) Reading and Step 3) Familiarisation. The author and primary advisor read and re-read the transcriptions and referred to the researcher/moderator field notes from the focus groups and interviews.

The author and primary advisor then moved on to Step 4) Coding, using NVivo Software (Ltd., 2020). Semantic codes were used to reflect the intent and meaning of the participants (Clarke & Braun, 2013). There were 48 initial codes generated by the researcher which are shown in Table 7. The first author and the primary advisor met via Zoom to discuss and agree upon each code. No codes were added but some codes were merged in the process toward becoming a theme (Table 8). Significant codes and frequent codes were transformed to themes. Step 5) Searching and Step 6) Reviewing were completed by continuing to search for patterns and refine themes to ensure they were underpinned by central organising concepts while also meeting the objectives of the research (Clarke & Braun, 2013). The researcher and primary advisor met via Zoom to discuss and agree upon patterns and their relationship to the research aims. These codes were brought to the discussion and compared to the primary advisor's code to themes summary and systematically worked through for agreeance/disagreeance before moving to Step 7) Finalising the themes.

Table 7: Initial codes

Codes	Example of coded text	Frequency
Access to an appropriate device	"I sometimes think that we're trying to make do with whatever people have got, rather than actually saying, "We actually need decent equipment and consistent equipment to make this work effectively." P5	10
Better than nothing	"People are quite happy to accept it as an alternative to nothing." P3	5
Caseload	"We work in the NDIS so we have children who have developmental delays. My youngest clients at the moment are two, at the time they were one, up to mostly through primary school." P8	12
Child engagement	"Also, I had a couple of the kids that aren't normally allowed near the iPads or the laptops, they're like, ooh, mummy's got her iPad out, I can go and play." P7	15
Child in their own space	"I mean it was good for us to see, obviously, and understand that but family environment is sometimes a limiting factor. They just didn't have anywhere for that baby to play on the floor." P2	2
Child suitability	"Children that have no cognitive delays and disabilities where they're very high functioning cognitively and you could just tell them what to do and they respond really well." P10	26
Collaboration	"So say a child's got to go back to the rehab visit and I can link in with all the therapists all in one and close to home." P3	29
Confidence with telehealth	"I'm not sure if I've got a very good overview of the whole telehealth system. I'm just on the tip there." P9	3
Convenience for families	"For the families it worked with, I actually had several families say to me, can we keep going, even when the pandemic's over. Because it was far more convenient for them." P7	3

Face-to-face	"So I don't think it's going to be the most popular for the options where face-to-face is possible. I think where face-to-face is possible, people will still do face-to-face." P5	10
Future use	"I wouldn't like to do it all the time and I certainly think that if you possibly can it's nicer to do the assessment [face-to-face] and you could perhaps do follow-ups [by telehealth]. So if you could have a hybrid way you could see people then. That would probably be a better option." P2	14
Lack of physical touch	"I found it very difficult to not be able to feel things." P1	9
Accuracy of telehealth	"When that kid eventually came into the clinic, I watched him walk in and I was like, I vastly underestimated how drastic his [condition was]." P9	8
Child positioning	"It would be really tricky teaching positioning, moving and handling over telehealth." P2	8
Impractical for assessments	"It's very difficult if you're trying to do assessments on hips or anything." P3	5
Learning from experience	"I think we go there in the end, but it's all about, as you say, it's learning on the job because we didn't have a choice, and then working backwards from that. But I think, yeah, by the end it was a lot easier once we got used to it, and once they got used to it." P7	11
Managing expectations	"I also was very realistic about what I could expect in that space. So I didn't – I expected it to be hard and frustrating for people and difficult. So when it wasn't as bad as I thought, it was like, wow, this is great, why didn't we do this earlier, we could heaps of this. Rural health, we should smash this out." P3	3
New vs existing patients	"I was going to say it works better if it's a family you've known beforehand and they're already set up." P1	3
Organisational support	"Just I guess because we're a bigger organisation, we have more people behind the scenes for us. So if we encounter problems, we do have the luxury of just walking next door	12

	and going, "It's not connecting," or whatever problem we're having and we have people there." P4	
Outcome measures	"I definitely did ages and stages questionnaires so more subjective questionnaires. They were really useful, yeah." P3	9
Parent capacity	"And the mum was just too overwhelmed. It was too hard for her. It was just too much to do." P5	15
Parent engagement	"The ones that stayed there were really engaged, were really good at making sure the child is sticking to task and keeping it fun, making sure they're not wondering off and doing it with them." P10	28
Parent willingness	"Interestingly not many of our families wanted to go to telehealth this time, maybe because it was only going to be an isolated lockdown. They all wanted to either come in and wear masks or they wanted to reschedule." P2	3
Physiotherapist communication	"And communication and how you communicate in that – how can you demonstrate; how can you communicate? If you want to do some assessment items, it can get quite tricky sometimes, but yeah, how do you communicate well enough that you get them – what you want from them without families feeling overwhelmed and stuff?" P5	22
Communication aids	"I did have a ragdoll that I stole off my daughter, that was to try and demonstrate a few things. So that definitely made life easier." P7	4
Communication of empathy	"It almost felt like "you're telling me all of this, I can see the struggling you've got, I can't really do anything and hey, in five minutes' time I'm going to turn the screen off and it won't be happening anymore." P1	2
Platform	"We did Skype, that was pretty rubbish. We did – not everyone has Teams because it's expensive. I didn't find it too bad. We did Umbo, which was another one, I think they had their own platform. We didn't love that." P3	22

Privacy	"Or confidentiality stuff, you learn that you've got to close the room. You learn you've got to put a sign on the door to say 'telehealth in progress'." P6	8
Reduced travel	"But I do think that when distance is a problem, it can be – in some cases – the whole service, but often an adjunct to the service, so reducing the amount of times that you need to travel." P5	8
Repetitiveness	"A lot of the sessions were probably more repetitive as well. Normally we might do some stuff in different settings, like a playground or something, so that keeps it more interesting. …So, there was none of that change in setting, that downtime and ebbs and flows." P8	1
Rural setting	"But it would give some of those outlying families - and probably in a whole of rural Australia, access to healthcare that they wouldn't necessarily previously have got." P7	13
Safety	"So I think from that perspective, but then I also do think there are risks in telehealth, safety risks and, like I said, of a child falling or yeah." P3	3
Schools	"Most schools weren't really super open to it because of how resource-heavy it is with having to have one or two teachers with them for the whole time." P8	4
Screen fatigue	"I found it very tiring to be looking at a screen all day and having that interaction in that way and office setup because we were all working from home." P2	3
Session preparation	"So being prepared myself with all the equipment I needed, but also having the parent - I used to send out a checklist of what they needed prior to the session so that it was all on hand. There was mixed uptake of reading that. So the parents that had obviously- you could tell the ones that had read it." P7	25
Shorter appointments	"The ones that I felt we managed to get into a regular routine and we were successful with every half hour	3

