

# ULRR

## **An exploration of independent and collaborative music therapy practices in the rehabilitation of young children with acquired communication impairments**

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**An Exploration of Independent and Collaborative Music  
Therapy Practices in the Rehabilitation of Young Children  
with Acquired Communication Impairments**

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A thesis submitted for the degree of Doctor of Philosophy, PhD

Irish World Academy of Music and Dance,

University of Limerick

**Supervisor**

Professor Hilary Moss, University of Limerick

Submitted to the University of Limerick, March 2025



## **Abstract**

Acquired communication impairments (ACIs) in childhood can significantly disrupt a child's language development, hinder social interactions, compromise emotional well-being, and diminish overall quality of life. This multiple methods research explores the use of music therapy to support language and communication in young children with ACIs through five interrelated studies.

Study I is an integrative review of existing literature on music and music therapy interventions on functional outcomes in children with acquired brain injury (ABI). Findings highlight the diverse role of music therapy within paediatric neurorehabilitation, particularly in enhancing motivation and engagement during rehabilitative interventions across functional domains. The review underscores the need for more detailed documentation of music and music therapy interventions, greater knowledge-sharing among researchers, and stronger evidence-building within the field. Additionally, it identifies a significant gap in empirical research, emphasising the need for larger, more rigorous studies to advance the evidence base.

Study II examines the clinical practices of music therapists working with young children with ACIs through a cross-sectional descriptive survey. Survey data reveals significant heterogeneity in approaches, clinical interventions, and outcome measures, reflecting the diverse backgrounds and practices of music therapists in this field. Notably, collaborative endeavours with speech and language therapists emerged as the most impactful approach to intervention.

Based on the findings of Study I and Study II, Study III explores the perspectives of music therapists and speech and language therapists on collaborative practices via semi-structured interviews. Clinicians reported that collaboration was often initiated in response to the complexity of paediatric ACIs, with joint sessions providing valuable insights into

children's communicative profiles. Joint interventions were viewed as particularly beneficial for fostering early pre-verbal skills and communicative engagement, foundational for later language development.

Study IV presents a case series of four young children with ACIs who participated in a collaborative music therapy and speech and language therapy programme. Video data documented increased vocal and verbal output, enhanced turn-taking and choice-making, and greater participation in communicative exchanges. The interactive and dynamic nature of joint sessions supported meaningful communicative interactions, facilitating both pre-verbal and emerging verbal communication.

Study V provides a reflective commentary on conducting music therapy research in paediatric neurorehabilitation, addressing key methodological, practical, and ethical challenges. It offers recommendations to overcome these challenges and strengthen the evidence base.

Overall, this thesis suggests that music therapy, particularly in collaboration with speech and language therapy, holds significant potential as a support for language and communication rehabilitation in children with ACIs. However, it emphasises the need for further research to enhance the understanding, application, and evaluation of music therapy in this context.

## Declaration

I hereby declare that this submission is entirely my own work. All sources used in this research have been fully acknowledged, and all quotations have been properly identified. I affirm that neither I nor any other individual has submitted this work, in whole or in part, for any other academic credit or degree. I am the author of this thesis and the principal author of the five articles that form its core.

Signed:

  
\_\_\_\_\_



## **Acknowledgements**

Firstly, I would like to express my sincere gratitude to my supervisor, Professor Hilary Moss. Your unwavering support, encouragement, and mentorship over the past number of years have been invaluable. I am continually inspired by you, and I hope this PhD is only the beginning of working together.

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To my parents Maeve and John, my brothers Michael and TJ, and aunt Moo, I will be forever grateful for your unconditional love, reassurance, and generosity, which gave me the strength to get to the finish line.

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## **Dedication**

This thesis is dedicated to the memory of my late grandfather, Jim O'Brien, whose love for music shaped my own.

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# Research Outputs

## Publications

- Burns, J., Bower, J., & Moss, H. (2025). Methodological, practical, and ethical perspectives on music therapy research in pediatric neurorehabilitation. *Music Therapy Perspectives*, 43(1). <https://doi.org/10.1093/mtp/miaf006>
- Burns, J., Healy, H., O'Connor, R., & Moss, H. (2024). Integrative review of music and music therapy interventions on functional outcomes in children with acquired brain injury. *Journal of Music Therapy*, 62(1).  
<https://doi.org/10.1093/jmt/thae017>
- Burns, J., Keaveney, C., Nieto, N., O'Connor, R., & Moss, H. (2024). Collaborative music therapy and speech-language pathology for pediatric acquired communication impairments: A phenomenological international perspective. *Music Therapy Perspectives*, 43(1). <https://doi.org/10.1093/mtp/miae026>
- Burns, J., O'Connor, R., & Moss, H. (2024). Music therapy for young children with acquired communication impairments: An international survey of clinical practices. *Nordic Journal of Music Therapy*, 33(5), 391-408.  
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## Oral Presentations

- Alley, S., Healy, H., & Burns, J. (2024, February 28). *Supporting children who experience trauma through music* [Seminar presentation]. Tower Seminar Series, University of Limerick, Limerick, Ireland.
- Alley, S., Healy, H., & Burns, J. (2024, October 11). *Music therapy for children experiencing adversity* [Seminar presentation]. 'Leigheas an Cheoil': An

Academy30 Celebration of Music Therapy, University of Limerick, Limerick, Ireland.

Burns, J., O'Connor, R., Woods, R., Lee, E., Little, J., Finn, S., Gill, I., & Moss H. (2024, September 18-21). *Enhancing functional communicative and language abilities in young children with acquired communication impairments: A collaborative music therapy and speech and language therapy approach* [Oral presentation]. Fifth Biennial Conference on Paediatric Brain Injury, Glasgow, Scotland.

### **Poster Presentations**

Burns, J., Healy, H., O'Connor, R., & Moss, H. (2024, September 18-21). *Integrative review of music and music therapy interventions on functional outcomes in children with acquired brain injury* [Poster presentation]. Fifth Biennial Conference on Paediatric Brain Injury, Glasgow, Scotland.

Burns, J., O'Connor, R., & Moss, H. (2024, May 17-19). *Music therapy for young children with acquired communication impairments: An international survey of clinical practices* [Poster presentation]. British Association for Music Therapy Conference 2024, Leicester, England.

Burns, J., O'Connor, R., Woods, R., Little, J., Finn, S., Gill, I., & Moss, H. (2023, November 23). *Investigating the impact of collaborative music therapy and speech and language therapy on language and communication in children with acquired communication impairments* [Poster presentation]. National Rehabilitation Hospital Clinical Audit and Quality Awards 2023, Dublin, Ireland.

## **Glossary of Abbreviations**

AAC	Augmentative and Alternative Communication
APNMT	Acute Paediatric Neuro Music Therapy
ABI	Acquired Brain Injury
AOP	Anti-Oppressive Practice
ACI	Acquired Communication Impairment
CVI	Content Validity Index
IRB	Institutional Review Board
MMAT	Mixed Methods Appraisal Tool
MT	Music Therapist
MT-SLT	Music Therapy and Speech and Language Therapy
NMT	Neurologic Music Therapy
PICU	Paediatric Intensive Care Unit
PEO	Population, Exposure, Outcome(s)
PPI	Public Patient Involvement
RAS	Rhythmic Auditory Stimulation
RCT	Randomised Control Trial
RQ	Research Question
SLP	Speech-Language Pathologist
SLT	Speech and Language Therapist
TBI	Traumatic Brain Injury

# Chapter 1

## Background and Context

### 1.1 Introduction

Language and communication are central to human interaction, serving as the primary means through which people express their thoughts, emotions, and identities while connecting with others. When these abilities are compromised, whether due to developmental conditions or acquired circumstances, the impact on an individual's life can be profound. Acquired communication impairments resulting from acquired brain injury can significantly hinder a child's ability to express themselves, engage in social interactions, and build relationships, leading to challenges that can restrict social integration and limit participation in everyday activities.

This thesis contributes to the limited body of knowledge surrounding music therapy for children with acquired communication impairments. In this introductory chapter, the background and rationale for this research will be explored, aims and research questions will be presented, and the structure of this thesis will be outlined.

### 1.2 Personal Motivation and Researcher Positioning

My interest in music therapy for children with acquired communication impairments was first shaped during a seven-month student placement at the National Rehabilitation Hospital in Dublin, Ireland. During this time, I worked with both adults and children with acquired brain injuries and observed the significant role that music therapy could play in supporting communicative rehabilitation. With young children in particular, its engaging and playful nature emerged as a compelling means of fostering motivation, which, in turn, facilitated communicative progress. These early encounters,

consistently marked by positive responses, established a foundational belief in the role of music therapy in facilitating the recovery of speech, language, and communication functioning.

This clinical foundation informed the direction of my MA research project, which explored the collaborative experiences of music therapists and speech and language therapists working with children with acquired brain injuries (Burns & O'Connor, 2023). Through this work, a substantial gap in the literature regarding the integration of music therapy for language and communication rehabilitation in children became apparent. Although I did not intend to build directly upon the MA project, this experience highlighted the need for more comprehensive investigations into the ways music therapy may influence communicative development for children with acquired communication impairments, affirming the decision to undertake doctoral studies.

At the outset of this research, I primarily identified as a clinician. Although I was beginning to engage more deeply with research, my perspective was shaped by regular clinical practice. My approach to music therapy was, and continues to be, grounded in humanistic principles, incorporating a neuroscience-informed perspective. Humanistic music therapy positions the therapists as a facilitator in a collaborative process, emphasising the client's innate capacity for growth, self-expression, and meaningful engagement. It prioritises the therapeutic relationship, subjective experience, and the client's agency within the music-making process (Abrams & Wheeler, 2015; Ansdell & Stige, 2018). This stance aligns with my own values and was particularly resonant when working with children, where play, spontaneity, and relational connection are fundamental to therapeutic engagement. Alongside this, I draw from a neuroscience-informed understanding of how music perception and production engage brain and behavioural functions. This perspective offers a foundation for

designing musically informed interventions that align with neurological principles and support functional rehabilitation (LaGasse & Thaut, 2013; O’Kelly & Magee, 2013). Neuroscience-informed approaches often position music as a means to achieve non-musical functional outcomes, such as improvements in cognitive, speech, and sensorimotor domains (Thaut & Hoemberg, 2014). Moore and Lagasse (2018) highlight the tension between these lenses, with neuroscience-informed music therapy focusing primarily on the amelioration of identified deficits stemming from neurological differences or injury, while humanistic music therapy values the therapeutic relationship and the individual’s intrinsic potential to conceive and realise one’s own health. Despite this fundamental difference, there is arguably sufficient commonality between these two approaches in their shared aim of supporting the client’s improved health and wellness.

In my own clinical experience, working with children in the acute and subacute stages of recovery from acquired brain injury, particularly within the Irish healthcare system, a blended approach proves invaluable. Central to humanistic music therapy is respect for the child’s innate communicative musicality and prioritising the therapeutic relationship between the child and therapist. When these principles are combined with an understanding of musical processing and the neurological impacts of brain injury, it extends music therapy practice to be more intentional and tailored for neurorehabilitation, while upholding humanistic values (Bower et al., 2021). This integration allows me to adapt musical experiences and interactions to facilitate connection, engagement, and ultimately functional recovery.

Upon commencing my doctoral research, I held a firm belief in the value of music therapy for children with acquired communication impairments, shaped by repeated instances in which music appeared to elicit meaningful engagement and communicative responses. While an openness to critical or unexpected findings was

maintained throughout, I entered the research with the expectation that positive contributions would be evident. This expectation was informed by clinical observation and informal dialogue with colleagues, as well as early engagement with relevant literature. These expectations were further reinforced when I commenced a clinical role at Children's Health Ireland at Temple Street during the second year of the PhD, where I continued to work with this cohort and observed communicative gains emerging through engagement with music therapy. I also assumed that collaborative working with speech and language therapists would emerge as a relevant theme during the research process. Having experienced such collaboration regularly in clinical settings, it seemed a likely point of intersection. However, I did not anticipate the extent to which collaborative practice would take a central role within this thesis. What initially appeared as a supportive dimension of practice ultimately became a primary focus, shaping the direction of the later stages of the research in ways I had not fully foreseen.

The broader professional context in Ireland also shaped my positioning as a researcher. Music therapy is not state registered or officially recognised within the Irish healthcare system (Ahessy, 2020), and this lack of recognition continues to impact service provision, professional identity, and interdisciplinary visibility. As such, I felt a responsibility to contribute to the development of an evidence base that could further support the profession's integration within Irish healthcare settings. While advocacy was not the primary motivation for the research, it informed my commitment to producing work that could contribute to ongoing dialogue around the recognition of music therapy as a valuable component of interdisciplinary healthcare in Ireland.

### **1.3 Situating the Research**

The research presented in this thesis is situated at the intersection of music therapy and paediatric acquired communication impairments. To provide context, the

following sections offer a brief introduction to the relevant areas of acquired brain injury, acquired communication impairments, and music therapy in neurorehabilitation.

### ***1.3.1 Acquired Brain Injury***

Acquired brain injury (ABI) is an umbrella term describing any injury to the brain occurring after birth, typically excluding injuries sustained during the early postnatal period (first 28 days post-birth) (Knight et al., 2019; McKinlay et al., 2016). The term explicitly excludes neurodegenerative diseases, birth trauma, neurodevelopmental disorders, neuromuscular conditions, or genetic and congenital anomalies (Crowe et al., 2017). Globally, ABI is recognised as a leading cause of mortality and neurological disability in children (Forsyth & Kirkham, 2012), although precise epidemiological data on its incidence remain limited (Tal & Tirosh, 2013).

ABI encompasses a broad spectrum of aetiologies, typically classified into two major categories: traumatic brain injury (TBI) and non-traumatic brain injury. TBI refers to injuries arising from external mechanical forces, such as falls, vehicular collisions, or sports-related injuries (Baker & Tamplin, 2006). Conversely, non-traumatic brain injuries result from internal processes, including vascular events, infections, neoplasms, anoxia, and hypoxia (Slykerman et al., 2024). Each aetiology results in diverse clinical presentations and recovery trajectories, influenced by factors such as the severity of the injury, its location in the brain, and developmental considerations, particularly the state of neurological and cognitive development at the time of the event (Goldman et al., 2022).

#### **1.3.1.1 Traumatic Brain Injury**

TBI occurs as a result of rapid acceleration and deceleration of the head, often due to contact with a hard surface (Catroppa et al., 2017). These inertial forces can lead

to diffuse axonal injury, characterised by the widespread shearing and tearing of axons and blood vessels (Kochanek et al., 2000). TBI is the most prevalent form of ABI, with incidence rates estimated between 180 and 825 cases per 100,000 individuals. However, these figures likely underestimate the true prevalence, as many individuals, particularly children, with mild TBI, including concussions, may not present to hospital (Knight et al., 2019).

### **1.3.1.2 Non-Traumatic Brain Injury**

Non-traumatic brain injuries encompass a diverse range of conditions that impair brain function through internal mechanisms. The most common causes of non-traumatic brain injury include:

- Stroke – There are two main types of stroke: ischemic and haemorrhagic. Ischemic stroke occurs when a blood vessel supplying the brain is obstructed, leading to oxygen deprivation and neuronal cell death (Goldman et al., 2022). Haemorrhagic stroke results from rupture or leakage of a cerebral artery, causing elevated intracranial pressure and cellular damage. This type of stroke often leads to more diffuse brain injury compared to ischemic strokes (Crowe et al., 2017).
- Infection – Conditions such as meningitis and encephalitis cause inflammation of brain tissues, potentially resulting in widespread neural damage (Goldman et al., 2022).
- Neoplasm (Tumour) – Neoplasms, commonly referred to as intracranial tumours, are abnormal growths that can be either benign or malignant. These growths may cause brain injury by compressing surrounding tissues, increasing intracranial pressure, and disrupting blood and oxygen supply. Malignant neoplasms grow aggressively and invade healthy tissue, while benign

neoplasms, though non-cancerous, can still result in significant damage due to the confined space within the skull (Murdoch, 2011; Seyfried & Mukherjee, 2005).

- Anoxia and Hypoxia – These conditions involve oxygen deprivation in the brain. Anoxia refers to a complete absence of oxygen supply to brain tissue despite adequate blood flow, whereas hypoxia describes a reduced oxygen supply that is insufficient to maintain normal brain function. Both can arise from incidents such as drowning, cardiac arrest, carbon monoxide poisoning, or prolonged seizures. These events disrupt the brain's metabolic balance, leading to neuronal injury, cell death, and potentially widespread brain damage (Busl & Greer, 2010; Goldman et al., 2022).

### **1.3.1.3 ABI in Childhood**

The impact of ABI during childhood is profound, often leading to complex and lifelong difficulties that span multiple domains of development and functioning (Catroppa et al., 2016). The challenges associated with childhood ABI are uniquely shaped by the brain's ongoing development. Unlike injuries sustained in adulthood, the impact of ABI in children may not be immediately apparent at the time of injury. Instead, they often emerge or intensify over time, as the child encounters increasing physical, cognitive, social, and emotional demands throughout their developmental trajectory (DePompei & Blosser, 2019; Schrieff-Elson et al., 2017).

ABI can result in a combination of immediate and long-term impairments, affecting physical mobility and coordination, communication skills, cognitive processes, emotional regulation, behavioural control, and social interaction. These impairments frequently co-occur, compounding one another and significantly hindering the child's ability to engage with their environment and meet expected developmental milestones

(Beauchamp & Anderson, 2013; Dewan et al., 2016). The gradual and evolving nature of these difficulties often leads to an underestimation of the overall long-term impact of childhood ABI (Hayes et al., 2017; Jenkin et al., 2022). An ABI can significantly diminish the quality of life for affected children, as well as the family unit, who must navigate ongoing emotional, social, and financial challenges as they adapt to the evolving demands of caregiving (Knight et al., 2019).

### ***1.3.2 Acquired Communication Impairments***

Acquired communications impairments (ACIs) refer to disturbances in speech, language, and communication arising from some form of cerebral insult after language acquisition has already commenced (Hécaen, 1976). Also termed neurogenic communication disorders, these impairments can result from any type of ABI, with the specific nature of the impairment determined primarily by the neuroanatomical location of the brain damage rather than by the cause of the injury itself (Murdoch, 2011).

Speech production relies on the coordination of three fundamental neurological processes. First, a concept of the intended speech output must be formed and symbolically formulated for expression. Next, a motor programme is generated to determine the sequence of muscle contractions necessary to produce the individual sounds and words that constitute the intended speech. Finally, this conceptualised message is externalised as speech through the integrated motor functions of respiration, phonation, resonance, articulation, and prosody (Murdoch, 2011). Disruptions to any of these processes can result in distinct communication impairments (Brookshire, 2015; Murdoch, 2011), including:

- Aphasias – A linguistic processing disorder that disrupts the brain’s ability to formulate and interpret words and sentences, despite preserved cognitive abilities (Hora et al., 2014). Individuals with aphasia may experience challenges

with word retrieval, sentence formation, and the comprehension of spoken or written language (Murdoch, 2011). In children, aphasia often manifests as non-fluent, characterised by mutism and limited spontaneous verbal output (O'Hare, 2016).

- **Dysarthria** – A motor speech disorder caused by neurological damage or paralysis of the muscles required for speech production, resulting in difficulties with articulation, phonation, and prosody (Hora et al., 2014). In children, dysarthria often leads to shallow, irregular breathing, which hinders breath support for speech, as well as low-pitched, breathy or harsh voices, nasalised speech, and poor pronunciation (Pennington et al., 2016).
- **Apraxia** – Acquired apraxia of speech is a motor speech disorder characterised by difficulty in planning and programming the movements required for successful speech or language production (Beathard & Krout, 2008; Cohen, 1992). It results in impaired articulation and altered prosody, despite the absence of muscle weakness or paralysis (Duffy, 2013). In children, acquired apraxia of speech is primarily marked by inconsistencies in sound production and sequencing, which can significantly impact intelligibility and expressive communication (Murdoch, 2011).
- **Cognitive Communication Impairments** – These impairments are characterised by difficulties with listening, speaking, reading, writing, conversing, and social interaction, resulting from underlying cognitive impairments in attention, memory, organisation, information processing, problem-solving, or executive functions (Cermak et al., 2019; Turkstra et al., 2015). These challenges often affect the ability to initiate, sustain, and adapt communication in dynamic contexts. In young children, cognitive communication impairments can lead to

delays in vocabulary acquisition, which may cascade into broader challenges in reading fluency, comprehension, and auditory processing (Turkstra et al., 2015).

Although ACIs in adults and children share many similarities, it is essential to recognise the developmental context of paediatric cases. Unlike adults, children are either in the early stages of developing speech and language or are continuing to refine these skills when damage to the brain occurs (Murdoch, 2011). A brain lesion in a child may disrupt established language functions or interfere with the development of emerging abilities (Gilardone et al., 2022). This dual challenge, managing both the impact of neurological damage and the complexities of ongoing developmental processes, creates significant barriers to directly applying adult-focused research to address the unique complexities of paediatric populations (Kennelly, 2006; Murdoch, 2011).

### ***1.3.3 Acquired Communication Impairments in Early Childhood***

The developmental period between ages 2 and 6 is a critical window for language acquisition, characterised by rapid advances in both receptive and expressive communication skills (Saxton, 2017). During these formative years, receptive vocabulary expands from approximately 200 words to over 10,000 words, while expressive vocabulary typically surpasses 2,000 words (Saxton, 2017; Shipley & McAfee, 2021). Children transition from forming simple phrases to constructing complex sentences and develop their narrative abilities by linking actions or events through causal chains (Hoff, 2013; Owens, 2019). Their grammatical abilities also advance, including accurate use of past and future tenses and increasing mastery of grammar rules in speech (Shipley & McAfee, 2021). However, a brain injury during this sensitive developmental window can profoundly disrupt these processes, impeding the

acquisition of foundational language skills and affecting both current and future communication abilities.

During early childhood, particularly before the emergence of complex verbal communication, diagnosing specific ACIs presents challenges. Although symptoms of these impairments are often evident, accurately categorising them into distinct classifications such as aphasia, apraxia, dysarthria, or cognitive communication impairments can be difficult. This diagnostic ambiguity stems from overlapping symptomatic presentations, the child's limited communicative abilities at the time of injury, and their developmental stage (Manasco, 2021; Murdoch, 2011).

Children with ACIs may exhibit reduced verbal expression, atypical sound production, or delays in achieving key communicative milestones (Hora et al., 2014; O'Hare, 2016). However, distinguishing the underlying nature of these impairments, whether linguistic, motoric, or cognitive in origin, remains a complex task (Owens & Farinella, 2018). For instance, a child with impaired intelligibility and limited verbal output may present with features consistent with both dysarthria and expressive aphasia (Hora et al., 2014). Moreover, brain injury during early development often disrupts communication in ways that do not align neatly with established diagnostic categories, further complicating precise identification of these impairments (Murdoch, 2011; Owens & Farinella, 2018).

Given these complexities, professionals frequently classify these impairments broadly as ACIs or neurogenic communication disorders during the early post-injury phase in early childhood (Murdoch, 2011). This approach provides flexibility in assessment and intervention, recognising that the nature of the impairment may evolve over time as the child's communicative skills develop and more refined diagnostic tools become applicable (Manasco, 2021; Murdoch, 2011; Owens & Farinella, 2018).

Grouping impairments under the ACI framework facilitates a holistic approach to treatment, emphasising the restoration or compensation of functional communication skills irrespective of the underlying aetiology (Hora et al., 2014).

### ***1.3.4 Music Therapy and Neurorehabilitation***

Music therapy is an evidenced-based profession that employs planned and intentional music-based methods to support individuals in improving, restoring, or maintaining health, functioning, and well-being (Irish Association of Creative Arts Therapists, 2025). The diffuse processing of music across the brain makes it a powerful tool for addressing a wide range of deficits associated with ABI (Magee & Baker, 2009). Research indicates that music promotes neuroplasticity by strengthening the brain's capacity to reorganise itself through the formation of new neural connections between healthy and damaged brain regions, thereby enabling the recovery of compromised functionality and the development of compensatory strategies (Baker & Roth, 2004; Magee & Baker, 2009). Within neurorehabilitation, music therapy has been utilised to stimulate brain functions involved in movement, cognition, speech, emotions, and sensory perceptions (Magee et al., 2017).

Magee (2020) underscores the importance of incorporating music therapy within the interdisciplinary neurorehabilitation team, emphasising that music serves as a familiar and salient stimulus that facilitates cortical changes in the brain to support recovery. Music is physiologically arousing and its ability to entrain movement makes it particularly effective in motor rehabilitation (Clark et al., 2016). Rhythm-based techniques in music therapy are widely employed to enhance motor outcomes, including gait retraining and improvement of upper limb coordination (Thaut, 2002; Thaut et al., 1997). In language rehabilitation, singing interventions have been shown to enhance key speech-related parameters, including phonation time, intensity, speech rate, prosody,

vocal range, and overall intelligibility (Baker et al., 2005; Cohen, 1992; Kim & Jo, 2013). The receptive and predictable structures inherent in music also provide effective cues for learning, aiding memory formation and recall (Thaut et al., 2014). Music therapy also addresses psychosocial functions such as behavioural outcomes, emotional needs, mood, wellbeing, social skills, and quality of life (Magee, 2020; Magee et al., 2017). Additionally, music's intrinsic motivational qualities play a vital role in sustaining engagement throughout the rehabilitation process (Burns & O'Connor, 2023; Kennelly, 2006). These diverse benefits highlight the significance of music therapy as a comprehensive intervention, supporting physical and cognitive recovery while addressing the emotional and social dimensions of rehabilitation post ABI.

## **1.4 Thesis Overview**

### ***1.4.1 Research Aims and Objectives***

The impetus for this research arose from the researcher's clinical experiences, academic inquiry, and engagement with existing literature. These elements collectively highlighted a paucity of research surrounding the role of music therapy for young children with ACIs. While music therapy is practiced in this context, there is limited evidence exploring its specific contributions to language and communication rehabilitation. This research seeks to begin addressing this gap by exploring the use of music therapy to support communication outcomes with this population.

This project has four aims:

1. To critically review existing literature on music therapy outcomes for children with ACIs.
2. To investigate current music therapy practices employed by clinicians working with children with ACIs.

3. To explore how music therapy can support language and communication rehabilitation in children with ACIs.
4. To contribute to the limited body of literature available to music therapists working in paediatric neurorehabilitation, particularly in the context of ACIs.

To achieve these aims, the following research questions (RQ) were formulated:

- RQ1: What is currently known about the impact of music therapy for children with ACIs?
- RQ2: How do music therapists describe their practice of working with young children with ACIs?
- RQ3: How does music therapy contribute to the rehabilitation of language and communication in young children with ACIs?

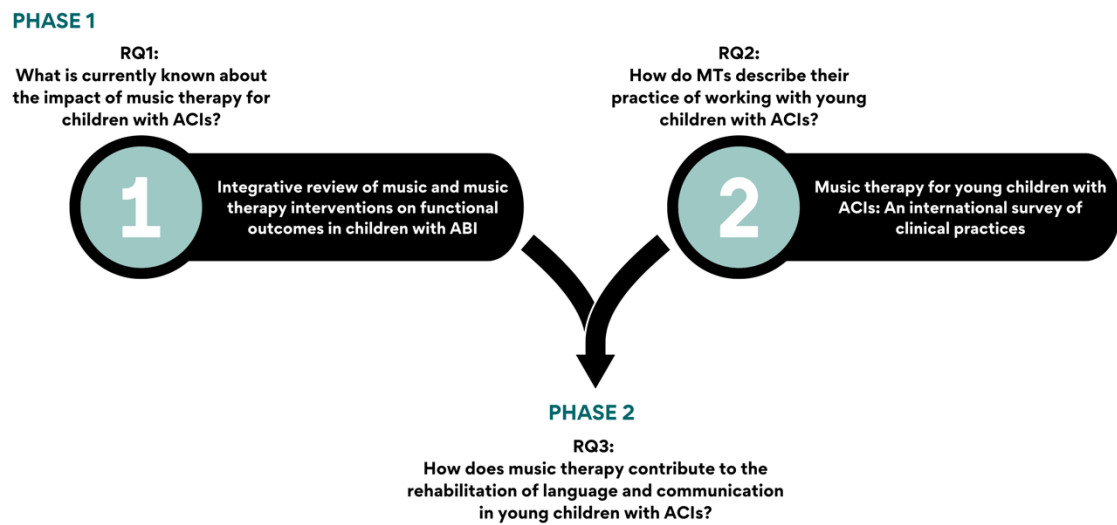
To address these questions, this thesis comprises five studies, organised into two distinct phases. Phase 1 serves as an exploratory stage, aiming to answer the first two research questions. It focuses on establishing foundational knowledge about music therapy for children with ACIs. The findings from this phase provide a basis for the subsequent phase by identifying key priorities and gaps in the field. Phase 2 builds on the insights gained from Phase 1, shifting focus to answer the third research question, investigating how music therapy contributes to the rehabilitation of language and communication in young children with ACIs. The aims of each study are outlined below, illustrating their contributions to addressing the guiding research questions within the context of the two research phases.

### ***1.4.2 Phase 1***

Phase 1 addressed the first two research questions through two distinct studies conducted in parallel. A visual representation of Phase 1 is provided in Figure 1.

## Figure 1

### *Visual Representation of Phase 1*



Note: ACI = Acquired Communication Impairment; ABI = Acquired Brain Injury; MT = Music Therapist.

#### **1.4.2.1 RQ1: What is currently known about the impact of music therapy for children with ACIs?**

To investigate how music therapy contributes to language and communication rehabilitation in children with ACIs, it was first necessary to conduct an in-depth review of current research in this area. Study I presents an integrative review of music and music therapy interventions on functional outcomes in children with ABI. The review sought to identify, evaluate, synthesise, and discuss the findings of existing studies, shedding light on the current state of the field and identifying avenues for future research.

#### **1.4.2.2 RQ2: How do music therapists describe their practice of working with young children with ACIs?**

To capture current clinical perspectives, Study II presents the findings of an international survey examining clinical practices among music therapists working with

children aged 2-6 years who have ACIs. This study aimed to document current approaches, clinical interventions, and outcome measures used by clinicians with this population.

### ***1.4.3 Phase 2***

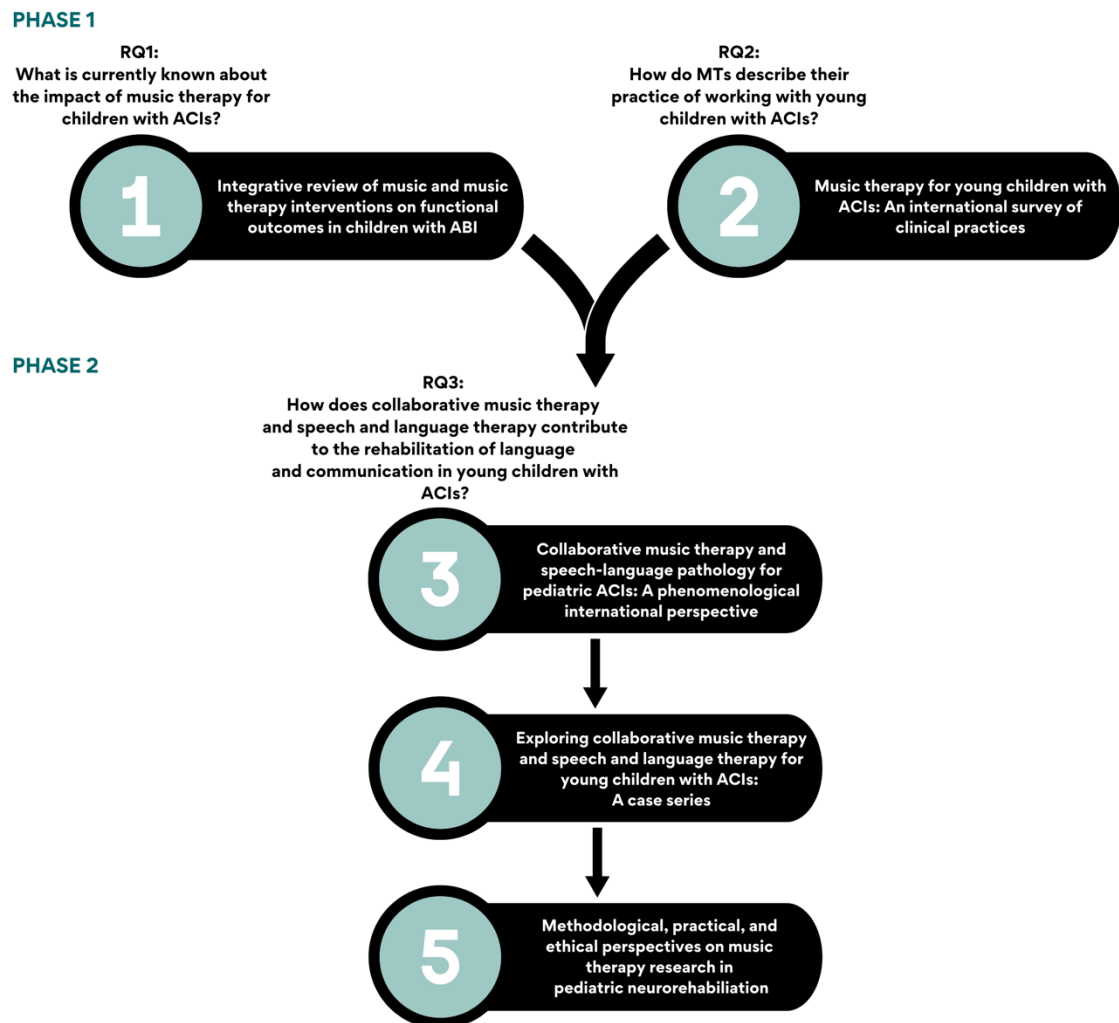
Phase 2 shifts focus to answering the third research question. The findings from the Phase 1 studies identified collaborative music therapy and speech and language therapy as an emerging interest and indicated a need for further investigation of their integration as a rehabilitative approach for young children with ACIs. While the independent contribution of music therapy remains an important avenue for future exploration, the evidence gathered from these foundational studies identified collaboration with speech and language therapists as a research priority for the second phase. Consequently, RQ3 was revised to align with the evolving focus.

- RQ3 Revised: How does collaborative music therapy and speech and language therapy contribute to the rehabilitation of language and communication in young children with ACIs?

Phase 2 adopted a sequential design, where the findings of each study informed the development of the next. Rather than comparing single-disciplinary and collaborative approaches, the aim of this phase was to investigate the unique contributions of a conjoint therapeutic model, offering insights into its role supporting language and communication rehabilitation. Figure 2 illustrates the research progression from Phase 1 into Phase 2, providing an overview of the studies and their sequential development within the thesis.

**Figure 2**

*Visual Representation of Research Progression*



Note: ACI = Acquired Communication Impairment; ABI = Acquired Brain Injury; MT = Music Therapist.

**1.4.3.1 RQ3: How does collaborative music therapy and speech and language therapy contribute to the rehabilitation of language and communication in young children with ACIs?**

The findings of Study II revealed that collaborative endeavours between music therapists and speech and language therapists were perceived as the most impactful intervention approach for children with ACIs. However, a deeper understanding of this

collaborative effort was necessary. Study III employed semi-structured interviews with nine pairs of music therapists and speech and language therapists from seven countries. The study sought to explore their collaborative experiences in treating children with ACIs, aiming to investigate the role of collaborative music therapy and speech and language therapy, the elements of successful collaboration, and the strategies clinicians used to evaluate their collaborative practices.

Study IV presents a case series of four young children with ACIs who participated in a collaborative music therapy and speech and language therapy programme. This study sought to document changes in speech, language and communication skills emerging from this integrated approach. Video data from the sessions were collected and analysed thematically, aiming to identify recurring patterns of engagement and therapeutic responses.

Answering RQ3 proved particularly challenging due to the methodological complexities inherent in acute clinical contexts. Building on the experiences and insights gained through the design and implementation of Study IV, Study V offers a reflective commentary on conducting music therapy research in paediatric neurorehabilitation. This study highlights key factors that complicate research design in this setting and concludes with recommendations to address these challenges and strengthen the evidence base.

#### ***1.4.4 Thesis Structure***

This thesis is presented in a research paper based format, with relevant chapters presented in published or pre-publication format. Four papers have been published in peer-reviewed journals, and one is presented as a pre-publication manuscript. The papers are framed by introductory, methodology, and discussion chapters.

The researcher served as the principal investigator and author of all included papers. Table 1 outlines the researcher’s contributions to the studies comprising this thesis.

**Table 1**

*Author's Contributions to Studies*

<b>Study</b>	<b>Reference</b>	<b>Contributions of JB</b>
<b>I</b>	<b>Burns, J.,</b> Healy, H., O’Connor, R., & Moss, H. (2024). Integrative review of music and music therapy interventions on functional outcomes in children with acquired brain injury. <i>Journal of Music Therapy</i> , 62(1). <a href="https://doi.org/10.1093/jmt/thae017">https://doi.org/10.1093/jmt/thae017</a>	<ul style="list-style-type: none"> <li>• Study conception and design (with R.O’C &amp; H.M.)</li> <li>• Literature search (with H.H.)</li> <li>• Data evaluation (with H.M.)</li> <li>• Data analysis (with H.H., R.O’C, and H.M.)</li> <li>• Drafting of manuscript</li> <li>• Manuscript revisions before publication</li> </ul>
<b>II</b>	<b>Burns, J.,</b> O’Connor, R., & Moss, H. (2024). Music therapy for young children with acquired communication impairments: An international survey of clinical practices. <i>Nordic Journal of Music Therapy</i> , 33(5), 391-408. <a href="https://doi.org/10.1080/08098131.2024.2329898">https://doi.org/10.1080/08098131.2024.2329898</a>	<ul style="list-style-type: none"> <li>• Study conception and design (with R.O’C. and H.M.)</li> <li>• Design of survey instrument</li> <li>• Review of the literature</li> <li>• Data collection and analysis (with R.O’C. and H.M.)</li> <li>• Drafting of manuscript</li> <li>• Manuscript revisions before publication</li> </ul>
<b>III</b>	<b>Burns, J.,</b> Keaveney, C., Nieto, N., O’Connor, R., & Moss, H. (2024). Collaborative music therapy and speech-language pathology for pediatric acquired communication impairments: A phenomenological international perspective. <i>Music Therapy Perspectives</i> , 43(1). <a href="https://doi.org/10.1093/mtp/miae026">https://doi.org/10.1093/mtp/miae026</a>	<ul style="list-style-type: none"> <li>• Study conception and design (with R.O’C. and H.M.)</li> <li>• Review of the literature</li> <li>• Data collection and analysis (with C.K. &amp; N.N.)</li> <li>• Drafting of manuscript</li> <li>• Manuscript revisions before publication</li> </ul>
<b>IV</b>	<b>Burns, J.,</b> O’Connor, R., Woods, R., Lee, E., Little, J., Finn, S., Gill, I., & Moss, H. (2025). Exploring collaborative music therapy and speech and language therapy for young children with acquired communication impairments: A case series. <i>Nordic Journal of Music Therapy</i> , [in review].	<ul style="list-style-type: none"> <li>• Study conception and design (with R.O’C., R.W., L.J., S.F., I.G., and H.M.)</li> <li>• Review of the literature</li> <li>• Data collection and analysis (with R.O’C., R.W., and E.L.)</li> <li>• Drafting of manuscript (with R.W. and E.L.)</li> <li>• Final preparation and editing of manuscript</li> </ul>
<b>V</b>	<b>Burns, J.,</b> Bower, J., & Moss, H. (2025). Methodological, practical, and ethical perspectives on music therapy research in pediatric neurorehabilitation. <i>Music Therapy Perspectives</i> , 43(1). <a href="https://doi.org/10.1093/mtp/miaf006">https://doi.org/10.1093/mtp/miaf006</a>	<ul style="list-style-type: none"> <li>• Study conception and design (with H.M. and J.B)</li> <li>• Drafting of manuscript (with J.B.)</li> <li>• Manuscript revisions before publication</li> </ul>

The formatting of papers, whether published or submitted for publication, adheres to the stylistic guidelines of the respective journals. American English was employed as necessary (Study I, Study III, and Study V), in accordance with journal requirements. Minor formatting changes have been applied to accommodate readability. Tables and figures are numbered according to their sequence in this thesis, and references are provided at the end of each paper.

## 1.5 References

- Abrams, B., & Wheeler, B. (2015). Humanistic approaches. In *Music therapy handbook* (pp. 148–160). Guildford Publications.
- Ahessy, B. (2020). Creative arts therapists in Ireland: Practice, professional engagement & employment. *Polyphony: Journal of the Irish Association of Creative Arts Therapists*. <http://polyphony.iacat.me/features/creative-arts-therapists-in-ireland-practice-professional-engagement-employment>
- Ansdell, G., & Stige, B. (2018). Can music therapy still be humanist? *Music Therapy Perspectives*, 36(2), 175–182. <https://doi.org/10.1093/mtp/miy018>
- Baker, F., & Roth, E. A. (2004). Neuroplasticity and functional recovery: Training models and compensatory strategies in music therapy. *Nordic Journal of Music Therapy*, 13(1), 20–32. <https://doi.org/10.1080/08098130409478095>
- Baker, F., & Tamplin, J. (2006). *Music therapy methods in neurorehabilitation: A clinician's manual*. Jessica Kingsley Publishers.
- Baker, F., Wigram, T., & Gold, C. (2005). The effects of a song-singing programme on the affective speaking intonation of people with traumatic brain injury. *Brain Injury*, 19(7), 519–528. <https://doi.org/10.1080/02699050400005150>
- Beathard, B., & Krout, R. E. (2008). A music therapy clinical case study of a girl with childhood apraxia of speech: Finding Lily's voice. *Arts in Psychotherapy*, 35(2), 107–116. <https://doi.org/10.1016/j.aip.2008.01.004>
- Beauchamp, M. H., & Anderson, V. (2013). Cognitive and psychopathological sequelae of pediatric traumatic brain injury. *Handbook of Clinical Neurology*, 112, 913–920. <https://doi.org/10.1016/B978-0-444-52910-7.00013-1>
- Bower, J., Magee, W. L., Catroppa, C., & Baker, F. A. (2021). The neurophysiological processing of music in children: A systematic review with narrative synthesis and

considerations for clinical practice in music therapy. *Frontiers in Psychology*, 12.

<https://doi.org/10.3389/fpsyg.2021.615209>

Brookshire, R. H. (2015). *Introduction to neurogenic communication disorders* (8th ed.). Elsevier.

Burns, J., & O'Connor, R. S. (2023). Exploring clinicians' experiences of engaging in collaborative music therapy and speech and language therapy for children with an acquired brain injury. *Approaches: An Interdisciplinary Journal of Music Therapy*.

<https://doi.org/10.56883/aijmt.2024.37>

Busl, K. M., & Greer, D. M. (2010). Hypoxic-ischemic brain injury: Pathophysiology, neuropathology and mechanisms. *NeuroRehabilitation*, 26(1), 5–13.

<https://doi.org/10.3233/NRE-2010-0531>

Catroppa, C., Anderson, V., Beauchamp, M. H., & Yeates, K. O. (2016). *New frontiers in pediatric traumatic brain injury*. Routledge.

<https://doi.org/10.4324/9780203868621>

Catroppa, C., Godfrey, C., Clasby, B., & Anderson, A. (2017). Children with traumatic brain injury. In B. A. Wilson, T. Ownsworth, C. M. van Heugten, & J. Winegardner (Eds.), *Neuropsychological rehabilitation: The international handbook* (pp. 102–112). Routledge.

Cermak, C. A., Scratch, S. E., Reed, N. P., Bradley, K., De Launay, K. L. Q., & Beal, D. S. (2019). Cognitive communication impairments in children with traumatic brain injury: A scoping review. *Journal of Head Trauma Rehabilitation*, 34(2), E13–E20.

<https://doi.org/10.1097/HTR.0000000000000419>

Clark, I. N., Baker, F. A., & Taylor, N. F. (2016). The modulating effects of music listening on health-related exercise and physical activity in adults: A systematic

- review and narrative synthesis. *Nordic Journal of Music Therapy*, 25(1), 76–104.  
<https://doi.org/10.1080/08098131.2015.1008558>
- Cohen, N. S. (1992). The effect of singing instruction on the speech production of neurologically impaired persons. *Journal of Music Therapy*, 29(2), 87–102.  
<https://doi.org/10.1093/jmt/29.2.102>
- Crowe, L., Brown, A., & Greenham, M. (2017). Other neurological conditions affecting children. In B. A. Wilson, T. Ownsworth, C. M. van Heugten, & J. Winegardner (Eds.), *Neuropsychological rehabilitation: The international handbook* (pp. 113–123). Taylor and Francis.
- DePompei, R., & Blosser, J. (2019). *Pediatric traumatic brain injury: Proactive intervention* (3rd ed.). Plural Publishing.
- Dewan, M. C., Mummareddy, N., Wellons, J. C., & Bonfield, C. M. (2016). Epidemiology of global pediatric traumatic brain injury: Qualitative review. *World Neurosurgery*, 91, 497-509.e1. <https://doi.org/10.1016/j.wneu.2016.03.045>
- Duffy, J. (2013). *Motor speech disorders: Substrates, differential diagnosis, and management* (3rd ed.). Elsevier Health Sciences.
- Forsyth, R., & Kirkham, F. (2012). Predicting outcome after childhood brain injury. *Canadian Medical Association Journal*, 184(11), 1257–1264.  
<https://doi.org/10.1503/cmaj.111045>
- Gilardone, G., Viganò, M., Cassinelli, D., Fumagalli, F. M., Calvo, I., Gilardone, M., Sozzi, M., & Corbo, M. (2022). Post-stroke acquired childhood aphasia. A scoping review. *Child Neuropsychology*, 29(8), 1268–1293.  
<https://doi.org/10.1080/09297049.2022.2156992>
- Goldman, L., Siddiqui, E. M., Khan, A., Jahan, S., Rehman, M. U., Mehan, S., Sharma, R., Budkin, S., Kumar, S. N., Sahu, A., Kumar, M., & Vaibhav, K. (2022).

Understanding acquired brain injury: A review. *Biomedicines*, 10(9), 2167.

<https://doi.org/10.3390/biomedicines10092167>

Hayes, L., Shaw, S., Pearce, M. S., & Forsyth, R. J. (2017). Requirements for and current provision of rehabilitation services for children after severe acquired brain injury in the UK: A population-based study. *Archives of Disease in Childhood*, 102(9), 813–820. <https://doi.org/10.1136/archdischild-2016-312166>

Hécaen, H. (1976). Acquired aphasia in children and the ontogenesis of hemispheric functional specialization. *Brain and Language*, 3(1), 114–134.

[https://doi.org/10.1016/0093-934X\(76\)90009-2](https://doi.org/10.1016/0093-934X(76)90009-2)

Hoff, E. (2013). *Language development* (5th ed.). Wadsworth, Cengage Learning.

Hora, E. C., Santana, L. V., de Jesus Santos, L., de Oliveira Souza, G., Pimentel, A. V., Bezerra, N. T. C., Rodrigues de Freitas Doria, S., Pinheiro Vaz de Carvalho, T., Abreu Mendes Júnior, A., Almedia Rodrigues, J., Leite Lopes, R. J. P., & Fakhouri, R. (2014). Communication disorders following traumatic brain injury. In F. Sadaka (Ed.), *Traumatic brain injury* (pp. 467–490). InTech. <https://doi.org/10.5772/57321>

Irish Association of Creative Arts Therapists. (2025). *Music Therapy*.

[https://iacat.ie/music-](https://iacat.ie/music-therapy#:~:text=Music%20therapy%20is%20an%20evidence,%2C%20functioning%20and%20well%2Dbeing)

[therapy#:~:text=Music%20therapy%20is%20an%20evidence,%2C%20functioning%20and%20well%2Dbeing](https://iacat.ie/music-therapy#:~:text=Music%20therapy%20is%20an%20evidence,%2C%20functioning%20and%20well%2Dbeing).

Jenkin, T., Anderson, V. A., D’Cruz, K., Scheinberg, A., & Knight, S. (2022). Family-centred service in paediatric acquired brain injury rehabilitation: Bridging the gaps.

*Frontiers in Rehabilitation Sciences*, 3. <https://doi.org/10.3389/fresc.2022.1085967>

Kennelly, J. (2006). Music therapy in paediatric rehabilitation. In F. Baker & J. Tamplin (Eds.), *Music therapy methods in neurorehabilitation: A clinician’s manual* (pp. 219–233). Jessica Kingsley Publishers.

- Kim, S. J., & Jo, U. (2013). Study of accent-based music speech protocol development for improving voice problems in stroke patients with mixed dysarthria. *NeuroRehabilitation*, 32(1), 185–190. <https://doi.org/10.3233/NRE-130835>
- Knight, S., Takagi, M., Fisher, E., Anderson, V., Lannin, N. A., Tavender, E., & Scheinberg, A. (2019). A systematic critical appraisal of evidence-based clinical practice guidelines for the rehabilitation of children with moderate or severe acquired brain injury. *Archives of Physical Medicine and Rehabilitation*, 100(4), 711–723. <https://doi.org/10.1016/j.apmr.2018.05.031>
- Kochanek, P. M., Clark, R. S. B., Ruppel, R. A., Adelson, P. D., Bell, M. J., Whalen, M. J., Robertson, C. L., Satchell, M. A., Seidberg, N. A., Marion, D. W., & Jenkins, L. W. (2000). Biochemical, cellular, and molecular mechanisms in the evolution of secondary damage after severe traumatic brain injury in infants and children: Lessons learned from the bedside. *Pediatric Critical Care Medicine*, 1(1), 4–19. <https://doi.org/10.1097/00130478-200007000-00003>
- LaGasse, A. B., & Thaut, M. H. (2013). The neurobiological foundation of neurologic music therapy. *Music and Medicine*, 5(4), 228–233. <https://doi.org/10.1177/1943862113502547>
- Magee, W. L. (2020). Why include music therapy in a neuro-rehabilitation team? *Advances in Clinical Neuroscience & Rehabilitation*, 19(2), 10–12. <https://doi.org/10.47795/STUI1319>
- Magee, W. L., & Baker, M. (2009). The use of music therapy in neuro-rehabilitation of people with acquired brain injury. *British Journal of Neuroscience Nursing*, 5(4), 150–156. <https://doi.org/10.12968/bjnn.2009.5.4.41678>

- Magee, W. L., Clark, I., Tamplin, J., & Bradt, J. (2017). Music interventions for acquired brain injury. *Cochrane Database of Systematic Reviews*, 2017(1).  
<https://doi.org/10.1002/14651858.CD006787.pub3>
- Manasco, H. M. (2021). *Introduction to neurogenic communication disorders* (3rd ed.). Jones & Bartlett Learning.
- McKinlay, A., Linden, M., DePompei, R., Aaro Jonsson, C., Anderson, V., Braga, L., Castelli, E., de Koning, P., Hawley, C. A., Hermans, E., Kristiansen, I., Madden, A., Rumney, P., Savage, R., & Wicks, B. (2016). Service provision for children and young people with acquired brain injury: Practice recommendations. *Brain Injury*, 30(13–14), 1656–1664. <https://doi.org/10.1080/02699052.2016.1201592>
- Moore, K. S., & Lagasse, A. B. (2018). Parallels and divergence between neuroscience and humanism: Considerations for the music therapist. *Music Therapy Perspectives*, 36(2), 267–276. <https://doi.org/10.1093/mtp/miy011>
- Murdoch, B. E. (2011). *Handbook of acquired communication disorders in childhood*. Plural Publishing.
- O’Hare, A. (2016). Management of developmental speech and language disorders. Part 2: Acquired conditions. *Archives of Disease in Childhood*, 101(3), 278–283.  
<https://doi.org/10.1136/archdischild-2014-306153>
- O’Kelly, J., & Magee, W. L. (2013). Music therapy with disorders of consciousness and neuroscience: the need for dialogue. *Nordic Journal of Music Therapy*, 22(2), 93–106. <https://doi.org/10.1080/08098131.2012.709269>
- Owens, R. E. (2019). *Language development: An introduction* (10th ed.). Pearson.
- Owens, R. E., & Farinella, K. A. (2018). *Introduction to communication disorders: a lifespan evidence-based perspective* (6th ed.). Pearson.

- Pennington, L., Parker, N. K., Kelly, H., & Miller, N. (2016). Speech therapy for children with dysarthria acquired before three years of age. *Cochrane Database of Systematic Reviews*, 7. <https://doi.org/10.1002/14651858.CD006937.pub3>
- Saxton, M. (2017). *Child language: Acquisition and development* (2nd ed.). Sage Publications.
- Schrieff-Elson, L. E., Steenkamp, N., Hendricks, M. I., Thomas, K. G. F., & Rohlwink, U. K. (2017). Local and global challenges in pediatric traumatic brain injury outcome and rehabilitation assessment. *Child's Nervous System*, 33(10), 1775–1784. <https://doi.org/10.1007/s00381-017-3527-6>
- Seyfried, T. N., & Mukherjee, P. (2005). Targeting energy metabolism in brain cancer: review and hypothesis. *Nutrition & Metabolism*, 2(1), 30. <https://doi.org/10.1186/1743-7075-2-30>
- Shipley, K. G., & McAfee, J. G. (2021). *Assessment in speech-language pathology: A resource manual* (6th ed.). Plural Publishing.
- Slykerman, R. F., Clasby, B. E., Chong, J., Edward, K., Milne, B. J., Temperton, H., Thabrew, H., & Bowden, N. (2024). Case identification of non-traumatic brain injury in youth using linked population data. *BMC Neurology*, 24(1), 82. <https://doi.org/10.1186/s12883-024-03575-6>
- Tal, G., & Tirosh, E. (2013). Rehabilitation of children with traumatic brain injury: A critical review. *Pediatric Neurology*, 48(6), 424–431. <https://doi.org/10.1016/j.pediatrneurol.2012.11.008>
- Thaut, M. (2002). Kinematic optimization of spatiotemporal patterns in paretic arm training with stroke patients. *Neuropsychologia*, 40(7), 1073–1081. [https://doi.org/10.1016/S0028-3932\(01\)00141-5](https://doi.org/10.1016/S0028-3932(01)00141-5)

- Thaut, M. H., McIntosh, G. C., & Rice, R. R. (1997). Rhythmic facilitation of gait training in hemiparetic stroke rehabilitation. *Journal of the Neurological Sciences*, *151*(2), 207–212. [https://doi.org/10.1016/S0022-510X\(97\)00146-9](https://doi.org/10.1016/S0022-510X(97)00146-9)
- Thaut, M. H., Peterson, D. A., McIntosh, G. C., & Hoemberg, V. (2014). Music mnemonics aid verbal memory and induce learning-related brain plasticity in multiple sclerosis. *Frontiers in Human Neuroscience*, *8*.  
<https://doi.org/10.3389/fnhum.2014.00395>
- Thaut, M., & Hoemberg, V. (2014). *Handbook of neurologic music therapy*. Oxford University Press.
- Turkstra, L. S., Politis, A. M., & Forsyth, R. (2015). Cognitive-communication disorders in children with traumatic brain injury. *Developmental Medicine and Child Neurology*, *57*(3), 217–222. <https://doi.org/10.1111/dmcn.12600>

## **Chapter 2**

### **Theoretical Framework**

#### **2.1 Introduction**

This chapter outlines the overarching theoretical framework that underpins the research approach and project design. While this thesis comprises five distinct studies, each with their own methodology and methods, this chapter provides an overview of the theoretical foundation guiding the research. The specific methodologies and methods employed in each study are also introduced in this chapter but are fully detailed and justified within their respective manuscripts.

#### **2.2 Research Paradigm**

The term ‘paradigm’ refers to the philosophical assumptions and beliefs regarding knowledge that guide the actions of a researcher (Creswell, 2007). Creswell and Plano Clark (2018) favour the term ‘worldview’ as it suggests the shared beliefs and values of researchers, without emphasising association with a specific discipline or scholarly community. There are generally understood to be five distinct paradigms: constructivism, the transformative perspective, pragmatism, postpositivism, and positivism (Teddlie & Tashakkori, 2009). However, some researchers advocate for the inclusion of a sixth paradigm, arts-based research, arguing that it struggles to fit into pre-existing paradigms (Conrad & Beck, 2015). Conversely, others propose that there are only two paradigms: one that supports quantitative research and one that upholds qualitative research (Florczak, 2014). Philosophical in nature, research paradigms can be compared and contrasted based on their epistemology, axiology, ontology,

methodology, and rhetoric (Creswell & Plano Clark, 2018; Teddlie & Tashakkori, 2009).

Epistemology refers to the study of knowledge; often expressed as “how we know what we know” (Crotty, 1998, p. 8). For instance, positivists assert that the knower and the known are independent, while constructivists contend that they are inseparable (Teddlie & Tashakkori, 2009). Epistemological positioning enables researchers to better articulate and validate their questions, assumptions, processes, and outcomes, providing a reference point that underpins the collection, analysis, and interpretation of data (Edwards, 2012; Matney, 2019). Axiology is the study of values and beliefs. It is closely linked to positionality and reflexivity, exploring how a researcher’s values and beliefs interact with and influence the research process (Hammond & Wellington, 2021). Ontology concerns the nature of being and existence (Hammond & Wellington, 2021). Positivists posit a single, objective reality; constructivists argue that reality is subjective and comprised of multiple constructed realities; and pragmatists reject this dichotomy, embracing diverse perspectives on social realities (Teddlie & Tashakkori, 2009). Methodology refers to the shared understanding of the optimal way to acquire knowledge about the world or the process of conducting research (Creswell & Plano Clark, 2018; Kaushik & Walsh, 2019). Methodological approaches are shaped by the ontological, axiological, and epistemological positions of the researcher. Rhetoric pertains to the language used in research. For example, postpositivist research often employs formal language, whereas constructivist approaches may adopt a more narrative or literary style (Creswell & Plano Clark, 2018). Table 2, adapted from Teddlie & Tashakkori (2009) and Creswell and Plano Clark (2018), contrasts the five research paradigms based on these elements,

offering context for the discussion of pragmatism, the paradigm underpinning this research project.

**Table 2**

*Research Paradigms*

<b>Philosophical Question</b>	<b>Constructivism</b>	<b>Transformative</b>	<b>Pragmatism</b>	<b>Postpositivism</b>	<b>Positivism</b>
<b>Epistemology</b>	Subjective point of view; reality co-constructed with participants	Both objectivity and interaction with participants valued by researchers	Both objective and subjective points of view, depending on stage of research cycle	Modified dualism	Objective point of view (dualism)
<b>Axiology</b>	Value-bound inquiry	All aspects of research guided by social injustice	Values important in interpreting results	Values in inquiry, but their influence may be controlled	Value-free inquiry
<b>Ontology</b>	Ontological relativism – multiple, constructed realities	Diverse viewpoints regarding social realities; explanations that promote justice	Diverse viewpoints regarding social realities; best explanations within personal value systems	Critical realism (external reality that is understood imperfectly and probabilistically)	Naïve realism (an objective, external reality that can be comprehended)
<b>Methodology</b>	QUAL	Both QUAL and QUAN; community of participants involved in methods decisions	Both QUAL and QUAN; researchers answer questions using best methods	Primarily QUAN	QUAN
<b>Rhetoric</b>	Informal style	Advocacy, activist-oriented	Formal or informal style	Formal style	Formal style

Note: Adapted from Teddlie & Tashakkori (2009) and Creswell & Plano Clark (2018)

### **2.2.1 Pragmatism**

Pragmatism is a philosophical approach articulated by American philosophers and polymaths Charles Sanders Pierce, William James, and John Dewey (Creswell & Plano Clark, 2018; Hammond & Wellington, 2021). While positivist and constructivist worldviews have historically been presented as incompatible (Howe, 1988), pragmatism rejects the dichotomy of either-or choices inherent in the constructivist-positivist discourse (Teddlie & Tashakkori, 2009). Widely regarded as the ‘third paradigm’, it considers perspectives from both constructivism and positivism (Creswell & Creswell, 2023; Johnson et al., 2007). Pragmatism views epistemological issues on a continuum,

recognising the value of both subjective and objective viewpoints depending on the stage of the research cycle (Teddlie & Tashakkori, 2009). This perspective enables pragmatist researchers to adopt research designs and methodologies most suited to addressing their research questions (Kaushik & Walsh, 2019). The ontological perspective of pragmatism is fluid and context-dependent, continuously interpreted and negotiated based on its utility in addressing unpredictable situations (Creswell & Plano Clark, 2018). Pragmatists also rely on their personal value systems to guide their choices regarding what to study and how to study it (Teddlie & Tashakkori, 2009).

Compared to constructivism and positivism, pragmatism offers researchers greater flexibility. It emphasises a practical orientation to problem-solving, seeking solutions that are fit for purpose (Hammond & Wellington, 2021). Pragmatism is particularly valuable in addressing complex social or health problems that require multi-pronged approaches (Allemang et al., 2022). The research question is prioritised, with a focus on the emergence of knowledge through the research process (Teddlie & Tashakkori, 2009). Pragmatism is associated with the use of both qualitative and quantitative methods (Creswell & Plano Clark, 2018). While it does not mandate adherence to a specific method, it is not an approach where “anything goes” (Denscombe, 2008, p. 274). Instead, it emphasises adaptability in the collection and examination of data (Feilzer, 2010).

## **2.3 Multiple Methods Research**

Multiple methods research refers to the practice of employing two or more methodological approaches within a research programme, characterised by distinct forms of data collection and analysis applied across separate studies or phases (Anguera et al., 2018; Brewer & Hunter, 2006; Creswell & Creswell, 2023). Although often conflated, multiple methods and mixed methods represent distinct methodological

strategies (Anguera et al., 2018). In mixed methods research, the investigator collects and analyses data, integrates the findings, and draws conclusions using both qualitative and quantitative approaches within a single study or programme of inquiry (Tashakkori & Creswell, 2007). In contrast, multiple methods is not restricted to the integration of qualitative and quantitative data but instead encompasses a variety of methodological combinations (Hunter & Brewer, 2015). These may include multiple qualitative methods, multiple quantitative methods, or a combination of both, implemented either concurrently or sequentially (Anguera et al., 2018).

Multiple methods research enables the exploration of different facets of a research problem through the purposeful selection and application of complementary methods (Greene, 2008, 2015). Given that different methodologies offer distinct strengths and limitations, their combined use can generate a more comprehensive understanding of the phenomenon under investigation. In a multiple methods design, each method is chosen to address a specific sub-question or dimension of the broader research aim (Morse, 2015). Morse (2003) emphasises that, in a robust multiple methods design, each component study must be capable of standing alone while still contributing meaningfully to the overarching inquiry.

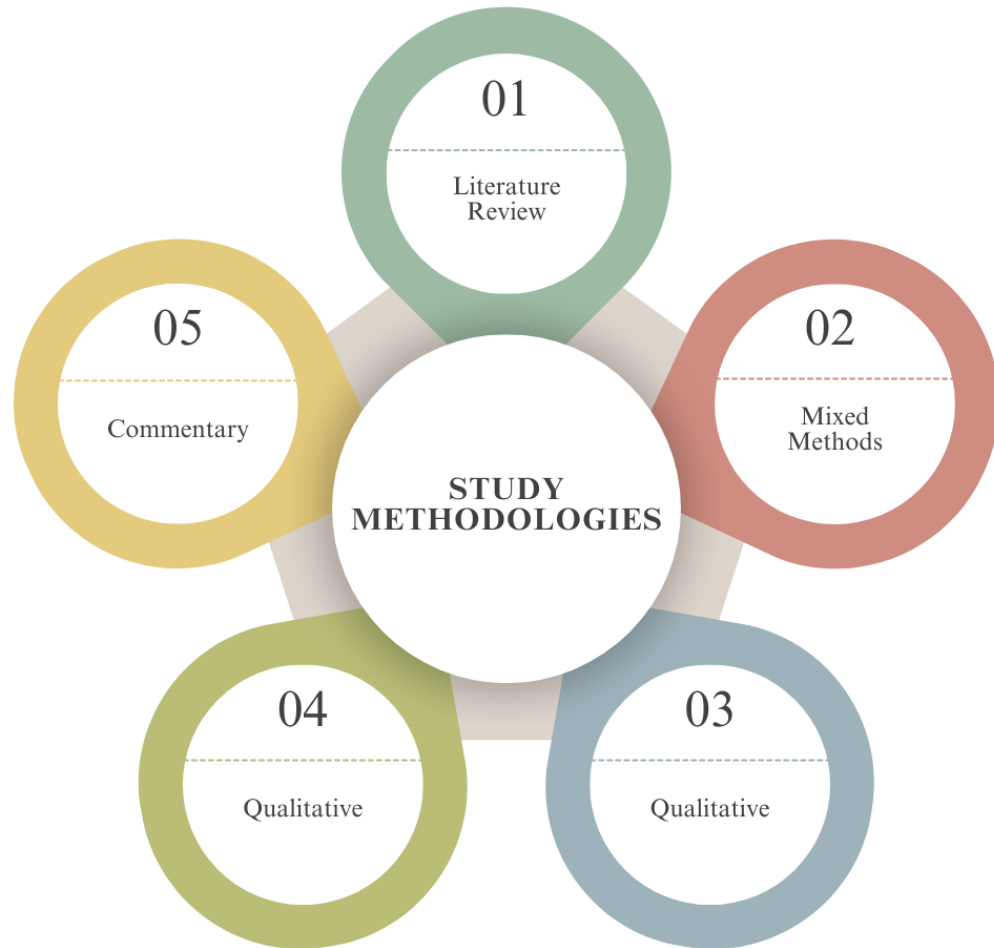
While multiple methods offers flexibility and a broader understanding of complex phenomena, it is not without limitations. The iterative nature of multiple methods research can lead to challenges in maintaining focus and coherence across the overarching research trajectory. Although adopting research designs in response to emerging insights may enhance relevance, such adjustments can also complicate the consistency of the research programme's direction (Vivek & Nanthagopan, 2021). Furthermore, this approach often demands considerable time, resources, and expertise across diverse methodological traditions. These demands can place considerable

pressure on the researcher and potentially dilute the depth of engagement with individual methods or approaches (McKendrick, 2020; Vivek & Nanthagopan, 2021). Moreover, synthesising findings from studies employing different methodologies can be complex, particularly when methods produce divergent or non-complementary results, which may hinder the development of a coherent overall narrative (McKendrick, 2020).

Rather than adhering to a single methodological approach, this thesis employed a multiple methods research design, with each study strategically aligned to investigate distinct aspects of the overarching research problem. Given the underexplored nature of music therapy and paediatric ACIs and the limited research to inform methodological decision-making, a multiple methods approach offered the necessary flexibility to pursue varied lines of inquiry without being constrained by a single design. This led to a programme of inquiry that evolved iteratively, informed by the findings and learning of each preceding stage. Each study within this thesis prioritised different types of data, as illustrated in Figure 3. Despite this methodological diversity, the research programme is unified by a pragmatic paradigm, which provided a consistent philosophical foundation that supported the selection of methods offering the most effective means of addressing each research problem.

**Figure 3**

*Methodology of Each Study*



An overview of the research design of each paper is presented in Table 3.

Detailed descriptions of other methodological elements such as study design, sampling methods, data collection, and data analysis are elaborated within each respective study.

**Table 3***Overview of Study Research Designs*

	<b>Design</b>	<b>Study Participants</b>	<b>No. of Participants</b>	<b>Data Collection</b>	<b>Data Analysis</b>
<b>Study I</b>	Integrative review	N/A	N/A	Literature search	Review matrix (Dwyer, 2020)  Thematic analysis (Braun & Clarke, 2006, 2019)
<b>Study II</b>	Online cross-sectional descriptive survey	Music therapists	54	Survey	Descriptive statistics  Conventional content analysis (Shava et al., 2021)
<b>Study III</b>	Hermeneutic phenomenology	Collaborating music therapists and speech and language therapists	18	Semi-structured interviews	Hermeneutic phenomenological analysis (Van Manen, 1990)
<b>Study IV</b>	Multiple case study	Children with acquired communication impairments	4	Video recordings	Thematic analysis (Braun & Clarke, 2006, 2019)
<b>Study V</b>	Commentary	N/A	N/A	Critical reflections	N/A

## 2.4 References

- Allemang, B., Sitter, K., & Dimitropoulos, G. (2022). Pragmatism as a paradigm for patient-oriented research. *Health Expectations*, 25(1), 38–47.  
<https://doi.org/10.1111/hex.13384>
- Anguera, M. T., Blanco-Villaseñor, A., Losada, J. L., Sánchez-Algarra, P., & Onwuegbuzie, A. J. (2018). Revisiting the difference between mixed methods and multimethods: Is it all in the name? *Quality & Quantity*, 52(6), 2757–2770.  
<https://doi.org/10.1007/s11135-018-0700-2>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.  
<https://doi.org/10.1191/1478088706qp063oa>
- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589–597.  
<https://doi.org/10.1080/2159676X.2019.1628806>
- Brewer, J., & Hunter, A. (2006). *Foundations of multimethod research: Synthesizing styles* (2nd ed.). Thousand Oaks.
- Conrad, D., & Beck, J. L. (2015). Toward articulating an arts-based research paradigm: Growing deeper. *UNESCO Observatory Multidisciplinary Journal in the Arts*, 5(1), 1–26.
- Creswell, J. W. (2007). *Qualitative inquiry and research design* (2nd ed.). Sage Publications.
- Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). Sage Publications.
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage Publications.

- Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. Sage Publications.
- Denscombe, M. (2008). Communities of practice: A research paradigm for the mixed methods approach. *Journal of Mixed Methods Research*, 2(3), 270–283.  
<https://doi.org/10.1177/1558689808316807>
- Dwyer, P. A. (2020). Analysis and synthesis. In C. E. Toronto & R. Remington (Eds.), *A step-by-step guide to conducting an integrative review* (pp. 57–70). Springer.
- Edwards, J. (2012). We need to talk about epistemology: Orientations, meaning, and interpretation within music therapy research. *Journal of Music Therapy*, 49(4), 372–394. <https://doi.org/10.1093/jmt/49.4.372>
- Feilzer, M. Y. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4(1), 6–16. <https://doi.org/10.1177/1558689809349691>
- Florczak, K. L. (2014). Purists need not apply: The case for pragmatism in mixed methods research. *Nursing Science Quarterly*, 27(4), 278–282.  
<https://doi.org/10.1177/0894318414546419>
- Hammond, M., & Wellington, J. (2021). *Research methods: The key concepts* (2nd ed.). Routledge.
- Howe, K. R. (1988). Against the quantitative-qualitative incompatibility thesis or dogmas die hard. *Educational Researcher*, 17(8), 10–16.  
<https://doi.org/10.3102/0013189X017008010>
- Hunter, A., & Brewer, J. (2015). Designing multimethod research. In S. N. Hesse-Biber & R. B. Johnson (Eds.), *The Oxford handbook of multimethod mixed methods research inquiry* (pp. 185–205). Oxford University Press.

- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research, 1*(2), 112–133.  
<https://doi.org/10.1177/1558689806298224>
- Kaushik, V., & Walsh, C. A. (2019). Pragmatism as a research paradigm and its implications for social work research. *Social Sciences, 8*(9), 255.  
<https://doi.org/10.3390/socsci8090255>
- Matney, B. (2019). A knowledge framework for the philosophical underpinnings of research: Implications for music therapy. *Journal of Music Therapy, 56*(1), 1–29.  
<https://doi.org/10.1093/jmt/thy018>
- McKendrick, J. H. (2020). Mixed and Multiple Methods. In A. Kobayashi (Ed.), *International Encyclopedia of Human Geography* (2nd ed., pp. 125–131). Elsevier.  
<https://doi.org/10.1016/B978-0-08-102295-5.10291-4>
- Morse, J. M. (2003). Principles of mixed methods and multimethod research design. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 189–208). Sage.
- Morse, J. M. (2015). Issues in qualitatively-driven mixed-methods designs: Walking through a mixed methods project. In S. N. Hess-Biber & R. B. Johnson (Eds.), *The Oxford handbook of multimethod and mixed methods research inquirt* (pp. 206–222). Oxford University Press.
- Shava, G., Hleza, S., Tlou, F., Shonhiwa, S., & Mathonsi, E. (2021). Qualitative content analysis. *International Journal of Research and Innovation in Social Science, 5*(7), 553–558.
- Tashakkori, A., & Creswell, J. W. (2007). Editorial: The new era of mixed methods. *Journal of Mixed Methods Research, 1*(1), 3–7.  
<https://doi.org/10.1177/2345678906293042>

Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research:*

*Integrating quantitative and qualitative approaches in the social and behavioral sciences.* Sage Publications.

Van Manen, M. (1990). *Research lived experience: Human science for an action sensitive pedagogy.* State University of New York Press.

Vivek, R., & Nanthagopan, Y. (2021). Review and comparison of multi-method and mixed method application in research studies. *European Journal of Management Issues, 29*(4), 200–208. <https://doi.org/10.15421/192119>

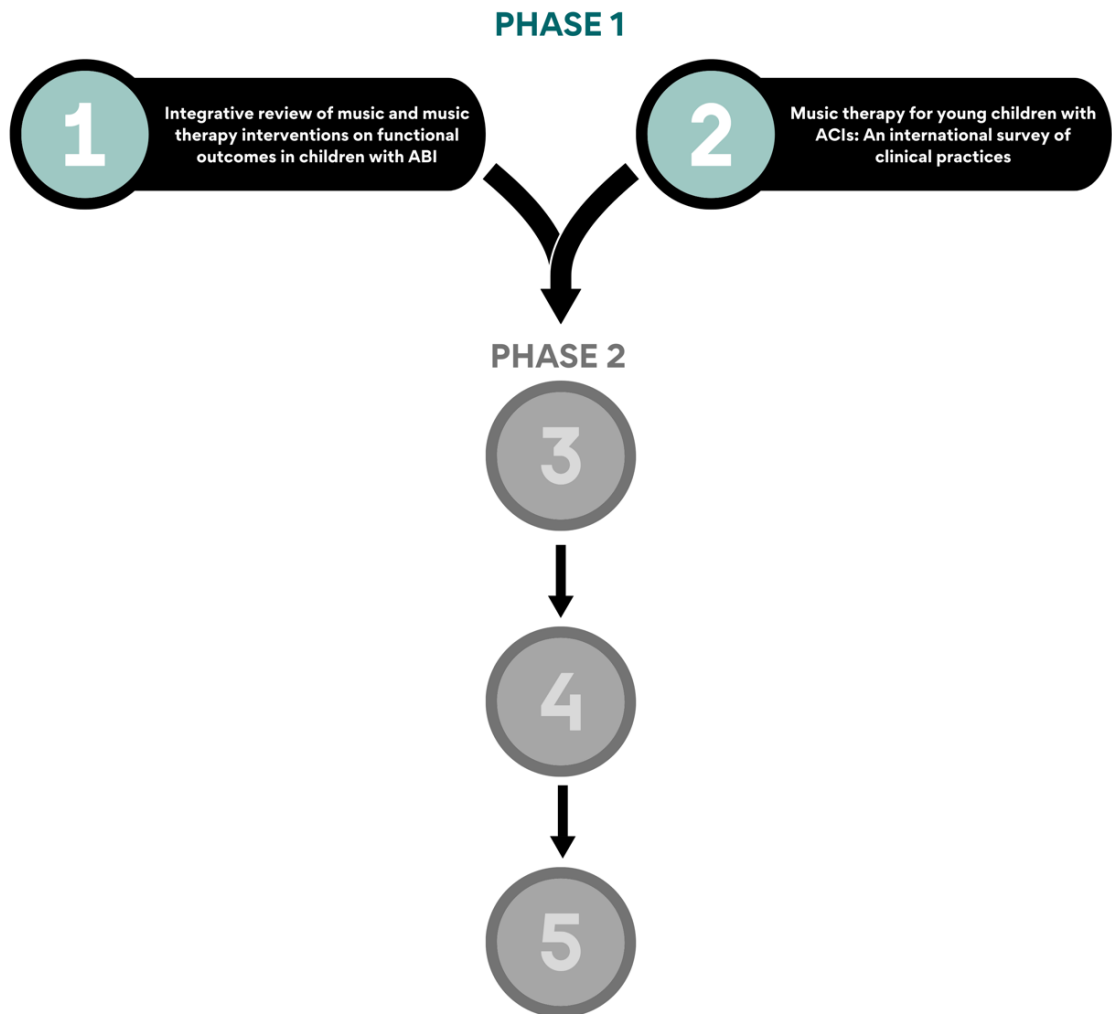
## Chapter 3

### Phase 1 Overview

Phase 1 of this research aimed to establish a foundational understanding of the use of music therapy in supporting language and communication in young children with ACIs. This phase comprised two studies, conducted independently and in parallel. See Figure 4.

**Figure 4**

*Phase 1 Overview*



### **3.1 Approaching Study I**

Study I presents an integrative review synthesising current research on music and music therapy interventions targeting functional outcomes in children with ABI. Although the overarching focus of the thesis centres on young children with ACIs, the scope of the review was intentionally broadened to include all functional domains across the full paediatric age range (0-18 years).