	telehealth appointment – that's another thing, half an hour was maximum." P10	
Sibling interference	"The siblings are trying to get in and interfere as well." P8	3
Tech savvy	"So, a lot of things, like getting resources and stuff, I already had a leg up on that compared to some people in my organisation who maybe weren't as technologically savvy." P8	6
Technological issues	"And then finding a place that had really good internet connectivity because that's something that if you can't connect, you can't connect, that's the most frustrating thing, because you're cutting in and out during a session, it can be so frustrating that you wish you had never done it." P3	19
Telehealth experience	"In terms of telehealth, it's much less than what Speaker 1's doing. It's been bits and pieces. So during the peak of COVID, we tried to swap over to telehealth for some of our clients, but had some issues with that. And so had some success stories and some not so successful stories." P5	18
Telehealth physical space	"But I would say there were some families, they just had stuff everywhere, and the child couldn't lie down on the floor despite you saying you need a space for them to lie down on." P3	14
Time management	"I think for me it was about the same amount of time. Just because I'm spending a bit of time preparing for sessions normally. So, it was about the same amount." P9	12
Training	"Yeah. It was good but because she was – yeah speech there wasn't as much stuff that was physio specific. But it was good, some just general ideas for engaging small children, but it would have been nice to have something that was a bit more gross motor specific, but I didn't find anything." P10	28
Transition to telehealth	"I think COVID forced it and it forced it in a way that meant it was a bit of an all or nothing type of thing, which made	10

	everyone have a go. But I think, yeah, as you say, more planning, more preparation." P5	
Upskilling families	"And maybe they had a bit more – upskill the parents a little bit more, I think." P10	5
Virtual toolkit	"I think more resources around what you can send out for goal setting and homework and just a larger library of resources to send out to families to say "here's the different ideas you can try that will target this one goal that we're looking at" and that was something I felt that I was really short on, was spending whole weekends trying to pull together anything I could find on the internet to try and keep a program going, to keep parents and kids engaged." P1	14
Visibility	"I've had families try and show me something and I'm just like, "Oh my God, I'm motion sick," because they have the Blairwitch house with it and just stuff like you're not really seeing what you need to see and you've got to ask a few times, "Move your camera back," or whatever, "Reset it up," yeah." P4	9
Worse than nothing	"I think it's rare, but I think you've got to – a situation like that, it's so frustrating, it just doesn't achieve anything. And nothing bad's happened to the child, but it hasn't helped your relationship, they don't feel you're any more confident and you haven't helped the child, so it was a whole waste of time basically." P3	1

Table 8: Progression of codes to themes

Initial codes	Merged coding groups	Final Themes
Access to an appropriate device Better than nothing Caseload Child engagement Child in their own space Child suitability Collaboration Confidence with telehealth Convenience for families Face-to-face Future use Lack of physical touch Accuracy of telehealth Child positioning Impractical for assessments Learning from experience Managing expectations New vs existing patients Organisational support Outcome measures Parent capacity Parent engagement Parent willingness	What helped facilitate telehealth: • The right child (I can then talk about child suitability factors) • The right family (parent engagement/parent capacity/tech savvy/space/already known to therapist) • Adequate technology (access to an appropriate device, good internet connection) Barriers to telehealth: • Inadequate information technology: devices, IT support, internet connection • Time management: time to prepare and research before telehealth sessions, extra resources required • Lack of organisational support: in training, privacy, time management, platforms and resource development • Lack of physical touch • Communicating effectively via screen: manual handling, empathy, visibility (move your camera), • Poor visibility • Work environment – therapist space, screen time • Parent capacity – conflicting demands, lack of confidence with technology, overwhelmed, siblings • Safety concerns • Privacy concerns	Facilitators: • The right family • The right child • Adequate technology and space • Collaboration Barriers • Technology • Time management • Lack of organisational support • Lack of physical touch • Communication • Work environment

Physiotherapist communication Communications aids Communication of empathy Platform Privacy Reduced travel Repetitiveness Rural setting Safety Schools Screen fatigue Session preparation Shorter appointments Sibling interference Tech savvy Technological issues Telehealth experience Telehealth physical space Time management Training Transition to telehealth Upskilling families Virtual toolkit Visibility Worse than nothing	Recommendations: • Family preparation: Prepare the family before telehealth sessions: equipment they will need, stationary camera set up, parents need to be there • Practice communication: – use an aid like a doll, practice with colleagues, learning from experience • Resource library for telehealth: e.g. online games, parent handouts, videos Overall feeling: • Physiotherapy via telehealth is usually better than no physiotherapy at all • Telehealth is not as effective as face-to-face (include IA vs FU, accuracy) • Telehealth can be used to collaborate with experts and other therapists • Telehealth has a place in rural health	

5.4 Results

The themes were grouped into facilitators and barriers. Facilitators were the right family, the right child, adequate technology and space, and collaboration. Barriers were technology, time management, lack of organisational support, lack of physical touch, communication and work environment.

The motivator behind using telehealth was described by nine of the ten participants as being due to face-to-face services not being available due to Covid-19 restrictions or lockdowns. Participants described a period during which all their services were provided via videoconferencing platforms, with the time-period being dependent on the location of the therapist. One participant worked for a permanent telehealth service where services were provided remotely to palliative paediatric patients in rural communities; most of their work related to palliation but included treatment of developmental delay if appropriate for the child. This was the only exception to telehealth being implemented due to the Covid-19 pandemic. Physiotherapists reported that when face-to-face services were allowed in their area, they usually reverted to using face-to-face services due to their own and family preferences.

5.4.1 Facilitators

5.4.1.1 The right family

Physiotherapists said that picking the right family was important in an effective telehealth service. Aspects of the 'right family' were parents understanding their role in telehealth, being present and prepared, having a reliable internet connection, a suitable device and being able and willing to follow therapists' instructions. Physiotherapists also reported that a previously established relationship with the child and family was helpful in using telehealth.

"it's picking the right family, I suppose. And the families that want to see you more are often the ones that will do what you recommend and want to be more hands-on and involved with their children." P3

"I think a lot really depended on the skills of the parent, how engaged, how competent, how good at handling they were, all the technical things, what their internet connection was like, what device they were using." P2

Physiotherapists reported that parents who were positive and took initiative in setting up the space, facilitated an effective telehealth service. In contrast, parents who were overwhelmed, were not confident with technology, were looking after other children or who were trying to work from

home at the same time were not able to be effective in helping meet the goals of each telehealth session.

"The poor parents are overwhelmed" P8

"Another young mum who said, "Oh yeah, that would be great. I won't have to come," and was really positive and set the space up quite spontaneously herself, had it all ready and set up with the camera in the right place, just had the confidence to think it through and work out what would work." P5

For these 'right families' there were the benefits of increased convenience and reduced travel. One participant reported that more families could access after school visits as there was no time lost to her travelling between appointments. One participant reported that while it was rare, some families continued to request telehealth when it was no longer required due to Covid-19 restrictions in their area.

"It's mostly been because they liked the timing of the Zoom sessions because you can fit more of them in after school times for example without having to travel, or the parents having to travel." P10

"They didn't have to worry about travel. They didn't have to worry about upsetting the child in their routine. Some children don't like strangers, they don't like strange places. So, for a couple of families - but I'm talking maybe three or four out of a hundred, they wanted to keep going." P7

5.4.1.2 The right child

Physiotherapists said that some children were more suitable than others for telehealth. Pre mobile children who would stay within the view of the camera and were supported by an engaged parent were manageable via telehealth. On the other end of the spectrum, older children who were previously known to the therapist and understood instructions and were able to engage with their intervention via the screen also had some effective sessions. Physiotherapists said that toddlers were very difficult to treat via telehealth as they would often run away or struggle to engage via the screen.

"I think I had some 13, 14-year-olds who were already established in a program before we had to start doing telehealth that we'd got results from." P1

"It was harder to keep that engagement because mum would talk to me on the computer and then he'd run off." P5

"I found working with very young children was easier than working with older children because they're in one spot and you can set things up and they don't move. Toddlers were really hard because they move so much and so to try and do things with them in one position was really tricky."

P2

Children with complex disabilities impacting their communication were considered difficult to be effective with via telehealth as physiotherapists felt they could not engage them through a screen.

"Why it worked well would be within the child themselves is probably not having a cognitive or intellectual disability." P1

Children with complex physical disabilities, specifically children with Cerebral Palsy Gross Motor Function Classification System (GMFCS) Levels IV and V were considered very difficult to treat via telehealth due to high manual handling and equipment needs as the physiotherapist felt unable to communicate with the parent or caregiver exactly what was needed. One participant gave an example of a child with high manual handling and seating needs that she felt was completely unsuitable for telehealth and was instead treated in person.

"I did have one young boy who – GMFCS5… in the end we decided – because he was a big lad, he needed positioning as soon as we could possibly do it." P1

Physiotherapists reported some surprising positive experiences where they had success engaging the child in ways similar to what they might in a face-to-face session.

"She (mum) was able to put the laptop with my face on it right in front of him. And that was really interesting that this child could actually enjoy that– I was singing to him from the computer."

P5

5.4.1.3 Adequate technology and space

Physiotherapists said that technology and space both on their end and the family end were important for facilitating an effective telehealth service. Physiotherapist and family space and technology facilitators are summarised in Table 9.

"A family who's got the right technology, a good stand, a good set up, a good space to have it where they've got room to move around." P10

"They had a stationary camera looking down on one space that we could then work with." P7

"I would like to have access to mobile devices that I can either use in a proper therapy space or to take them out to a client's home to access some of those other services." P5

"I think the thing that makes it easiest to use is to have a good internet connection." P4

Table 9:Technology and space facilitators for physiotherapists and families

Physiotherapist	Family
• Mobile devices to take to home sessions for collaborating with a remote therapist. • Laptop or computer with a private room with space for demonstrating therapy. • Good internet connection.	• Access to an appropriate device for their child. Mobile device for a moving child. Stationary camera looking at a designated space for observing movements. • Enough space to move around for the purposes of therapy. • Good internet connection.

5.4.1.4 Collaboration

Physiotherapists frequently reported telehealth as a way to collaborate with other professionals in different locations. There were some instances where physiotherapists found it difficult to communicate with very inexperienced therapists.

"I found it much harder with the therapist if they were junior." P3

It was also difficult for physiotherapists to support students who were linking in over telehealth as the students were unable to see properly. The participant reported it was 'better than nothing' for the students but not ideal.

"But we also felt like we weren't doing the best job for the family because we were busy trying to teach someone who wasn't there and who couldn't see very well either." P2

However, most experiences of providing and receiving support from another therapist were very positive. In particular, it was identified that participants felt that children in remote sites could still receive effective care when the therapist on site with them was supported.

"I think one child was with Down's syndrome, another one with cerebral palsy and so I could coach them through it and because there were therapists there, they were holding the cameras at the right angles, they knew what I was talking about, what I was looking at so I could coach them through that stuff." P1

Physiotherapists also identified telehealth as useful for rural locations to collaborate with central sites. For example, the therapist could be at the rural site with the child with other

professionals from a metropolitan centre attending remotely. In addition, physiotherapists reported that using telehealth to collaborate could save the family travel and money.

"I use it a fair bit too with linking into Sydney, so say a child's got to go back to the rehab visit and I can link in with all the therapists all in one and close to home. And if that saves the child eight hours and parents overnight costs, it can save hundreds of dollars." P3

"There was one child who was actually out on [remote] Island which was super-exciting to think I had an influence up there on the health of these young - and they were young therapists out there doing their best so it was nice, that was good." P1

One participant reported that collaborating with central sites has been easier since the Covid-19 pandemic.

"And I suppose prior to COVID, the [metropolitan children's hospital] were really just can't do type of approach to it, just didn't see it as an option. So, what's facilitated it for me is that everybody has had to do it and so it's become possible." P5

5.4.2 Barriers

5.4.2.1 Technology

Technology was frequently reported as a barrier to implementing effective telehealth. Physiotherapists said that a lack of a suitable device both on their end and the families end was a barrier and that internet connection and drop out was another issue. Physiotherapists reported that the family's internet was more likely to be an issue as they were often more rurally located than the therapist.

"They're always going to have worse internet than you most likely. So, when you're trying to call these really regional, remote places that have to stand up on one leg, hand on their head facing the sunlight to get signal, that's tricky." P4

Another technological barrier was families not having the right technology for the physiotherapist to see the child. Children that constantly moved were difficult to see from a stationary camera and conversely, children that could stay within a designated area were not best seen from a mobile device as the device would keep moving or shaking and reducing visibility, for example...