Early engagement with the literature highlighted a notable scarcity of empirical studies focused specifically on music therapy for young children with ACIs. However, given that ACIs constitute a recognised subset of outcomes following ABI, relevant insights into how music therapy supports communication outcomes could be drawn from a wider examination of functional rehabilitation. Broadening the scope to include all paediatric ABI and associated functional outcomes allowed for a more comprehensive investigation into the role of music therapy in paediatric rehabilitation, producing findings of wider relevance to clinicians and researchers. The expanded scope also encompassed the full paediatric age range, as restricting the review by age group alone would have unduly constrained its contribution.

This decision to undertake a broader review addressed a gap in the field, specifically the absence of a prior systematic review on music therapy in paediatric rehabilitation. By taking a wider lens, the review was able to synthesise trends across diverse outcome domains, while still identifying studies with direct relevance to language and communication rehabilitation in children with ACIs.

### **3.2 Approaching Study II**

Study II examines current clinical practice through an international survey of music therapists working with children aged 2-6 with ACIs. This age range was selected

due to the developmental vulnerability of this population and was informed by consultation with practicing music therapists and speech and language therapists.

The developmental period between ages 2 and 6 represents a critical window for early communication development during which preverbal and early verbal skills rapidly emerge (Saxton, 2017). A brain injury during this sensitive period can severely disrupt the acquisition of foundational language abilities, with lasting implications for both immediate and long-term communication outcomes (Murdoch, 2011). This creates a complex clinical picture, where communication skills may be newly emerging, abruptly lost, or re-emerging in altered form (Hora et al., 2014; O'Hare, 2016). Despite the significance of a brain injury during this developmental window, young children with ACIs remain underrepresented in both the music therapy literature and the broader field of paediatric neurorehabilitation.

Study II documents the approaches, interventions, and outcome measures used in practice, offering insights into how music therapy is currently implemented to support communication recovery with this population. The findings of this study served as a foundation for the empirical investigations in Phase 2, guiding the development of a clinical programme and informing how it might be explored or evaluated.

### ***3.2.1 Reflecting on the Reporting of Study II***

A critically reflective account of Study II is warranted to enhance the clarity and transparency of how the international survey of music therapists working with young children (aged 2-6) with ACIs was reported. Although the study has been published in the *Nordic Journal of Music Therapy*, revisiting specific aspects of the reporting allows for a fuller contextualisation of the survey responses and a more explicit acknowledgement of the constraints, assumptions, and decisions that shaped the study.

### **3.2.1.1 Clarifying the Use of Approaches and Models**

The development of music therapy internationally has been characterised by the establishment of multiple models of practice and the development of various approaches that practitioners apply in their work (Edwards, 2017). One of the survey's research questions asked: What music therapy approaches and clinical models are currently being used with children aged 2-6 with ACIs? As this area remains unexplored in paediatric ACI music therapy literature, this question was intended to generate preliminary insights into how therapists' theoretical frameworks shape practice in this context. Within the survey, the terms 'model' and 'approach' were used to capture the theoretical and clinical orientations informing therapists' work with this population. However, these terms were not explicitly defined in the survey instrument, and further clarification is warranted to articulate how they were intended to be understood for the purpose of this study and to clarify the interpretive lens through which the findings were analysed.

An approach refers to the incorporation of an established tradition of therapeutic practice theory, originating outside of music therapy, into music therapy techniques and methods. These approaches can draw from psychotherapeutic systems such as psychodynamic, humanistic, or cognitive-behavioural frameworks (Edwards, 2017; Wheeler, 2015). Edwards (2017) defines models of music therapy as frameworks that are considered unique to the discipline of music therapy. Some of the most prominent models of music therapy include Nordoff-Robbins Music Therapy (Creative Music Therapy), Resource-Oriented Music Therapy, Community Music Therapy, and Neurologic Music Therapy. Each model or approach emphasises an aspect of music therapy deemed important by its founders, such as musical, sociocultural, relational, behavioural, or cause-response dimensions. While these factors are emphasised or

illuminated to varying degrees, all approaches and models reference them in some way (Edwards, 2017). Finally, theoretical orientation refers to the foundational worldview that shapes a therapist's overall understanding of clients and guides their clinical decision-making (Johnson & Heiderscheit, 2018). While an approach represents the practical application of this orientation within a therapeutic context, and a model provides a structured framework outlining specific methods and principles for practice, a therapist's theoretical orientation often underpins both.

Although the survey presented approaches and models as distinct constructs, their relationship in practice is often fluid and overlapping (Edwards, 2017; Trondalen & Bonde, 2012). The survey was structured on the assumption that therapists may identify with a primary approach while drawing on multiple clinical models depending on the child's needs and therapeutic context. While this structural distinction was embedded in the survey instrument, the terms themselves were not explicitly defined in either the survey or the published report. The lack of definition meant that the rationale for distinguishing between approaches and models was not fully articulated, particularly the idea that these choices reflect deeper values and assumptions that shape intervention strategies, therapeutic goals, and interpretations of client responsiveness. In the discussion of findings, participants' responses to these items were interpreted in relation to overarching therapeutic orientations, with particular attention to potential incongruence between stated approaches and selected models, most notably in the contrast between humanistic practice and the application of neurologic music therapy. This reflects the researcher's underlying belief, consistent with Johnson and Heiderscheit (2018), that a therapist's guiding philosophy influences not only the selection of interventions but also the broader alignment between values, methods, and clinical frameworks. However, as this conceptual connection was not made explicit in

earlier sections of the study, its introduction in the discussion may appear assumptive or unsupported. Greater transparency around this belief would have strengthened the theoretical coherence of the study and more clearly situated the interpretation of the findings.

### **3.2.1.2 Expanded Account of Participant Recruitment**

The published article described the use of purposive sampling and outlined the inclusion criteria for participants. However, it offered limited detail regarding how music therapists and researchers were identified and contacted. Given the absence of a database of music therapists working in paediatric neurorehabilitation, participant identification relied on a pragmatic and adaptive search process.

Initial efforts focused on identifying hospitals and rehabilitation centres that provide paediatric neurosurgery and neurorehabilitation services through internet searches. Once relevant centres were identified, further investigation was undertaken to determine whether music therapy was offered as part of the clinical service, and whether therapists within those services were involved in the care of children aged 2-6 with ACIs. Contact details were gathered from publicly available staff directories, departmental webpages, and service descriptions. Where possible, individual music therapists were contacted directly; otherwise, general departmental or administrative addresses were used to initiate communication. Where necessary, the scope of music therapy provision was clarified during these exchanges. Prospective participants received an invitation letter and a participant information leaflet, along with an eligibility check to ensure alignment with the study's inclusion criteria.

Furthermore, researchers were identified based on their authorship of peer-reviewed publications relevant to paediatric ABI. This process was informed by the researcher's familiarity with this existing literature and awareness of individuals

actively engaging in clinical research in the field. Where researchers appeared to have direct clinical involvement or were affiliated with relevant services, they were also invited to participate in the study.

The recruitment process was inevitably shaped by practical limitations. These included the variability in how services were publicly represented online, the availability of accurate contact information, and the visibility of music therapy services within larger institutional structures. In addition, the researcher's existing knowledge of the field and prior awareness of services and clinicians most likely influenced which sites were contacted. As a result, there is a risk that selection bias may have shaped the final sample, with likely overrepresentation of English-speaking countries, well-resourced institutions, and settings with a strong research presence or established online visibility.

A more detailed account of these processes would have improved the transparency of the study's reporting and allowed for a more informed interpretation of the sample characteristics, particularly in relation to representativeness and transferability of findings.

### **3.2.1.3 Overview of Expert Reviewers Involved in Content Validity Testing**

In the published study, it was stated that "eight experts were invited to review the survey subjectively" as part of the content validity testing process. Further explanation is provided to enhance transparency around how these individuals were selected and the nature of their involvement in the study.

The eight expert reviewers were known to the researcher and were invited to contribute to the content validity testing based on their relevant expertise in music therapy and/or research. Although not all reviewers had direct clinical experience with paediatric ACIs, the panel represented a range of relevant perspectives spanning music

therapy, music and health, and research. A summary of the reviewers' backgrounds is provided in Table 4. All experts were based in Ireland and did not complete the survey following their involvement in the content validity testing process.

**Table 4**

*Content Validity Testing Experts*

<b>Number</b>	<b>Expert Category</b>	<b>Occupation</b>
1	Allied health professional with research background	Music Therapist and PhD Candidate
2	Allied health professional with research background	Music Therapist and Researcher
3	Allied health professional	Music Therapist with previous experience working with children with acquired communication impairments
4	Allied health professional	Music Therapist with previous experience working with children with acquired communication impairments
5	Arts and health professional with research background	Arts and Health Professional, Music Educator, and PhD Graduate
6	Allied health professional	Music Therapist currently working with children with acquired communication impairments
7	Allied health professional with research background	Music Therapist currently working with children with acquired communication impairments and PhD Graduate
8	Allied health professional with research background	Music Therapist, Community Musician, and PhD Candidate

### 3.3 References

- Edwards, J. (2017). Approaches and models of music therapy. In *The Oxford Handbook of Music Therapy* (pp. 417–427). Oxford University Press.
- Hora, E. C., Santana, L. V., de Jesus Santos, L., de Oliveira Souza, G., Pimentel, A. V., Bezerra, N. T. C., Rodrigues de Freitas Doria, S., Pinheiro Vaz de Carvalho, T., Abreu Mendes Júnior, A., Almedia Rodrigues, J., Leite Lopes, R. J. P., & Fakhouri, R. (2014). Communication disorders following traumatic brain injury. In F. Sadaka (Ed.), *Traumatic brain injury* (pp. 467–490). InTech. <https://doi.org/10.5772/57321>
- Johnson, K., & Heiderscheit, A. (2018). A survey of music therapy methods on adolescent inpatient mental health units. *Journal of Music Therapy*, 55(4), 463–488. <https://doi.org/10.1093/jmt/thy015>
- Murdoch, B. E. (2011). *Handbook of acquired communication disorders in childhood*. Plural Publishing.
- O'Hare, A. (2016). Management of developmental speech and language disorders. Part 2: Acquired conditions. *Archives of Disease in Childhood*, 101(3), 278–283. <https://doi.org/10.1136/archdischild-2014-306153>
- Saxton, M. (2017). *Child language: Acquisition and development* (2nd ed.). Sage Publications.
- Trondalen, G., & Bonde, L. O. (2012). Music therapy: Models and interventions. In R. A. R. MacDonald, G. Kreutz, & L. Mitchell (Eds.), *Music, health, and wellbeing* (pp. 40–60). Oxford University Press.
- Wheeler, B. (2015). Orientations and approaches. In *Music Therapy Handbook* (pp. 129–132). Guildford Publications.

## **Chapter 4**

### **Study I**

# **Integrative Review of Music and Music Therapy Interventions on Functional Outcomes in Children with Acquired Brain Injury**

Burns, J., Healy, H., O'Connor, R., & Moss, H. (2024). Integrative review of music and music therapy interventions on functional outcomes in children with acquired brain injury. *Journal of Music Therapy*, 62(1). <https://doi.org/10.1093/jmt/thae017>

## 4.1 Abstract

Acquired brain injury (ABI) can result in a multitude of impairments to physical, cognitive, communicative, psychological, and psychosocial functioning. Music interventions are emerging as a valuable form of intervention in the rehabilitation of children with ABI, stimulating brain functions involved in movement, cognition, speech, emotions, and sensory perceptions. To date, the literature detailing the impact of music and music therapy interventions on functional outcomes in children with ABI has not been reviewed systematically. To address this, Whitemore and Knafl's five-stage integrative review framework was employed, which includes (a) problem identification, (b) literature search, (c) data evaluation, (d) data analysis and synthesis, and (e) presentation of the findings. A total of 388 articles were retrieved, and 8 studies met the inclusion criteria. Analysis and synthesis resulted in three overarching themes: outcomes of using music therapy in pediatric ABI, music therapy as a motivator in pediatric ABI rehabilitation, and collaboration. The review highlights the pivotal role of music as a motivational catalyst that promotes adherence to rehabilitative intervention. Nevertheless, it underscores a significant gap in empirical research within the field, emphasizing the necessity for larger, more rigorous studies.

**Keywords:** music, music therapy, integrative review, pediatric, acquired brain injury.

## 4.2 Background

Acquired brain injuries (ABI) are a leading cause of death and disability worldwide (Dewan et al., 2016). In the United States, pediatric ABI results in approximately 600,000 emergency department visits and 60,000 hospitalizations annually (Lindsay et al., 2023). These children encounter a complex sequela of chronic neuropsychological, behavioral, and psychosocial impacts (Beauchamp & Anderson, 2013; Dewan et al., 2016). When ABI occurs during childhood, its consequences may not be immediately apparent in the acute or post-acute phase but may only emerge as the child moves through the developmental trajectory (DePompei & Blosser, 2019; Schrieff-Elson et al., 2017). This gradual emergence often leads to an underestimation of the overall long-term impact of pediatric ABI (Hayes et al., 2017; Jenkin et al., 2022). The consequences and difficulties associated with ABI are unique for each child, manifesting in a manner that is specific to their individual growth and development.

In the initial months following the onset of an ABI, the timely provision of early rehabilitation services by an interdisciplinary team is paramount. These services play a crucial role in addressing the intricate and multidimensional consequences of ABI (Knight et al., 2019; Reuter-Rice et al., 2018). Rehabilitation strives to optimize functionality and foster active engagement through an interdisciplinary approach to care tailored to each individual (Wade, 2020). It aims at enabling individuals to achieve and sustain optimal levels of physical, sensory, intellectual, and social functioning (Gordon & di Maggio, 2012). After the acute phase, children and young people with moderate-to-severe ABIs are often admitted to inpatient rehabilitation programs for intensive therapies to regain their functional abilities with the goal of returning to their home and community (Bedell, 2008; Gmelig Meyling et al., 2022). Early and intensive

intervention is critical to support people who have had an ABI and is often associated with better functional outcomes (León-Carrión et al., 2013; Lind Irgens et al., 2016).

Music has been used in rehabilitation to stimulate brain functions involved in movement, cognition, speech, emotions, and sensory perception (Magee et al., 2017). Research demonstrates that music promotes neuroplasticity, strengthening the brain's ability to reorganize itself through the formation of new neural connections between healthy and damaged brain centers (Baker & Roth, 2004; Magee & Baker, 2009). This process facilitates the restoration of compromised functionality and the cultivation of compensatory abilities. While music-based interventions are traditionally led by a trained music therapist, other healthcare professionals can also utilize music to improve, restore, or maintain health, functioning, and wellbeing (Moss, 2016). For instance, music listening has been employed by healthcare professionals in rehabilitation settings to bolster cognitive recovery and improve mood (Särkämö et al., 2008).

In comparison to broader music-based interventions, music therapy, as defined by the American Music Therapy Association, entails “the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program” (2005). Magee and Baker (2009) provide an overview of the main principles underpinning the application of music therapy in the rehabilitation of individuals with ABI, underscoring the intrinsic capacity of all human beings to appreciate and respond to music. Moreover, music possesses a motivational quality that can be utilized therapeutically to maintain engagement with the rehabilitation process (Burns & O'Connor, 2023; Kennelly, 2006; Tamplin, 2015). Magee (2020) advocates for the use of music therapy within the interdisciplinary neurorehabilitation team, stating that music provides a familiar salient stimulus that facilitates cortical changes in

the brain to promote recovery. Despite the rapidly accumulating evidence showcasing the positive outcomes of music therapy intervention for adults with ABI (Magee et al., 2017), the expansion of music therapy practices in pediatric rehabilitation is progressing at a comparatively slower rate (Burns & O'Connor, 2023; Kennelly, 2013).

To date, the literature detailing the impact of music and music therapy interventions on functional outcomes in children with ABI has not been reviewed systematically. The aim of this study was to conduct an in-depth investigation into the current research surrounding this area. This review sought to identify, evaluate, synthesize, and discuss the findings of existing studies and endeavored to illuminate the diverse data sources and unrestricted study designs in order to shed light on the current state of the field and identify avenues for future research.

### **4.3 Methods**

The research team was comprised of music therapy clinician-researchers with expertise in pediatrics, rehabilitation, and literature review methodologies. An initial exploration of the literature revealed a limited number of studies with various methodological designs and philosophical approaches. This informed the choice to employ Whittemore and Knafl's (2005) integrative review framework. This five-stage integrative review is distinct from other systemic review types as it is specifically designed to accommodate for qualitative, quantitative, and mixed methods research. Toronto (2020) states that an integrative review "enables the reviewer the ability to provide a more holistic understanding of a specific phenomenon" (p. 4). Oermann and Knafl (2021) and Hopia et al. (2016) echo this, stating that as integrative reviews allow for the inclusion of multiple sources of information, they can lead to a better understanding of complex concepts. As this represents the inaugural comprehensive review of the literature concerning music and music therapy interventions targeting

functional outcomes in children with ABI, the integrative review framework serves as an invaluable tool for capturing a diverse array of sources. The methodological flexibility enables a thorough exploration into the multifaceted nature of the subject matter.

However, the integrative review method, while promising, poses certain complexities that warrant consideration. Its execution is hindered by limited guidance on conducting such reviews, and navigating the diverse methodologies involved presents inherent challenges, particularly in terms of analysis, synthesis, and drawing conclusions (Toronto, 2020; Whitemore & Knafl, 2005). In line with other integrative reviews within the music and health landscape, transparency and reflexivity will be prioritized throughout the review process to address these challenges, mitigating potential biases, and ensuring the robustness of findings (Lee et al., 2022; McCaffrey et al., 2020; Schmid et al., 2018). The five stages of Whitemore and Knafl's (2005) framework are: (1) problem identification, (2) literature search, (3) data evaluation, (4) data analysis, and (5) presentation of findings.

#### ***4.3.1 Problem Identification***

The initial stage of this integrative review involved clearly identifying the purpose of the review and the problem that it addressed (Whitemore & Knafl, 2005). A PEO (Population, Exposure, Outcome(s)) framework was employed which identified the 'population' as children, aged 0-18, with an ABI, the 'exposure' as engaging in a music or music therapy intervention, and the 'outcome' as the resulting effects of these interventions.

Studies were required to meet the following inclusion criteria: (a) peer-reviewed, (b) written in the English language, and (c) documents the outcomes arising from the participation of children aged 0-18 with ABIs in music or music therapy interventions.

Studies were excluded if they were (a) not empirical research studies, (b) background articles, discussion or opinion pieces, or reviews, or (c) studies where it was not possible to extract data specific to children with ABI. There was no restriction placed on the year of publication.

### ***4.3.2 Literature Search***

Three comprehensive search strategies were implemented to identify the maximum number of eligible primary sources (Conn et al., 2003; Jadad et al., 1998; Lee et al., 2022; Whitemore & Knafl, 2005).

- (1) Relevant electronic databases were identified, and a search strategy was developed by the research team. This process involved the rigorous testing of search terms through a preliminary search of the literature. The search strategy implemented in Magee et al.'s (2017) Cochrane review on music interventions for ABI also informed the development of the search strategy. The following electronic databases were searched 10-11 August 2023: Cochrane Library; EBSCOhost<sup>1</sup>; Ovid<sup>2</sup>; PubMed; Sage; Science Direct; SCOPUS; and Web of Science. The search strategies are included in Appendix A. The search was limited to studies in the English language. The references were imported to Covidence<sup>3</sup> where they were deduplicated and made available to the research team for review. The first and second author independently completed the initial title and abstract screening, looking for relevance based on the inclusion and exclusion criteria established in the problem identification stage. Any

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<sup>1</sup> EBSCOhost is a search engine that provides access to 21 electronic databases, including Academic Search Complete, AMED – The Allied and Complementary Medicine Database, APA PsycINFO, and CINAHL Complete. Using EBSCOhost, the 21 electronic databases were searched simultaneously.

<sup>2</sup> Similarly to EBSCOhost, Ovid is a search engine that provides access to 11 electronic databases, including Medline/Ovid.

<sup>3</sup> Covidence software was used for managing and streamlining the review process. It facilitated easy and efficient collaboration between members of the research team.

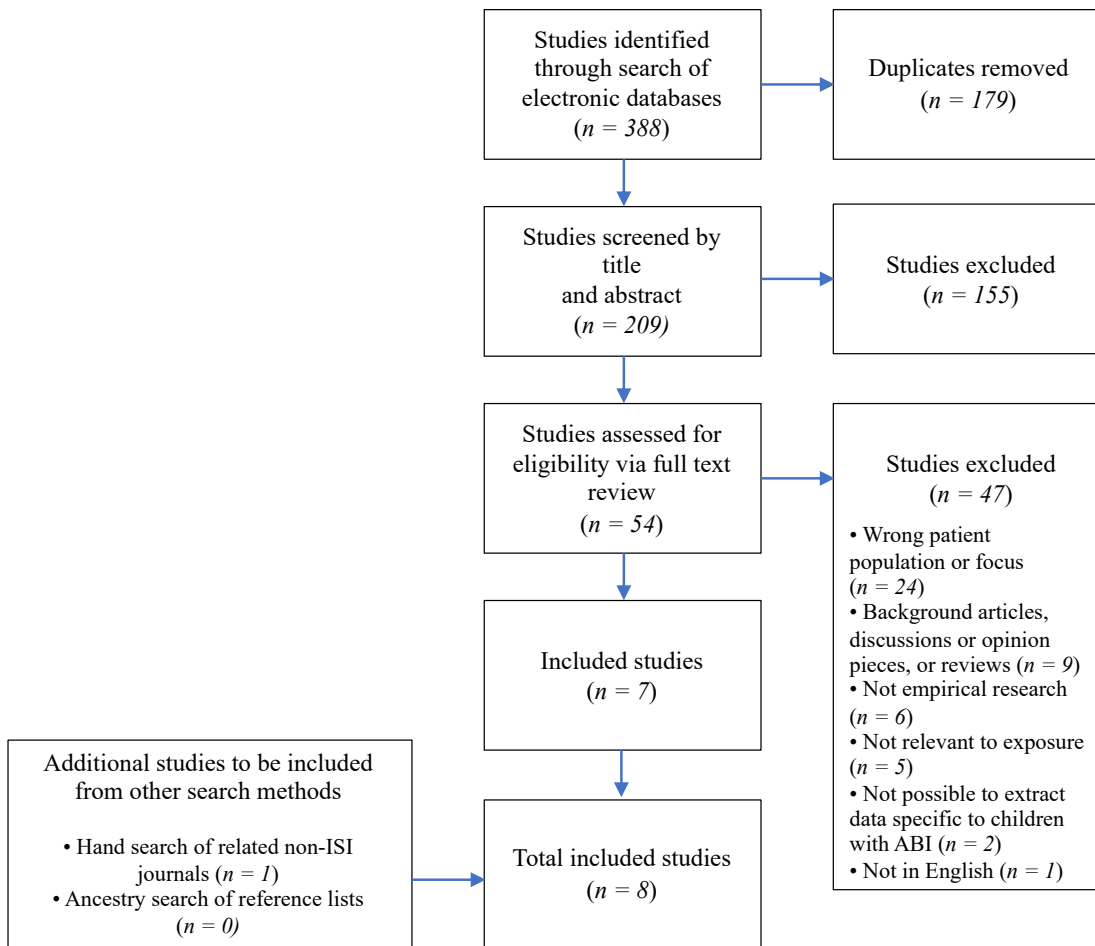
uncertainties during the screening led to texts being advanced to the next stage of full-text screening for further evaluation. The first two authors then independently reviewed the full texts of the included studies. A reason for exclusion was required at this stage. A meeting with the research team was held to mediate and resolve any disagreements, ultimately reaching a consensus by thoroughly discussing each point of contention. Subsequently, a final decision was made on which studies to include in the review.

- (2) A hand search of non-Institute for Scientific Information journals relating to music therapy and/or music and health including *Approaches: An Interdisciplinary Journal of Music Therapy, Music and Medicine*, and *Voices: A World Forum for Music Therapy* was conducted on 6 September 2023. Potential studies to be included in the review were identified, shared with the research team, and reviewed at a research meeting, where the final decision was made.
- (3) An ancestry search of eligible studies was conducted. This process involved examining the reference lists of studies identified via search strategies one and two to uncover any additional relevant studies. Similarly, potential studies for inclusion were identified, sourced, shared with the research team, and reviewed at a research meeting, where the final decision was made. The ancestry search process was repeated iteratively until no new studies were identified.

In any instance where a potentially relevant full text could not be located, the author was contacted. The results of the search strategy are presented in Figure 5.

**Figure 5**

*Search Strategy Results*



**4.3.3 Data Evaluation**

The quality and methodological rigor of each study was critically evaluated using the Mixed Methods Appraisal Tool (MMAT) Version 2018. Designed to serve as a checklist, the MMAT facilitates the concurrent appraisal and/or description of studies incorporated in systematic mixed studies reviews, such as an integrative review. This capability stems from its capacity to accommodate a variety of methodological designs (Hong et al., 2018).

While the MMAT does not prescribe specific cut-off values to differentiate between high- and low-quality studies, it enables a structured assessment of

methodological strengths and weaknesses across various criteria (Hong et al., 2018). For the purpose of this review, high-quality studies exhibited robust methodological approaches, including clear reporting, rigorous data analysis, and efforts to minimize bias. Conversely, low-quality studies may manifest methodological weaknesses, biases, or inadequacies in reporting detail.

Independent reviews of the papers were conducted by the first and final authors, following the relevant appraisal checklists: (a) qualitative, (b) quantitative randomized controlled trials, (c) quantitative non-randomized, (d) quantitative descriptive, and (e) mixed methods. In any instance of differing appraisals, a structured consultation process was initiated involving the other members of the research team. This collaborative effort aimed to reconcile any discrepancies and achieve a consensus on the overall quality assessment of the study under review. By engaging in dialogue and leveraging the diverse expertise within the team, this process fostered a robust and comprehensive evaluation, mitigating the potential for individual biases and enhancing the reliability of the final appraisal outcomes. Consistent with recommendations from prior integrative reviews, no studies were excluded on the grounds of quality appraisal (Lee et al., 2022; McCaffrey et al., 2020).

The results of the MMAT are presented in Appendix B. Overall, the qualitative, mixed methods, and quantitative, non-randomized, studies were perceived to be of high quality. However, the presence of small sample sizes across different methodological designs posed challenges in accurately representing the target population. Furthermore, the inclusion of only one participant in some studies raised concerns regarding the adherence of the quantitative component to traditional quality standards. This underscores the significance of considering sample sizes and their implications for the validity and generalizability of findings.

#### ***4.3.4 Data Analysis***

The studies were read several times by all members of the research team to enable the identification of mutually agreed-upon categories of information. Pertinent data was then extracted and presented within a review matrix (Dwyer, 2020), facilitating the systematic comparison of primary data sources as recommended by Whittemore and Knafl (2005). See Table 5.

To analyze the collected data, Braun and Clarke's (2006, 2019) six-phase cyclical process of thematic analysis was adopted. Initially developed for qualitative data analysis, this approach extends to the identification and organization of salient, recurring, or pivotal themes and concepts found across a multitude of literary sources (Dwyer, 2020; Popay et al., 2006). This process involved (a) familiarizing yourself with your data, (b) generating initial codes, (c) searching for themes, (d) reviewing themes, (e) defining and naming themes; and (f) producing the report (Braun & Clarke, 2006, 2019). The first and second authors independently reviewed and analyzed the data, identifying commonalities, patterns, and connections across the dataset. An inductive approach was utilized to allow for a comprehensive exploration, ensuring that the derived themes were data-driven rather than being influenced by preconceived theories and researcher bias (Kiger & Varpio, 2020). To enhance the reliability and objectivity of the analysis, the final two authors served as mediators, reviewing themes and resolving any interpretational discrepancies. As neutral parties, they facilitated discussions to reconcile differing perspectives and maintain the integrity of the analysis process. The iterative nature of thematic analysis involved continually reviewing and refining emerging themes until a final set of themes was achieved, ensuring that the identified themes accurately reflected the nuances and complexities present within the dataset.

**Table 5***Narrative Summary Overview*

<b>Authors, Year</b>	<b>Aims</b>	<b>Research Design</b>	<b>Sample</b>	<b>Data Collection</b>	<b>Summary of Key Findings</b>
Bower et al. (2014)	To explore the behavioral changes of a pediatric patient in post-traumatic amnesia during a music therapy session.	Mixed methods. Case study.	<i>n</i> = 1	Qualitative: Video recording of each session, including 10 minutes pre- and post-session.	Qualitative findings revealed four distinct categories of behaviors: neutral, acceptance, recruitment, rejection. The music therapist responded with corresponding strategies: holding, affirming, enticing, and containing.
			Cause of ABI: TBI	Quantitative: Agitated Behavior Scale (ABS).	Participant displayed brief periods of awareness and responsiveness to the music, termed <i>Islands of Awareness</i> , during which she exhibited acceptance, recruitment, or rejection behaviors.
			Gender(s): female		Quantitative data analysis on agitated levels yielded inconclusive results.
			Age(s): 10 years		
Chong et al. (2014)	To evaluate the effects of keyboard playing using Musical Instrument Digital Interface (MIDI) on finger movements for adolescents with ABI.	Quantitative. Quasi-experimental, no control.	<i>n</i> = 8	Pre- and post-MIDI-based test on the pressing force of the fingers.	Participants demonstrated increased finger movement velocity when assessed through MIDI-based tests.

<b>Authors, Year</b>	<b>Aims</b>	<b>Research Design</b>	<b>Sample</b>	<b>Data Collection</b>	<b>Summary of Key Findings</b>
			<p>Cause of ABI: 3 TBI, 5 non-TBI, including stroke, tumor, and infection.</p> <p>Gender(s): 6 male, 2 female</p> <p>Age(s): 9 – 18 years</p>	<p>Pre- and post-hand function tests:</p> <p>(a) Grip and Pinch Strength Test.</p> <p>(b) Box and Block Test (BBT).</p> <p>(c) Jebsen Taylor Hand Function Test.</p>	<p>Participants also showed improvements in hand function tests. Notably, there was a significant increase in grip strength, and BBT scores improved.</p> <p>The study revealed a strong correlation between the MIDI-based finger movement tests and BBT results. This correlation suggested that the improvements in finger movement velocity were associated with enhanced hand function.</p>
Cohen (1988)	To explore the implementation of rhythm to decrease the rate of speech in an adolescent with ABI.	Quantitative. Single-subject reversal design (ABACAC).	<p><math>n = 1</math></p> <p>Causes of ABI: Non-TBI, infection, herpes encephalitis</p> <p>Gender(s): female</p>	Rate of speech was recorded and measured using metronome measurements.	<p>Both music and functional speaking interventions were effective in significantly reducing the participant's rate of speech compared to baseline.</p> <p>Over a 3-month period without testing, the participant's rate of speech stabilized at a lower rate, indicating a lasting impact of the intervention.</p>

Authors, Year	Aims	Research Design	Sample	Data Collection	Summary of Key Findings
			Age(s): 18 years		
Gentle et al. (2015)	To explore the preservation of singing function in the developing brain following acquired neurological damage.	Qualitative. Case study.	$n = 1$  Causes of ABI: TBI  Gender(s): female  Age(s) 5 years; 7 months	Observed behaviors and responses.	The participant demonstrated recognition and memory of previously familiar songs post ABI. New learning and retention of unfamiliar songs was also observed. Findings suggest that the song system in childhood is a resilient and neurologically significant system able to withstand extensive neurological impairment.
Kelly et al. (2023)	To investigate if Rhythmic Auditory Stimulation (RAS) would improve walking speed and gait quality in children with ABI.	Quantitative. Non-concurrent multiple-baseline single case experimental design.	$n = 4$  Causes of ABI: 1 TBI, 3 non-TBI, including stroke and hemispherectomy.	Pre- and post-intervention assessments: (a) 10-metre walk test. (b) Edinburgh Visual Gait Score.	Participants walking speed and gait biomechanics improved with both standard physiotherapy and physiotherapy combined with RAS, but individual responses varied.  With regards to walking speed, children exhibited a greater rate of change when undergoing standard physiotherapy alone in comparison to standard physiotherapy plus RAS. However, there were variations

Authors, Year	Aims	Research Design	Sample	Data Collection	Summary of Key Findings
			Gender(s): 2 male, 2 female  Age(s) 10 – 12 years		amongst the participants, and analysis demonstrated the effect size was small and not statistically significant.  Physiotherapy with RAS was observed to influence gait biomechanics, again with variation between the participants.
Kim et al. (2016)	To examine the effects of RAS on gait function in adolescents with ABI.	Quantitative. Quasi-experimental, with control.	<i>n</i> = 12 (experimental group <i>n</i> = 6, control group <i>n</i> = 6).  Causes of ABI: Experimental group: 2 TBI, 4 non-TBI, including stroke and brain tumor. Control group: 2 TBI, 4 non-TBI, including stroke and brain tumor.	A three-dimensional Vicon 370 Motion Analysis system was employed to collect spatiotemporal parameters and kinematic data.	Participants who received gait training with RAS incorporating preferred music demonstrated significant improvements in spatiotemporal gait parameters, including increased cadence, walking velocity, and step time.  The RAS group demonstrated increased range of motion in hip and knee joints during specific phases of the gait cycle.

Authors, Year	Aims	Research Design	Sample	Data Collection	Summary of Key Findings
			Gender(s): 8 male, 4 female  Age(s): Mean age of 14.5 years		There was no significant difference in the Gait Deviation Index between the RAS group and control group.
Kobus et al. (2022)	To examine the effects of live music on children's vital signs during physical therapy intervention.	Quantitative. Quasi-experimental, with control.	<i>n</i> = 17  Causes of ABI: TBI (24%), infections (12%), brain attacks due to previous illnesses (29%), or birth as preterm infant or ill newborn (35%).  Gender(s): 14 male, 3 female  Age(s): 1 – 134 months	Physiological data was collected 15 mins before, during, and 15 mins after each therapy session: (a) Heart rate. (b) Respiratory rate. (c) Oxygen saturation.	Significantly lower heart and respiratory rates as well as higher oxygen saturation levels were observed during physical therapy sessions that included music therapy.  Findings suggest that live music therapy can help stabilize and improve vital signs in children with neurological diseases during physical therapy intervention in early rehabilitation.

<b>Authors, Year</b>	<b>Aims</b>	<b>Research Design</b>	<b>Sample</b>	<b>Data Collection</b>	<b>Summary of Key Findings</b>
Twyford & Watters (2016)	To investigate the effectiveness of a joint music therapy and occupational therapy group in promoting the development of self-regulation skills in children with an ABI.	Mixed methods. Quasi-experimental, no control.	<i>n</i> = 6	Qualitative measures: (a) Goal Attainment Scaling. (b) Individualized Music Therapy Assessment Profile. (c) School Function Assessment. (d) Canadian Occupational Performance Measure. (e) Likert-type self-evaluation scale.	The joint program positively impacted the participants' self-regulation skills, social interaction, and learning.
			Causes of ABI: Unspecified variety of TBI and non-TBI.	Mixed measures: (a) Parent questionnaire. (b) Staff survey.	Parents of the children involved felt supported and empowered to implement a range of strategies for their child's rehabilitation.
			Gender(s): not reported		Music therapy was found to be a motivating and effective tool for promoting skills, complementing occupational therapy.
			Age(s) 5 – 10 years		

## 4.4 Results

### 4.4.1 Descriptive Results

A total of eight studies met the inclusion criteria for this review, all of which comprised of journal articles. These studies originated from Australia ( $n = 3$ ), South Korea ( $n = 2$ ), Germany ( $n = 1$ ), the United States ( $n = 1$ ), and an international collaboration between Australia and the United Kingdom ( $n = 1$ ). The date range of the studies spans 1988-2023. Of the studies included, one was published prior to 1990 (12.5%), five from 2010 to 2020 (62.5%), and two published between 2021 and 2023 (25%).

The studies had diverse methodological designs. One study was qualitative using observation as the data collection method (Gentle et al., 2015). Five studies employed a quasi-experimental design, all of which used quantitative measures to measure change across the domains of functioning (Chong et al., 2014; Cohen, 1988; Kelly et al., 2023; Kim et al., 2016; Kobus et al., 2022). The final two studies used other mixed methods designs (Bower et al., 2014; Twyford & Watters, 2016).

A total of 50 children with ABIs participated in the studies, which reported a range of etiologies including traumatic brain injury (TBI) and non-TBI conditions such as stroke, brain tumors, and viral infections. The smallest sample size was  $n = 1$  (Bower et al., 2014; Cohen, 1988; Gentle et al., 2015) and the largest was  $n = 17$  (Kobus et al., 2022). Gender was reported in seven studies. Among the children with ABI, 30 were male (60%); 14 were female (28%); and gender was not indicated for the remaining 6 participants (12%). Age was reported in all studies. The youngest participant reported was 1 month old (Kobus et al., 2022) and the oldest was 18 years old (Chong et al., 2014; Cohen, 1988). None of the studies disclosed information regarding the ethnicity of the participants.

All studies reported the use of music therapy interventions for enhancing functional outcomes, with none reporting the application of general music-based interventions. The described music therapy interventions targeted various domains of functioning, including motor skills ( $n = 3$ ), speech, language, and communication skills ( $n = 2$ ), psychosocial care ( $n = 1$ ), physiological outcomes ( $n = 1$ ), and behavioral and cognitive skills ( $n = 1$ ). The interventions employed comprised of song singing ( $n = 2$ ), rhythmic auditory stimulation (RAS) ( $n = 2$ ), and other methods ( $n = 4$ ). An overview of the music therapy interventions is presented in Table 6. These interventions were administered in diverse healthcare settings, with the majority occurring in hospitals (62.5%) across five studies. Additionally, one study took place in a post-acute neurorehabilitation center (12.5%), another in a rehabilitation hospital (12.5%), and one in an unspecified setting (12.5%).

**Table 6***Overview of Music Therapy Interventions*

<b>Authors, Year</b>	<b>Type of Music Therapy Intervention</b>	<b>Facilitator(s)</b>	<b>Length of Music Therapy Intervention</b>	<b>Brief Description of Musical Content</b>
Bower et al. (2014)	Singing of familiar songs	Music Therapist	10 weekdays (14 consecutive days), 5-22 minutes per session.	The intervention comprised of live singing of familiar songs, either unaccompanied or with guitar accompaniment. The music therapist matched tempo, volume, vocal timbre, and accompaniment to the characteristics of the patient's presentation.
Chong et al. (2014)	Keyboard playing exercises	Unspecified Therapist	4-6 weeks, 25-minutes per session, twice weekly.	The exercises involved playing simple melodic patterns and sequences on the keyboard. The therapist offered harmonic accompaniment.
Cohen (1988)	Song singing	Not Specified	Music intervention (Treatment B) lasted for 4 weeks, 20 minutes per session.	The participant was asked to sing along to 'Hey Jude' by The Beatles at a tempo of m.m. = 80. The participant was instructed to tap the beat of the music on her legs while singing along.
Gentle et al. (2015)	Neurologic music therapy: Musical neglect training (MNT), Music Attention and Control Training (MACT), and Musical Sensory Orientation Training (MSOT)	Music Therapist	20+ sessions up to 60 minutes	Familiar songs were used to stimulate arousal, awareness, and orientation, and facilitate meaningful responses. The therapist offered simple guitar accompaniment. Small hand held percussion instruments gradually introduced.