"The parents trying to follow them with the camera on the – either on their laptop or on a phone and the handheld thing and you're shaking because you're trying to see where the child – is

really, really hard to get good enough quality images to actually see what you're needing to see in a

mobile, busy child." P5

Physiotherapists reported that the best technology set up depended on the child and the assessment or intervention they were trying to perform and what they needed to be able to see on the day. Physiotherapists reported that not being able to see resulted in inaccurate assessments.

"They sat on the floor and then they move that camera down, so I didn't see him get to the floor and then I realised when he came in, he can't actually even get himself to the ground… so I've just totally overestimated his mobility because of the fact that I didn't see these transitions." P8

Physiotherapists generally reported that they were not initially confident with the technology but that they learned from experience, although three participants reported that they found the platforms easy to use initially.

"That's one thing that I guess I'd used Zoom before but I was still a little bit nervous about IT crashing or something like that." P9

"It's learning on the job because we didn't have a choice, and then working backwards from that." P7

5.4.2.2 Time management

Physiotherapists reported that initially telehealth was more time consuming than face-to-face due to searching for suitable resources to engage the child during sessions and to plan for the session and prepare the family.

"I just remember working weekend after weekend after weekend trying to just have that library at my fingertips that I could send out." P1

"I found it took a lot longer in terms of we don't have admin support so in terms of the setting up and the emailing of families and getting all the links set up… it just took hours." P2

Physiotherapists said that they could not expect to get as much done via telehealth as they would face-to-face. It was reported that sessions had to be shorter as children could often not engage for a longer session (any greater than 30 minutes) with the screen.

"It is going to take longer and being allowed for it to take longer and you're only going to be able to – in a normal session you might do this much, in telehealth you can do this much and that's the nature of what it is and that's okay." P2

5.4.2.3 Lack of organisational support

Physiotherapists said that their transition to telehealth had been rushed due to the Covid-19 pandemic and that instructions from their organisation had been inconsistent. It was reported that the transition occurred 'overnight' and that limited and sometimes no training had been received.

"I don't think we ever had training. "Here's your password. Good luck," everyone to telehealth instantly because of COVID." P4

"I think – if we're continuing to have the problems that we're having, I think it's more due to the push to everyone onto it straightaway. If it had been a more gradual introduction, it would have been more successful." P4

In general, physiotherapists felt that the sudden transition was unavoidable, for example…

"I think before going live it would have been great to have had training on how to use it… and some treatment ideas and ways of managing that way. But it was such a sudden change… that there wasn't that feasibility to put that training in." P7

However, as continued use of telehealth progressed during lockdowns and restrictions in various states of Australia, physiotherapists reported an ongoing lack of organisational support of telehealth practice. Participants reported that there was a lack of physiotherapy specific training available, lack of IT support for technological issues, lack of IT infrastructure and lack of guidance around privacy and safety. One participant reported confidentiality as a major obstruction to delivering a telehealth service with lack of private space to conduct the session, lack of individual passwords and lack of suitable features of the platform to ensure that the family's privacy was protected.

"All of a sudden everyone is using telehealth and it's back to back to back – and we were sharing one meeting room password because IT was so backed up. It took three months for each clinician to get their own meeting code password."P6

"And also the safety on the other end, you cannot stop a child falling, you can't stop – if something happens on the other end who's responsible if you're having a therapy session."P3

Physiotherapists who had more substantial organisational support felt that this was helpful for providing an effective service. One participant worked in a permanent telehealth service and had admin support and suitable space for her appointments. One participant reported that a central service supported their telehealth and had staff on call to help with technological issues, however it

was not specific to her population nor provided at the time of implementing telehealth so it was not as useful as it could have been if it were provided at the right time and tailored to her client group.

"I went and looked at the [adult] tele rehab project as part of a half-day thing where we looked at what was happening in tele rehab… and by the time I needed to do the training – it just didn't match up timewise." P5

5.4.2.4 Lack of physical touch

Physiotherapists said certain assessments were impractical via telehealth. Assessments for children with suspected torticollis or suspected abnormalities of muscle tone were given as examples where physical touch was required. Physiotherapists reported that they could not explain what they wanted to the parent and trust the result of an assessment delivered through the parent.

"I think without having your hands on them… without me being able to slightly tip that way, check that reflex, this, that and the other, there's a whole arm of your assessment and your knowledge that I could not talk families through." P1

Physiotherapists reported that initial assessments were very limited and that they could not take measures of muscle strength or joint range without physically touching the child. Assessments were mainly observation based and this was not felt to be as accurate as face-to-face assessments involving physical touch. Physiotherapists reported rarely trying standardised assessment and having little success when they did.

"Your assessment can't be as accurate, I don't think, as if you're able to feel it yourself." P2

Eight of the physiotherapists (P1,2,4,5,6,8,9,10) reported that telehealth was not as accurate or as effective as face-to-face services and that it should not be used as a replacement for face-to-face services, particularly when trying to do an initial assessment.

"You do feel it's better than nothing but it's not as effective as face-to-face." P10

"I use it more for therapy sessions in between, not so much assessment. I'll get them to come for the first one." P6

5.4.2.5 Communication

Physiotherapists reported that communication with the parent and the child was not as effective over the screen as it was face-to-face. There were two components to this. The first was in a practical sense of not being able to communicate desired manual handling to a parent or desired

positions to a child and achieving the same outcome as in a face-to-face service. One participant reported that her sessions were not as effective as face-to-face due to communication barriers.

"There were a lot of kids that didn't get much better because I'm trying to give them instructions like verbally and they often physically have to queue them or give them those sorts of prompts." P8

The second component was the therapeutic relationship with the parent and the child. Physiotherapists reported that it was difficult to make sessions fun and engaging and that there was no modelling of communication and play to the parent that would normally take place in a face-to-face session.

"I think I just found it difficult to make the session fun. I think just generally I find the communication side of things more difficult. I always left those appointments just not sure if Mum really felt like she'd gotten a full service from it." P9

"I think at times you lose the ability to be able to talk to parents as you're demonstrating what you're doing so often, you'll have your child in your hand and you'll be narrating what you're doing as you're doing it, while you're working with the child. So, the whole session becomes not only a therapy session, it's an educational session for the families." P1

Physiotherapists tried using various communication tools during their sessions including dolls, to model what they wanted from the parent. Physiotherapists also reported that their communication improved over the time they delivered telehealth services and that they learned from experience.

5.4.2.6 Work environment

Physiotherapists reported changes to their work environment and day to day nature of their work when primarily using telehealth. There were several issues that combined in this theme. Therapists reported that they sometimes conducted sessions at home which removed the professional barriers between themselves and the family. They also reported increased screen time and associated fatigue.

"I found it very tiring to be looking at a screen all day and having that interaction in that way and office setup because we were all working from home. It's not an ideal position, you're not in a good ergonomic position." P2

Therapists reported that when using their work office there was not always a suitable space to conduct a telehealth session. What made the space unsuitable was lack of access to a computer, privacy, and space to move and demonstrate.

"Room with a computer in it that has space to demonstrate things, rather than just an office"

P5

"You'd go to the gym, and you'd be on your computer and then they just walk past, open the door and start talking to you because they think you're just there on your computer typing notes." P6

5.5 Discussion

5.5.1 Aim 1: Determine what barriers and facilitators physiotherapists perceive to using telehealth.

Participants in phase two identified both facilitators and barriers to using telehealth for service delivery with children with developmental delays. Facilitators are the right family, the right child, adequate technology and space and collaboration. Barriers are technology, time management, lack of physical touch, lack of organisational support and work environment. While barriers and facilitators are generally similar to those previously identified by allied health professionals working with children, the issue around the work environment had not previously been identified which may be due to the high frequency of telehealth required due to the enforced restrictions mandated during the Covid-19 pandemic (Campbell et al., 2019; Dunkley et al., 2010; Edirripulige et al., 2016; Hill & Miller, 2012; Iacono et al., 2016; McAllister et al., 2008; Tucker, 2012b).

5.5.2 Aim 2: Determine physiotherapists' willingness to use telehealth.

Participants reported that in future they would be willing to use telehealth for some children with developmental delay in some situations. It was not felt to be as accurate as face-to-face, and physiotherapists did not perceive it to be suitable for initial assessments. Physiotherapists reported that telehealth was a useful tool for collaborating with professionals in other locations, including therapists in rural locations. If it was the 'right family' the family received benefits like reduced travel and increased convenience. Feelings around willingness to use telehealth are similar to perspectives identified in previous research on speech pathologists, occupational therapists and physiotherapists who worked with children living in rural areas who had developmental delays; particularly in respect to telehealth not being a replacement of face-to-face services while having a place in reaching children in rural areas (Campbell et al., 2019; Edirippulige et al., 2016).

5.5.3 Aim 3: Determine physiotherapists' perspectives on training in the use of telehealth.

Participants identified that physiotherapy specific training in telehealth was lacking. Participants also said that while training in technology and platforms was somewhat useful, more

organisational support around which platforms to use would have been helpful. Participants also reported learning telehealth on the job and improving with practice. Previous research identified perceptions that training in technology would have been useful but did not identify professional specific training as a facilitator (Edirippulige et al., 2016; Hill & Miller, 2012; Johnsson et al., 2019).

5.5.4 Limitations

A limitation of phase two was that only one moderator conducted the focus groups and interviews. This was controlled by the moderator summarising responses and seeking feedback from participants at the end of each discussion. The primary advisor listened to the recordings to ensure that focus group questions were consistent, and that the moderator attempted to control bias throughout the discussions. Recordings, transcriptions, and moderator notes were compared by the author and primary advisor to ensure that data collection was consistent and trustworthy.

A further limitation was that qualitative research on its own cannot be generalised to a population. To the authors' knowledge, this is the first study of telehealth in the target population and, as such, taking a purposive sample across clinical experience, location and telehealth experiences was fitting for this exploratory setting (Palinkas et al., 2015).

5.6 Chapter summary

This is the first known study to explore physiotherapists' perspectives on using telehealth to deliver service delivery to children with developmental delays. Throughout the focus groups, physiotherapists' perspectives on barriers and facilitators emerged as themes from the discussion. These themes were split into facilitators and barriers with facilitators being the right family, the right child, adequate technology and space and collaboration. Barriers were technology, time management, lack of physical touch, lack of organisational support and work environment. Physiotherapists' perspectives on willingness to use telehealth were that telehealth is not a suitable replacement for all face-to-face services but follow up services could be provided to the right family and the right child using telehealth, resulting in increased convenience and reduced travel for families. Physiotherapists also thought telehealth was useful for collaborating with other professionals, particularly to improve services to children in rural locations. Physiotherapists perceived a lack of available physiotherapy specific training.

Chapter 6: Merging the phases: considering the survey and focus groups together

6.1 Introduction

This project was an explanatory sequential mixed methods design. The quantitative phase preceded the qualitative phase in the timeline. The qualitative phase took a purposive sample from the quantitative phase sample. The phases interacted again in the results and development of recommendations. Figure 24 shows a concept map of the interaction between the two phases.
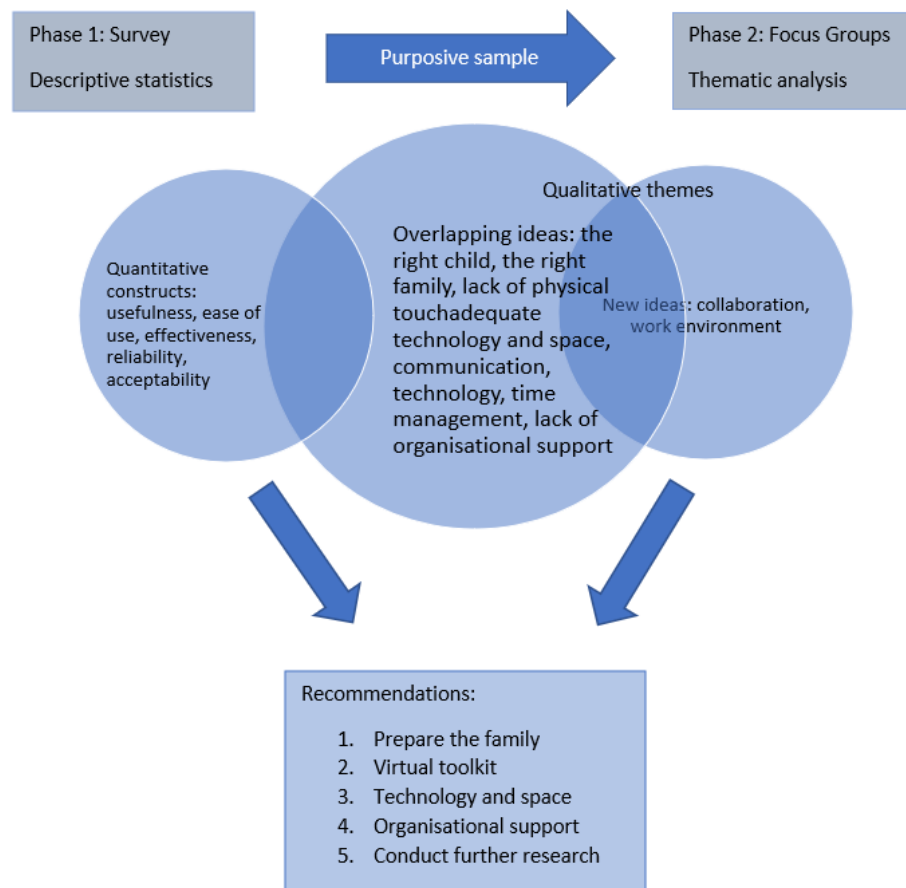
Figure 24

Concept map of phase interactions

6.2 Filling gaps and providing clarity

Using the two phases to cross-validate each other has already been spoken about in chapter three. The second phase was able to complement and expand on the first phase, giving the human explanation behind the numbers (Greene et al., 1989).