<b>Authors, Year</b>	<b>Type of Music Therapy Intervention</b>	<b>Facilitator(s)</b>	<b>Length of Music Therapy Intervention</b>	<b>Brief Description of Musical Content</b>
Kelly et al. (2023)	RAS	Music Therapist and Physiotherapist	4 weeks, approx. 60 minutes per session, twice weekly.	Music therapist played guitar. During RAS, the tempo was set to match the child's natural walking speed. The tempo was adjusted by 5-10% (faster and slower) to challenge the child to walk at different speeds.
Kim et al. (2016)	RAS	Music Therapist	4 weeks, 30 minutes per session, thrice weekly.	RAS utilised participant preferred music with a focus on creating a rhythmic and melodic framework that could be effectively used as a cue for gait training. RAS was provided live on keyboard.
Kobus et al. (2022)	Music listening	Music Therapist and Physical Therapist	Twice weekly.  The mean duration of each therapy session was 44 minutes (21 – 71 minutes).	The music therapist played the sansula, reflecting the children's breathing and responses. The tempo was adjusted according to breathing and heart rates.
Twyford & Watters (2016)	Group music therapy and occupational therapy	Music Therapist and Occupational Therapist	7 weeks, 60 minutes per session.	Each session began and finished with the same song/activity. Sessions were non-linear to respond to group dynamics and perceived needs, incorporating improvisation, song singing, and verbal processing.

#### ***4.4.2 Theme 1: Outcomes of Using Music Therapy in Pediatric ABI***

##### **4.4.2.1 Augmented Motor Skills**

Three studies found that participating in music therapy intervention enhanced motor skills in children with ABI (Chong et al., 2014; Kelly et al., 2023; Kim et al., 2016). Chong et al. (2014) investigated keyboard-based rehabilitation and demonstrated improvements in finger dexterity and hand function. Kelly et al. (2023) and Kim et al. (2016) explored gait rehabilitation of children and adolescents, respectively. Kelly et al. (2023) noted varying improvements in walking speed and gait biomechanics when combining RAS with standard physiotherapy. Kim et al. (2016) similarly reported significant enhancements in gait parameters, including walking cadence, velocity, and joint mobility among adolescents when exposed to RAS.

##### **4.4.2.2 Enhanced Communication Abilities**

Two studies centered on the application of music therapy intervention to address speech, language, and communication skills. Cohen (1988) explored the effects of music therapy on rate of speech, while Gentle et al. (2015) examined the recovery of musical and linguistic abilities following ABI. Both studies leveraged song-based methods as a central component to their interventions. Cohen (1988) used synchronized tapping with a song as a pacing method to modify speech rate. Gentle et al. (2015) employed pre-morbidly familiar songs and nursery rhymes to stimulate awareness, orientation, and meaningful responses to foster increased responsiveness, basic attention, and encourage active participation in singing familiar songs, in turn supporting language rehabilitation.

### ***4.4.3 Theme 2: Music Therapy as a Motivator in Pediatric ABI***

#### ***Rehabilitation***

##### **4.4.3.1 Adherence to Therapeutic Intervention**

Music therapy has emerged as a compelling and multifaceted motivating factor in pediatric ABI rehabilitation. Despite the absence of specific measures used to assess participants' motivation, several studies have documented its pervasive influence (Chong et al., 2014; Kim et al., 2016; Kobus et al., 2022; Twyford & Watters, 2016). Chong et al. (2014) believed that the role of music, particularly in keyboard playing, was to facilitate motivation through immediate auditory feedback, creating intrinsic motivation for endurance in the execution of simple repetitive movements. Similarly, Twyford and Watters (2016) suggested that music therapy may furnish focus, potentially facilitating increased engagement, which could enhance children's commitment to rehabilitation. Furthermore, Kim et al. (2016) acknowledged that using participants' preferred music during intervention has the potential to maximize motivation, thereby enhancing adherence to rehabilitation. Kobus et al. (2022) echoed these sentiments, stating that music activates brain regions involved in reward, motivation, emotion, and arousal, thus highlighting the promising role of music in promoting sustained engagement.

##### **4.4.3.2 Enjoyment**

Music therapy is described as a fun and non-threatening medium for therapeutic intervention. Twyford and Watters (2016) utilized a Children's Enjoyment and Self-Observation Survey to gauge participants' satisfaction levels, revealing a consistently high level of enjoyment among participants. Additionally, parental feedback indicated that the children enjoyed attending the group sessions, emphasizing music therapy as a source of enjoyment that provided opportunities for children to express themselves

through creative activities. Although Kelly et al. (2023) did not collect specific data on participants' enjoyment levels, they affirmed that all participating children found the music therapy intervention enjoyable, alluding to how the inherent enjoyment of music results in full engagement from children during rehabilitative intervention.

#### ***4.4.4 Theme 3: Collaboration***

Three studies highlighted the collaborative efforts between music therapy and other allied health professions in pediatric rehabilitation. A joint music therapy and occupational therapy intervention was identified as a cohesive strategy in supporting children with ABI to achieve shared therapeutic goals. This approach was noted to facilitate the acquisition of self-regulation and interpersonal skills (Twyford & Watters, 2016). The integration of music therapy and physiotherapy, incorporating RAS, resulted in enhanced walking speed and gait biomechanics (Kelly et al., 2023). Furthermore, the inclusion of music therapy in physical therapy sessions during neurological early rehabilitation led to decreased heart and respiratory rates and increased oxygen saturation (Kobus et al., 2022). These studies contribute to the growing recognition of the advantages of collaborative approaches in pediatric rehabilitation.

### **4.5 Discussion**

This integrative review of eight papers explored the use of music and music therapy interventions on functional outcomes in children with ABI. Although the initial scope encompassed both music-based and music therapy interventions, it is noteworthy that the findings exclusively focus on music therapy, as no music-based studies met the inclusion criteria. The absence of music-based interventions warrants further examination and prompts reflection on the underlying reasons within the context of pediatric ABI. It is plausible that the interactive nature inherent in music therapy renders

it more suitable for this population compared to music-based interventions, which might be perceived as less engaging or accessible to children. Additionally, it prompts consideration of whether other healthcare professionals lack confidence or training in implementing music interventions, thereby contributing to the dearth of these studies with this population. Given the intricacy of pediatric ABI, it also calls into question the feasibility, appropriateness, and perhaps even the underestimation of potential benefits associated with music-based approaches. This may suggest a gap in research exploration rather than an inherent lack of applicability. The absence of published research does not necessarily imply the absence of practice, as music-based interventions might be occurring informally in clinical settings. Understanding the underlying reasons could pave the way for future research directions and the development of innovative interventions tailored to the needs of children with ABI. The predominance of music therapy studies underscores the recognized potential and relevance of the profession in pediatric ABI. It suggests a growing acknowledgement of the therapeutic potential of music within these clinical settings. However, the exclusive focus on music therapy warrants consideration of whether alternative music-based interventions are being overlooked or underexplored in the context of ABI.

#### ***4.5.1 A Heterogenous Landscape***

The complexity of music therapy in pediatric ABI is accentuated by the heterogeneity discernible within the presented results. The geographical diversity of the studies highlights the global interest and applicability of music therapy in pediatric ABI rehabilitation. However, the variation in cultural contexts, healthcare settings, and established methodological designs may be rooted in this nascent stage of research development. The expansive spectrum of music therapy interventions, targeting motor skills, speech, language, and communication skills, psychosocial care, physiological

outcomes, and behavioral and cognitive skills, contributes to the observed heterogeneity. The choice of intervention methods, such as song singing or rhythmic auditory stimulation, reflects the adaptability and versatility of music therapy in fostering the recovery and enhancement of diverse functional capacities in children with ABI. Nevertheless, this flexibility proves disadvantageous when endeavoring to establish meaningful comparisons of interventions. Magee et al. (2017) echo a similar sentiment in their Cochrane review of music interventions on functional outcomes in adults with ABI. As the field of music therapy for children with ABI progresses, increased and enhanced research rigor will likely unveil apparent trends and guide future investigations. This evolution holds promise for refining interventions and establishing clearer pathways for advancing pediatric ABI rehabilitation.

#### ***4.5.2 Music Therapy in Pediatric ABI***

Despite the existing heterogeneity across the various studies, there was a consensus amongst the papers that the use of music within a therapeutic context serves as a motivational catalyst, elevating engagement and participation in children with ABI (Chong et al., 2014; Kim et al., 2016; Kobus et al., 2022; Twyford & Watters, 2016). Similar observations have been documented in the broader landscape of pediatric ABI (Burns & O'Connor, 2023; Kennelly, 2006) and in the context of adult ABI (Magee et al., 2017; Tamplin, 2015). Neurologically, music is intrinsically rewarding, activating brain regions associated with reward, motivation, emotion, and arousal, thus contributing to maximizing motivation and fostering sustained engagement (Kobus et al., 2022). Furthermore, music therapy inherently involves interactions between the therapist, the child, and the music, fostering a therapeutic relationship that may further enhance treatment outcomes. Kennelly (2013) highlights the significance of these relationships, noting that hospitalization for an ABI and subsequent rehabilitation can be

lengthy, leading to prolonged isolation from peers. Consequently, building supportive relationships with children becomes an important psychosocial aspect of their recovery journey. While the specific impact of this therapeutic relationship is not explored in the included empirical studies, it is reasonable to speculate that the quality of these relationships contributed to the success of the interventions. Within a musical therapeutic milieu enriched with enjoyable and preferred activities, there is a cultivation of intrinsic motivation that addresses challenges related to adherence to therapy. Moreover, music therapy in a collaborative capacity further supports its potential to foster a cohesive and synergistic approach (Burns & O'Connor, 2023), amplifying its impact on motivation and adherence within a multidisciplinary rehabilitation context. Finally, it is important to acknowledge the scarcity of empirical research in music therapy for pediatric ABI. Practitioners, researchers, and students alike must exercise caution against overstating claims without robust evidence to substantiate them, emphasizing the need for further research to validate and expand upon preliminary findings.

#### ***4.5.3 Exclusion of Non-Empirical Studies***

Six studies were excluded from the final review due to their non-empirical nature, as they primarily presented case vignettes elucidating the role of music therapy within pediatric ABI. Although not meeting the criteria for empirical research, these studies contribute valuable insights, reinforcing the efficacy of music therapy within this context. Kennelly and Brien-Elliott (2001) provide a compilation of vignettes delineating the applications of music therapy in four main goal areas: motor skills, behavioral and cognitive skills, psychosocial care, and speech, language, and communication skills. Robb (1996) illustrates the use of songwriting as a means to foster emotional wellbeing in adolescents with ABI. Furthermore, Magee et al. (2011)

offer two case vignettes which illustrates the application of music therapy with children with neurobehavioral disorders incurred by ABI. Kennelly et al. (2001) and Bower and Shoemark (2009) contribute vignettes that underscore the synergistic effect of collaborative music therapy and speech and language therapy supporting language rehabilitation, communication, and interpersonal relationships. Similarly, O'Doherty and O'Connor (2015) provide an account of joint working between music therapy and neuropsychology to improve rehabilitation outcomes. As the field of music therapy within pediatric ABI continues its expansion, future literature reviews should consider incorporating non-empirical research studies. This inclusive approach ensures a comprehensive examination of the burgeoning body of research recognizing the intrinsic value of studies that may not conform to traditional empirical methodologies.

#### ***4.5.4 Limitations and Recommendations***

A constraint of this review is that it only included studies written in English. Consequently, the results may have excluded valuable accounts of music and music therapy interventions used to support children with ABI from other geographical regions. Additionally, the heterogenous findings limit generalizability and restrict the formation of meaningful comparisons. It is also crucial to reflect on the validity and limitations inherent in the methodological approach. Despite best efforts to adhere to established frameworks and guidelines, the interpretation of study findings and the synthesis of themes inevitably involve subjective judgements. The iterative nature of this review process allowed for ongoing reflection and discussion among members of the research team, which helped mitigate potential biases. However, the fallibility of human judgement and possibility of overlooking alternative interpretations or excluding relevant literature despite the rigorous search strategy is recognized.

The findings highlight the need for larger, more rigorous studies in this area to begin addressing the existing gaps and provide a more robust foundation for evidence-based practices. Within this examination, significant recommendations emerge to guide future research and inquiry for music and music therapy interventions and pediatric ABI:

- Undertake a comprehensive review that incorporates both empirical and non-empirical research. Recognizing the value of case vignettes and theoretical discussions will provide a more holistic understanding of the varied applications of music and music therapy interventions and their impact on children with ABI, which is necessary during this foundational phase of exploration.
- Establish a special interest group focused on music therapy in pediatric ABI. This network can serve as a collaborative platform for researchers, clinicians, and stakeholders to direct and coordinate future investigations. The group can facilitate the design and implementation of multisite studies, enabling access to larger and more diverse sample sizes, ensuring the generation of more robust and generalizable findings.
- Enhance the description of music and music therapy interventions and delivery methods. Although the inherent flexibility of music ensures the uniqueness of each interaction, offering detailed descriptions would facilitate the replication of studies in the future, thereby fostering comparability across research endeavors.

## **4.6 Conclusion**

The findings of this integrative review affirm that music therapy intervention holds a diverse role in the rehabilitation of children with ABI. Music therapy possesses the capacity to enhance motivation and engagement during rehabilitative interventions across various functional domains. However, it is crucial to note the absence of general

music-based intervention studies within the scope of this review. This discrepancy prompts reflection on potential overlooked avenues within music-based approaches for pediatric ABI. Nevertheless, further research with children and adolescents recovering from ABI is required in order to develop techniques and interventions that are developmentally appropriate and grounded in evidence-based practices.

## 4.7 References

\*References marked with an asterisk indicate studies included in the integrative review.

American Music Therapy Association. (2005). *What is music therapy?*

<https://www.musictherapy.org/about/musictherapy/>

Baker, F., & Roth, E. A. (2004). Neuroplasticity and functional recovery: Training models and compensatory strategies in music therapy. *Nordic Journal of Music Therapy, 13*(1), 20–32. <https://doi.org/10.1080/08098130409478095>

Beauchamp, M. H., & Anderson, V. (2013). Cognitive and psychopathological sequelae of pediatric traumatic brain injury. *Handbook of Clinical Neurology, 112*, 913–920. <https://doi.org/10.1016/B978-0-444-52910-7.00013-1>

Bedell, G. M. (2008). Functional outcomes of school-age children with acquired brain injuries at discharge from inpatient rehabilitation. *Brain Injury, 22*(4), 313–324. <https://doi.org/10.1080/02699050801978948>

\*Bower, J., Catroppa, C., Grocke, D., & Shoemark, H. (2014). Music therapy for early cognitive rehabilitation post-childhood TBI: An intrinsic mixed methods case study. *Developmental Neurorehabilitation, 17*(5), 339–346. <https://doi.org/10.3109/17518423.2013.778910>

Bower, J., & Shoemark, H. (2009). Music therapy to promote interpersonal interactions in early paediatric neurorehabilitation. *Australian Journal of Music Therapy, 20*, 59–75.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>

- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health, 11*(4), 589–597.  
<https://doi.org/10.1080/2159676X.2019.1628806>
- Burns, J., & O'Connor, R. S. (2023). Exploring clinicians' experiences of engaging in collaborative music therapy and speech and language therapy for children with an acquired brain injury. *Approaches: An Interdisciplinary Journal of Music Therapy*.  
<https://doi.org/10.56883/ajjmt.2024.37>
- \*Chong, H. J., Cho, S. R., & Kim, S. J. (2014). Hand rehabilitation using MIDI keyboard playing in adolescents with brain damage: A preliminary study. *NeuroRehabilitation, 34*(1), 147–155. <https://doi.org/10.3233/NRE-131026>
- \*Cohen, N. S. (1988). The use of superimposed rhythm to decrease the rate of speech in a brain-damaged adolescent. *Journal of Music Therapy, 25*(2), 85–93.  
<https://doi.org/10.1093/jmt/25.2.85>
- Conn, V. S., Isaramalai, S., Rath, S., Jantarakupt, P., Wadhawan, R., & Dash, Y. (2003). Beyond MEDLINE for literature searches. *Journal of Nursing Scholarship, 35*(2), 177–182. <https://doi.org/10.1111/j.1547-5069.2003.00177.x>
- DePompei, R., & Blosser, J. (2019). *Pediatric traumatic brain injury: Proactive intervention* (3rd ed.). Plural Publishing.
- Dewan, M. C., Mummareddy, N., Wellons, J. C., & Bonfield, C. M. (2016). Epidemiology of global pediatric traumatic brain injury: Qualitative review. *World Neurosurgery, 91*, 497-509.e1. <https://doi.org/10.1016/j.wneu.2016.03.045>
- Dwyer, P. A. (2020). Analysis and synthesis. In C. E. Toronto & R. Remington (Eds.), *A step-by-step guide to conducting an integrative review* (pp. 57–70). Springer.
- \*Gentle, E. C., Barker, M., & Bower, J. (2015). Preservation of singing functioning in a 5 year-old following severe right-sided traumatic brain injury: Insights into the

neurological resilience of song from pediatric music therapy. *Music and Medicine*, 7(3), 14–19. <https://doi.org/10.47513/mmd.v7i3.405>

Gmelig Meyling, C., Verschuren, O., Rentinck, I. R., Engelbert, R. H. H., & Gorter, J. W. (2022). Physical rehabilitation interventions in children with acquired brain injury: A scoping review. *Developmental Medicine & Child Neurology*, 64(1), 40–48. <https://doi.org/10.1111/dmcn.14997>

Gordon, A. L., & di Maggio, A. (2012). Rehabilitation for children after acquired brain injury: Current and emerging approaches. *Pediatric Neurology*, 46(6), 339–344. <https://doi.org/10.1016/j.pediatrneurol.2012.02.029>

Hayes, L., Shaw, S., Pearce, M. S., & Forsyth, R. J. (2017). Requirements for and current provision of rehabilitation services for children after severe acquired brain injury in the UK: A population-based study. *Archives of Disease in Childhood*, 102(9), 813–820. <https://doi.org/10.1136/archdischild-2016-312166>

Hong, Q. N., Pluye, P., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M.-P., Griffiths, F., Nicolau, B., O’Cathain, A., Rousseau, M.-C., & Vedel, I. (2018). *Mixed methods appraisal tool (MMAT) Version 2018: User guide*.

Hopia, H., Latvala, E., & Liimatainen, L. (2016). Reviewing the methodology of an integrative review. *Scandinavian Journal of Caring Sciences*, 30(4), 662–669. <https://doi.org/10.1111/scs.12327>

Jadad, A. R., Moher, D., & Klassen, T. P. (1998). Guides for reading and interpreting systematic reviews. *Archives of Pediatrics & Adolescent Medicine*, 152(8). <https://doi.org/10.1001/archpedi.152.8.812>

Jenkin, T., Anderson, V. A., D’Cruz, K., Scheinberg, A., & Knight, S. (2022). Family-centred service in paediatric acquired brain injury rehabilitation: Bridging the gaps. *Frontiers in Rehabilitation Sciences*, 3. <https://doi.org/10.3389/fresc.2022.1085967>

- \*Kelly, G., Pool, J., Hamilton, C., & Rodda, J. (2023). Rhythmic auditory stimulation to improve gait rehabilitation outcomes for children with acquired brain injury: A pilot study. *International Journal of Therapy and Rehabilitation*, 30(3).  
<https://doi.org/10.12968/ijtr.2022.0121>
- Kennelly, J. (2006). Music therapy in paediatric rehabilitation. In F. Baker & J. Tamplin (Eds.), *Music therapy methods in neurorehabilitation: A clinician's manual* (pp. 219–233). Jessica Kingsley Publishers.
- Kennelly, J. (2013). Brain injuries and rehabilitation in children. In J. Bradt (Ed.), *Guidelines for music therapy practice in pediatric care* (pp. 356–402). Barcelona Publishers.
- Kennelly, J., & Brien-Elliott, K. (2001). The role of music therapy in paediatric rehabilitation. *Pediatric Rehabilitation*, 4(3), 137–143.  
<https://doi.org/10.1080/13638490110067687>
- Kennelly, J., Hamilton, L., & Cross, J. A. (2001). The interface of music therapy and speech pathology in the rehabilitation of children with acquired brain injury. *Australian Journal of Music Therapy*, 12, 13–20.  
<https://doi.org/10.3109/17518423.2013.778910>
- Kiger, M. E., & Varpio, L. (2020). Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical Teacher*, 42(8), 846–854.  
<https://doi.org/10.1080/0142159X.2020.1755030>
- \*Kim, S. J., Shin, Y. K., Yoo, G. E., Chong, H. J., & Cho, S. R. (2016). Changes in gait patterns induced by rhythmic auditory stimulation for adolescents with acquired brain injury. *Annals of the New York Academy of Sciences*, 1385(1), 53–62.  
<https://doi.org/10.1111/nyas.13294>

- Knight, S., Takagi, M., Fisher, E., Anderson, V., Lannin, N. A., Tavender, E., & Scheinberg, A. (2019). A systematic critical appraisal of evidence-based clinical practice guidelines for the rehabilitation of children with moderate or severe acquired brain injury. *Archives of Physical Medicine and Rehabilitation, 100*(4), 711–723. <https://doi.org/10.1016/j.apmr.2018.05.031>
- \*Kobus, S., Bologna, F., Maucher, I., Gruenen, D., Brandt, R., Dercks, M., Debus, O., & Jouini, E. (2022). Music therapy supports children with neurological diseases during physical therapy interventions. *International Journal of Environmental Research and Public Health, 19*(3). <https://doi.org/10.3390/ijerph19031492>
- Lee, S., Allison, T., O'Neill, D., Punch, P., Helitzer, E., & Moss, H. (2022). Integrative review of singing and music interventions for family carers of people living with dementia. *Health Promotion International, 37*, I49–I61. <https://doi.org/10.1093/heapro/daac024>
- León-Carrión, J., Machuca-Murga, F., Solís-Marcos, I., León-Domínguez, U., & Domínguez-Morales, M. del R. (2013). The sooner patients begin neurorehabilitation, the better their functional outcome. *Brain Injury, 27*(10), 1119–1123. <https://doi.org/10.3109/02699052.2013.804204>
- Lind Irgens, E., Henriksen, N., & Moe, S. (2016). Acquired brain injury rehabilitation: Dilemmas in neurological physiotherapy across healthcare settings. *European Journal of Physiotherapy, 18*(4), 202–209. <https://doi.org/10.1080/21679169.2016.1181206>
- Lindsay, S., Patel, S., Ragunathan, S., & Fuentes, K. (2023). Ableism among children and youth with acquired brain injury and their caregivers: A systematic review. *Brain Injury, 37*(8), 714–725. <https://doi.org/10.1080/02699052.2023.2184869>

- Magee, W. L. (2020). Why include music therapy in a neuro-rehabilitation team? *Advances in Clinical Neuroscience & Rehabilitation, 19*(2), 10–12.  
<https://doi.org/10.47795/STUI1319>
- Magee, W. L., Baker, F., Daveson, B., Hitchen, H., Kennelly, J., Leung, M., & Tamplin, J. (2011). Music therapy methods with children, adolescents, and adults with severe neurobehavioral disorders due to brain injury. *Music Therapy Perspectives, 29*(1), 5–13. <https://doi.org/10.1093/mtp/29.1.5>
- Magee, W. L., & Baker, M. (2009). The use of music therapy in neuro-rehabilitation of people with acquired brain injury. *British Journal of Neuroscience Nursing, 5*(4), 150–156. <https://doi.org/10.12968/bjnn.2009.5.4.41678>
- Magee, W. L., Clark, I., Tamplin, J., & Bradt, J. (2017). Music interventions for acquired brain injury. *Cochrane Database of Systematic Reviews, 2017*(1).  
<https://doi.org/10.1002/14651858.CD006787.pub3>
- McCaffrey, T., Cheung, P. S., Barry, M., Punch, P., & Dore, L. (2020). The role and outcomes of music listening for women in childbirth: An integrative review. *Midwifery, 83*, 102627. <https://doi.org/10.1016/j.midw.2020.102627>
- Moss, H. (2016). Arts and health: A new paradigm. *Voices: A World Forum for Music Therapy, 16*(3). <https://doi.org/10.15845/voices.v16i3.863>
- O'Doherty, S., & O'Connor, R. (2015). Music therapy and neuropsychology: An innovative and integrated approach. In J. Reed, K. Byard, & H. Fine (Eds.), *Neuropsychological rehabilitation of childhood brain injury* (pp. 254–270). Palgrave Macmillan.
- Oermann, M. H., & Knafl, K. A. (2021). Strategies for completing a successful integrative review. *Nurse Author & Editor, 31*(3–4), 65–68.  
<https://doi.org/10.1111/nae2.30>

- Popay, J., Roberts, H., Sowden, A., Petticrew, M., Aria, L., Rodgers, M., & Britten, N. (2006). *Guidance on the Conduct of Narrative Synthesis in Systematic Reviews: A Product from the ESRC Methods Programme*. Lancaster University. <https://doi.org/10.13140/2.1.1018.4643>
- Reuter-Rice, K., Eads, J. K., Berndt, S., & Doser, K. (2018). The initiation of rehabilitation therapies and observed outcomes in pediatric traumatic brain injury. *Rehabilitation Nursing, 43*(6), 327–334. <https://doi.org/10.1097/rnj.000000000000116>
- Robb, S. L. (1996). Techniques in song writing: Restoring emotional and physical well being in adolescents who have been traumatically injured. *Music Therapy Perspectives, 14*(1), 30–37. <https://doi.org/10.1093/mtp/14.1.30>
- Särkämö, T., Tervaniemi, M., Laitinen, S., Forsblom, A., Soinila, S., Mikkonen, M., Autti, T., Silvennoinen, H. M., Erkkilä, J., Laine, M., Peretz, I., & Hietanen, M. (2008). Music listening enhances cognitive recovery and mood after middle cerebral artery stroke. *Brain, 131*(3), 866–876. <https://doi.org/10.1093/brain/awn013>
- Schmid, W., Rosland, J. H., Von Hofacker, S., Hunskaar, I., & Bruvik, F. (2018). Patient's and health care provider's perspectives on music therapy in palliative care - An integrative review. *BMC Palliative Care, 17*(1). <https://doi.org/10.1186/s12904-018-0286-4>
- Schrieff-Elson, L. E., Steenkamp, N., Hendricks, M. I., Thomas, K. G. F., & Rohlwink, U. K. (2017). Local and global challenges in pediatric traumatic brain injury outcome and rehabilitation assessment. *Child's Nervous System, 33*(10), 1775–1784. <https://doi.org/10.1007/s00381-017-3527-6>

- Tamplin, J. (2015). Music therapy for adults with traumatic brain injury or other neurological disorders. In B. L. Wheeler (Ed.), *Music therapy handbook* (pp. 454–467). Guilford Publications.
- Toronto, C. E. (2020). Overview of the integrative review. In *A step-by-step guide to conducting an integrative review* (pp. 1–9). Springer International Publishing.  
[https://doi.org/10.1007/978-3-030-37504-1\\_1](https://doi.org/10.1007/978-3-030-37504-1_1)
- \*Twyford, K., & Watters, S. (2016). In the groove: An evaluation to explore a joint music therapy and occupational therapy intervention for children with acquired brain injury. *Voices: A World Forum for Music Therapy*, 16(1).  
<https://doi.org/10.15845/voices.v16i1.851>
- Wade, D. T. (2020). What is rehabilitation? An empirical investigation leading to an evidence-based description. *Clinical Rehabilitation*, 34(5), 571–583.  
<https://doi.org/10.1177/0269215520905112>
- Whittemore, R., & Knafl, K. (2005). The integrative review: Updated methodology. *Journal of Advanced Nursing*, 52(5), 546–553. <https://doi.org/10.1111/j.1365-2648.2005.03621.x>

## **Chapter 5**

### **Study II**

# **Music Therapy for Young Children with Acquired Communication Impairments: An International Survey of Clinical Practices**

Burns, J., O'Connor, R., & Moss, H. (2024). Music therapy for young children with acquired communication impairments: An international survey of clinical practices.

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## 5.1 Abstract

**Introduction:** Acquired communication impairments (ACIs) can significantly hinder the development and functioning of language and communication in children, impeding their social interactions and self-expression. Music therapy is emerging as a favourable practice in supporting children with ACIs; however, a deeper understanding regarding the clinical practices of music therapists with this population is required to advance service provision.

**Method:** This study employed an online cross-sectional descriptive survey to investigate current approaches, clinical interventions, and outcome measures used by music therapists working with young children with ACIs to address language- and communication-oriented goals. Fifty-four music therapists across ten countries completed a 16-item online questionnaire. Descriptive statistics and conventional content analysis were used to analyse the data.

**Results:** Respondents demonstrated a notable preference for humanistic and integrative approaches in their clinical practice. Among the diverse range of interventions employed by music therapists, song singing, vocal improvisation, and music and play emerged as the most effective techniques for supporting individuals with ACIs in achieving their communication goals. Additionally, collaborative endeavours with speech and language therapists were considered the most impactful approach to intervention. Respondents also sought alternative non-standardised evaluation methods, driven by a scarcity of suitable measures, to evaluate the effectiveness of their work.

**Discussion:** There exists a high degree of heterogeneity in clinical practices amongst music therapists working with children with ACIs, reflecting diverse backgrounds and approaches. The absence of clear trends or dominant approaches emphasises the necessity for further research to establish evidence-based practices for this population.

**Keywords:** music therapy; acquired communication impairments; paediatrics; clinical practice; survey

## 5.2 Introduction

Language development between the ages of 2 and 6 is a critical period of growth and acquisition. During this time, children make significant strides in their language skills, including vocabulary expansion, grammar development, and the ability to engage in meaningful conversation (Saxton, 2017). A prominent mechanism that fuels vocabulary growth during this period is fast mapping. Through this process children rapidly absorb and integrate new words into their lexicon, acquiring an average of two to three new words per day (Owens, 2019). Receptive vocabulary expands exponentially during this preschool period, growing from around 200 words to over 10,000 words, and expressive vocabulary typically reaches 2,000 words or more (Saxton, 2017; Shipley & McAfee, 2021). As children advance their narrative skills, they develop causal chains to connect events or actions in a cause-and-effect relationship (Owens, 2019). Furthermore, they undergo grammatical development, becoming proficient in using past and future tenses and demonstrating appropriate grammar usage in most instances (Shipley & McAfee, 2021). As children actively engage in conversations and interactions with others, they continue to strengthen and refine their communication skills. They unceasingly enhance the foundational structures of communication, which include active listening, turn-taking, and the ability to interpret non-verbal cues (Buckley, 2003).

Acquired communication impairments (ACIs) are disturbances in speech-language function that result from some form of cerebral insult after language acquisition has already commenced (Hécaen, 1976). The cerebral insult can result from a variety of aetiologies, including traumatic brain injury, cerebrovascular accidents, brain haemorrhage, tumour, and infection. While adult and paediatric ACIs closely resemble one another, it is important to remember that children, depending on their age,

are either beginning to develop or are still developing speech and language concurrent with damage to the central nervous system (Murdoch, 2011). In children, a brain lesion could interfere with the aspects of language that are already developed or disrupt the acquisition of those that have not fully emerged yet (Gillardone et al., 2022).

Consequently, the combination of acquired neurological damage and child development complicates the translatability of adult research to the paediatric population (Murdoch, 2011). Aphasia, dysarthria, apraxia, and cognitive communication impairments are among the chief alternations in communication that are caused by neurological damage.

Aphasia is a linguistic processing disorder that compromises the brain's ability to formulate and/or interpret words and sentences (Hora et al., 2014). Acquired childhood aphasia follows damage to the neural language network and, similarly to the adult population, aetiology can vary. Murdoch (2011) and O'Hare (2016) note that childhood aphasia is predominantly non-fluent, with its major features being mutism and lack of spontaneous speech. However, O'Hare (2016) also acknowledges the possibility of paraphasia, preservation, and circumlocution occurring. Dysarthria is a motor speech disorder in which the muscles that are used to produce speech are damaged or paralysed (Hora et al., 2014). Children with dysarthria commonly experience shallow irregular breathing which creates difficulties in generating sufficient breath to support speech production. Paediatric dysarthria often leads to the low pitched, breathy or harsh voices, nasalised speech, and poor pronunciation (Pennington et al., 2016). Acquired apraxia of speech is a motor speech disorder and is defined as the inability to articulate sounds necessary for successful speech or language production (Beathard & Krout, 2008; Cohen, 1992). There is a dearth in the literature surrounding the nature and occurrence of acquired apraxia of speech in children (Murdoch, 2011). As in adults, it is reported that apraxia frequently co-occurs with acquired aphasia

and/or dysarthria. Murdoch (2011) suggests that one potential reason for the limited attention given to acquired apraxia of speech in the literature is that the condition appears to resolve quickly. In children, acquired apraxia of speech is characterised primarily by inaccuracies in articulation and secondarily by alterations in prosody (Murdoch, 2011). Cognitive communication impairments are characterised by difficulties with listening, speaking, reading, writing, conversing, or interacting socially that stem from underlying cognitive impairments in attention, memory, organisation, information processing, problem-solving, or executive functions (Cermak et al., 2019; Turkstra et al., 2015). For young children with cognitive communication impairments, there is a notable risk of experiencing delays in vocabulary acquisition which may contribute to impairments in reading and auditory comprehension (Turkstra et al., 2015).

The complex interplay of ACIs highlight the diverse challenges faced by children in their language development, underscoring the importance of comprehensive assessment and intervention strategies. Children with ACIs often require intensive interdisciplinary neurorehabilitation involving speech and language therapy and occupational therapy to facilitate the relearning and development of changed or lost abilities as a result of their injury (Murdoch, 2011). As an example, when addressing paediatric dysarthria, speech and language therapy intervention often employs traditional drill exercises of the tongue and lips to increase the rate, strength, range, or co-ordination of the musculature supporting articulation (Morgan & Vogel, 2008).

Music and language exhibit common characteristics, employing elements such as pitch, rhythm, and tempo to convey meaning and evoke emotional responses (Besson & Schön, 2001). Furthermore, music is a social activity that works at both pre-verbal and verbal levels. It acts as a potent means of communication that is readily accessible

long before the acquisition of expressive language, making it an effective medium for relearning and enhancing communication skills as well as fostering social interaction (Bunt & Stige, 2014). In light of this, music therapy becomes increasingly relevant in supporting young children with ACIs; however, the body of literature surrounding the use and clinical practice of music therapy with this population remains limited. A selection of case study reports offer valuable insight into clinical practices and shed light on the impact of music therapy when working with children with ACIs.

Bower and Shoemark (2009) illustrate the effectiveness of collaborative music therapy and speech and language therapy in supporting a 10-year-old boy with an acquired neurogenic communication disorder. Through therapeutic song singing, drumming interventions, and vocal improvisation exercises, collaboration between the disciplines improved the clarity and intelligibility of the boy's speech as well as fostering his ability to engage in meaningful interaction. More specifically, case vignettes by Kennelly and Brien-Elliott (2001) and Kennelly et al. (2001) also describe the use of combined music therapy and speech and language therapy to address dysarthria rehabilitation. The collaborative sessions included breathing exercises focusing on sustained vowel sounds and melodic variation exercises in major and minor tonalities to target the areas of articulation, pitch, and volume control. To encourage active participation, the sessions incorporated familiar songs played at a slow tempo. The tempo was gradually increased as articulation and breath control improved to develop a faster rate of speech. Additionally, both case studies highlighted the emotional support provided by music therapy intervention, aiding the children in adapting to the hospital environment. Conversely, Cohen (1988) employed song singing at a tempo of 80 beats per minute with an 18-year-old experiencing dysarthria and an excessively fast rate of speech, leading to a significant decrease in speech production.

Only one case study has been identified that discusses music therapy intervention for children with ACIs during the formative pre-schooler stage, which encompasses ages 2-6. Kennelly et al. (2001) present a joint music therapy and speech and language therapy intervention, focused on aphasia rehabilitation in a three-year-old girl. Her communication difficulties encompassed delayed language development, severe word-finding difficulties, offering inappropriate responses to questions, and experiencing challenges in following directions. Familiar songs were used to elicit one-word utterances at the end of a phrase through anticipatory cues in the music, and the elements of music were explored and manipulated to encourage vocalisations. By the end of this joint therapeutic intervention, the child could successfully verbalise their preferred song choice, sing entire songs, and follow directions related to instrumental play. While the highlighted case studies draw attention to a collaborative approach involving speech and language therapy, there remains a limited scope of information and literature regarding the application of music therapy with paediatric ACIs.

### ***5.2.1 Study Aims***

Given the extremely limited research and evidence regarding the role of music therapy for children with ACIs, the aim of this study was to gather information regarding current approaches, clinical interventions, and outcome measures being used by music therapists in their work with children, aged 2-6, to address language- and communication-oriented goals. The objective was to target music therapists currently working with this population to document the body of knowledge which exists in clinical practice but is not necessarily published. The following research questions were established:

- What music therapy approaches and clinical models are currently being used with children, aged 2-6, with ACIs?

- What clinical interventions do music therapists find most effective in addressing language- and communication-oriented goals with this population?
- How are music therapists evaluating the impact of their work on language and communication in children, aged 2-6, with ACIs?

## **5.3 Methodology**

### ***5.3.1 Research Design***

An online cross-sectional descriptive survey design was adopted for this study in order to generate a robust description of music therapy practices used with young children with ACIs. This design was employed to facilitate a comprehensive exploration of the multifaceted landscape while also enhancing generalisability to the entire population as a direct result of being able to gather larger amounts of data (Curtis, 2016). Cross-sectional descriptive surveys offer valuable insights into the status of phenomena at a fixed point in time, offering a snapshot of prevailing trends (Andres, 2012).

### ***5.3.2 Participant Recruitment***

When recruiting participants for this study, a purposive sampling method was employed. This method allows researchers to glean knowledge from individuals that have particular expertise and experience “that is valuable to the research process” (Bowling, 2014, p. 209). As with other non-probability sampling techniques, purposive sampling has been criticised for being prone to sampling bias. However, given the purpose of this study, this limitation was of minor concern to the researchers.

The inclusion criteria stipulated that participants be professional music therapists currently working with children, aged 2-6, with ACIs. No restriction was imposed on participants based on their length of experience. As the survey instrument was in the

English language, participants were excluded from this study if they were unable to submit their responses in English.

The recruitment process involved identifying music therapists who met the specified inclusion criteria, with invitations extended to clinicians currently employed at paediatric rehabilitation hospitals and research centres. Moreover, researchers actively involved in paediatric acquired brain injury research were also invited to participate. Potential participants and facilities were contacted by the research team, issuing invitation letters and information leaflets (see Appendix C).