The second phase uncovered two themes that were not explored in the survey. As there was limited physiotherapy specific research available to guide the development of the questionnaire, it is

not surprising that some information was missed (Grant et al., 2021b). Overlap between survey ideas and themes was measured by searching for similar wording in codes and questionnaire statements or free text responses. While all the constructs measured in the questionnaire overlapped with the focus group findings, the themes of collaboration and work environment were new to the focus group phase. In this way, the focus group design filled in gaps in the questionnaire and reduced the chance that important information was missed in the overall project (Greene et al., 1989; Johnson & Onwuegbuzie, 2004).

The focus groups also served to clarify meaning behind questionnaire responses and in some cases to dispute the findings of the questionnaire. Participants in the first phase responded to effectiveness statements with a summary score of 4.5. This indicated a response between neither agree nor disagree and agree. The Telehealth Usability Questionnaire (TUQ) defines the effectiveness construct as the ability to see, hear and communicate with the patient (Parmanto et al., 2016). Participants in the focus groups and interviews reported poor visibility and difficulty communicating with parents and the child. The participants reported not being able to see if the child moved away from the camera or the device was not set up correctly or was unsuitable for the situation. Participants reported that communicating what they wanted the parent or child to do to meet the requirements of their session was a challenge. While, yes, they could see and hear in theory, this did not always translate to seeing, hearing and communicating in the context of a physiotherapy session with a child with developmental delay. As can be seen in Table 10, the focus group findings did not support the survey findings for the effectiveness construct.

In another example, the focus group responses expanded on the usefulness construct through the theme of time management. Within the usefulness construct of the questionnaire, there is the statement: telehealth saves me time travelling for healthcare appointments (Parmanto et al., 2016). While participants frequently mentioned reduced travel for families, they did not speak frequently about reduced travel for themselves. While participants did report fitting in more after school appointments using telehealth, the repeated and significant ideas around time, were that telehealth cost time. Any time saved on travel was insignificant to the participants compared to the time spent preparing for telehealth sessions.

To enable qualitative and quantitative findings to be compared, qualitative data was transformed to quantitative data. The qualitative codes with similar wording or ideas to questionnaire statements were searched for frequency, as proposed by Srnka and Koeszegi (2007) as a data transformation method. For example, the code 'visibility' was checked for frequency as the TUQ questionnaire has a statement: using telehealth, I can see as well as if we met in person (Parmanto et

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al., 2016). Reliability is defined as the confidence and trust of users in the proper and accurate functioning of a technology (Kim et al., 2015). Therefore, 'accuracy' was checked for frequency. Table 10 shows the constructs, codes and qualitative explanations.

Table 10: Explaining the quantitative result with qualitative responses

Quantitative Constructs	TUQ summary score	Codes and frequency	Qualitative explanations and their theme
Usefulness	5.5	Convenience for families – 3 Rural setting – 13 Reduced travel – 8 (referring to travel for families) Time management – 12 (referring to therapist time spent preparing)	"For the right client and the right family and in the right situation. It can be great."P10 – right child, right family "Hours, certainly. I just remember working weekend after weekend after weekend trying to just have that library at my fingertips that I could send out."P1 – time management
Ease of use	4.9	No directly related codes. Word count: Ease/easy – 15 (negative connotation e.g. 'not easy' 6, positive connotation 9	"The one I use privately, [Cliniko] – I don't know if it's because I just haven't used it as much, but it just seems really good. It's just so easy and even just the whole set up."P6 – organisational support "As in easy to treat, babies were much easier. Because with the toddlers, you're relying on the parents to be able to distract them and to engage them."P7 – the right child "So, we're basically on fixed computers, and that is really not very easy for doing telehealth." P5 – technology

Effectiveness	4.5	Visibility – 9 Physiotherapist communication- 22	"It was really difficult if they were using just a laptop because of the angle of the laptop, you couldn't really see and I felt bad about saying "I can't see, can you – no, that's not enough, can you move?" P1 – technology "I think just generally I find the communication side of things more difficult. I always left those appointments just not sure if Mum really felt like she'd gotten a full service from it."P9 - communication
Reliability	3.7	Technological issues – 19 Accuracy of telehealth – 8	"It's difficult in terms of being able to really know what you're dealing with because your assessment can't be as accurate, I don't think, as if you're able to feel it yourself."P1 – lack of physical touch "It was just lots of troubleshooting at the time and around the technical issues, yeah."P6 – technology
Acceptability	4.8	Future use – 14 Better than nothing – 5 Worse than nothing - 1	"I think where face-to-face is possible, people will still do face-to-face."P5 – lack of physical touch "In some situations for some families it might be the right thing at the time."P2 – the right family "You haven't helped the child, so it was a whole waste of time." – lack of physical touch, communication

			"Inter professional stuff with, yeah, other health services, so rural and remote health services. We have just had meetings with treating teams and stuff like that, which then can also guide our community development staff. And we can do some outreach and some popups and stuff as required."P5- collaboration

Green – coding developed facilitators, Red – coding developed barriers

6.3 Overall findings

The findings from phase one support telehealth videoconferencing as easy to use, useful and acceptable for service delivery to children with developmental delays. The findings from phase two also support telehealth as easy to use. Phase two results are supportive that telehealth is useful but only for the right child and the right family; in these cases, telehealth can reduce travel and increase convenience for the family, particularly in rural settings. Phase two results were supportive of the acceptability construct, but again, only for the right child and the right family. Participants reported that telehealth was better suited to be an adjunct to face-to-face rather than a replacement.

The findings from phase two expanded to find that participants perceive facilitators to telehealth to be the right child, the right family, adequate technology and space and collaboration. Barriers were technology, time management, lack of organisational support, lack of physical touch, communication and work environment. Phase two participants were willing to use telehealth for service delivery to children with developmental delays in rural settings, to collaborate with other professionals, or as an adjunct to face-to-face but only for the right child and the right family. Phase two participants identified a need for physiotherapy specific training in telehealth.