### ***5.3.3 Data Collection***

A 16-item questionnaire was constructed by the research team with five areas of inquiry: (1) professional background, (2) music therapy clinical practice, (3) music therapy interventions, (4) outcome measures, and (5) case vignette. See Table 7 for the survey content and accompanying rationale for each of the five areas of inquiry.

**Table 7***The Survey Content and Accompanying Rationale for Each of the Five Areas of Inquiry*

<b>Section</b>	<b>Question</b>	<b>Rationale</b>	<b>Origin</b>
<b>Professional Background</b>	(1) number of years as a qualified music therapist	To better understand the level of expertise and experience of the participants.	Johnson & Heiderscheit, 2018; Kern & Tague, 2017; Knott et al., 2020
	(2) number of years working as a music therapist with children, aged 2-6, with ACIs	To better understand the level of expertise and experience of the participants.	Johnson & Heiderscheit, 2018
<b>Music Therapy Clinical Practice</b>	(3) clinical approach used	To identify the overarching philosophy that informs practitioners' interventions. While there exists potential for integration and overlap between approaches, respondents are encouraged to reflect on the primary lens through which they approach their work.	Johnson & Heiderscheit, 2018 Further informed by Edwards, 2017; Moore & Lagasse, 2018; Wheeler, 2015
	(4) clinical model applied	To gain insight into the perceived effectiveness of different models for achieving language and communication goals. Allowing multiple answers recognises the reality of music therapy practice, where therapists may draw from a toolbox of clinical models and techniques depending on the child's individual needs.	New question – outside the scope of referenced research Further informed by Edwards, 2017; Moore & Lagasse, 2018; Wheeler, 2015
	(5) frequency of sessions per week	To understand how often therapists deem intervention to be necessary with this population to reach target goals.	Johnson & Heiderscheit, 2018
	(6) capacity in which music therapy is offered	To capture the diverse ways in which music therapy is delivered to this population.	Johnson & Heiderscheit, 2018; Kern & Tague, 2017

<b>Section</b>	<b>Question</b>	<b>Rationale</b>	<b>Origin</b>
	(7) capacity found most impactful	To gain insight into the perceived effectiveness of different programme types in achieving target goals.	Kern & Tague, 2017
	(8) length of music therapy sessions	To identify average duration of sessions.	Johnson & Heiderscheidt, 2018; Kern & Tague, 2017
<b>Music Therapy Interventions</b>	(9) effectiveness of music therapy interventions in addressing speech and language goals	To gain insight into the perceived effectiveness of various music therapy interventions for language and communication goals.	Johnson & Heiderscheidt, 2018; Kern & Tague, 2017; Knott et al., 2020
	(10) joint therapeutic interventions employed	To identify joint therapeutic interventions.	New question – outside the scope of referenced research
<b>Outcome Measures</b>	(11) use of standardised outcome measures	To assess the integration of standardised outcome measures into clinical practice, and if so, to identify which specific measures are being used.	Knott et al., 2020
	(12) use of non-standardised outcome measures	To assess whether non-standardised outcome measures are integrated into clinical practice.	New question – outside the scope of referenced research
	(13) identifying non-standardised outcome measures used	To identify which non-standardised measures are being used.	New question – outside the scope of referenced research
	(14) additional methods used to evaluate clinical programmes	To gather a comprehensive view of any additional assessment practices.	New question – outside the scope of referenced research
<b>Case Vignette</b>	(15) provision of case vignette	To determine if participants wish to share a case vignette.	New question – outside the scope of referenced research
	(16) case vignette details	To gather a holistic understanding of music therapy in the context of young children with ACIs	New question – outside the scope of referenced research

Informed by prior survey studies (Johnson & Heiderscheit, 2018; Kern & Tague, 2017; Knott et al., 2020), survey questions included a combination of nominal, rank order, and open-ended response options. To acknowledge the wide variety of music therapy practices and trends worldwide, semi-closed question formats were incorporated, including the option ‘Other (Please Specify.)’ in six of the nominal questions. The option ‘Unsure’ was included in two nominal questions regarding the participants’ music therapy approach. By explicitly offering an unsure option, it indicated to respondents that it was acceptable to say that they did not have the information with which to answer the question and in turn minimised guessing (Krosnick & Presser, 2010). Open-ended response questions were utilised to solicit detailed descriptions of music therapy interventions, outcome measures, and an example of participants’ clinical work. Participants were required to answer 12 questions and the remaining four questions were optional.

The survey was hosted on Qualtrics, an online survey tool, and was made available to the participants for 8 weeks from 16 January to 13 March 2023. The estimated time to complete the survey was 10-15 minutes. A full copy of the survey instrument is available in Appendix D.

### ***5.3.4 Ethical Considerations***

Ethical approval was sought and obtained through the Research Ethics Committee at the University of Limerick (2022-10-09-AHSS). The online survey included a cover page outlining participant information and consent. Participants who did not agree to the terms in the consent form were disqualified from completing the survey. Furthermore, participants were made aware that the point of withdrawal was at the point of submission. As data collection was anonymous, participants were not able to withdraw their information after this time.

### ***5.3.5 Data Analysis***

Categorical and numerical data, which were collected from participants' responses to closed and semi-closed questions, were analysed in Qualtrics using descriptive statistical analysis. This process entails using mathematical methods to ascertain distribution frequencies, aggregate totals, and averages (Meadows, 2016). Subsequently, the research team conducted a comprehensive review to ensure accuracy.

Responses to open-ended questions on music therapy interventions and outcome measures yielded definitive exclusive clusters, converted to post hoc categories for descriptive statistical analysis, complemented by illustrative examples.

Qualitative data gathered through the case vignettes was analysed using conventional content analysis as outlined by Shava et al. (2021). This cyclical method involved identifying and categorising recurring patterns and themes which are derived directly and inductively from the data. A conventional approach to qualitative content analysis is appropriate when a study aims to describe a phenomenon where existing literature is limited, as it enables researchers to immerse themselves in the data and uncover new insights (Hsieh & Shannon, 2005; Kondracki et al., 2002). The authors independently reviewed the data prior to collaboratively developing themes and discussing findings in order to minimise bias, thus augmenting the credibility of the results. However, the optional provision of the case vignettes led to an inherent imbalance in the qualitative and quantitative data. This imbalance limited the scope for triangulation and integration of findings, necessitating only cautious interpretation.

### ***5.3.6 Measures of Rigour and Quality***

Two senior music therapists with extensive clinical experience in the area of paediatric ACIs served as experts to review a preliminary draft of the questionnaire.

Their feedback highlighted some issues with the user interface and the need for further amendments regarding the clarity and intention of some questions.

Content validity testing was employed to assess the accuracy of the survey and ensure its items effectively represent the intended construct it aims to measure. Content validity is defined as the extent to which an instrument adequately evaluates all aspects of the research domain of interest when attempting to measure phenomena (Wynd et al., 2003). It is recommended to conduct content validity testing on a new survey instrument to ensure that it includes all essential items and eliminates undesirable items to a particular construct domain (Taherdoost, 2016; Wynd et al., 2003).

The most widely used method for measuring content validity is the content validity index (CVI) which is based on expert ratings of relevance using a four-item scale (Polit et al., 2007). The first two items of the scale, not relevant (score 1) and needs major revisions (score 2), are considered 'content invalid' while the remaining two items, needs minor revisions (score 3) and relevant to the aims of the research (score 4), are considered 'content valid' (Lynn, 1986; Polit et al., 2007; Wynd et al., 2003). To calculate a CVI value, the number of experts giving a rating of either 3 or 4 is divided by the total number of experts. Items which are below the acceptable level of relevance are eliminated (Polit et al., 2007). Eight experts were invited to review the survey subjectively. This process was carried out for every item of the survey, ensuring the survey questions reflected the aims of the study and that key related subjects were not excluded.

There are no defined guidelines which indicate what an acceptable CVI should be. Davis (1992) states that for new instruments, investigators should seek 80% or better agreement among expert reviewers. Therefore, an item was deemed content valid and accepted for this study if a CVI of 0.8 was obtained. The CVI was calculated for each

item of the survey (i.e., the number of 3 or 4 ratings divided by the number of experts, in this case eight). Each item scored 1.0 or 0.875; no items scored below 0.8. It can be concluded from this analysis that there was a strong agreement amongst the reviewers that the content of the survey was valid.

## **5.4 Results**

The survey was completed over an 8-week period from 16 January to 13 March 2023. A total of 54 participants across ten countries completed the survey. In addition to the following presentation of the main results, supplemental material is available in Appendix E, providing further details on professional background, session format, and an overview of the case vignettes.

### ***5.4.1 Professional Background***

The number of years respondents worked as a music therapist ranged from 8 months to 36 years; most had between 1 and 5 years ( $n = 16, 29.6\%$ ) and 11 to 20 years ( $n = 16, 29.6\%$ ) of work experience. Based on 52 responses, the majority of music therapists indicated that they had been working with children with ACIs between 1 and 5 years ( $n = 18, 34.6\%$ ).

### ***5.4.2 Music Therapy Clinical Practice***

When working with children with ACIs, clinicians mainly reported applying a humanistic, person-centred approach ( $n = 25, 46.3\%$ ) or an integrative (eclectic) approach ( $n = 17, 31.5\%$ ) to inform their clinical practice. Of the 17 respondents that reported utilising an integrative approach, 12 unique combinations were identified. Three clinicians (5.6%) stated they utilised a humanistic and developmental approach,

and two respondents (3.7%) shared that they adapted their clinical approach depending on the context and immediate needs of the child.

Survey respondents were presented with seven music therapy clinical models and asked to select all models they have applied when working with a child with an ACI towards language- and communication-oriented goals. Clinicians indicated using Neurologic Music Therapy ( $n = 40, 74.1\%$ ), Behavioural Music Therapy ( $n = 17, 31.5\%$ ), Nordoff-Robbins Music Therapy ( $n = 14, 25.9\%$ ), and Resource-Oriented Music Therapy ( $n = 14, 25.9\%$ ). Table 8 outlines the wide variety of clinical approaches and models used by clinicians when working with this population.

**Table 8**

*Clinical Approaches and Models*

<b>Question</b>	<b>Count</b>	<b>%</b>
<b>Clinical Approach</b>		
Humanistic	25	46.3
Integrative	17	31.5
Developmental	8	14.8
Cognitive-Behavioural	3	5.6
Psychodynamic	1	1.9
<b>Clinical Model</b>		
Neurologic Music Therapy	40	74.1
Behavioural Music Therapy	17	31.5
Nordoff-Robbins Music Therapy	14	25.9
Resource-Oriented Music Therapy	14	25.9
Other (Please specify.)	9	16.7
Community Music Therapy	7	13
Analytical Music Therapy	4	7.4
Unsure	2	3.7
Guided Imagery and Music	1	1.9

Note: In the question pertaining to clinical models, respondents were permitted to select multiple response options. Consequently, the total number of responses for this question exceeds the sample size,  $N = 54$ .

### **5.4.3 Session Format**

Music therapists shared that they primarily work with the same child once per week ( $n = 29, 53.7\%$ ), followed by twice per week ( $n = 14, 25.9\%$ ). A smaller number of therapists reported seeing the same client three times per week ( $n = 8, 14.8\%$ ), four times per week ( $n = 1, 1.9\%$ ), or five times per week ( $n = 2, 3.7\%$ ). The mean frequency was 1.76 times per week. Sessions were reported to range from 20-60 minutes in duration.

All participants ( $n = 54, 100\%$ ) reported that they offered individual music therapy programmes to children with ACIs. Respondents also indicated offering joint music therapy and speech and language therapy programmes ( $n = 39, 72.2\%$ ), joint music therapy and occupational therapy programmes ( $n = 23, 42.6\%$ ), group music therapy programmes ( $n = 20, 37\%$ ), and telehealth music therapy programmes ( $n = 4, 7.4\%$ ). A small percentage of respondents ( $n = 3, 5.6\%$ ) listed additional programmes under the response option 'Other'; these included group joint music therapy and speech and language therapy programmes, joint music therapy and physiotherapy programmes, and joint music therapy and parent programmes.

Thirty-two music therapists ranked joint music therapy and speech and language therapy programmes as the most impactful medium to address language- and communication-oriented goals with children with ACIs (59.2%). Individual music therapy programmes were deemed most impactful by 17 respondents (31.9%), and group music therapy programmes were considered most impactful by three respondents (5.6%). Two respondents (3.7%) selected 'Other', further elaborating that it was dependant on the needs of the client. The most predominant choice was telehealth music therapy programmes, selected as a fifth priority by 35 respondents. See Table 9.

**Table 9***Most Impactful Session Orientation*

<b>Session Orientation</b>	<b>Priority</b>						<b>Sum</b>
	<b>1st</b>	<b>2nd</b>	<b>3rd</b>	<b>4th</b>	<b>5th</b>	<b>6th</b>	
Individual Music Therapy Programmes	17	31	3	2	0	0	53
Group Music Therapy Programmes	3	4	17	23	3	0	50
Joint Music Therapy and Speech and Language Therapy Programmes	32	12	4	2	1	0	51
Joint Music Therapy and Occupational Therapy Programmes	0	5	25	12	3	1	46
Telehealth (Online) Music Therapy Programmes	0	1	0	6	35	1	43
Other (Please specify.)	2	0	0	0	1	0	3

Note:  $N = 54$ . Participants were asked to rank each orientation 1-6, where 1 is the most impactful and 6 is the least impactful.

**5.4.4 Music Therapy Interventions**

Table 10 illustrates the music therapy interventions found most effective by clinicians in addressing language- and communication-oriented goals when working with children, aged 2-6, with ACIs. Notably, only three respondents indicated using Neurologic Music Therapy interventions under the response option ‘Other’.

**Table 10***Music Therapy Interventions*

<b>Music Therapy Interventions</b>	<b>Count</b>	<b>%</b>
Song Singing	50	92.6
Vocal Improvisation	34	63
Music and Play	31	57.4
Instrumental Improvisation	24	44.4
Music combined with Visual Media	21	38.9
Story Song Creation	21	38.9
Augmentative and Alternative Communication	19	35.2
Music and Movement	16	30
Songwriting / Composition	9	16.7
Other (Please specify.)	6	11.1
Music Listening	5	9.3
Conducting Music	4	7.4
Song Discussion	3	5.6
Computer-based Music Activities	2	3.7
Music and Art	1	1.9
Lyric Analysis	0	0

Note: Respondents were allowed to select a maximum of five interventions. Consequently, the number of responses for this question exceeds the sample size,  $N = 54$ . Other response options include: Neurologic Music Therapy Speech and Language Techniques, Breathing Exercises, Using Wind Instruments to Support Sustained Exhalation, Singing and Sign Language.

Twenty-two music therapy practitioners provided details on additional joint therapeutic interventions used in sessions with children, aged 2-6, with ACIs. Among the responses, participants highlighted collaborative efforts with speech and language therapy ( $n = 15$ , 68.2%), occupational therapy ( $n = 4$ , 18.2%), physiotherapy ( $n = 2$ , 9.1%), and neuropsychology ( $n = 1$ , 4.5%). Respondents described how music therapy provides a motivating quality that promotes adherence to therapeutic activities. They shared experiences of collaborating with speech and language therapists, incorporating target sounds and words into familiar songs, utilising music to reinforce speech exercises, assisting in the exploration of augmentative and alternative communication (AAC) devices, and contributing musical interactions during standardised speech assessments. One respondent shared that “sessions tend to be music therapy led” and remarked that music is used as a stimulus that is often adapted to achieve specific speech or communication goals. Participants also described collaborating with

occupational therapists, using music to explore potential AAC devices and promoting a developing awareness through musical play.

#### **5.4.5 Outcome Measures**

The majority of respondents ( $n = 48$ , 88.9%) indicated that they did not use standardised outcome measures to assess the impact of music therapy intervention on language and communication in their work with children, aged 2-6, with ACIs.

However, a small number of participants ( $n = 6$ , 11.1%) answered in the affirmative.

These respondents used a range of standardised outcome measures, including the Dysarthria Impact Profile (DIP), Diagnostic Evaluation of Articulation and Phonology (DEAP), Goldman-Fristoe Test of Articulation (GFTA), Pediatric Evaluation of Disability Inventory (PEDI), and Weschsler Abbreviated Scale of Intelligence (WASI).

When asked if they utilised non-standardised outcome measures to evaluate the effectiveness of their work, 46 respondents (85.2%) replied 'Yes', while the remaining participants ( $n = 8$ , 14.8%) responded 'No'. Those who answered 'Yes' were then asked to specify which non-standardised outcomes measures they used to evaluate their work. Out of the 46 respondents, the methods commonly used by music therapists included observation ( $n = 43$ , 93.5%), video recording ( $n = 21$ , 45.7%), using their own or developmental screening tool ( $n = 18$ , 39.1%), audio recording ( $n = 13$ , 28.3%), a modified standardised outcome measure ( $n = 11$ , 23.9%), and other methods ( $n = 6$ , 13%).

Nineteen music therapists offered further information on methods used to evaluate the outcomes of music therapy intervention on language and communication in children, aged 2-6, with ACIs. Eight respondents (42.1%) highlighted how they used observation and feedback from parents, grandparents, and other family members to assess progress. Additionally, collaboration with other therapists ( $n = 7$ , 36.8%) and the

wider rehabilitation team ( $n = 4$ , 21.1%) was also a common method used for evaluating progress.

### ***5.4.6 Case Vignette***

Only four music therapists chose to provide a brief case vignette detailing their work with a child with an ACI (7.4%). From these vignettes three major themes emerged in analysis, as presented below.

#### **5.4.6.1 Enhancing Communication Skills**

Across the case studies, music therapy is noted as being effective in improving communication skills. In the case study of Maria, who had dysarthria, music therapy “was successful in supporting controlled breathing, improving articulation, and regulating rate of speech.” In the cases of Julie and Lucy, collaborative music therapy and speech and language therapy was used to promote vocalisation and phrase completion through familiar song, visual cues, and instrumental improvisation. Similarly, Ryan’s music therapist reported an improvement in his ability to verbally recall single-step commands.

#### **5.4.6.2 Collaboration**

Interdisciplinary collaboration was present within three of the case studies. In the cases of Julie and Lucy, collaboration between music therapy and speech and language therapy assisted in facilitating a comprehensive treatment plan that targeted each child’s specific communication needs. In the case study of Ryan, collaborative music therapy and occupational therapy provided initial support in his pre-speech exercises, including enhancing his ability to sustain attention and “developing his proprioceptive understanding of his voice.” Following reassessment, it was concluded that Ryan would benefit more from participating in collaborative music therapy and

speech and language therapy in order to further advance his speech acquisition and language development.

#### **5.4.6.3 Diverse Practices**

Although the case vignettes share similarities, they serve to highlight the diverse array of diagnoses and communication difficulties that fall under the umbrella of ACIs. Consequently, a variety of approaches and interventions are employed to address specific communication areas, such as expressive output, breath control, sustained phonation, or sustained attention.

### **5.5 Discussion**

#### ***5.5.1 Variability Within Clinical Practice***

There is a high degree of heterogeneity in the results presented. This diversity may be indicative of the lack of consensus or standardisation in the field of music therapy and paediatric ACIs. This heterogeneity does not necessarily signify uncertainty but rather reflects the varied backgrounds and approaches of the music therapists who participated in the survey. Among the 17 respondents who reported using an integrative approach to music therapy, 12 unique combinations of approaches were identified, indicating that clinicians draw from a myriad of theoretical perspectives when working with children, aged 2-6, who have ACIs. Additionally, the wide range of clinical models used emphasises the diversity present in music therapy clinical practice. This heterogeneity reflects the eclectic and client-led nature of music therapy, tailoring treatment to the individual needs of each child and the primacy within the profession for clinicians to be flexible and adaptable in their approach (Edwards, 2017). As one respondent stated, “my clinical approach incorporates a variety of theoretical

approaches and is dynamic and responsive depending on the needs and context of the child.”

The survey findings indicate that clinicians primarily applied a humanistic, person-centred approach to inform their clinical practice, while neurologic music therapy (NMT) was reported as the most favourable clinical model. This could be interpreted as a potential incongruity between the values of a humanistic, person-centred approach, which emphasises the individual’s unique experiences, and the underpinning principles of a neuroscience-informed approach, which may be perceived as authoritarian as it is grounded in addressing the client’s presenting disease and disability, potentially diminishing the client’s agency (Moore & Lagasse, 2018). Furthermore, while 40 respondents reported adopting an NMT model in their clinical practice, only three respondents reported using specific NMT interventions such as melodic intonation therapy and vocal intonation therapy as effective methods for addressing language- and communication-oriented goals. This disparity might indicate a variance in the extent to which clinicians adhere to specific NMT interventions. Some clinicians might selectively integrate principles or concepts from NMT into their interventions without embracing the full array of associated techniques. Alternatively, some respondents may have chosen NMT due to their familiarity with the approach but may not use it in their clinical practice with children who have ACIs. It is also worth considering that the absence of predefined NMT options among the intervention response choices may have influenced the low selection of these specific interventions. Wheeler (2015) acknowledges that many music therapists incorporate elements of various approaches and models in their work, whereas others follow a particular orientation. However, the interplay between these distinct models and approaches can create challenges in maintaining a consistent therapeutic framework as the theoretical

orientation serves as the foundation upon which clinicians construct their practices, influencing the choice and implementation of clinical intervention (Johnson & Heiderscheidt, 2018).

The broad spectrum of approaches and models used by music therapists when working with children with ACIs may be reflective of the diverse presentations that fall under this diagnostic umbrella. However, it is also possible that the array of clinical practices and lack of clear trends or dominant approaches indicates a need for greater understanding and education among clinicians to ensure that they are equipped to provide effective and tailored support to this population in their language and communication needs. This raises the question of whether there is a need to formalise and standardise music therapy as a profession, or if its strength lies in its inherent flexibility and adaptability. More research is needed to establish evidenced-based practices for music therapy in this area.

### ***5.5.2 Interdisciplinary Strength***

The results indicate that collaboration between music therapists and professionals from other disciplines, particularly speech and language therapy and occupational therapy, is common and considered impactful for addressing language- and communication-oriented goals with children with ACIs. The results revealed that 72.2% of the respondents reported offering joint music therapy and speech and language therapy programmes, while 59.2% of surveyed music therapists ranked this collaborative approach as the most effective method for achieving these goals. The case vignettes offered by respondents further highlight how collaboration between music therapy and speech and language therapy assisted in facilitating a comprehensive treatment plan that targeted each child's specific communication needs. This collaborative relationship has been extensively reported in previous case studies (Bower

& Shoemark, 2009; Kennelly et al., 2001; Kennelly & Brien-Elliott, 2001), and these results reinforce that collaboration between these disciplines is perceived to be effective in improving language and communication skills in children with ACIs. Although this study did not explore the reasons behind the perceived effectiveness of collaboration over music therapy alone, it is reasonable to speculate that the integration of various therapeutic disciplines offers a more comprehensive treatment approach. Speech and language therapy, for instance, can provide specific techniques and strategies for enhancing language and communication skills, while music therapy can improve motivation and engagement, promote social interaction, and provide opportunities for self-expression. By combining these two therapies, clinicians can offer a holistic approach within a creative environment that not only targets specific language and communication goals but also fosters growth and development.

### ***5.5.3 Shifting the Focus***

While we know which music therapy interventions were deemed most effective by clinicians in addressing language- and communication-oriented goals when working with children with ACIs, this survey did not identify the specifics of how these interventions are used or what specific communication goals they target. The case vignettes provided some insights into the application of music therapy for enhancing communication skills; however these vignettes present only a few examples, including using song singing to elicit vocalisations through anticipatory cues, vocal improvisation to promote prolonged phonation, and instrumental improvisation to support the foundations of pre-verbal communication such as turn-taking, choice-making, and sustained attention. Song singing can be an effective method to target vocabulary building, pronunciation, and intonation but may not be the most effective in addressing cognitive communication impairments. For instance, difficulties with sustaining

attention, executive function, or sentence construction and comprehension may not be adequately addressed through song singing alone. Perhaps when treating ACIs it may be more advantageous to focus on the symptoms rather than solely relying on the diagnosis itself. For example, as well as considering how music therapy can address apraxia, it would be beneficial to explore how music therapy can address specific issues like slow or effortful speech as well as inconsistent stress and intonation. Shifting the focus to these symptoms could prove valuable in terms of session planning and preparation, ultimately resulting in more impactful and successful programmes.

#### ***5.5.4 Evaluating Music Therapy Programmes***

It appears that the majority of surveyed music therapists do not use standardised outcome measures to evaluate the effectiveness of music therapy intervention on language and communication in children aged 2-6 with ACIs. Only a small percentage (11.1%) reported using such measures, and a broad range of assessment tools were offered by the survey respondents. The suitability of these tools to measure changes in language and communication in this population depends on several factors, including the nature and severity of the child's communication impairment and their developmental level. For instance, the Diagnostic Evaluation of Articulation and Phonology (DEAP) and the Goldman-Fristoe Test of Articulation (GFTA) are primarily intended to evaluate a child's articulation and phonology abilities, making them appropriate for children with speech sound disorders but not necessarily for assessing other aspects of communication like language comprehension and production. Furthermore, the Dysarthria Impact Profile (DIP) evaluates the impact of dysarthria and is potentially inappropriate for children with other acquired communication impairments. Given the complex and diverse range of symptoms associated with these impairments, it is challenging (and perhaps impractical) to capture all aspects of a

child's language profile using a single assessment tool. Language development during this period is complex and varied and would require the use of a range of tools to obtain a comprehensive understanding of a child's communication abilities. Further inquiry with speech therapists regarding their assessments of this population, and an investigation into whether these assessments are more standardised or present similar challenges, is highly recommended. Furthermore, conducting an exploration of how these assessment practices align with those of music therapy will yield valuable insights.

The survey results indicate a clear preference for non-standardised outcome measures, including observation, video recording, and using developmental screening tools. However, the survey failed to capture important contextual information about how these measures are used and implemented to measure change. This lack of information may limit the usefulness of the survey results. Non-standardised outcome measures may be more accessible to music therapists who may not have the necessary specialised training to use standardised tools effectively. Non-standardised measures can offer greater flexibility in terms of their administration and interpretation, which can be particularly useful in clinical settings where standardised tools may not be practical or feasible. The previously published case studies pertaining to paediatric ACIs use observational methods to evaluate the impact of their work and make no reference to standardised assessment tools or outcome measures. This may be because these existing standardised measures are not always appropriate in the complex clinical contexts in which these impairments occur (Bower & Shoemark, 2009; Kennelly et al., 2001; Kennelly & Brien-Elliott, 2001). Conversely, it is worth noting that while non-standardised measures can provide valuable information, they may not be as valid or reliable as standardised outcome measures. Therefore, the use of both standardised and

non-standardised measures may be more beneficial for a comprehensive evaluation of music therapy intervention.

### ***5.5.5 Study Limitations and Directions for Future Research***

The relatively small sample size of this survey deserves consideration. Due to the specific nature of the clinical population being studied within a small profession, it was not feasible to obtain a large survey population. It is important to acknowledge that the small sample size may not be fully representative of music therapists working in the studied setting, and it is possible that there is bias in that those who chose to reply were therapists with positive experiences of successfully working with this client group. Only four participants contributed case vignettes that informed the development of the themes arising from the conventional content analysis. Consequently, it is crucial to interpret these findings with care, as they may not fully capture the breadth of experiences and practices within the larger group of respondents.

While the survey instrument underwent pilot testing and content validity testing to enhance its quality, it is important to acknowledge that the survey's design may have inadvertently influenced participants' responses by presenting a predetermined set of response options. Nonetheless, participants were given the opportunity to offer their own perspectives by utilising the 'Other' response option. Despite its wide distribution, the survey results are restricted to respondents from only 10 countries. This limited geographical representation may constrain the generalisability of the findings, particularly considering that some countries had only one respondent. Furthermore, the survey tool was developed and distributed solely in English, which may have posed language comprehension difficulties for some participants, potentially leading to hesitancy in completing the study or misunderstanding some of the questions. Future

research should explore the use of the survey tool in multiple languages to ensure a more inclusive and comprehensive examination of the phenomenon.

The survey also relied on self-reported data from music therapists, which could introduce bias or inaccuracies in the responses. For example, music therapists may have selectively chosen to report case studies that were particularly successful, rather than providing a more representative sample of their work with children with ACIs. Despite these limitations, the study still provides valuable insight into the clinical practice of music therapists with children with ACIs, aged 2-6, and is the largest study of its kind to date.

It is recommended that future research should seek to understand specific music therapy clinical models further and their effectiveness in supporting language and communication in children aged 2-6 with ACIs. This will enable the identification of the most effective approach that will yield the best outcomes for these children. Furthermore, it may be worthwhile to conduct this survey again in the future to assess whether the perspectives and clinical practices of music therapists have evolved as the field of music therapy continues to grow and develop within this context.

## **5.6 Conclusion**

This study provides valuable insights into the current landscape of music therapy practices for children, aged 2-6, with ACIs. It offers important information about music therapy approaches, clinical interventions, and outcome measures used with this population when working towards language- and communication-oriented goals. The results reveal a lack of standardisation in this field and highlight the diversity within clinical practices. Consequently, further research is necessary to establish evidence-based practices. Nevertheless, it is important to acknowledge the strengths of the profession, which lie in its inherent flexibility and adaptability. These qualities allow for

tailored heterogeneous programmes, particularly necessary in acute rehabilitation settings, providing respite from the clinical environment which is especially beneficial for young children undergoing intensive rehabilitative intervention.

## 5.7 References

- Andres, L. (2012). *Designing & doing survey research*. Sage Publications.  
<https://doi.org/10.4135/9781526402202>
- Beathard, B., & Krout, R. E. (2008). A music therapy clinical case study of a girl with childhood apraxia of speech: Finding Lily's voice. *Arts in Psychotherapy, 35*(2), 107–116. <https://doi.org/10.1016/j.aip.2008.01.004>
- Besson, M., & Schön, D. (2001). Comparison between language and music. *Annals of the New York Academy of Sciences, 930*, 232–258. <https://doi.org/10.1111/j.1749-6632.2001.tb05736.x>
- Bower, J., & Shoemark, H. (2009). Music therapy to promote interpersonal interactions in early paediatric neurorehabilitation. *Australian Journal of Music Therapy, 20*, 59–75.
- Bowling, A. (2014). *Research methods in health* (4th ed.). Open University Press.
- Buckley, B. (2003). *Children's communication skills: From birth to five years*. Routledge. <https://doi.org/10.4324/9780203865750>
- Bunt, L., & Stige, B. (2014). *Music therapy: An art beyond words*. Taylor and Francis.  
<https://doi.org/10.4324/9781315817989>
- Cermak, C. A., Scratch, S. E., Reed, N. P., Bradley, K., De Launay, K. L. Q., & Beal, D. S. (2019). Cognitive communication impairments in children with traumatic brain injury: A scoping review. *Journal of Head Trauma Rehabilitation, 34*(2), E13–E20.  
<https://doi.org/10.1097/HTR.0000000000000419>
- Cohen, N. S. (1988). The use of superimposed rhythm to decrease the rate of speech in a brain-damaged adolescent. *Journal of Music Therapy, 25*(2), 85–93.  
<https://doi.org/10.1093/jmt/25.2.85>

- Cohen, N. S. (1992). The effect of singing instruction on the speech production of neurologically impaired persons. *Journal of Music Therapy*, 29(2), 87–102.  
<https://doi.org/10.1093/jmt/29.2.102>
- Curtis, S. (2016). Survey research. In B. Wheeler & K. Murphy (Eds.), *Music therapy research* (3rd ed., pp. 322–330). Barcelona Publisher.
- Davis, L. L. (1992). Instrument review: Getting the most from a panel of experts. *Applied Nursing Research*, 5(4), 194–197. [https://doi.org/10.1016/S0897-1897\(05\)80008-4](https://doi.org/10.1016/S0897-1897(05)80008-4)
- Edwards, J. (2017). *The Oxford handbook of music therapy*. Oxford University Press.
- Gilardone, G., Viganò, M., Cassinelli, D., Fumagalli, F. M., Calvo, I., Gilardone, M., Sozzi, M., & Corbo, M. (2022). Post-stroke acquired childhood aphasia. A scoping review. *Child Neuropsychology*, 29(8), 1268–1293.  
<https://doi.org/10.1080/09297049.2022.2156992>
- Hécaen, H. (1976). Acquired aphasia in children and the ontogenesis of hemispheric functional specialization. *Brain and Language*, 3(1), 114–134.  
[https://doi.org/10.1016/0093-934X\(76\)90009-2](https://doi.org/10.1016/0093-934X(76)90009-2)
- Hora, E. C., Santana, L. V., de Jesus Santos, L., de Oliveira Souza, G., Pimentel, A. V., Bezerra, N. T. C., Rodrigues de Freitas Doria, S., Pinheiro Vaz de Carvalho, T., Abreu Mendes Júnior, A., Almedia Rodrigues, J., Leite Lopes, R. J. P., & Fakhouri, R. (2014). Communication disorders following traumatic brain injury. In F. Sadaka (Ed.), *Traumatic brain injury* (pp. 467–490). InTech. <https://doi.org/10.5772/57321>
- Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277–1288.  
<https://doi.org/10.1177/1049732305276687>

- Johnson, K., & Heiderscheid, A. (2018). A survey of music therapy methods on adolescent inpatient mental health units. *Journal of Music Therapy*, 55(4), 463–488. <https://doi.org/10.1093/jmt/thy015>
- Kennelly, J., & Brien-Elliott, K. (2001). The role of music therapy in paediatric rehabilitation. *Pediatric Rehabilitation*, 4(3), 137–143. <https://doi.org/10.1080/13638490110067687>
- Kennelly, J., Hamilton, L., & Cross, J. A. (2001). The interface of music therapy and speech pathology in the rehabilitation of children with acquired brain injury. *Australian Journal of Music Therapy*, 12, 13–20. <https://doi.org/10.3109/17518423.2013.778910>
- Kern, P., & Tague, D. B. (2017). Music therapy practice status and trends worldwide: An international survey study. *Journal of Music Therapy*, 54(3), 255–286. <https://doi.org/10.1093/jmt/thx011>
- Knott, D., Biard, M., Nelson, K. E., Epstein, S., Robb, S. L., & Ghetti, C. M. (2020). A survey of music therapists working in pediatric medical settings in the United States. *Journal of Music Therapy*, 57(1), 34–65. <https://doi.org/10.1093/jmt/thz019>
- Kondracki, N. L., Wellman, N. S., & Amundson, D. R. (2002). Content analysis: Review of methods and their applications in nutrition education. *Journal of Nutrition Education and Behavior*, 34(4), 224–230. [https://doi.org/10.1016/S1499-4046\(06\)60097-3](https://doi.org/10.1016/S1499-4046(06)60097-3)
- Krosnick, J. A., & Presser, S. (2010). Question and questionnaire design. In P. V. Marsden & J. D. Wright (Eds.), *Handbook of survey research* (2nd ed., pp. 263–313). Emerald Publishing.
- Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research*, 35(6), 382–385. <https://doi.org/10.1097/00006199-198611000-00017>

- Meadows, A. (2016). Introduction to statistical concepts. In B. L. Wheeler & K. Murphy (Eds.), *Music therapy research* (3rd ed., pp. 190–202). Barcelona Publishers.
- Moore, K. S., & Lagasse, A. B. (2018). Parallels and divergence between neuroscience and humanism: Considerations for the music therapist. *Music Therapy Perspectives*, 36(2), 267–276. <https://doi.org/10.1093/mtp/miy011>
- Morgan, A. T., & Vogel, A. P. (2008). Intervention for dysarthria associated with acquired brain injury in children and adolescents. *Cochrane Database of Systematic Reviews*, 3. <https://doi.org/10.1002/14651858.CD006279.pub2>
- Murdoch, B. E. (2011). *Handbook of acquired communication disorders in childhood*. Plural Publishing.
- O'Hare, A. (2016). Management of developmental speech and language disorders. Part 2: Acquired conditions. *Archives of Disease in Childhood*, 101(3), 278–283. <https://doi.org/10.1136/archdischild-2014-306153>
- Owens, R. E. (2019). *Language development: An introduction* (10th ed.). Pearson.
- Pennington, L., Parker, N. K., Kelly, H., & Miller, N. (2016). Speech therapy for children with dysarthria acquired before three years of age. *Cochrane Database of Systematic Reviews*, 7. <https://doi.org/10.1002/14651858.CD006937.pub3>
- Polit, D. F., Beck, C. T., & Owen, S. V. (2007). Focus on research methods: Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing and Health*, 30(4), 459–467. <https://doi.org/10.1002/nur.20199>
- Saxton, M. (2017). *Child language: Acquisition and development* (2nd ed.). Sage Publications.

- Shava, G., Hleza, S., Tlou, F., Shonhiwa, S., & Mathonsi, E. (2021). Qualitative content analysis. *International Journal of Research and Innovation in Social Science*, 5(7), 553–558.
- ShIPLEY, K. G., & McAfee, J. G. (2021). *Assessment in speech-language pathology: A resource manual* (6th ed.). Plural Publishing.
- Taherdoost, H. (2016). Validity and reliability of the research instrument; How to test the validation of a questionnaire/survey in a research. *International Journal of Academic Research in Management*, 5(3), 28–36.  
<https://doi.org/10.2139/ssrn.3205040>
- Turkstra, L. S., Politis, A. M., & Forsyth, R. (2015). Cognitive-communication disorders in children with traumatic brain injury. *Developmental Medicine and Child Neurology*, 57(3), 217–222. <https://doi.org/10.1111/dmcn.12600>
- Wheeler, B. L. (2015). *Music Therapy Handbook*. Guilford Publications.
- Wynd, C. A., Schmidt, B., & Schaefer, M. A. (2003). Two quantitative approaches for estimating content validity. *Western Journal of Nursing Research*, 25(5), 508–518.  
<https://doi.org/10.1177/0193945903252998>

## Chapter 6

### Phase 2 Overview

Phase 1 of this research aimed to establish a foundational understanding of the use of music therapy in supporting language and communication in young children with ACIs. The integrative review identified several instances of interdisciplinary collaboration between music therapy and other allied health professionals in paediatric rehabilitation, namely occupational therapy, physiotherapy, and physical therapy. However, no empirical studies were found that examined collaborative efforts with speech and language therapists. Although a small number of case vignettes offered preliminary insights into joint efforts to support communication outcomes with this population, robust empirical research on such partnerships was notably lacking. Findings from the international survey revealed that music therapists considered joint programmes with speech and language therapists to be the most impactful approach for addressing language and communication goals in children with ACIs. While collaboration was a recurring theme in the literature, empirical research on partnerships with speech and language therapists was notably lacking, despite their perceived importance in practice. This signalled a gap in the literature that warranted further investigation.