6.4 Considering the findings amongst the body of literature

The systematic review identified the current research evidence of allied health interventions (speech pathology, occupational therapy and physiotherapy) delivered by telehealth to children with developmental delays (Grant et al., 2021b). The review identified seven themes: technology, self-efficacy, replacement of face-to-face services, time management, relationships, access and family centred care. Table 11 summarises the study findings compared to the review themes.

Table 11: Comparing the results to the body of literature

Themes from the literature	Study findings
Technology – identified as a barrier due technological failures and poor internet connection.	Technology was a theme of phase two. Participants reported lack of adequate technology and poor internet connection as barriers while adequate technology was a facilitator.
Self – efficacy – participants reported poor self-efficacy relating to insufficient training.	Similarly, participants in phase two reported a need for physiotherapy specific training.
Replacement of face-to-face services – participants reported telehealth as unsuitable as a replacement for face-to-face services due to lack of physical touch and difficulty with clients with communication disorders.	Lack of physical touch was a theme of phase two. Participants also identified client suitability in the theme 'the right child', however this theme related to complex physical disability, age of the child as well as communication difficulties.
Time management - participants reported that telehealth took time to logistically set up and that technology failures took time to resolve.	Time management was identified as a theme in phase two. The issues were around preparation of resources for telehealth appointments. This is different to the issues reported in the systematic review, however resolving technological issues arose in the theme of technology.
Relationships – participants reported improved relationships with adult stakeholders but had difficulty establishing a therapeutic relationship with the child over the screen	Participants in phase two reported telehealth was useful to collaborate with other professionals. Similarly, they reported difficulties communicating with the child. Unlike the systematic review, participants also reported difficulties communicating with the parent over the screen.
Access and family centred care– participants reported reduced travel for children and their families, improved access to services and improved convenience for families.	Participants in both phases reported reduced travel and improved access for children and families. Phase two participants reported that for the 'right families' there was the benefit of convenience with telehealth.

The results of this study, for the most part, were similar to the results of the systematic review (Grant et al., 2021b). Physiotherapy specific training was identified as a need in this study and not the systematic review however as the populations included in the systematic review were mainly speech pathologists, this is not unexpected. The emphasis of the technology theme in the systematic review was on technology failure, while this study found that having the right device for the child in question and the intervention required was a major issue. Internet connection was frequently mentioned in both the systematic review and this study. Organisational support was a significant theme in this study, with need for training, safety, privacy and provision of technology and space to be on the organisational level. However, this was only briefly mentioned in the systematic review within the time management theme. Communication was another significant theme that did not have the same emphasis in the systematic review. Communication concerns in the review were chiefly around the therapeutic relationship and the child not engaging through the screen, and whilst this did come up in the study participants also felt that their communication with parents was a barrier to telehealth. They reported not being able to communicate sufficiently with parents to be confident in the accuracy of their assessments. This difference may be because the population of this study was physiotherapists while the review mainly included speech pathologists. Overall, the results were similar to those of the systematic review however, there was greater emphasis on physiotherapy specific issues due to the difference in samples.

6.5 Recommendations

Prior to embarking on this project, the author considered rural health to be the potential beneficiary of the perspectives' physiotherapists might hold on using telehealth with children with developmental delays. Rural and remote areas in Australia have health service gaps that contribute to poorer health outcomes for children with developmental delays (Australian Institute of Health and Welfare, 2019; Bradford et al., 2016). However, due to various lockdowns and restrictions during the Covid-19 pandemic, participants generally spoke about their experience in lockdowns, rather than their experience in rural health. However, there was a rural cohort amongst the study participants. The participants of the first phase of the study came from a variety of ruralities with 39% classified as MM1, 29% as MM2, 16% MM3 and 16% MM5. Rural setting went on to be coded from the focus groups and interviews. Participants in phase two did identify collaboration as a theme, with its main use being to provide or receive support to or from other physiotherapists when distance was a barrier. While there was some consideration given to rural health, the repeated and frequent ideas from both phases related to the telehealth experience during Covid-19 lockdowns and restrictions. Therefore, the recommendations reflect this emphasis.

6.5.1 Prepare the family

Prepare families before a telehealth session by using a mix of mediums that could include emails, videos and/or phone calls to ensure the family has clear expectations around telehealth services. Families should expect to be present and engaged in the session and they should understand that the session might be shorter or involve more parent coaching than a typical face-to-face session. They should also know what equipment to have on hand and how to set up their space and cameras.

6.5.2 Virtual tool kit

Physiotherapists reported that much time was used on collecting resources to use much like a therapist might have a 'kit bag' of physical objects to use in a face-to-face session. Therapists should have a list of web resources that they can easily access to keep the child engaged in their therapy session. This virtual tool kit could be provided by their organisation or a supporting body.

6.5.3 Technology and space

Both the physiotherapist and family should have access to a private space with room to move while still in view of the camera. The therapist should have a stationary camera pointing at a designated area where they know they will be in view. The family should be flexible with camera set up and prepared to use a mobile camera for a moving child.

6.5.4 Organisational support

Organisations should support their staff by providing clear guidance on which platforms to use and policies around privacy and safety. Organisations should provide suitable technology, good internet connection and readily available technological support. Organisations should provide time for therapists to train and prepare for telehealth and should provide more physiotherapy specific training about telehealth for children with developmental delays.

6.5.5 Conduct further research

6.5.5.1 Investigate effectiveness and feasibility of hybrid models

There is emerging research in populations with inflammatory bowel disease into the effectiveness of hybrid telehealth models where patients receive an initial face-to-face appointment followed by telehealth (Gray et al., 2021). Using telehealth for follow up interventions in a rural setting been suggested in previous qualitative research (Edirippulige et al., 2016). A hybrid model of face-to-face initial assessments and reviews interspersed with telehealth was suggested by participants as a possible model to support children for whom proximity of services is a barrier to physiotherapy access. Further research is required into the effectiveness of hybrid models of physiotherapy service delivery for children with developmental delay.

6.5.5.2 Conduct a longitudinal study

A longitudinal study would allow perspectives to be compared over time. Sharma & Clarke (2014) found that community nurses perspectives of telehealth changed over time from initially finding it threatening to finding it useful when balanced with face-to-face visits. Similarly, physiotherapists' perspectives may change as they become more used to telehealth and the body of research develops to better guide their use of telehealth.

6.5.5.3 Investigate parent and other stakeholder perspectives

The theme of the right family encompassed the perspectives that parents who were prepared, engaged in the session and technologically competent could facilitate a successful telehealth session. Parent and other stakeholders, such as teachers who might stand in for the parent in a school setting, should be asked for their perspectives in the future.