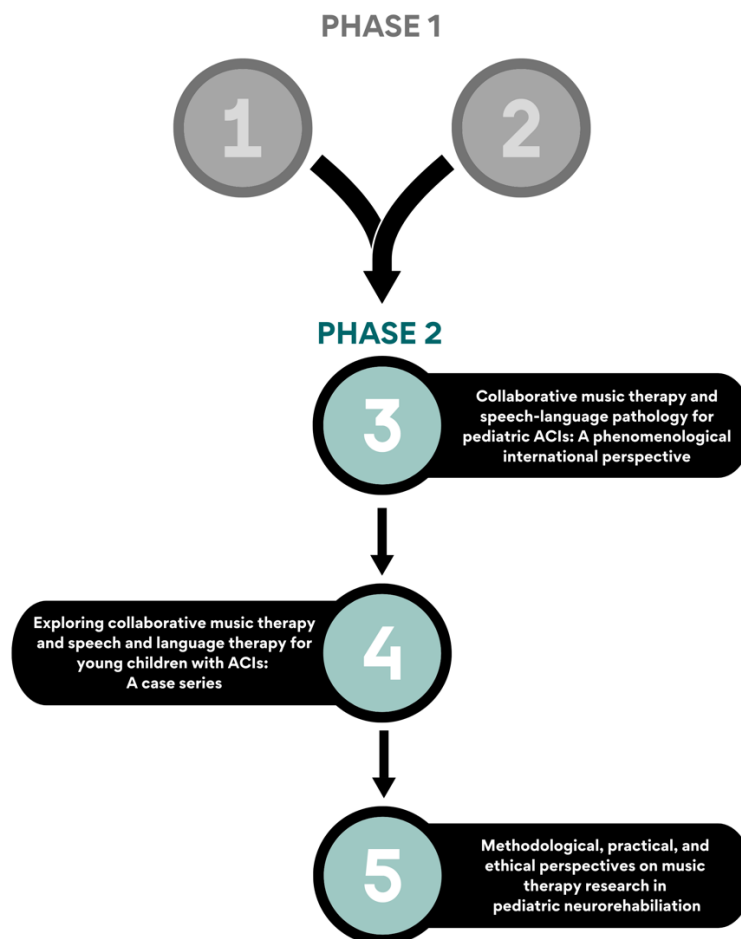
Given this, research question 3 (RQ3) was refined to reflect this evolving focus, shifting from a broader investigation of music therapy's use in language and communication rehabilitation to a specific exploration of how collaborative music therapy and speech and language therapy contributes to this process.

- Revised RQ3: How does collaborative music therapy and speech and language therapy contribute to the rehabilitation of language and communication in young children with ACIs?

Phase 2 builds upon the findings of Phase 1, further investigating the use of collaborative music therapy and speech and language therapy in young children with ACIs. It follows a sequential design where the findings of each study informed the development of the next. See Figure 6.

**Figure 6**

*Phase 2 Overview*



## **6.1 Approaching Study III**

Study III was developed in response to the emerging need to better understand collaborative practices between music therapists and speech and language therapists in the treatment of children with ACIs. While the thesis initially set out to investigate how music therapy supports language and communication rehabilitation, it became increasingly apparent that collaboration between these two professions represents a valuable, yet underexplored, area of clinical practice. Given the complex and overlapping roles of music therapy and speech and language therapy in supporting communication development, examining how these disciplines work together offered a logical and necessary progression in the research.

Rather than proceeding directly to an investigation of a collaborative clinical programme, it was first necessary to explore the perspectives and experiences of clinicians engaged in joint practice. Study III was therefore designed to examine the nature of collaborative work in this context, including how collaboration is enacted, the principles that underpin effective partnerships, and how its impact is evaluated. This study aimed to provide a deeper understanding of interdisciplinary collaboration as it relates to paediatric ACI rehabilitation and to generate insights that could inform both clinical practice and the design of the subsequent research study. In line with journal conventions, the term ‘speech-language pathologist’ is used in this study in place of ‘speech and language therapist’.

### ***6.2.1 Reflecting on the Reporting of Study III***

While Study III has been published in *Music Therapy Perspectives*, further detail on its reporting is required to enhance the clarity and transparency of the research process. This includes a more comprehensive account of how suitable participants were

identified and recruited, as well as greater articulation of the researcher's prior experiences and assumptions that may have influenced the study's design, focus, and interpretation.

#### **6.2.1.1 Articulating Researcher Perspectives and Positionality**

A critical reflection on Study III reveals the need for greater transparency regarding the author's perspectives and potential biases. While the published paper acknowledged the professional backgrounds of the research team, it did not fully articulate the pre-existing beliefs, experiences, and values that may have shaped the study's design, interpretation, and reporting. Articulating these perspectives more explicitly would enhance the study's trustworthiness and align with the principles of reflexivity that underpin phenomenological inquiry.

I approached the study with considerable clinical experience in collaborative practices between music therapists and speech-language pathologists in the treatment of children with ACIs. This experience was shaped initially by my clinical placement at the National Rehabilitation Hospital and developed further through my work at Children's Health Ireland at Temple Street. In these settings, I was regularly involved in interdisciplinary sessions and observed firsthand how joint working could meaningfully support communication outcomes, particularly in complex paediatric cases. As a result, I began the research with a belief in the value, and often the necessity, of collaborative practice in this context. I also held a strong view that collaborative practice is inherently effective. These beliefs were grounded in repeated and meaningful clinical experiences. In the settings where I worked, collaboration was not only encouraged but often initiated by speech and language therapists. I observed how collaborative sessions frequently resulted in a more integrated understanding of a child's need and enabled more cohesive intervention planning. This stood in contrast to non-collaborative

situations, where progress could feel slower. While not always the case, I consistently found that children made more noticeable gains in communication and engagement when both disciplines worked together.

While I was aware that my role as first author meant my influence on the study was likely more prominent, I remained attentive to how this perspective might shape the research process. Given my background as a clinician-researcher, I found myself naturally attuned to the perspectives shared by music therapists. Their language, priorities, and clinical framing often resonated with my own experience, which may have shaped how I initially interpreted aspects of the data. At the same time, I remained mindful of these leanings. I was committed to ensuring that the analysis was guided by the data rather than my expectations. I approached the study with a genuine openness to insights that might challenge or complicate my assumptions. Rather than seeking confirmation of a pre-existing belief, I saw the study as an opportunity to explore how collaboration is experienced across diverse clinical contexts and to allow the participants' voices to guide the development of the study's findings.

#### **6.2.1.2 Expanded Account of Participant Recruitment**

The published article outlined the purposive sampling strategy used to recruit clinician dyads and noted the use of snowball sampling. However, it provided limited detail regarding how eligible music therapists and speech-language pathologists were identified. As with the international survey (Chapter 5), no central registry exists for identifying music therapists working in paediatric neurorehabilitation, particularly those engaged in collaborative practice with speech-language pathologists. As a result, participant identification once again relied on a pragmatic and iterative search process.

Insights gained through the earlier international survey study provided an initial foundation for the interview recruitment process. That study had generated a list of

clinicians and music therapy services known to be involved in paediatric neurorehabilitation, specifically those working with children with ACIs. These existing contacts were reviewed, and music therapists were recontacted and invited to participate in the interview study, provided they met the inclusion criteria and could nominate a collaborating speech-language pathologist.

This was complemented by targeted searches aimed at identifying additional collaborating dyads in paediatric hospitals serving young children with ACIs. In the earlier survey study, participant recruitment had involved extensive efforts focused on English-speaking countries, in part due to the ease of accessing and navigating services in the researcher's first language. Given the breadth of that earlier work, these subsequent recruitment efforts concentrated on non-English-speaking regions to broaden the study's reach and avoid duplicating previous recruitment efforts. Hospitals providing paediatric neurosurgery and neurorehabilitation services were identified through internet searches. Once relevant centres were located, further investigation was undertaken to determine whether both music therapy and speech-language pathology were part of the clinical service. A total of 46 clinical sites were contacted through both the survey-derived network and the additional internet searches. Contact was made with named onsite music therapists where possible, or otherwise through general departmental email addresses, in order to identify eligible clinician dyads.

In an effort to further expand recruitment, 15 national and international music therapy associations were contacted and invited to circulate the study information to their members. However, it was not possible to track which associations ultimately disseminated this information. Two music therapists subsequently contacted the researcher to express interest in participating in the study, citing their professional association as the source of the recruitment materials. Additionally, snowball sampling

played a supplementary role in the recruitment. Three additional clinician dyads were recommended by initial participants, who identified colleagues or professional contacts meeting the study's inclusion criteria. Of the nine final participating dyads, five were recruited through the original survey network, one through new contacts identified via online searches, one via a professional organisation, and two through snowball sampling.

### **6.3 Approaching Study IV**

Study IV presents a case series of four young children with ACIs who participated in a collaborative music therapy and speech and language therapy programme. Having established the perceived value of interdisciplinary collaboration, it became necessary to investigate how such collaborative interventions manifest in practice with this population.

At this juncture in the research, it was apparent that much of the existing literature on music therapy for young children presenting with ACIs remained formative, often focused more on describing clinical approaches than on producing robust evaluative data. While outcome measurement remains an important long-term objective for the field, the present study intentionally shifted focus towards the process of intervention delivery and child engagement. This shift was driven by both methodological and clinical considerations. Chief among these was the recognition that available standardised assessment tools are ill-equipped to capture the subtle, emergent communicative behaviours that arise during the course of rehabilitation following brain injury in early childhood. These behaviours typically do not conform to linear or easily quantifiable patterns of change. As such, the application of conventional pre-post evaluation models risked oversimplifying, or misrepresenting, the complex and processual nature of communicative rehabilitation with this cohort. Rather than seeking

to quantify change in isolated domains, this study aimed to explore how communicative behaviours evolved over time in response to collaborative intervention. The focus was on observing how children engaged within the joint therapeutic context and what forms of communicative expression were emerging through the interactional dynamics of collaborative music therapy and speech and language therapy.

#### **6.4 Approaching Study V**

Study V provides a commentary on the methodological, practical, and ethical challenges of conducting music therapy research in paediatric neurorehabilitation. A number of challenges were encountered during the design and implementation of Study IV, shaped by various contextual constraints. Recognising the need to articulate the obstacles and learnings that arose, this paper explores the complexities of research design in acute clinical contexts and offers recommendations to address these barriers and strengthen the evidence base.

## **Chapter 7**

### **Study III**

#### **Collaborative Music Therapy and Speech-Language**

#### **Pathology for Pediatric Acquired Communication**

#### **Impairments: A Phenomenological International Perspective**

Burns, J., Keaveney, C., Nieto, N., O'Connor, R., & Moss, H. (2024). Collaborative music therapy and speech-language pathology for pediatric acquired communication impairments: A phenomenological international perspective. *Music Therapy Perspectives*, 43(1). <https://doi.org/10.1093/mtp/miae026>

## 7.1 Abstract

The partnership between music therapy and speech-language pathology is gaining recognition as an effective approach in the rehabilitation of young children with acquired communication impairments (ACIs). Yet, there remains a notable gap in understanding the distinctive contributions and challenges inherent in this collaborative practice. This study explored the perspectives of music therapists (MTs) and speech-language pathologists (SLPs) regarding the unique role of this collaborative effort, the elements of successful collaboration, and the methods implemented by clinicians to evaluate outcomes. Semi-structured interviews were conducted with nine pairs of MTs and SLPs in rehabilitation facilities across seven countries. These interviews were analyzed thematically using Van Manen's approach to hermeneutic phenomenology. Three themes arose from the data: (a) the role of collaborative music therapy and speech-language pathology, (b) building blocks of successful collaboration, and (c) evaluating collaborative practices. This collaboration fosters a unified strategy aimed at achieving shared language and communication goals. By combining their distinct expertise, MTs and SLPs can address the complex and varied needs of children with ACIs more effectively. However, further research is essential to comprehensively understand the functional outcomes arising from such collaborative endeavors in pediatric ACIs. This is crucial for validating the efficacy and significance of this approach in bolstering language and communication skills and advocating for its wider integration within rehabilitation services.

**Keywords:** music therapy, speech-language pathology, acquired communication impairments, collaboration, pediatrics

## 7.2 Background

Acquired communication impairments (ACIs) refer to disruptions in speech and language functioning arising from neurological injury (Hécaen, 1976). These impairments stem from various etiologies of acquired brain injury (ABI) and present as conditions like aphasia, dysarthria, apraxia, and cognitive communication impairments (Burns, O'Connor, et al., 2024). Children with ACIs often require intensive neurorehabilitation, including speech-language pathology and music therapy, to relearn and redevelop abilities impacted by their injury (Burns, O'Connor, et al., 2024; Murdoch, 2011).

### 7.2.1 Collaboration

Collaborative care, where healthcare professionals share knowledge, expertise, and skills, is widely considered the most effective way to deliver quality care, with the client at the center (Reeves et al., 2010; Twyford, 2017; Twyford & Watson, 2008).

Hobson (2006b) delineates three distinct modes of teamwork:

1. **Multidisciplinary** – Professionals approach the client's needs from their specific disciplinary focus, implementing their own goals, interventions, and treatments autonomously. This ensures direct application of each discipline's expertise but may result in fragmented care due to limited collaboration.
2. **Interdisciplinary** – The team collaborates on shared goals, with each discipline conducting individual assessments and treatments. Information is openly exchanged, and team members are well-informed about each other's approaches. This enhances the depth of care by integrating multiple perspectives, though differing terminologies and frameworks can sometimes hinder full integration.

3. Transdisciplinary – Professionals transcend traditional disciplinary boundaries by integrating knowledge, methods, and perspectives from multiple disciplines into a unified approach. The potential for teamworking is realized and co-treating frequently occurs. This often leads to innovative, well-rounded solutions, although the blurring of roles and the complexity of synthesizing knowledge across disciplines can pose challenges.

An interdisciplinary approach is commonly found in specialist rehabilitation services (Behm & Gray, 2012). However, in many low- and middle-income settings, rehabilitation services are often limited to a single discipline, typically physiotherapy, resulting in significant service gaps (World Health Organization, 2017). Cartmill et al. (2011) recommend a transdisciplinary approach for populations with complex needs to provide comprehensive functional and psychosocial levels of care for optimal outcomes. While this approach is touted as the most efficient for early intervention, theoretical understanding of evidence-based practice does not always translate to the practical processes required to effectively establish and maintain high-functioning teams (Aubin & Mortenson, 2015; Bell et al., 2010). Ultimately, the choice of approach should be guided by the client's needs, the rehabilitation goals, and the available resources and expertise within the team.

### ***7.2.2 Collaborative Music Therapy and Speech-Language Pathology***

Music and language are deeply intertwined, both utilizing elements like pitch, rhythm, and tempo to convey and express emotive meaning (Besson & Schön, 2001). Music functions at both pre-verbal and verbal levels, acting as a potent form of communication accessible long before the acquisition of expressive language (Bunt & Stige, 2014). Though music and language differ in semantics, they share some neural mechanisms involved in processing pitch and rhythm (Jentschke, 2016; Peretz et al.,

2015). However, it remains largely elusive as to how music elicits neural changes that help to facilitate speech and language processes in the brain (Lee et al., 2019).

Nonetheless, music plays a therapeutic role in language rehabilitation, particularly within ABI. Singing has been shown to improve several speech-related parameters, including phonation time, intensity, speech rate, prosody, vocal range, and overall intelligibility (Baker et al., 2005; Cohen, 1992; Kim & Jo, 2013).

Music therapists (MTs) and speech-language pathologists (SLPs) bring distinct yet complementary contributions to the treatment of individuals with ACIs. Their shared skillset in assessment, goal setting, social skills development, and play facilitation suggests a natural potential for collaboration in practice (Ryckaert & Kenworthy, 2016). Twyford and Watson (2008) propose that collaborative efforts between music therapy and speech-language pathology can enhance motivation and attention, thereby bolstering communication and social interaction skills. Kennelly et al. (2001) emphasize that music, being both stimulating and enjoyable, enhances motivation in repetitive speech exercises. Co-treatment involving music therapy and speech-language pathology has been employed to support various client groups, including adults with apraxia of speech and aphasia (Hurkmans et al., 2015), children with developmental apraxia of speech (van Tellingen et al., 2023), and children with developmental communication impairments (Geist et al., 2008). Hobson (2006a, 2006b) asserts that active collaboration between MTs and SLPs is essential for delivering optimal service provision, especially for individuals with neurologic deficits or ACIs.

### ***7.2.3 The Pediatric ACI Landscape***

Despite the recognized benefits of interprofessional approaches, the intersection of music therapy, speech-language pathology, and pediatric ACIs remains underexplored. In a review of music therapy and pediatric ABI, Burns, Healy, et al.

(2024) identified no empirical studies examining collaborative efforts between MTs and SLPs. Existing research relies heavily on anecdotal reports and case studies (Bower & Shoemark, 2009; Kennelly et al., 2001; Kennelly & Brien-Elliott, 2001), limiting generalizability. Although dated, their relevance and applicability remain significant. Researchers have demonstrated the importance of collaboration on addressing articulation, speech rate, pitch range, intonation, and volume control in dysarthria rehabilitation (Kennelly et al., 2001; Kennelly & Brien-Elliott, 2001), and word-finding capabilities and expressive language in aphasia rehabilitation (Bower & Shoemark, 2009; Kennelly et al., 2001). However, they offer limited insights into clinician experience and role delineation between MTs and SLPs. Factors influencing successful collaboration and knowledge around measures of success are lacking, and further research is necessary to fully elucidate the impact and broader applicability of these interventions. Burns and O'Connor's (2023) interviews with MTs and SLPs provide foundational insights into clinicians' experiences in pediatric ABI. Clinicians positively reported that, despite being resource-heavy, shared knowledge and collaborative intervention enhanced client care. However, the small sample from a single rehabilitation setting in Ireland may not fully represent global practices. Burns, O'Connor, et al.'s (2024) survey of music therapy clinical practices in pediatric ACIs revealed that MTs viewed collaborative endeavors with SLPs as the most impactful approach to intervention. While the study did not delve into the specific reasons behind the perceived effectiveness of collaboration, further investigation is essential to understand the underlying factors contributing to successful interprofessional practices in this context.

### **7.2.4 Study Aims**

The purpose of this study was to explore the experiences of MTs and SLPs collaborating in the treatment of children with ACIs. By collecting first-hand accounts from clinicians working in a field with limited research, the objective was to gain insights that could facilitate reflection on the complexities of collaborative practices, enhance service provision, and guide further research in pediatric ACI. The study sought to address the following research questions:

- What is the role of collaborative music therapy and speech-language pathology in the rehabilitation of children with ACIs?
- What are the elements of successful collaboration between music therapy and speech-language pathology in this context?
- How are MTs and SLPs evaluating the impact of their collaborative practices within pediatric ACIs?

Ethical approval was sought and obtained through the Research Ethics Committee at the University of Limerick (2023-10-20-AHSS).

## **7.3 Methodology**

### **7.3.1 Author's Lens and Biases**

In phenomenological research, researchers must acknowledge and set aside their preexisting beliefs and assumptions about the phenomenon under study (Hiller, 2016). The research team brings diverse perspectives shaped by their roles and experiences. Authors 1 and 4 are music therapy clinicians-researchers with extensive pediatric neurorehabilitation experience. Their previous collaborations with SLPs have fostered a deep appreciation for such practice. Authors 2 and 3, music therapy students, have formed similar perspectives through clinical training and contemporary literature.

Author 5, a music therapy researcher and educator with experience in adult settings, provides a broader understanding of collaboration, though with expectations that may differ from pediatric contexts. The research team acknowledged their diverse professional backgrounds and made a concerted effort to remain aware of any preconceptions throughout data collection and analysis.

### ***7.3.2 Research Design***

The researchers employed an interpretivist design to gain an in-depth, context-specific understanding of clinicians' experiences. A hermeneutic phenomenological design was adopted to explore the lived experiences of collaborating MTs and SLPs working with children with ACIs. Phenomenology, defined as the study of that which can be directly experienced (Williams, 2021), and hermeneutics, a method of revealing the unseen world of lived experience (Oerther, 2020), guided the approach to understanding the subjective realities of collaborative clinical practice. This design emphasized the autobiographical and contextualized nature of each clinician's experiences (Miles et al., 2013). Capturing such encounters from the viewpoint of both clinicians simultaneously aimed to bring the experience of collaborative practices with children with ACIs to life by recognizing the contextual dimensions of their narratives.

### ***7.3.3 Participant Recruitment***

A purposive sampling method was employed to identify clinicians possessing specific target characteristics, ensuring that the sample reflects relevant insights and experience within the research context (Bowling, 2014). The inclusion criteria required that participants be (a) fully qualified MTs or SLPs with at least five years clinical experience working with children with ACIs, (b) regularly engaging in collaborative music therapy and speech-language pathology practices with children with ACIs, and

(c) be proficient in either English or Spanish. Clinicians working outside the specific remit of pediatric ACIs in areas, such as autism, were excluded.

The recruitment process involved identifying collaborating pairs of MTs and SLPs meeting these criteria. Invitations and information leaflets were extended to clinicians in pediatric rehabilitation hospitals, and music therapy associations were also contacted to distribute study information to their members (see Appendix F & G). Additionally, a snowball sampling method emerged, where initial participants facilitated the recruitment of additional subjects from within their professional networks (Naderifar et al., 2017). Clinicians from thirty-seven countries were invited, with nine teams from seven countries agreeing to participate.

#### ***7.3.4 Data Collection***

Semi-structured interviews were selected as the most appropriate means of data collection, allowing for a comprehensive exploration of participants' experiences while ensuring alignment with the research questions (Morse, 2012). A topic guide was developed to systematically cover key issues while allowing flexibility to delve into aspects critical to the participating dyads (Arthur & Nazroo, 2003). See Appendix H. This approach supported a wide-ranging discussion of both anticipated and emergent topics (Bowling, 2014). When interviewees diverged in interesting and relevant directions, follow-up questions were posed to clarify or expand on their points. The focus was on understanding the essence of participants' experiences, prioritizing depth and richness over precise terminology (Willig, 2008).

Geographical dispersion necessitated online interviews via Zoom. Conducted from January to April 2024, interviews ranged from 45 to 60 minutes in length. All interviews were video recorded and transcribed verbatim. In the singular instance where an interview was conducted in Spanish, author 3, a native speaker, translated and

verified the accuracy of the English manuscript for subsequent analysis. Interview transcripts were not returned to participants for review.

Data saturation was not fully achieved, as the heterogeneity of the participants' experiences continued to provide new information and perspectives (Guest et al., 2006). Although common themes were emerging, the distinct healthcare systems and cultural influences introduced nuances that made it difficult to reach a point where no new information was generated. While saturation is often an indicator of data adequacy, it is not always a strict requirement when dealing with diverse populations (Guest et al., 2020). However, the absence of saturation might indicate the need for caution in generalizing findings across all contexts.

### ***7.3.5 Data Analysis***

Hermeneutic phenomenological analysis is an iterative process of reading transcripts and developing themes, continually enhancing the researchers' understanding (Oerther, 2020). Van Manen's (1990) hermeneutic phenomenological approach was employed, which involved the following activities:

1. Turning to the nature of lived experience: Formulating a phenomenological question and developing a deep interest in a particular lived experience.
2. Investigating experience as we live it: Capturing the phenomenon through methods of investigation that provide rich descriptions of the lived experience.
3. Reflecting on the essential themes: Conducting thematic analysis to identify and reflect on essential themes that characterize the phenomenon. This involves open coding, creating initial themes, and highlighting core aspects of the experience.
4. The art of writing and rewriting: Articulating participants' feelings, thoughts, and attitudes to vividly and accurately capture the essence of their experiences.

5. Maintaining a strong and oriented relation: Remaining engaged with the research questions to ensure focus on the lived experience being explored.
6. Balancing the research context by considering parts and whole: Integrating individual themes into a comprehensive understanding of the phenomenon by examining the relationship between the parts (individual themes) and the whole (overall experience) to achieve a balanced and nuanced interpretation.

The authors' initial perspectives were noted and set aside before analysis. The first three authors independently reviewed the interviews, coding and thematically analyzing the data following Van Manen's (1990) approach. Each transcript was read multiple times, with the text coded line by line to generate initial codes. These codes were then clustered into broader themes, focusing on units of relevant meaning that illuminated the research questions. Finally, these groupings were refined into core themes representing participants' experiences. The research team then discussed their analyses to reach a consensus on the final themes, enhancing the credibility of the analysis by ensuring a comprehensive exploration of the data (Bernard et al., 2016).

To further validate the study and mitigate potential biases, two randomly selected teams of collaborating pairs examined the emerging themes. This external validation process aimed to confirm the fidelity of the analysis and explore any additional perspectives. While member checking with each pair was not feasible due to time and resource constraints, the feedback received led to revisions in theme and sub-theme names, ensuring a more accurate representation of participants' descriptions and minimizing the influence of personal assumption and biases on the analysis.

## 7.4 Results

Nine pairs of MTs and SLPs from seven countries outlined their experiences of collaboration within pediatric ACIs. A summary of participants' demographic information is detailed in Table 11.

**Table 11**

*Demographic Information of Participants*

Team	Country	Identifier	Years experience in pediatric ABI	Years working collaboratively
1	Spain	Sp-MT	8	8
		Sp-SLP	8	
2	Australia	Aus-MT1	5	5
		Aus-SLP1	32	
3	United Kingdom	UK-MT	22	22
		UK-SLP	22	
4	Ireland	Ire-MT1	15	10
		Ire-SLP1	10	
5	Ireland	Ire-MT2	9	3
		Ire-SLP2	9	
6	Australia	Aus-MT2	30	24
		Aus-SLP2	24	
7	Argentina	Arg-MT	7	5
		Arg-SLP	9	
8	United States of America	USA-MT	5	4
		USA-SLP	7	
9	Canada	Can-MT	15	8
		Can-SLP	9	

Note: ABI = Acquired Brain Injury; MT = Music Therapist; SLP = Speech-Language Pathologist

Using Van Manen's (1990) hermeneutic phenomenological approach, three overarching themes arose: (a) the role of collaborative music therapy and speech-language pathology, (b) building blocks of successful collaboration, and (c) evaluating collaborative practices. See Table 12.

**Table 12**

*Themes and Subthemes*

<b>Themes</b>	<b>Subthemes</b>
The role of collaborative music therapy and speech-language pathology	<ul style="list-style-type: none"><li>• Complexity demands teamwork</li><li>• Collaboration is innate</li><li>• Cross-fertilization nurtures knowledge and expertise</li></ul>
Building blocks of successful collaboration	<ul style="list-style-type: none"><li>• Personality</li><li>• Practicalities</li><li>• Understanding roles</li></ul>
Evaluating collaborative practices	<ul style="list-style-type: none"><li>• Reliance on qualitative note writing</li><li>• Sensitivity of video recording</li></ul>

**7.4.1 Theme 1: The Role of Collaborative Music Therapy and Speech-Language Pathology**

Throughout the interviews, the synergy between music therapy and speech-language pathology was a central focus and their collaborative role in supporting children with ACIs was addressed. Three key subthemes were identified: (a) complexity demands teamwork, (b) collaboration is innate, and (c) cross-fertilization nurtures knowledge and expertise.

**7.4.1.1 Complexity Demands Teamwork**

Participants underscored the unique challenges of pediatric ACIs, emphasizing its distinction from adult ACIs due to the added layer of child development. This complexity frequently challenged seasoned clinicians. Aus-SLP1 expressed, “even as a speech pathologist, that is supposed to know everything about those presentations, it is always something new. Every patient is different and presents with different issues.” “Trickier” (Ire-SLP2) or “complex” (USA-MT) presentations were prioritized for joint sessions. As noted by Ire-SLP1: “we are coming together because we need to.”

Collaboration was viewed as essential for gaining crucial insights into clients’ communicative presentations and effectively addressing identified needs. Participants

described its role in early diagnosis as “vital for unraveling complexities” (UK-SLP), with each clinician seeking assistance, advice, or guidance from others as needed.

I’m just waiting for [Aus-MT1] to come so I can see whether it is dyspraxia or aphasia or whatever – it’s the only way I can do it. I rely on music therapy in helping me work these kids out – it’s invaluable (Aus-SLP1).

The value of differing perspectives was emphasized by Sp-SLP: “sometimes we will see the same things but sometimes we will notice different things.” Joint intervention was deemed effective in supporting early pre-verbal skills, facilitating subsequent language acquisition, and alleviating symptoms of ACIs.

#### **7.4.1.2 Collaboration is Innate**

Participants struggled to articulate a concise role to succinctly justify the presence of two clinicians in a single session, despite their commitment to collaboration in pediatric ACI. They instinctively gravitated toward each other when assistance was needed with a specific child: “we just do it, don’t we?” (Aus-SLP1).

Participants recognized the commonalities between the two disciplines, acknowledging that both work toward enhancing speech, language, and communication with this population. Aus-MT2 described how the roles seamlessly integrated when combined:

It is fluid. It moves in and out and back and forth all the time – constant modification – all of that working out what it is that we are doing and what the intervention is going to look like – is a different role.

Despite shared goals, participants expressed conflicting attitudes on whether their roles as clinicians changed when working individually versus collaboratively. Some felt that their core responsibilities remained constant, viewing both individual and collaborative efforts as “different pieces of the same puzzle” (Aus-SLP2). Others

believed their roles adapted significantly when working in a collaborative context, noting that the presence of another clinician brought new dynamics and opportunities for intervention: “When we work together, it’s like we’re adding layers to the same task. My role shifts slightly to complement [Ire-SLP1]’s strengths” (Ire-MT1).

#### **7.4.1.3 Cross-fertilization Nurtures Knowledge and Expertise**

Participants praised the informal, “collegial learning” (Can-SLP) occurring through collaborative processes, valuing the acquisition of new techniques, confidence, and experiences resulting from collaboration. UK-SLP shared insights gained from UK-MT, describing a shift in approach toward “being” with the child rather than setting rigid expectations. Arg-MT echoed this, noting how collaboration “enriqueció mi formación y desarrollo” [enriched my training and development].

While participants found collaboration personally enriching, their focus remained on maximizing the outcomes for children. Aus-SLP2 emphasized the transformative potential of working with MTs: “everybody should get to work with a music therapist – then you can get more out of the child.” Sp-MT underscored that “every child that comes has different goals linked to speech or conversation, or social abilities, we help each other to make the children do their best.”

### ***7.4.2 Theme 2: Building Blocks of Successful Collaboration***

Participants provided insights into the factors that contribute to successful collaboration. Three subthemes emerged from the data: (a) personality, (b) practicalities, and (c) understanding roles.

#### **7.4.2.1 Personality**

Teams universally highlighted the significance of personality in fostering successful collaboration. As one participant articulated, “it is the people first, then the

two disciplines, and then you have to follow the child” (Ire-SLP1). Participants stressed the importance of interpersonal dynamics, highlighting the need for an environment of equality and mutual respect, where individuals can “gently share things that are relevant along the way” (Aus-MT1). The value of rapport was underscored, with one participant noting their collaborating pair “is also a good friend – I love her. That also helps” (Can-MT).

Participants reported that personal compatibility enhanced collaboration, making the partnership more effective. “Getting to know each other” (Ire-MT2) was deemed an essential prerequisite. Building upon this, UK-MT stated, “we took time to really build a way of working together. . . achieving that level of congruence can take time – together we operate very fluidly as a team.”

Participants acknowledged that not all partnerships succeed. Personal connection between collaborators can impact the effectiveness of their partnership, with one participant commenting, “llevarse bien con el companero, eso me parece muy bien super importante por que a veces tu puedes tener mucha formacion y por ahi no fluye” [getting along with your partner, that seems very important to me because sometimes you can have a lot of training and it doesn’t flow] (Arg-MT).

#### **7.4.2.2 Practicalities**

Several participants underscored the significance of securing stable funding for music therapy positions, highlighting that “structural and institutional barriers are what frequently inhibit collaboration” (USA-SLP). They noted a prevailing sentiment that MTs must continually “prove” (UK-MT) themselves. Participants reported that the lack of funding for MTs limits opportunities for collaboration. “Unfortunately, we only have [Can-MT] two days per week” (Can-SLP).

Furthermore, MTs noted their varied roles and responsibilities. With “limited funding comes limited resources” (IreMT1), necessitating the “triaging of music therapy services” (USA-MT) to prioritize and allocate time and efforts effectively. “We only have limited opportunities to see a child, so we need to determine, does the child need procedural support, psychosocial support, or do I need to collaborate with physiotherapy instead?” (USA-MT).

Participants unanimously stressed the importance of time allocation and scheduling for effective joint planning, goal setting, and documentation. As stated by Arg-MT, “creo que se benefician todos cuando realmente ahí objetivos específicos para ese paciente o cuando realmente ahí un trabajo coordinado, anticipado, planificado” [everyone benefits when there are specific objectives for the patient or when there is really coordinated, anticipated, planned work].

#### **7.4.2.3 Understanding Roles**

Participants stressed the importance of having “shared knowledge of what each brings to the table” (UK-MT). One participant articulated, “if I did not understand your role, what music therapy entails, I wouldn’t know how to ask you to do something to help the communication goal” (Ire-SLP1), succinctly summarizing the difference between genuine collaboration and merely working “side by side” (Ire-SLP2).

A prevailing theme was that collaboration faltered when roles were not equally understood and valued. MTs described instances where they felt relegated to a supporting role, where “someone else is the leader, and I’m the follower” (Aus-MT1). While acknowledging that a leader/follower dynamic could be appropriate in certain contexts, the absence of a “true collaborative approach” (Aus-MT1) was keenly felt.

### ***7.4.3 Theme 3: Evaluating Collaborative Practices***

Participants shared their experiences of evaluating collaborative endeavors in pediatric ACIs. Two subthemes were established: (a) reliance on qualitative note writing, and (b) sensitivity of video recording.

#### **7.4.3.1 Qualitative Note Writing**

Participants found session evaluation challenging, with several noting that “there are very few standardized measures that are normed to this population” (USA-SLP). Goal Attainment Scaling was cited as beneficial due to the “need for quantitative data, rather than qualitative data” (Can-MT), though concerns about “subjectivity and consistency” (Ire-MT2) across practitioners were raised. During interviews, the predominant evaluation method mentioned was joint qualitative note writing. Reflecting this sentiment, Ire-SLP2 stated:

In terms of marking changes. I would be using my notes for that. If you went back over the notes, you would be able to see there was ‘only needed a prompting to make a choice today’ and six weeks later maybe that’s changed.

There were reservations about formal evaluations, particularly in acute care settings where conditions fluctuate significantly. Aus-SLP1 emphasized: “I’ve been taught that until our patient stabilizes in terms of their cognitive state- between that sort of zero and three-month stage- not to do too much formal evaluation..

Aus-MT2 emphasized the importance of assessing the relevance and impact of assessments on the client. They questioned the necessity of “time-consuming assessments” (Aus-MT2) and reports, advocating for meaningful use of resources. The consensus was that active support during sessions, documented through qualitative notes, was more beneficial for the child’s progress.

### **7.4.3.2 Sensitivity of Video Recording**

Many participants viewed video recording as a visually compelling method for tracking outcomes. While video recording can provide clear, objective evidence of progress, Aus-SLP1 expressed concerns as securing consent can be complicated and “emotionally taxing for parents.” Managing technology during sessions was viewed as “burdensome” (Ire-MT1) unless properly equipped facilities were available. However, participants were inspired to consider videoing, arising from hearing their collaborative partner endorse it. “The idea of taking a little snippet of video at each point would be quite amazing” (Aus-MT1).

### ***7.4.4 The Essence of the Phenomenon***

To encapsulate the essence of the collaborative work between MTs and SLPs within pediatric ACIs, the following descriptive piece is written from the perspective of the participants. Guided by Van Manen’s (1990) hermeneutic phenomenological approach, the essence is presented in a narrative form that reflects the lived experiences of those involved in this collaborative practice.

*In our work with children with ACIs, the synergy between music therapy and speech-language pathology has become an indispensable part of our approach. The challenges presented by pediatric ACI demand a level of teamwork that transcends traditional boundaries. In these moments, collaboration becomes not just helpful but essential, allowing us to navigate the complexities of each child’s case with greater insight and effectiveness.*

*Our collaboration goes beyond merely combining our skills; it involves a seamless integration where our roles merge and adapt in response to the needs of the child. There is a fluidity in our sessions, a constant back-and-forth as we modify our*

*approaches, sometimes leading, sometimes supporting, but always working toward a shared goal.*

*Through this process, we also find ourselves growing as professionals. The exchange of knowledge and expertise enriches our practice, leading to better outcomes for the children. However, the success of our collaboration is not solely due to our shared skills; it is deeply rooted in the relationships we build with each other. Mutual respect, understanding, and a strong personal connection are the foundation of our effective teamwork. When we truly appreciate each other's roles, our sessions become more fluid, and the children benefit from a more integrated and supportive approach.*

*As we continue to work together, we remain committed to refining and expanding our collaborative practice. We see the need for more systematic methods to evaluate therapeutic outcomes and gain deeper insights into our collaborative impact. By communicating the benefits of this approach, we aim to advocate for its broader adoption, ensuring that more children can access and benefit from this form of care to support their language and communicative needs.*

## **7.5 Discussion**

This study explored the perspectives of MTs and SLPs regarding collaborative work with children who have ACIs. By bringing together data from a highly specialized sample, this research seeks to illuminate the experiences and insights related to collaboration in this field.

### ***7.5.1 Navigating Collaborative Practice***

Based on the findings, intrinsic complexity of pediatric ACIs exist, often necessitating a collaborative music therapy and speech-language pathology approach. Participants' experiences revealed that collaboration is often indispensable in addressing

the diverse communication challenges presented by children with ACIs. This reflects the sentiment of existing literature that underscores the essential role of collaboration in optimizing outcomes for individuals with complex healthcare needs (Reeves et al., 2010; Twyford, 2017). Although participants did not explicitly reference teamwork models, their descriptions suggested the use of interdisciplinary and transdisciplinary approaches. Their collaborative methods were flexible, adapting to the child's needs, showcasing cooperation that was highly responsive to the dynamic requirements of patient care.

A notable finding from this study is the struggle participants experienced in defining the collaborative role clearly. This ambiguity may stem from the relatively new and under researched nature of this collaborative approach. In traditional settings, the roles of MTs and SLPs are well-defined and distinct (Hobson, 2006a, 2006b; Kennelly & Brien-Elliott, 2001). However, when these professionals work together their roles can become fluid and intertwined, leading to a dynamic but sometimes unclear collaborative practice. Despite this lack of precise role definition, the impact of collaboration on improving speech, language, and communication skills in children with ACIs is evident (Bower & Shoemark, 2009; Kennelly et al., 2001; Kennelly & Brien-Elliott, 2001). Participants instinctively gravitated toward collaborative practices, driven by the complexity of their cases. While the exact mechanisms and best practices for such work are still emerging, this evolving understanding highlights the necessity for further research to explore and solidify the roles within these collaborative efforts.