6.6 Conclusion

The findings of this mixed methods explanatory sequential study support telehealth as a useful, easy to use platform for delivering physiotherapy services to children with developmental delays. However, these services should only be provided in certain situations to children and families that can engage in interventions via videoconferencing. Participants identified telehealth as an acceptable mode of service delivery when face-to-face was not available but felt that telehealth should only be an adjunct to face-to-face services. Participants identified physiotherapy specific training as a need moving forward with telehealth. Recommendations developed from the findings were to prepare the family, be supported to develop a virtual toolkit, have access to adequate technology and space, receive organisational support and to investigate effectiveness and feasibility of hybrid models.

6.7 Chapter summary

The research question guiding this study was 'What are perspectives of physiotherapists toward using telehealth for service delivery to children with developmental delays?'. This study used a mixed methods explanatory sequential design to answer the question. Phase one: the survey arm was completed first and followed by phase two: the qualitative focus group arm. The two arms interacted at the data collection stage where a purposive sample of first phase participants was taken for the second phase. The arms interacted again in interpreting the results. The themes identified in phase two mainly support the constructs in phase one while adding a layer of understanding and context. However, the concepts of collaboration and work environment were new to phase two. Recommendations were developed using the findings from both phases. There were limitations to individual designs, however these were sought to be offset by using a mixed methods approach. The overall study findings concur with the existing literature while adding a physiotherapy specific view-point. Overall, physiotherapists perceive telehealth as useful, easy to use, and acceptable for service delivery for the right child and the right family in situations where distance is a barrier.

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Appendix A

Telehealth Usability Questionnaire Statements

1. Telehealth improves my access to healthcare services
2. Telehealth saves me time traveling to a hospital or specialist clinic
3. Telehealth provides for my healthcare needs
4. It was simple to use this system
5. It was easy to learn to use the system
6. I believe I could become productive quickly using this system
7. The way I interact with the system is pleasant
8. I like using the system
9. The system is simple and easy to understand
10. The system is able to do everything I would want it to be able to do
11. I could easily talk to the clinician using the telehealth system
12. I could hear the clinician easily using the telehealth system
13. I felt I was able to express myself effectively
14. Using the telehealth system, I could see the clinician as well as if we met in person
15. I think the visits provided over telehealth are the same as in person visits
16. Whenever I made a mistake using the telehealth system, I could recover quickly and easily
17. The system gave error messages that clearly told me how to fix problems
18. I feel comfortable communicating with the clinician using the telehealth system
19. Telehealth is an acceptable way to receive healthcare services
20. I would use telehealth services again
21. Overall, I am satisfied with this telehealth system

Parmanto, B., Lewis, A. N., Jr, Graham, K. M., & Bertolet, M. H. (2016). Development of the Telehealth Usability Questionnaire (TUQ). *International journal of telerehabilitation*, *8*(1), 3–10. https://doi.org/10.5195/ijt.2016.6196

Appendix B

Modified Telehealth Usability Questionnaire with demographic questions

Q. 1 How many years have you worked with children with a developmental delay?

<2, 2-5, 6-10, 11+

Q. 2 – What is your age?

<24, 24-34, 35-44, 45-54, 55-64, 65+

Q. 4 – How often do you use telehealth to deliver interventions to children?

Once a week or more, on average; one to three times a month, on average; less than once a month, on average; never

Q. 5 – (For those that selected never to Qu. 4) – Why did you select 'never'?

I don't know how to use it; I don't have the right technology; my client doesn't have the right technology; I don't like using it; other

Q. 6 What best describes your main work setting?

School based; public hospital; private hospital; private practice – physio only; private practice – multi D; public community health; other

Q. 7 Do you work as a physiotherapist, on average, at least one day a week, with children who have developmental delays?

Yes/No

Q. 8 Postcode of primary place of practice.

Q. 9 Has your use of telehealth changed since Covid-19 restrictions?

Decreased; remained unchanged; increased

Statement	Likert Response 1- 7 1- Strongly Disagree, 2 – Disagree, 3- Somewhat Disagree, 4 – Neither agree nor disagree, 5 – Somewhat Agree, 6 – Agree, 7 – Strongly Agree
Telehealth improves client access to healthcare services	

Telehealth saves me time traveling to healthcare appointments	
It is simple to use this system	
It was easy to learn to use the system	
I believe I can be productive using this system	
The way I interact with this system is pleasant	
I like using the system	
The system is simple and easy to understand	
This system is able to do everything I want it to be able to do	
I could easily talk to the client using the telehealth system	
I can hear the client clearly using the telehealth system	
I am able to express myself effectively	
Using the telehealth system, I can see the client as well as if we met in person	
I think the visits provided over the telehealth system are the same as in-person visits	
Whenever I make a mistake using the system, I can recover easily and quickly	
The system gives error messages that clearly told me how to fix problems	

I received training in how to use telehealth	
I feel comfortable communicating with the client using telehealth	
Telehealth is an acceptable way to deliver physiotherapy services to children	
I will continue to use telehealth services	

Parmanto, B., Lewis, J., Allen Nelson, Graham, K. M., & Bertolet, M. H. (2016). Development of the telehealth usability questionnaire (TUQ). International Journal of Telerehabilitation, 8(1), 3-10. doi:10.5195/ijt.2016.6196

Appendix C

Semi Structured Interview Guide

Thank you for agreeing to be part of this interview. Today we'll be talking about your opinions on using telehealth with your paediatric patients. I will be taking notes and the audio is being recorded. This is so we can analyse the data afterward. I'm going to ask about 10 questions but they're not too formal so feel free to jump in whenever you like. This whole process should take about half an hour. You can choose to stop the interview at any point.

For this interview, we're defining telehealth as web-based and real time. For example, using a videoconferencing platform and calling or emailing the parent beforehand with material would be included in the definition. Emailing through a program with pictures or talking through something on the phone in the absence of a related videoconference would not be included in the definition.

We are talking today about your use of telehealth with children and we have assumed from your survey response that you work with children on average at least one day a week.

Do you have any questions?

Are you happy to get started?

1. What are your experiences of using telehealth with this population group?
2. In considering telehealth, who has received training and what did that entail?
3. From your experiences, what has facilitated your use of telehealth?
4. From your experiences, what have been challenges in your telehealth delivery?
5. Do you have any solutions to these challenges?
6. What are your feelings around using telehealth in the future?
7. Knowing what you know now, would you do anything differently in the implementation of telehealth service delivery?
8. Is there anything we have missed?