### ***7.5.2 Triaging of Services***

The limited availability of MTs significantly restricts collaboration with SLPs. This limitation is compounded by the broad scope of music therapy practice, which addresses a wide range of needs beyond communication, necessitating a strategic

prioritization of services. In contrast, SLPs, with a typically larger workforce, have more frequent opportunities for collaboration. Participants consistently noted that the scarcity of music therapy resources impedes the potential for sustained and effective collaboration. This intermittent availability can lead to fragmented care, where collaborative efforts are confined to sporadic joint sessions rather than a continuous, integrated approach. Such constraints hinder the ability to establish a cohesive treatment plan and reduces opportunities for clinicians to develop the deep, intuitive understanding necessary for effective teamwork.

Music therapy in pediatric ACIs extends beyond communication to encompass a variety of therapeutic needs, including psychosocial support, cognitive rehabilitation, and motor skill development. This broad scope necessitates a triage system to prioritize the most pressing needs of each child as identified by USA-MT. Assessing each child's unique needs, involves considering multiple factors, including the severity of communication impairment, the child's emotional and psychological state, and the presence of co-occurring impairments resulting from their ABI. Given the diverse needs addressed by music therapy, establishing clear criteria for prioritization is essential. Stable funding and institutional support are essential to facilitate ongoing, effective collaboration, ultimately improving therapeutic outcomes for this vulnerable population. While the specific constraints described may be particularly pronounced in the context of music therapy within pediatric ACIs, it is reasonable to speculate that similar challenges are likely faced by other allied health professionals working with limited resources in various settings.

### ***7.5.3 Assessing the Effectiveness of Collaborative Interventions***

From the data, a predominant reliance on qualitative note writing exists for evaluating the outcomes of collaborative sessions. The potential of video recording as a

tool for tracking progress was also recognized, though concerns about consent and practicality were raised. While these methods provide detailed, contextualized insights, the lack of standardized measures poses a challenge for objectively assessing the impact of interventions. This issue is exacerbated by the fluctuating conditions of children with ACIs, which complicates formal evaluations, a concern also noted by Burns and O'Connor (2023).

There is a notable lack of standardized assessment tools in both music therapy and speech-language pathology for this population, with existing tools often failing to capture the subtle changes in these children. Developing robust and feasible evaluation methods is crucial to accurately capture the effectiveness of interprofessional interventions. MTs have a professional responsibility to design and implement such tools (American Music Therapy Association, 2013), as limited opportunities to evaluate outcomes will inevitably impact service provision, underscoring the urgency of addressing these gaps.

#### ***7.5.4 Limitations and Recommendations***

The study encountered several limitations that warrant consideration in interpreting its findings. While the sample size was appropriate given the chosen methodology, the study would have benefitted from greater diversity among participants. Despite efforts to include clinicians from Asian and African countries, the final sample predominantly consisted of individuals from Western, English-speaking backgrounds. This was partly due to the study invitations not being issued in native languages, and the research team's capacity to conduct interviews only in English and Spanish. The ability to participate in interviews in one's native language is crucial for accurately expressing experiences and reflections, and this limitation likely affected the diversity of the sample. For instance, a German-speaking team initially expressed

interest but ultimately decided not to partake, citing concerns about their proficiency in English. Another limitation was the absence of member checking. This omission is particularly relevant to the interview conducted in Spanish. Despite translation efforts, the lack of member checking means that the translation's accuracy in reflecting the participant's intended meaning could not be confirmed. This highlights the importance of incorporating validation methods, especially when working across languages.

Furthermore, the voluntary nature of participation may have introduced a positive bias in the sample. Clinicians who opted to participate may have already held favorable views toward collaborative approaches, possibly skewing the findings toward more positive experiences. This bias could lead to an underestimation of the challenges associated with collaborative care delivery in pediatric ACIs. Additionally, while the research team aimed to set aside preexisting beliefs regarding collaboration, it is important to acknowledge that the authors' professional background and experiences may have influenced the study's design, analysis, and interpretation.

Future researchers should aim to include more diverse samples and consider quantitative and mixed-methods methodologies to capture a wider range of experiences and perspectives. This will provide complementary insights into the nuances involved in collaborative practices between MTs and SLPs. Alternatively, a more focused examination of a specific region could yield details into the specific challenges and opportunities within that context. Additionally, longitudinal studies could offer valuable insights into how these collaborative relationships evolve over time. A critical next step for advancing the field is to conduct empirical research that translates insights from existing literature into actionable studies, specifically evaluating the effectiveness of collaborative therapy. Bridging the gap between theoretical knowledge and practical

application will enhance the quality and impact of collaborative music therapy and speech-language pathology intervention.

## **7.6 Conclusion**

This study explored the experiences of MTs and SLPs in collaborative practices for children with ACIs. The findings illuminated the synergy between these professions, especially in handling intricate cases where their combined efforts led to more robust intervention. While defining collaborative roles posed challenges, participants emphasized collaboration as a pathway to enriching skills and expertise, ultimately enhancing the quality of care provided. Additionally, the study underscores the difficulties in evaluating outcomes of collaborative efforts effectively. Moving forward, it is crucial to advocate for the resources and support needed to nurture effective collaboration, ultimately improving outcomes for this population.

## 7.7 References

- American Music Therapy Association. (2013). *American Music Therapy Association professional competencies*. <https://www.musictherapy.org/about/competencies/>
- Arthur, S., & Nazroo, J. (2003). Designing fieldwork strategies and materials. In J. Ritchie & J. Lewis (Eds.), *Qualitative research practice: A guide for social science students and researchers* (pp. 109–137). Sage Publications.
- Aubin, T., & Mortenson, P. (2015). Experiences of early transdisciplinary teams in pediatric community rehabilitation. *Infants & Young Children, 28*(2), 165–181. <https://doi.org/10.1097/IYC.0000000000000033>
- Baker, F., Wigram, T., & Gold, C. (2005). The effects of a song-singing programme on the affective speaking intonation of people with traumatic brain injury. *Brain Injury, 19*(7), 519–528. <https://doi.org/10.1080/02699050400005150>
- Behm, J., & Gray, N. (2012). Interdisciplinary rehabilitation team. In E. Mauk (Ed.), *Rehabilitation nursing: A contemporary approach to practice* (pp. 51–62). Jones & Bartlett.
- Bell, A., Corfield, M., Davies, J., & Richardson, N. (2010). Collaborative transdisciplinary intervention in early years – Putting theory into practice. *Child: Care, Health and Development, 36*(1), 142–148. <https://doi.org/10.1111/j.1365-2214.2009.01027.x>
- Bernard, H. R., Ryan, G. W., & Wutich, A. Y. (2016). *Analyzing qualitative data: Systematic approaches* (2nd ed.). Sage Publications.
- Besson, M., & Schön, D. (2001). Comparison between language and music. *Annals of the New York Academy of Sciences, 930*, 232–258. <https://doi.org/10.1111/j.1749-6632.2001.tb05736.x>

- Bower, J., & Shoemark, H. (2009). Music therapy to promote interpersonal interactions in early paediatric neurorehabilitation. *Australian Journal of Music Therapy*, 20, 59–75.
- Bowling, A. (2014). *Research methods in health* (4th ed.). Open University Press.
- Bunt, L., & Stige, B. (2014). *Music therapy: An art beyond words*. Taylor and Francis.  
<https://doi.org/10.4324/9781315817989>
- Burns, J., Healy, H., O'Connor, R., & Moss, H. (2024). Integrative review of music and music therapy interventions on functional outcomes in children with acquired brain injury. *Journal of Music Therapy*, 62(1). <https://doi.org/10.1093/jmt/thae017>
- Burns, J., O'Connor, R., & Moss, H. (2024). Music therapy for young children with acquired communication impairments: An international survey of clinical practices. *Nordic Journal of Music Therapy*, 33(5), 391–408.  
<https://doi.org/10.1080/08098131.2024.2329898>
- Burns, J., & O'Connor, R. S. (2023). Exploring clinicians' experiences of engaging in collaborative music therapy and speech and language therapy for children with an acquired brain injury. *Approaches: An Interdisciplinary Journal of Music Therapy*.  
<https://doi.org/10.56883/aijmt.2024.37>
- Cartmill, C., Soklaridis, S., & David Cassidy, J. (2011). Transdisciplinary teamwork: The experience of clinicians at a functional restoration program. *Journal of Occupational Rehabilitation*, 21(1), 1–8. <https://doi.org/10.1007/s10926-010-9247-3>
- Cohen, N. S. (1992). The effect of singing instruction on the speech production of neurologically impaired persons. *Journal of Music Therapy*, 29(2), 87–102.  
<https://doi.org/10.1093/jmt/29.2.102>

- Geist, K., McCarthy, J., Rodgers-Smith, A., & Porter, J. (2008). Integrating music therapy services and speech-language therapy services for children with severe communication impairments: A co-treatment model. *Journal of Instructional Psychology*, 35(4), 311–316. <https://doi.org/10.55487/ijcih.v1i1.6>
- Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? *Field Methods*, 18(1), 59–82. <https://doi.org/10.1177/1525822X05279903>
- Guest, G., Namey, E., & Chen, M. (2020). A simple method to assess and report thematic saturation in qualitative research. *PLOS ONE*, 15(5), e0232076. <https://doi.org/10.1371/journal.pone.0232076>
- Hécaen, H. (1976). Acquired aphasia in children and the ontogenesis of hemispheric functional specialization. *Brain and Language*, 3(1), 114–134. [https://doi.org/10.1016/0093-934X\(76\)90009-2](https://doi.org/10.1016/0093-934X(76)90009-2)
- Hiller, J. (2016). Epistemological foundations of objectivist and interpretivist research. In B. Wheeler & K. Murphy (Eds.), *Music therapy research* (pp. 236–268). Barcelona Publishers.
- Hobson, M. R. (2006a). The collaboration of music therapy and speech-language pathology in the treatment of neurogenic communication disorders: Part I- Diagnosis, therapist roles, and rationale for music. *Music Therapy Perspectives*, 24(2), 58–65. <https://doi.org/10.1093/mtp/24.2.58>
- Hobson, M. R. (2006b). The collaboration of music therapy and speech-language pathology in the treatment of neurogenic communication disorders: Part II- Collaborative strategies and scope of practice. *Music Therapy Perspectives*, 24(2), 66–72. <https://doi.org/10.1093/mtp/24.2.66>
- Hurkmans, J., Jonkers, R., de Bruijn, M., Boonstra, A. M., Hartman, P. P., Arendzen, H., & Reinders-Messelink, H. A. (2015). The effectiveness of speech–music therapy

for aphasia (SMTA) in five speakers with apraxia of speech and aphasia.

*Aphasiology*, 29(8), 939–964. <https://doi.org/10.1080/02687038.2015.1006565>

Jentschke, S. (2016). The relationship between music and language. In S. Hallam, I. Cross, & M. Thaut (Eds.), *The Oxford handbook of music psychology* (2nd ed., pp. 343–355). Oxford University Press.

<https://doi.org/10.1093/oxfordhb/9780198722946.013.24>

Kennelly, J., & Brien-Elliott, K. (2001). The role of music therapy in paediatric rehabilitation. *Pediatric Rehabilitation*, 4(3), 137–143.

<https://doi.org/10.1080/13638490110067687>

Kennelly, J., Hamilton, L., & Cross, J. A. (2001). The interface of music therapy and speech pathology in the rehabilitation of children with acquired brain injury.

*Australian Journal of Music Therapy*, 12, 13–20.

<https://doi.org/10.3109/17518423.2013.778910>

Kim, S. J., & Jo, U. (2013). Study of accent-based music speech protocol development for improving voice problems in stroke patients with mixed dysarthria.

*NeuroRehabilitation*, 32(1), 185–190. <https://doi.org/10.3233/NRE-130835>

Lee, Y. S., Thaut, C., & Santoni, C. (2019). Neurologic music therapy for speech and language rehabilitation. In M. H. Thaut & D. A. Hodges (Eds.), *The Oxford handbook of music and the brain* (pp. 715–737). Oxford University Press.

Miles, M., Francis, K., Chapman, Y., & Taylor, B. (2013). Hermeneutic phenomenology: A methodology of choice for midwives. *International Journal of Nursing Practice*, 19(4), 409–414. <https://doi.org/10.1111/ijn.12082>

<https://doi.org/10.1111/ijn.12082>

Morse, J. (2012). The implications of interview type and structure in mixed-method designs. In J. F. Gubrium, J. A. Holstein, A. B. Marvasti, & K. D. McKinney

- (Eds.), *The Sage handbook of interview research: The complexity of craft* (2nd ed., pp. 193–204). Sage Publications.
- Murdoch, B. E. (2011). *Handbook of acquired communication disorders in childhood*. Plural Publishing.
- Naderifar, M., Goli, H., & Ghaljaie, F. (2017). Snowball sampling: A purposeful method of sampling in qualitative research. *Strides in Development of Medical Education*, 14(3). <https://doi.org/10.5812/sdme.67670>
- Oerther, S. (2020). Analysis methods in hermeneutic phenomenological research: Interpretive profiles. *Frontiers of Nursing*, 7(4), 293–298. <https://doi.org/10.2478/fon-2020-0038>
- Peretz, I., Vuvan, D., Lagrois, M.-É., & Armony, J. L. (2015). Neural overlap in processing music and speech. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 370(1664), 20140090. <https://doi.org/10.1098/rstb.2014.0090>
- Reeves, S., Zwarenstein, M., Goldman, J., Barr, H., Freeth, D., Koppel, I., & Hammick, M. (2010). The effectiveness of interprofessional education: Key findings from a new systematic review. *Journal of Interprofessional Care*, 24(3), 230–241. <https://doi.org/10.3109/13561820903163405>
- Ryckaert, J., & Kenworthy, F. (2016). Tune in: Creating confident communicators through music therapy and speech-language therapy collaboration. *New Zealand Journal of Music Therapy*, 14(14), 104–121.
- Twyford, K. (2017). Collaborating: A role for music therapy within interprofessional teams and beyond. In J. Edwards (Ed.), *The Oxford handbook of music therapy* (pp. 894–926). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199639755.013.41>

- Twyford, K., & Watson, T. (2008). *Integrated team working: Music therapy as part of transdisciplinary and collaborative approaches*. Jessica Kingsley Publishers.
- Van Manen, M. (1990). *Research lived experience: Human science for an action sensitive pedagogy*. State University of New York Press.
- van Tellinghen, M., Hurkmans, J., Terband, H., van de Zande, A. M., Maassen, B., & Jonkers, R. (2023). Speech and music therapy in the treatment of childhood apraxia of speech: An introduction and a case study. *Journal of Speech, Language, and Hearing Research*, 67(9S), 3269–3287. [https://doi.org/10.1044/2023\\_JSLHR-22-00619](https://doi.org/10.1044/2023_JSLHR-22-00619)
- Williams, H. (2021). The meaning of “phenomenology”: Qualitative and philosophical phenomenological research methods. *The Qualitative Report*, 2(26), 366–385. <https://doi.org/10.46743/2160-3715/2021.4587>
- Willig, C. (2008). *Introducing qualitative research in psychology* (2nd ed.). Open University Press.
- World Health Organization. (2017). *Rehabilitation in health systems*.

## **Chapter 8**

### **Study IV**

# **Exploring Collaborative Music Therapy and Speech and Language Therapy for Young Children with Acquired Communication Impairments: A Case Series**

Burns, J., O'Connor, R., Woods, R., Lee, E., Little, J., Finn, S., Gill, I., & Moss, H. (2025). Exploring collaborative music therapy and speech and language therapy for young children with acquired communication impairments: A case series. *Nordic Journal of Music Therapy*, [in review].

## 8.1 Abstract

Acquired communication impairments (ACIs) in young children can significantly hinder the development and functioning of speech, language, and communication skills, impacting their ability to interact and engage with others. Collaborative music therapy and speech and language therapy (MT-SLT) has gained increasing recognition for its potential to support communicative rehabilitation. This study explores the therapeutic response of young children (ages 2-6 years) with ACIs to a joint MT-SLT programme through a multiple case study design. Four children receiving inpatient neurorehabilitation participated in twice-weekly collaborative sessions. Video data from these sessions was collected and analysed thematically. Three shared themes emerged from the data: (a) leveraging familiar song to build vocal expression, (b) fostering social reciprocity and turn-taking through active musical play, and (c) supporting choice-making through immediate contextualisation. Findings indicate that collaborative MT-SLT can enhance engagement, strengthen foundational communicative skills, and promote greater communicative intent within this population. The interactive musical context provided children with structured yet flexible opportunities to initiate, sustain, and develop communicative exchanges, supporting both pre-verbal and verbal communication. Although the degree of progress directly attributable to the intervention is not yet quantifiable, collaborative interventions between music therapists and speech and language therapists demonstrate significant potential in fostering communicative development in children with ACIs. There remains a clear need for isolated evaluation of collaborative practices using objective outcome measures, a prospect that will remain unfeasible until appropriate observation tools are developed for this cohort. In the absence of such tools, this study advances the field by moving beyond intervention

descriptions to closely examining therapeutic engagement and emerging communicative responses.

**Keywords:** music therapy, speech and language therapy, collaboration, paediatrics, acquired communication impairments

## 8.2 Introduction

Acquired communication impairments (ACIs) refer to a range of speech, language, and communication disorders resulting from neurological damage occurring after the onset of language acquisition (Hécaen, 1976). Often referred to as neurogenic communication disorders, ACIs can arise from various aetiologies, including traumatic brain injury, strokes, infections, neoplasms, anoxia, and hypoxia. The specific characteristics of an ACI are largely determined by the neuroanatomical location and extent of the brain injury, rather than the underlying cause of the injury itself (Murdoch, 2011).

The efficient execution of speech production relies on the coordination of three fundamental neurological processes. First, a concept of the intended speech output must be formed and symbolically formulated for expression. Next, this conceptualised message must be externalised as speech through the integrated motor functions of respiration, phonation, resonance, articulation, and prosody. Finally, before externalisation, a motor programme is generated to determine the sequence of muscle contractions necessary to produce the individual sounds and words that constitute the intended speech (Brookshire, 2015; Murdoch, 2011). Disruptions to any of these processes can result in distinct communication impairments, including:

- Aphasia, a linguistic processing disorder that disrupts the brain's ability to formulate and interpret words and sentences, despite preserved cognitive abilities (Hora et al., 2014). Individuals with aphasia may experience challenges with word retrieval, sentence formation, and the comprehension of spoken or written language (Murdoch, 2011). In children, aphasia often presents as non-fluent, characterised by mutism and limited spontaneous verbal output (O'Hare, 2016).

- Dysarthria, a motor speech disorder caused by neurological damage or paralysis of the muscles involved in speech production, resulting in difficulties with articulation, phonation, and prosody (Hora et al., 2014). In children, dysarthria often leads to shallow, irregular breathing, which compromises breath support for speech, as well as low-pitched, breathy or harsh voices, nasalised speech, and poor pronunciation (Pennington et al., 2016).
- Apraxia of speech, a motor speech disorder characterised by difficulty in planning and programming the movements required for successful speech or language production (Beathard & Krout, 2008; Cohen, 1992). Apraxia causes impaired articulation and altered prosody, despite the absence of muscle weakness or paralysis (Duffy, 2013). In children, acquired apraxia of speech is primarily marked by inconsistencies in sound production and sequencing, which can severely impact intelligibility and expressive communication (Murdoch, 2011).
- Cognitive communication impairments, which involve difficulties in listening, speaking, reading, writing, conversing, and social interaction, arise from underlying cognitive deficits in attention, memory, organisation, information processing, problem-solving, or executive functions (Cermak et al., 2019; Turkstra et al., 2015). These impairments frequently disrupt the ability to initiate, sustain, and adapt communication in dynamic contexts. In young children, cognitive communication impairments commonly manifest as delays in vocabulary acquisition, which may cascade into broader challenges in reading fluency, comprehension, and auditory processing (Turkstra et al., 2015).

While ACIs in adults and children share certain similarities, addressing these impairments within paediatric populations requires careful consideration of the

developmental context. Unlike adults, children are either in the early stages of acquiring speech and language skills or in the process of refining these abilities when neurological damage occurs (Murdoch, 2011). As a result, a brain injury in childhood may not only disrupt established language functions but also impede the development of emerging communication skills (Gilardone et al., 2022). Furthermore, while brain injuries in adults often result in focal lesions that give rise to distinct impairments, childhood brain injuries are more commonly diffuse, affecting the brain more broadly and disrupting multiple cognitive and communicative processes rather than isolated language functions (Anderson et al., 2019). This interplay between neurological damage and ongoing developmental processes creates unique challenges in understanding and addressing ACIs in children, highlighting the limitations of directly applying adult-focused research to paediatric populations (Kennelly, 2006, 2013).

Children with ACIs often require intensive neurorehabilitation, with speech and language therapy, along with occupational therapy, playing pivotal roles in facilitating the relearning and development of abilities impacted by the injury (Murdoch, 2011). In recent years, collaborative efforts between music therapists (MTs) and speech and language therapists (SLTs) have garnered increasing recognition for their potential to address the language and communication needs of this population (Burns, O'Connor, et al., 2024). Hobson (2006a, 2006b) emphasises that active collaboration between these disciplines is essential for providing optimal service, particularly for individuals with neurological deficits or ACIs. Music and language share fundamental elements, such as pitch, rhythm, and tempo, which both serve to express emotive meaning (Besson & Schön, 2001). This overlap provides a strong foundation for integrated therapeutic interventions (Burns, Keaveney, et al., 2024). Moreover, both MTs and SLTs share expertise in assessment, goal setting, social skills development, and play facilitation,

which highlights the natural synergy between their practices (Ryckaert & Kenworthy, 2016). Twyford and Watson (2008) propose that collaboration between music therapy and speech and language therapy can enhance motivation, engagement, and attention, thereby improving communication and social interaction skills. Music, being inherently stimulating and enjoyable, is particularly effective in enhancing motivation during repetitive speech exercises (Kennelly et al., 2001). Beyond its motivational benefits, music is also a deeply social activity that engages individuals at both pre-verbal and verbal levels. Its accessibility as a means of communication, even prior to the development of expressive language, makes it especially valuable in the rehabilitation of communication skills (Bunt & Stige, 2014).

While collaborative music therapy and speech and language therapy (MT-SLT) for young children with ACIs remains relatively underexplored, foundational research into clinician experiences offers valuable insights into the perceived impact and broader application of this approach. Burns, O'Connor, et al. (2024) conducted a survey of music therapy clinical practices in paediatric ACIs, revealing that collaborative efforts with SLTs were perceived as the most impactful intervention approach when supporting language and communication goals. Although the study did not explore the specific reasons behind the perceived success of these collaborations, it provided useful information on preferred music therapy approaches, models, session frequency and duration, interventions, and evaluation methods used in clinical practice. Burns and O'Connor (2023) examined the experiences of MTs and SLTs collaborating to develop communication and social interaction skills in children with acquired brain injury (ABI). Their interviews indicated that clinicians generally held a positive view of collaboration, acknowledging that, despite being resource-intensive, shared knowledge and coordinated interventions contributed to enhanced client outcomes. However, the

study's findings are constrained by the small sample size and the focus on a single rehabilitation setting in Ireland, which may not fully represent global practices. An international perspective was provided by Burns, Keaveney, et al., (2024), who interviewed nine teams of MTs and SLTs across seven countries. Clinicians expressed a natural gravitation towards collaborative practices, driven by the complexities inherent in treating paediatric ACIs. However, participants noted the lack of standardised measures for assessing outcomes make it challenging to objectively evaluate the effectiveness of such interventions, thereby hindering advocacy efforts for broader implementation.

A review by Burns, Healy, et al. (2024) identified no empirical studies examining the collaborative efforts between MTs and SLTs within the paediatric ABI landscape. The existing evidence primarily relies on anecdotal reports and case studies (Bower & Shoemark, 2009; Kennelly et al., 2001; Kennelly & Brien-Elliott, 2001). Previous research has illustrated the use of collaborative practices in addressing articulation, speech rate, pitch range, intonation and volume control in dysarthria rehabilitation (Kennelly et al., 2001; Kennelly & Brien-Elliott, 2001), as well as word-finding capabilities and expressive language in aphasia rehabilitation (Bower & Shoemark, 2009; Kennelly et al., 2001). Only one case study has focused on collaborative interventions for young children within the formative preschool years (aged 2-6). Kennelly et al. (2001) describe a joint MT-SLT programme for a three-year-old girl with severe aphasia. The intervention employed familiar songs to prompt one-word utterances through anticipatory musical cues, alongside musical play to shape and extend vocalisations. The child demonstrated improvements in expressive and receptive communication, including expressing preferred song choice, full-song singing, and following directions. However, the specific contributions of the SLT within the

intervention remain unclear, making it difficult to determine the impact of their role in the observed progress.

While these case studies demonstrate the potential of collaborative MT-SLT, the evidence base remains limited, particularly for young children with ACIs. Much of the existing clinical research remains in a formative stage, primarily documenting clinical applications and intervention processes rather than systematically evaluating outcomes. Despite growing interest in interdisciplinary approaches, there is still little understanding of how these interventions influence therapeutic responses and communicative rehabilitation in this population. Further research is needed to move beyond documentation of clinical practice and towards a deeper examination of the mechanisms underlying intervention effects, supporting the development of a more comprehensive evidence base for collaborative MT-SLT in paediatric neurorehabilitation.

### ***8.2.1 Study Aims***

The aim of this study was to explore the responses of young children, aged 2-6, with ACIs to collaborative MT-SLT intervention. Rather than measuring the efficacy of the intervention, this study sought to document changes in speech, language, and communication skills that emerged throughout a joint therapeutic programme. The following research questions were established:

- What patterns of engagement and therapeutic responses emerge through collaborative MT-SLT intervention for young children with ACIs?
- What insights into collaborative clinical practices can be drawn from observed therapeutic interactions in young children with ACIs?

## **8.3 Methodology**

### ***8.3.1 Research Design***

This study adopts a multiple case study approach as described by Yin (2018), drawing on the established tradition of case study research in music therapy (Aldridge, 2005; Bruscia, 1991; Meadows, 2010). A multiple case study design involves the in-depth analysis of multiple cases within a defined system, allowing for rich, individual case narratives while also capturing broader insights into shared intervention processes (Stake, 2006; Yin, 2018). This approach is well-suited for investigating contemporary phenomena in depth within their real-world context, particularly when the boundaries between the phenomenon and its context are not clearly defined (Yin, 2018; Yin & Davis, 2007). Given the interdisciplinary nature of rehabilitation services, the joint MT-SLT intervention could not be isolated from the broader suite of therapeutic interventions being provided within the clinical setting. This complexity arises due to several factors, including the absence of standardised outcome measures that accurately capture the nuances of engagement and communication in this population, ethical considerations that precluded withholding interventions from this this vulnerable cohort, and environmental influences such as family involvement, exposure to language-rich environments, and the natural recovery process (Burns et al., 2025). Additionally, both music therapy and speech and language therapy provided independent therapeutic input within the hospital rehabilitation programme, further contributing to the challenge of isolating the joint intervention's specific impact. Given these complexities, a qualitative methodology was the most rigorous option for capturing the depth and nuance of therapeutic engagement, allowing for a rich exploration of individual responses and interactional processes.

Explanatory multiple case studies seek to explore casual relationships and provide theoretical insights by investigating how and why certain interventions produce specific outcomes within real-world conditions (Yin, 2018). This framework enables a detailed exploration of key intervention elements that demonstrate significant potential to address specific clinical needs (Jones & Odell-Miller, 2023; Yin, 2018). Multiple case studies are gaining recognition as a valuable research method in music therapy and have been previously used to investigate its use in the treatment of selective mutism in young children (Jones & Odell-Miller, 2023). In this study, four case studies of collaborative MT-SLT are presented, with the first author serving as the MT for all four cases, and authors three and four serving as the SLTs, each working with two cases. The implications of these dual roles are addressed in the discussion section.

### ***8.3.2 Participant Recruitment***

Participants ( $n = 4$ ) were recruited from a rehabilitation hospital in Ireland using a convenience sampling method between November 2023 and December 2024. Recruitment was conducted consecutively, meaning all eligible children who met the inclusion criteria during this period were invited to participate, and no eligible participants declined. Children were eligible to participate provided they met the following inclusion criteria: (a) sustained an ABI, (b) were between 2-6 years old at the time of admission, and (c) presented with an ACI secondary to their ABI, as assessed by an SLT. Children with pre-existing developmental language or communication difficulties were excluded from participation.

### ***8.3.3 Ethical Considerations***

Ethical approval was obtained from the Research Ethics Committee at the National Rehabilitation Hospital (12-05-2023-NRH). Prior to participation, informed

consent was obtained from parents or legal guardians of participants following an initial research meeting with the first author. During this meeting, the study's purpose, procedures, potential benefits, and risks were outlined, a research information sheet provided, and parents/legal guardians were encouraged to ask questions to ensure fully informed decision-making (See Appendix I-L).

To uphold the autonomy and assent of prospective participants, the study was explained to the children in an age-appropriate manner using simplified language. Furthermore, prior to each collaborative MT-SLT session, participants were asked if they wished to attend, ensuring their ongoing voluntary participation throughout the study.

### ***8.3.4 The Collaborative Music Therapy and Speech and Language Therapy Programme***

Participants engaged in 30-minute collaborative MT-SLT sessions, held twice weekly for the duration of their admission at the rehabilitation facility. The length of each child's admission varied depending on individualised rehabilitative needs, as determined by the interdisciplinary team and available resources.

Sessions were held in the music therapy room within the hospital's paediatric unit. Programme content, informed by Burns, O'Connor, et al. (2024) and Burns and O'Connor (2023), consisted of musical experiences specifically designed to target language and communication skills. Sessions consisted of an introduction, active music making, vocalisation and verbalisation eliciting activities, and concluded with a farewell. Musical materials were tailored to each child's age, interests, and preferences. Session planning and debriefing between the MT and SLT took place immediately before and after each session, allowing the clinicians to align goals, adapt activities to the child's evolving needs, and reflect collaboratively on therapeutic responses. See

Table 13 for an overview of session content and target goal areas. The MT and SLT worked collaboratively, in a co-facilitated model, alternating between leading and supporting roles (Burns, Keaveney, et al., 2024). Through musical interaction and play, the therapists sought to capture and maintain the child's attention, fostering contextualised opportunities for meaningful connection and facilitating progress in language and communication rehabilitation and development (Burns, Keaveney, et al., 2024; Burns & O'Connor, 2023).

**Table 13***Overview of Session Content and Target Goal Areas*

<b>Session Component</b>	<b>Example Activities</b>	<b>Target Goal Area</b>
Introduction / Greeting	Singing a structured Hello Song	<ul style="list-style-type: none"> <li>• Engagement &amp; Attention: Building anticipation and familiarity</li> <li>• Social Connection: Recognising and responding to greetings</li> <li>• Turn-Taking &amp; Reciprocity: Initiating or responding within structured interaction</li> <li>• Transitioning into the Therapy Space: Supporting adjustment to the session environment</li> </ul>
Active Music Making	Structured or improvised play using melodic and percussive instruments	<ul style="list-style-type: none"> <li>• Joint Attention &amp; Engagement: Focusing on musical cues and therapist modelling</li> <li>• Receptive Listening &amp; Auditory Discrimination: Strengthening ability to process and respond to cues</li> <li>• Turn-Taking: Practicing reciprocal interactions</li> <li>• Social Interaction: Encouraging shared participation and responsiveness to communication partner</li> </ul>
Familiar Song Singing	Singing familiar or favourite songs; embedding intentional pauses to encourage vocalisations	<ul style="list-style-type: none"> <li>• Expressive Communication: Engaging verbally, vocally, or through gestures</li> <li>• Participation &amp; Anticipation: Strengthening turn-taking and engagement</li> </ul>
Vocal Play	Improvised vocal play such as call-and-response, exaggerated intonation, and pitch exploration	<ul style="list-style-type: none"> <li>• Vocal Exploration &amp; Early Sound Play: Encouraging spontaneous vocalisations and playful sound production</li> <li>• Oral-Motor Activation &amp; Coordination: Strengthening breath support and articulation</li> </ul>
Choice-Making Activities	Offering musical choices (e.g., selecting an instrument or song)	<ul style="list-style-type: none"> <li>• Autonomy &amp; Intentional Communication: Encouraging participation in decision-making</li> <li>• Cause &amp; Effect Awareness: Strengthening understanding of action-outcome relationships</li> <li>• Item and Symbolic Level Choice-Making: Using gesture, vocalisations or words to indicate preference</li> </ul>
Ending / Farewell	Singing a structured Goodbye Song	<ul style="list-style-type: none"> <li>• Social Connection: Recognising and responding to endings</li> <li>• Turn-Taking &amp; Reciprocity: Providing opportunities for final interactions and expressive responses</li> <li>• Transitioning out of the Therapy Space: Providing structure and closure to ease the transition out of therapy</li> </ul>

Note: While Introduction and Ending were fixed components of each session, the order of the remaining session content was flexible and adapted to the needs, engagement, and responsiveness of each child.

### ***8.3.5 Data Collection***

Video data was the most appropriate method of data collection given the study's aims to examine interactional processes and therapeutic responses within a collaborative therapeutic context. This approach enabled the documentation, review, and verification of nuanced, often subtle responses to therapeutic interventions that might not be captured through live observation alone (Lau & Bratby, 2024; Ratcliff, 2003). Data was collected via high-definition video recordings of each collaborative session. The camera was positioned unobtrusively to capture the entirety of the music therapy room while minimising disruption to the natural flow of interactions. Given the complex clinical presentations typical of children with ACIs, video recordings provided a comprehensive, real-time account of engagement, communicative attempts, and therapist-child interactions.

### ***8.3.6 Data Analysis***

This study involved a large volume of video data, capturing numerous therapy sessions. To manage this extensive dataset, an initial screening process was conducted by the first and second authors to identify 'significant moments.' The term is adapted from music therapy literature to describe notable events where the therapeutic process fosters a meaningful change or insight for the client (Amir, 1996; Gavrielidou & Odell-Miller, 2017; Jones & Odell-Miller, 2023). In this study, significant moments were defined as instances in which a child demonstrated notable progress, engagement, or responsiveness, directly related to the collaborative interventions. These moments were selected based on their alignment with each child's communicative goals, which included verbal and non-verbal expression, sustained attention, and pre-verbal abilities such as choice-making and turn-taking.

Following this screening, the identified significant moments underwent analysis using Braun and Clarke's (2006, 2019) six-phase reflexive thematic analysis. Originally developed for textual qualitative data, thematic analysis has increasingly been applied to video data to explore complex, multimodal interactions (Bavngaard et al., 2023; Davis et al., 2023; Kostøl, 2025). Alternative video analysis methods, such as the visual-verbal video analysis method (Fazeli et al., 2023) and video data analysis (Nassauer & Legewie, 2021), were considered but deemed impractical due to the extensive volume of recorded sessions and the need for exhaustive transcription of verbal and non-verbal behaviours, which was not feasible within the study's scope. Thematic analysis, by contrast, provided a rigorous yet adaptable approach to identifying recurring patterns of interactions without the requirement for detailed micro-level transcription.

Braun and Clarke's (2006, 2019) six-phase approach involved: (a) familiarisation with the data, (b) generation of initial codes, (c) searching for themes, (d) reviewing themes, (e) defining and naming themes, and (f) producing the report. The first, third, and fourth authors, who were also the treating clinicians, independently reviewed and analysed the data, identifying commonalities, patterns, and connections across the dataset. Video recordings of significant moments were repeatedly reviewed, with coding systematically documenting communicative attempts, actions, and interactions with corresponding timestamps for traceability. Although significant moments were selected based on their alignment with each child's communicative goals, the thematic analysis itself remained inductive and data-driven, allowing patterns to emerge naturally rather than being imposed by pre-existing theoretical frameworks (Kiger & Varpio, 2020). Following initial coding, the first, third, and fourth authors clustered related codes to identify broader patterns of meaning, forming the basis for preliminary themes. These themes were subsequently reviewed by the second and fifth

authors to enhance coherence, challenge potential biases, and ensure an accurate representation of the dataset. The analysis process was iterative, enabling the team to continually refine emerging themes through repeated review, resulting in a coherent and comprehensive set of themes that encapsulated the depth and complexity of the dataset (Braun & Clarke, 2021; Byrne, 2022).

Following the finalisation of themes, the analysis progressed to the construction of the case narratives. For each child, significant moments were grouped by overarching theme and arranged in chronological order to reflect the trajectory of therapeutic engagement over time. Within each theme, selected video segments were described in detail, using objective behavioural observation alongside contextual details such as activity structure and facilitation strategies. The case narratives were composed by the first author, who regularly consulted with the third and fourth authors, the co-treating SLTs, to ensure accuracy in behavioural description and to maintain balance in representing both disciplines' contributions to the intervention.

## **8.4 Results**

Three primary themes emerged from the data: (a) leveraging familiar song to build vocal expression, (b) active musical play to foster social reciprocity and turn-taking, and (c) supporting choice-making through immediate contextualisation. Deviating from the traditional format of thematic analysis studies, yet aligning with the nature of case study research, the findings are presented as case narratives rather than as categorical taxonomy. Specifically, each case is structured within the overarching themes identified through the thematic analysis of the video data. This approach not only provides a contextualised understanding of the collaborative clinical practices but also offers clinicians practical insights into how these interventions can be implemented with

young children with ACIs. Furthermore, presenting the findings in this format allows for clearer demonstration of each child's therapeutic progression over time.

#### ***8.4.1 Case Study 1: Ryan<sup>4</sup>***

At 3 years and 6 months, Ryan was diagnosed with Rasmussen's Encephalitis, a rare and progressive epileptic disorder affecting the left hemisphere of the brain, notably the areas responsible for language and communication. Prior to the onset of seizure activity, Ryan's language development was consistent with typical developmental milestones. He exhibited a robust vocabulary, expressive five- to seven-word sentences, and age-appropriate comprehension. However, as his seizure activity increased, his speech regressed. He struggled with word retrieval, often experienced frustration during communication, and exhibited reduced intelligibility characterised by a nasal quality and pronunciation difficulties. Following his diagnosis, Ryan underwent a functional hemispherectomy during an acute care admission aimed at achieving seizure freedom. Ryan spent five months in acute care, including four months of inpatient post-operative rehabilitation.

Five months after discharge from his acute care admission, Ryan was admitted to the rehabilitation facility to support ongoing recovery. Upon admission, Ryan presented with limited spontaneous verbal output, primarily relying on single-word utterances or fragmented phrases. His receptive language skills appeared to be affected by his attention and concentration levels, as he displayed fleeting attention and a preference for exploratory play.

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<sup>4</sup> All participants are represented by pseudonyms to ensure confidentiality.

#### **8.4.1.1 Leveraging Familiar Song to Build Vocal Expression**

From the outset of the joint therapy programme, familiar songs were utilised to encourage Ryan's vocal participation and expressive communication. Songs like *Twinkle Twinkle Little Star* and *Old McDonald* provided structured opportunities for Ryan to anticipate and complete phrases during musical pauses. Initially, Ryan required consistent verbal prompting from the SLT and musical scaffolding from the MT to engage in familiar song. In the first session, Ryan verbalised isolated words and sounds during *Old McDonald*, such as "farm" and "o" from the E-I-E-I-O sequence, supported by phonemic cues from the SLT while maintaining pauses to allow him time to respond (Week 1, Session 1, 23:42-24:43).

These strategies were extended to less familiar but structurally predictable songs, such as *Hello* and *Goodbye*. By the second session, Ryan began repeating and verbalising "bye" during pauses in *Goodbye* (Week 1, Session 2, 26:14-27:08). In a subsequent session, *Hello* was facilitated a cappella, and a toy microphone was introduced as a visual and tactile cue. The MT guided the microphone between Ryan and the therapists, while the SLT modelled verbalising "hello" when prompted with the microphone. Ryan successfully imitated this action, responding consistently to all anticipatory cues. After several turns, he spontaneously stated, "It's my turn," gesturing towards the microphone, demonstrating his desire to take lead in guiding the microphone around the group (Week 5, Session 9, 07:58-08:43).

As therapy progressed, Ryan's verbal output increased, and he began to use short, spontaneous phrases more frequently. By Week 5, he independently sang the phrase "up above the world so high" from *Twinkle Twinkle Little Star* without prompting or scaffolding, accompanied only by guitar (Week 5, Session 9, 23:58-26:49). In the final session, Ryan demonstrated spontaneous and creative language use

during a self-initiated sleep-themed game. With subtle facilitation from the SLT, he instructed the MT to sleep and independently sang the opening two phrases of *Twinkle Twinkle Little Star* without musical accompaniment as a lullaby to prompt the MT to fall asleep. Ryan then used a drum to wake the MT, exclaiming, “Wake up, James” (Week 9, Session 14, 12:43-14:18).

#### **8.4.1.2 Active Musical Play to Foster Social Reciprocity and Turn-Taking**

Opportunities for turn-taking were embedded throughout the programme to foster social reciprocity and enhance Ryan’s understanding of shared communication. During an initial gathering drum activity, Ryan struck the drum twice while vocalising “duh duh,” an action mirrored by the MT. Ryan then repeated this exchange, establishing a simple yet meaningful back-and-forth interaction (Week 1, Session 1, 09:16-09:31).

By Week 3, Ryan exhibited greater initiative and autonomy in turn-taking activities. During percussive play, Ryan pointed to the SLT and verbalised, “Your turn,” prompting their participation (Week 3, Session 5, 15:47). The MT supported these interactions by creating accessible and engaging musical structures, while the SLT modelled and reinforced appropriate turn-taking behaviours. Ryan’s participation during *Hello* with the toy microphone reflected his growing ability to engage in reciprocal exchanges. After observing and participating in the structured framework created by the therapists, Ryan verbalised, “It’s my turn,” taking the microphone and leading the activity, underscoring his increased confidence in initiating and guiding interactions (Week 5, Session 9, 07:58-08:43).

Later in the programme, Ryan initiated more complex shared interactions. In Week 7, during another gathering drum activity, Ryan sat on the drum and verbalised, “Ready, steady, go,” instructing the therapists to play. When the SLT suggested taking a

turn on the drum, Ryan replied, “No together. One, two, three,” gesturing for them to join him on the drum, while directing the MT to continue playing (Week 7, Session 11, 08:15-08:39).

#### **8.4.1.3 Supporting Choice-Making Through Immediate Contextualisation**

The joint therapy programme emphasised fostering Ryan’s autonomy by creating opportunities for choice-making within activities where his decisions could be immediately acted upon, reinforcing the relationship between communication and outcome. In early sessions, Ryan was supported in making simple, item-level choices. In one instance, Ryan was presented with a large orange shaker and a smaller red shaker. When invited to choose, Ryan selected the orange shaker, which was immediately incorporated into a musical activity, *Shake Freeze*, providing an accessible framework observing the impact of his choices (Week 1, Session, 2, 07:32-10:47). Choice-making opportunities were increasingly integrated into activities that encouraged vocal and verbal output. Ryan participated in *See That Crocodile*, an unfamiliar song structured to foster spontaneous vocalisations. A decorative drum featuring various animal images was introduced, and Ryan was invited to select an animal to incorporate into the song. He independently identified and verbalised “lion” and was guided by the SLT to imitate the corresponding animal sounds within the musical framework (Week 2, Session 3, 16:17-16:50). By Week 5, Ryan exhibited unprompted decision-making, selecting “Wheels on bus” when asked for a song choice (Week 5, Session 9, 12:36).

In later sessions, choice-making activities became more complex, incorporating semantic understanding and autonomous choice-making. *The Monster Song*, a narrative-based activity, required Ryan to determine the monster’s location and associated action by answering questions such as, “Where does the monster go next?” and “What is the

monster doing there?” The SLT supported Ryan’s participation with visual aids as symbolic choice-making tools, depicting locations and actions. Additionally, the SLT modelled sentence structures and provided occasional prompting for use of prepositions and articles as needed (Week 7, Session 11, 19:03-23:25). By Week 9, Ryan demonstrated increased independence, responding without scaffolding. When asked, “Where does the monster go next?” Ryan replied, “Hmm, the beach.” When further prompted, “What is the monster doing at the beach?” he suggested, “Sandcastles” (Week 9, Session 13, 04:36-05:19).

#### ***8.4.2 Case Study 2: Thiago***

Thiago experienced a left middle cerebral artery (MCA) stroke at the age of 3 years and 5 months, secondary to Moya Moya disease, a rare cerebrovascular condition characterised by progressive narrowing and blockage of the internal carotid arteries. Prior to his ABI, Thiago’s language development was age appropriate. He demonstrated a growing vocabulary, the ability to construct complex sentences with causal chains, and an increasing understanding of grammar. However, the stroke significantly affected the language-dominant left hemisphere of his brain, leading to noticeable deficits in his language and communication abilities.

Six months after discharge from acute care, Thiago was admitted to the rehabilitation facility for therapy focused on addressing his communication impairments and supporting his overall recovery. Upon admission, he presented with reduced expression, delayed comprehension skills, diminished attention, and reduced speech intelligibility. Despite Thiago’s language challenges, he presented as a very functional communicator and was able to express himself and get his basic needs and wants met through a total communication approach that included gestures and leading his communication partner to desired locations.

#### **8.4.2.1 Leveraging Familiar Song to Build Vocal Expression**

Thiago did not engage in familiar song during the first week of therapy, despite encouragement from the SLT and MT. He first began participating in Week 2 during *Old McDonald*. Thiago was initially disengaged, rolling on the mat. However, when presented with a visual aid depicting a cow, he vocalised “moo” (on that farm he had a “moo”) and repeated the sound when prompted by the SLT. By the end of the verse, he independently sang the “E-I-E-I-O” phrase (Week 2, Session 3, 11:19-12:21). In the following session, Thiago demonstrated significant progress, actively engaging in *The Wheels on the Bus*. He mimicked the SLT’s actions and vocalised during the action phrases “round and round” and “swish swish swish” (Week 2, Session 4, 03:43-4:26). Later in the session, he demonstrated increased independence by singing the entirety of *Twinkle Twinkle Little Star* without prompting (Week 2, Session 4, 04:48-05:27). This engagement extended to another activity where the SLT prompted, “Will we sing another song?” Thiago repeated the phrase, “Another song,” and participated in *Incy Wincy Spider* with increased volume and vocal projection, celebrating his accomplishment with a loud cheer upon completing the song (Week 2, Session 4, 12:10-12:38).

In Week 3, *Head Shoulders, Knees, and Toes* was adapted to further support Thiago’s language goals. The SLT adopted a total communication approach, incorporating gesturing and pointing to encourage Thiago to verbalise various body parts. The order of body parts was alternated within the song, and new vocabulary, such as “tummy” and “bum,” was introduced. The musical structure of the song provided a familiar and engaging framework, while the visual aid of pointing and gesturing reinforced Thiago’s understanding and production of the targeted vocabulary (Week 3, Session 5, 20:41-24:30).

Towards the end of the therapy programme, Thiago's participation in familiar song had developed significantly. He was demonstrating increased sustained attention and engaging with a variety of familiar songs with less prompting from both therapists required. In Session 8, he actively participated in several verses of *Old McDonald*, correctly verbalising "cow" when shown the corresponding visual aids and producing associated animal sounds. Thiago extended this activity to include "chicken" and "sheep" and guided by the SLT, transitioned into an adapted version, *Old McDonald Had a Zoo*. This allowed him to expand his animal vocabulary, adding animals such as "lion" and accompanying sounds (Week 5, Session 8, 09:16-11:52).

#### **8.4.2.2 Active Musical Play to Foster Social Reciprocity and Turn-Taking**

Throughout Thiago's therapy programme, active musical play was central to fostering social reciprocity and developing turn-taking skills. In the first session, Thiago demonstrated early signs of joint engagement during playful interactions with the gathering drum. He struck the drum and humorously pretended to fall the floor, vocalising "ooohh" in a descending glissando. This action was mirrored by the SLT, prompting a playful, back-and-forth exchange. Thiago repeated the action, which was mirrored again by both the SLT and MT, creating a dynamic communicative exchange. Thiago expressed visible enjoyment, laughing throughout. When asked, "Whose turn is it next?" he pointed to the MT and verbalised, "You," demonstrating early awareness of turn-taking dynamics (Week 1, Session 1, 09:23-12:02). In the following session, Thiago continued to engage in reciprocal musical play. He participated in a brief exchange with the MT, striking the temple blocks twice and looking to the MT for a musical response on the guitar. This turn-taking interaction continued over several cycles, indicating early reciprocal behaviours and attentiveness to his communication partner (Week 1, Session 2, 20:31-20:46).

As therapy progressed, Thiago expanded his participation through structured action songs, which provided opportunities to practice reciprocal interactions in a predictable and engaging format. During *The Wheels on the Bus*, Thiago mimicked the SLT's gestures during the action phrases "round and round" and "swish swish swish," highlighting his ability to observe and respond to modelled actions (Week 2, Session 4, 03:43-04:26). Similarly, in *Incy Wincy Spider*, Thiago actively observed and copied the SLT's actions, maintaining joint participation throughout the song (Week 3, Session 5, 19:42-20:24).

By Week 5, Thiago demonstrated greater independence and confidence in initiating shared musical interactions. In the penultimate session, he ran to the keyboard, activated the beat-maker, and initiated spontaneous, improvised musical play. Playing in parallel with the MT, Thiago displayed an awareness of his social environment by looking around for the SLT and inviting them to join the interaction. He maintained eye contact and smiled as the SLT joined in, showcasing sustained attention, social engagement, and his emerging ability to participate collaboratively in musical activities (Week 5, Session 7, 12:34-13:19).

#### **8.4.2.3 Supporting Choice-Making Through Immediate Contextualisation**

Throughout the therapy programme, immediate contextualisation was incorporated to facilitate Thiago's ability to make autonomous choices and strengthen his expressive communication. By embedding choice-making opportunities within musical interactions, the MT and SLT provided structured yet flexible environments in which Thiago could practice decision-making.

In Week 1, Thiago exhibited difficulties in sustaining attention during structured musical activities. To enhance his engagement and provide additional support, the SLT introduced a visual timetable in Week 2. This tool served as a visual scaffold to guide

the session and facilitate participation. Thiago was encouraged to engage with the timetable by selecting velcro-backed options to structure the session, actively placing them onto the timetable. The timetable was consistently referenced throughout the session, reinforcing his choices by providing a concrete framework for engagement and implementation (Week 2, Session 3, 01:14-02:49). In the following session, Thiago participated in a choice-making activity using visual aids to select between a drum and a shaker. He initially verbalised “this” while pointing to the shaker, demonstrating an emerging ability to indicate preference. When the options were reversed and presented in opposite hands, he again gestured towards the picture of the shaker and repeated “this,” confirming his selection and reinforcing his developing capacity for intentional choice-making (Week 2, Session 4, 05:46-06:09).

As therapy progressed, Thiago further demonstrated his ability to make meaningful choices. Not wanting to engage with the options presented, Thiago independently located the visual aid for *Incy Wincy Spider* and verbalised “spider” while handing the aid to the MT, indicating a preference for the song (Week 3, Session 5, 19:42-20:24). By the following session, Thiago extended his use of choice-making to express anticipation of routine events. Immediately following *Goodbye*, he verbalised, “Then we go mama,” repeating the phrase twice (Week 3, Session 6, 22:06-22:12). This demonstrated his growing ability to sequence events and communicate an understanding of transitions.

By the final weeks of therapy, Thiago was initiating musical interactions with greater independence, making choices that shaped the structure of the session. In Week 5, he ran to the keyboard, activated the beat-maker, and initiated shared musical play. While playing in parallel with the MT, he maintained eye contact and smiled as he

included the SLT in the interaction, demonstrating independent decision-making within a social context (Week 5, Session 7, 12:34-13:19).

### **8.4.3 Case Study 3: Bonnie**

At 2 years and 3 months, Bonnie was re-admitted to the rehabilitation facility for a second admission to receive further support following a history of complex medical conditions. These included Turner's Syndrome, congenital heart disease with coarctation of the aorta, hypothyroidism, and an ABI secondary to hypoxia and hypoglycaemia. Bonnie's communication profile was characterised by delayed speech and language skills, with limited, inconsistent vocal output restricted to a narrow phonemic range. Her expressive communication included minimal use of gestures, such as pointing and reaching, though these were variably employed. Bonnie consistently followed one-step commands, such as "clap hands" and "wave bye-bye," when attending to her communication partner. Since her previous admission, Bonnie had made some progress in her pre-verbal skills, particularly in understanding cause and effect. Recognising these areas, her family identified expressive communication as a priority focus for her re-admission.

#### **8.4.3.1 Leveraging Familiar Song to Build Vocal Expression**

Bonnie's engagement with familiar song served as a structured approach to support her emerging expressive communication. Initially, she exhibited limited vocal participation, requiring consistent prompting and scaffolding from both the MT and SLT.

Bonnie's first observed instance of vocalisation within song occurred in Week 3 during *Old McDonald*. When presented with a visual aid depicting a duck by the SLT, she vocalised "quack quack" within the provided musical pause (Week 3, Session, 3

19:34-25:56). Later in the same session, *Twinkle Twinkle Little Star* was introduced to further prompt vocal participation. The MT completed each phrase in full before pausing, creating an opportunity for Bonnie to reinitiate the music through vocalisation or verbalisation. To support this, the SLT employed a total communication approach, using gesture and phonemic cues to elicit the target word “more.” Bonnie initially remained quiet; however, after multiple opportunities, she approximated “more” during the pauses, successfully signalling for the song to continue (Week 3, Session 3, 26:19-29:05).

As the therapy programme progressed, Bonnie’s engagement with song became more consistent. In Session 5, she participated in *Hello* by vocalising “lo” in response to appropriate cues, while the SLT reinforced meaning and encouraged vocal participation using a total communication approach (Week 4, Session 5, 02:57-05:03). Her participation in *Old McDonald* also expanded as she began vocalising “O” within the E-I-E-I-O sequence and successfully imitated “cluck cluck” for chicken within the musical pause when presented with a corresponding visual aid (Week 4, Session 6, 05:29-10:27).

Further developments in Bonnie’s verbal output became evident over the following weeks. During *Goodbye*, she spontaneously verbalised “bye” (Week 6, Session 7, 34:54) and recalled and vocalised “uh-oh” within a musical anticipatory cue, demonstrating emerging retention and retrieval of familiar expressions within the musical context (Week 6, Session 7, 35:00). In Week 7, changes in session dynamics provided additional insights into Bonnie’s communicative participation. Typically, Bonnie’s mother attended sessions; however, in Session 9, she was absent. During *Old McDonald*, Bonnie verbalised “mama” instead of engaging with the targeted animal sounds (Week 7, Session 9, 03:48).

By Session 10, Bonnie demonstrated further progress in generalising vocal expressions across songs. She verbalised “hello” during *Hello* (Week 7, Session 10, 02:22) and engaged in *Wheels on the Bus* by verbalising and approximating “beep beep beep” and “swish” while performing the corresponding actions (Week 7, Session 10, 15:50-18:01). Additionally, during *Goodbye*, she expanded her vocabulary, verbalising “goodnight” (Week 7, Session 10, 23:21).

#### **8.4.3.2 Active Musical Play to Foster Social Reciprocity and Turn-Taking**

Structured musical play provided opportunities for Bonnie to develop social reciprocity and turn-taking skills. In Week 1, Bonnie engaged in a communicative exchange with the MT as she played the gathering drum. The MT cross-modally reflected her rhythms on the guitar, to which Bonnie responded, creating a back-and-forth musical interaction. Simultaneously, the SLT mirrored Bonnie’s actions on a second drum, reinforcing her engagement and encouraging sustained participation (Week 1, Session 1, 12:35-14:47).

In Session 3, during improvised musical play with shakers, Bonnie controlled the musical interaction through her engagement, with both the MT and SLT responding to her cues. When Bonnie played, both therapists joined in, and when she stopped, they paused in unison. The MT framed the interaction harmonically on the guitar, while the SLT mirrored Bonnie’s actions, following her lead, reinforcing an emerging awareness of cause-and-effect within shared musical play (Week 3, Session 3, 06:58-09:44). In the following session, Bonnie engaged in parallel play on the piano during *Hello*. During a call-and-response exchange, she played a phrase and then turned her head towards the MT in anticipation of a response (Week 3, Session 4, 04:16-04:44).

Bonnie also demonstrated greater agency in structured turn-taking activities. In Session 5, she participated in *We’re Gonna Shake*, responding to the MT’s stop-start

cues within the musical framework. The SLT introduced a high-tech Augmentative and Alternative Communication (AAC) device featuring a two-cell grid choice board with “stop” and “go” visuals with auditory output. After the MT paused the music, Bonnie scanned both options before selecting “go,” initiating the continuation of the music (Week 4, Session 5, 19:00-20:41).

Later in the programme, Bonnie’s participation reflected an emerging awareness of social context. In Session 9, when her mother was absent, Bonnie repeatedly verbalised “mama.” After seeing Bonnie become unsettled, the MT asked, “Bonnie, will we sing Goodbye?” In response, Bonnie immediately gestured with a wave (Week 7, Session 9, 07:15).

#### **8.4.3.3 Supporting Choice-Making Through Immediate Contextualisation**

Bonnie’s participation in choice-making activities evolved over the course of the intervention period, gradually shifting from passive engagement to more autonomous and meaningful decision-making within structured musical contexts.

In Week 3, Bonnie was introduced to symbolic choice-making using visual aids during *Old McDonald*. When presented with two options, cow and sheep, she initially took both aids simultaneously, demonstrating difficulty attending to and scanning both options purposefully (Week 3, Session 3, 11:13-12:48). The following week, the SLT implemented visual aids within *Five Little Speckled Frogs* to scaffold Bonnie’s ability to make purposeful choices. Velcro frogs of varying colours were placed on a log, allowing Bonnie to physically remove one frog of her choice at a time as the song progressed. This structured, errorless choice-making approach provided a predictable framework that not only reinforced the relationship between her selections and immediate outcomes but also supported her in scanning and attending to the available options before making a choice. While Bonnie’s initial selections were very quick, she

gradually began to slow down and scan the options with assistance from the SLT (Week 4, Session 5, 13:14-16:08).

Choice-making was further embedded in *Wheels on the Bus* during the following session, where Bonnie was presented with a visual aid featuring velcro representations of different parts of the bus (e.g., horn, doors, wheels, wipers). She was encouraged to scan and attend to one item at a time to determine the next verse of the song. Throughout the activity, Bonnie occasionally vocalised while making choices, demonstrating an emerging link between intentional choice-making and communicative expression (Week 4, Session 6, 23:34-27:22).

By the end of the therapy programme, Bonnie exhibited increased independence in making verbal choices within musical activities. During *Old McDonald*, she verbalised “quack quack” without the need for visual prompts, reflecting a growing ability to participate in choice-making through spontaneous verbalisation rather than relying on visual aids (Week 7, Session 10, 03:26).

#### **8.4.4 Case Study 4: Tyla**

At 5 years and 8 months, Tyla was admitted to the rehabilitation facility following an ABI secondary to anti-NMDA receptor encephalitis. This rare autoimmune condition occurs when the body produces antibodies that target NMDA receptors in the brain, which are essential for memory, learning, and communication. The resulting inflammation can cause a complex array of symptoms, including severe cognitive and motor impairments, speech and language difficulties, and seizures. In Tyla’s case, the encephalitis also led to a mixed movement disorder with significant dyskinesia, epilepsy, and profound communication challenges.

Prior to the onset of encephalitis, Tyla had no history of speech, language, or communication difficulties. She remained in acute care for four months, where she

received initial inpatient rehabilitation. Approximately one year after her acute discharge, she was admitted to the rehabilitation facility. Tyla presented as a non-verbal communicator. She expressed herself predominately through non-verbal means, including eye contact, facial expressions, vocalisations, and gestures, which often required interpretation by her communication partners.

#### **8.4.4.1 Leveraging Familiar Song to Build Vocal Expression**

At the commencement of the therapy programme, Tyla exhibited minimal vocal output or engagement during joint therapy sessions. Early interventions incorporated musical activities designed to support cause-and-effect understanding and encourage vocal participation within familiar song contexts.

In Week 3, guided by Tyla's interests, the MT introduced *How Far I'll Go*, embedding musical pauses to facilitate engagement. Tyla was encouraged to strike a drum to reinitiate the music, reinforcing the relationship between her actions and musical continuity. Initially, she was slow to follow the cues, requiring significant modelling and scaffolding from the SLT. As the song progressed, she demonstrated increased engagement and responsiveness, reinitiating the music with progressively shorter pauses (Week 3, Session 3, 11:00-13:53). In the subsequent session, the SLT introduced a BigMac switch, which, when activated using direct access methods (i.e., pressing the switch), triggers an auditory output of "more." During *Do You Want to Build a Snowman*, Tyla was supported in pressing the switch to reinstate the music. The SLT modelled the function of the switch while employing a total communication approach, incorporating gestures to reinforce meaning (Week 3, Session 4, 18:15-23:24).

Consistent engagement with the BigMac switch facilitated an increasingly efficient response over time. By Week 5, during *How Far I'll Go*, Tyla demonstrated an

increased awareness of cause-and-effect, responding more promptly when the SLT reinforced, “Oh Tyla, the music has stopped” (Week 5, Session 7, 11:22-14:39). A similar response was observed in Week 6, during *Let It Go*, where Tyla actively pressed the switch with greater control to reengage the music (Week 6, Session 10, 11:42-15:15).

Vocal engagement within familiar song first emerged around the mid-point of the therapy programme. During *Dig a Little Deeper*, Tyla was using the drum to reinitiate the music when it was paused and simultaneously produced a vocal sound while engaging with the task (Week 7, Session 11, 10:01-12:48). This emerging vocal participation was further supported in subsequent sessions, when opportunities to reinstate the music were contingent on vocalisation rather than musical play or switch activation. During *Dig a Little Deeper*, the SLT provided maximum scaffolding and prompting, incorporating phonemic cues, gesturing, and exaggerated facial expressions, to facilitate vocal output, while the MT embedded anticipatory pauses at climaxes within the song. While initial responses were slow to emerge, the frequency of Tyla’s vocalisations increased as the song progressed (Week 9, Session 15, 05:36-07:57). The same approach was trialled later in the session during *Shake Freeze*, where Tyla demonstrated improved responsiveness, consistently orienting towards the MT when the music stopped, changing her facial expressions, and producing a range of vocal sounds to reinstate the song (Week 9, Session 15, 19:03-21:03).

In the latter half of the programme, Tyla demonstrated an emerging ability to follow anticipatory cues. During *Goodbye*, she vocalised at the conclusion of a phrase, marking her first instance of aligning her vocal output with structured musical cues (Week 10, Session 17, 21:42-23:18). This development continued, as she vocalised throughout *How Far I’ll Go* in response to anticipatory cues and the SLT’s phonemic

prompting (Week 12, Session 19, 14:36-17:22). Further progress was evident in Week 13 during *Hello*, where Tyla responded to anticipatory cues by producing an approximation “lo” to complete the word “hello,” supported by the SLT (Week 13, Session 21, 01:16-02:26). By the final session, Tyla’s vocal engagement had further generalised beyond structured cues, as she produced spontaneous vocalisations throughout the session, both within and outside of familiar song contexts (Week 15, Session 26).

#### **8.4.4.2 Active Musical Play to Foster Social Reciprocity and Turn-Taking**

Early in the therapy programme, Tyla demonstrated limited engagement in reciprocal interactions. Her tendency to grasp and hold objects in a non-purposeful manner, coupled with a limited understanding of their functional use, restricted her ability to participate actively in musical exchanges. In the first session, the MT framed Tyla’s drumming by accompanying her on the guitar, while the SLT mirrored her actions. Tyla exhibited early signs of social awareness by turning her head towards both therapists, indicating recognition of their involvement in the shared interaction (Week 1, Session 1, 11:22-14:53). To introduce structured turn-taking, the MT facilitated a drumming activity in which a small djembe was guided between Tyla and the therapists. The SLT provided verbal scaffolding, stating, “Tyla’s turn,” as an auditory cue to support her engagement. She initially required significant hand-over-hand support and, as the intervention progressed, demonstrated increased engagement and understanding of the task, playing the drum upon its presentation (Week 4, Session 6, 11:46-16:28).

Further progress was observed in Week 5 during a group shaker-passing activity. After independently playing the shaker, Tyla was encouraged to pass it to a therapist. The MT and SLT modelled the interaction, while the SLT provided additional gestural cues to indicate whose turn was next. Tyla required substantial support to participate but

gradually began to engage in the turn-taking sequence with guidance (Week 5, Session 7, 16:00-21:47).

Week 7 introduced vocal play as a further means of fostering social reciprocity while encouraging vocal output. A microphone and amplifier were incorporated into the session, with the therapists modelling vocal turn-taking. Although Tyla did not produce vocalisations, she displayed increased oral-motor engagement by opening her mouth in apparent attempts to participate (Week 7, Session 11, 24:41-26:37). The following week, Tyla arrived to the session vocalising and smiling. The MT and SLT responded by matching her vocal patterns, establishing a back-and-forth vocal exchange and extending vocal participation (Week 8, Session 13, 00:42:03:43).

Tyla's mother was present in the space during the following session. During a joint xylophone activity, Tyla demonstrated increased social awareness by orienting towards her mother and seeking engagement through reaching out for her. The MT facilitated structured turn-taking by physically shifting the instrument between them, reinforcing shared participation (Week 8, Session 14, 07:54-11:12).

Towards the end of the therapy programme, vocal play with the microphone and amplifier became more structured, and Tyla began to vocalise more frequently. She gestured to hold the microphone and guided it towards the therapists, prompting them to vocalise in a manner similar to how she had previously been encouraged (Week 12, Session 19, 21-18:24:22). In Week 14, Tyla's father joined the therapy session. During *We're Gonna Shake*, she vocalised frequently while shifting her attention between the therapists and her father. Tyla initiated turn-taking by handing him an egg shaker, actively inviting him to participate in the musical interaction (Week 14, Session 23, 09:21-12:17).

#### 8.4.4.3 Supporting Choice-Making Through Immediate Contextualisation

At the outset of the therapy programme, Tyla demonstrated a tendency to grab and retain objects. This limited her ability to engage meaningfully in choice-making tasks at both item-level and symbolic-level. When presented with two visual aids depicting *Frozen* and *The Little Mermaid*, she took both options simultaneously and was reluctant to return the visual prompts, preventing her from successfully making a clear selection (Week 1, Session 2, 13:58-15:32). In the following session, the SLT introduced a high-tech AAC device featuring a two-cell grid choice board with *Frozen* and *The Little Mermaid* visuals with auditory output, preventing Tyla from physically grabbing the options and instead requiring her to make a purposeful selection. When prompted, she successfully selected *Frozen*, which was reinforced through engagement with the familiar song *Let it Go* (Week 3, Session 3, 02:38-03:25). In a subsequent session, she again selected *Frozen*, and when the SLT verbalised her choice, Tyla responded with a vocalisation “ya” (Week 3, Session 4, 11:05-13:42).

Tyla’s engagement with the AAC device expanded in later sessions as choice-making was embedded into musical activities. In Week 5, she was presented with three instrument choices, the chimes, piano, and shaker, on the choice-board. Tyla successfully selected the shaker, and this choice was immediately incorporated into improvised musical play to reinforce her selection (Week 5, Session 8, 07:44).

In Week 7, Session 12, when presented with *Frozen* and *Moana* visual aids, Tyla initially selected *Frozen*. However, when asked to confirm her selection, she instead chose *Moana*, suggesting inconsistencies in her intentional choice-making (Week 7, Session 12, 17:40-18:36). By Week 9, Tyla exhibited greater consistency in her choice-making, selecting *The Princess and the Frog* on two successive occasions when presented with the same choice set (Week 9, Session 15, 05:36-07:57).

Towards the end of the therapy programme, Tyla demonstrated the ability to engage in structured choice-making beyond preferred activities. She participated in functional choice-making related to session structure. At the beginning of the session, she was presented with a choice board displaying “hello” and “goodbye” and accurately selected “hello” to initiate the session (Week 14, Session 23, 01:50). Similarly, at the end of the session, she was again presented with the same choice board and successfully selected “goodbye” (Week 14, Session 23, 26:02).

## **8.5 Discussion**

This study explored the therapeutic responses emerging from a collaborative MT-SLT programme for young children with ACIs. Through a case series of four joint programmes, it examined the ways in which this joint approach facilitates communicative rehabilitation while offering insights into collaborative clinical practices.

### ***8.5.1 Facilitating Communicative Progress Through Collaborative Practice***

Across all four cases, children demonstrated clear communicative progress within the collaborative MT-SLT sessions. These gains were evidenced in increased vocal and verbal output, greater consistency in turn-taking and interactive exchanges, improved attention and responsiveness to communication partners, and enhanced participation in choice-making and communicative initiation. The collaborative programme had an immediate, observable impact on communication, as the children experienced clear cause-and-effect relationships within the therapeutic space. Each interaction carried meaning, reinforcing the understanding that communication was not just an isolated skill but an active tool for shaping their environment and engaging with

others. Within the musical setting, children uncovered that their communicative attempts directly influenced real-time interactions, strengthening both communicative intent and engagement. While communicative progress likely also stemmed from other rehabilitative inputs such as individual speech and language therapy, music therapy, or occupational therapy, the collaborative programme uniquely contextualised communication within interactive, music-based exchanges. This provided children with opportunities to practice emerging skills in socially meaningful ways, as confirmed by Burns and O'Connor (2023).

Children in this study presented with a range of communicative profiles indicative of conditions such as aphasia, dysarthria, apraxia, or cognitive communication impairments. While the nature and severity of deficits varied, all shared a common disruption in foundational interaction skills. The children exhibited limited spontaneous vocal output, inconsistent sustained attention, and reduced awareness of social reciprocity. Within the collaborative space, interventions were structured to rehabilitate these fundamental communicative abilities, providing a foundation for the development of more functional and intentional communication. Active music making transformed seemingly passive exchanges into structured intentional communication opportunities. Within this collaborative framework, children's communicative attempts became more meaningful, as the predictable structure of musical engagement, combined with total communication strategies, provided clear opportunities for initiating, sustaining, and responding to communication. Collaboration within active musical play further established natural turn-taking, supported children in navigating interactive sequences, and reinforced their role in communication exchanges while reducing the linguistic demands of participation. While previous case study reports have discussed collaborative MT-SLT as a means of supporting non-verbal interactions amongst older

children, these interventions aimed to rehabilitate existing speech and language abilities rather than facilitate early communicative development (Bower & Shoemark, 2009; Kennelly et al., 2001; Kennelly & Brien-Elliott, 2001). The younger children within this study required more time to establish foundational interaction skills before progressing towards vocal and verbal expression. The emphasis was not solely on speech production but on fostering engagement, reciprocity, and intentionality within communicative exchanges, ensuring that emerging vocal and verbal skills were built upon a strong pre-verbal foundation.

Where present, all vocal and verbal attempts were acknowledged and responded to within the collaborative space. Whether a spontaneous vocalisation, an approximated phoneme, or an emerging word, each attempt elicited an immediate response from the therapists, affirming the child's role as an active communicator. Burns and O'Connor (2023) emphasise that this responsiveness, embedded within both the MT's music and the SLT's communicative scaffolding, encourages vocal output by ensuring that each vocal attempt has an effect on the surrounding interaction. Song further supports verbal expression by embedding repetition into an engaging, structured format (Kennelly, 2013; Twyford & Watson, 2008) and has the capacity to weave target sounds and words into familiar melodies, disguising the effortful nature of rehabilitative practice (Kennelly et al., 2001). Songs were adapted to introduce new vocabulary, refine phonemic accuracy, and enhance expressive language, all guided by the SLT's expertise in selecting the most appropriate and attainable speech targets. Across the case studies, collaborative practice facilitated communicative progress. Pre-verbal attempts evolved into intentional vocal output, while emerging verbal expression was continuously shaped, reinforced, and expanded.

### ***8.5.2 The Role of Familiar Song in Supporting Communication***

In paediatric neurorehabilitation, familiar songs are widely recognised for their engaging and motivating qualities (Kennelly, 2006, 2013). Research suggests that their structured and predictable nature, combined with their emotional significance, may reduce cognitive demand, making them more accessible to children with neurological impairments (Bower et al., 2014; Kennelly & Edwards, 1997). Their therapeutic potential extends beyond familiarity and emotional regulation, as familiar songs can serve as a powerful communicative scaffold. Across cases in this study, familiar songs favoured by the child provided predictability and anticipation, which supported vocalisation, verbalisation, turn-taking, and engagement. It is notable that the way these songs were shaped and adapted within the collaborative programme, through intentional pauses, structured repetition, and interactive musical elements, facilitated communicative participation.

Ryan and Thiago, who initially exhibited limited verbal participation, responded more readily within these structured song interactions. Early in the intervention, they relied primarily on gestures or non-verbal responses; however, as sessions progressed, they began vocalising during pauses, completing song phrases, and initiating participation with less prompting. These responses are consistent with existing case study reports involving older children, in which familiar and preferred songs have been shown to support similar communicative developments (Bower & Shoemark, 2009; Kennelly et al., 2001; Kennelly & Brien-Elliott, 2001). For Bonnie and Tyla, familiar song served as a foundation for rebuilding early communicative intent, particularly through cause-and-effect understanding and vocalisations. In these cases, communicative abilities emerged even in the absence of clear verbalisation, suggesting

that familiar song, when used strategically, can act as a bridge towards more intentional expression.

When familiar song was facilitated collaboratively by a MT and SLT, its communicative potential was amplified. The effectiveness of familiar song lay not just in its familiarity but in the therapist's ability to shape its use. Unlike passive listening or simply singing a song, the MT's expertise allowed for flexible, responsive musical interactions, creating opportunities for spontaneous communication that a pre-recorded or rigidly delivered song could not achieve. The synergistic use of music and total communication strategies not only broadened the child's expressive communication options but also fostered greater intentionality in their interactions. The MT's ability to shape musical structure, through rhythm, phrasing, and dynamic variation helped maintain engagement and encouraged spontaneous vocal participation. Meanwhile, the SLT adapted communication strategies and provided multimodal cues, ensuring that children could access and express themselves in ways that suited their individual abilities. Moreover, the motivational quality of familiar song makes difficult or repetitive tasks more enjoyable, sustaining participation while reinforcing communicative rehabilitation. This not only captures the child's interest but also creates a natural entry point for therapists to foster communication and interaction.

### ***8.5.3 Recommendations for Effective Collaborative Clinical Practice***

Collaborative MT-SLT interventions provide an impactful and engaging approach to support young children with ACIs. However, successful implementation depends on thoughtful collaboration, mutual respect, and strategic integration of both disciplines (Burns, Keaveney, et al., 2024; Burns & O'Connor, 2023; Hobson, 2006b; Twyford & Watson, 2008). Drawing on findings from this study, existing literature, and

clinical experience, the following recommendations provide practical guidance for clinicians looking to establish or refine collaborative MT-SLT practices in this area.

- Collaboration should be an equal partnership. Both clinicians must contribute ideas, lead activities, and shape interventions. Planning sessions together, rotating leadership roles, and integrating both perspectives ensure a balanced approach.
- Avoid rigid role division. Clinicians should focus on shared goals rather than assigning strict roles or responsibilities. Effective collaboration thrives on open communication, adaptability, and mutual respect, ensuring that both professionals bring their expertise without one profession overshadowing the other.
- Music and speech-language strategies should be integrated to support multimodal communication. Combining music-based scaffolding (rhythm, melody, harmony) with speech and language therapy techniques (visual supports, gesture, AAC, spoken language) creates a multimodal approach that enhances communication. Clinicians should co-design interventions that encourage spoken, sung, gestural, and augmentative expression, ensuring accessibility for children with ACIs.
- Effective collaboration takes practice. Clinicians should embrace creativity, experiment with new approaches, and be open to trial and error. Scheduling debriefs to reflect on what works, adjusting strategies as needed, and allowing time for natural working rhythm to develop are key. Not all aspects of collaboration will be clearly defined, but clinicians should engage in the process despite uncertainty, relying on their clinical expertise, flexibility, and adaptability to guide their approach.

- Each clinician should understand the other's core methods. Familiarity with each profession's strengths, training, and scope of practice helps clinicians recognise how their expertise contributes to the collaborative process.
- Respect professional boundaries. Clinicians should recognise the boundaries of their professional education and training and be willing to set limits on their role within the collaborative process to avoid stepping beyond their professional competencies. Respecting each profession's expertise ensures that interventions remain within scope and that the highest standard of care is provided to clients.
- Consider institutional constraints. Securing dedicated co-treatment time requires proactive planning and advocacy. Clinicians should communicate the benefits of collaboration through clinical observations, case discussions, and interdisciplinary planning. If full co-treatment isn't feasible, alternative approaches such as periodic joint sessions, shared goal setting, or integrating strategies across independent sessions can help maintain continuity.

#### ***8.5.4 Limitations and Future Research***

The multiple case study approach provided a strong framework for capturing the complexity of collaborative therapeutic interactions, yet the findings remain limited in their generalisability. The study was not intended to measure the efficacy of the collaborative programme but rather document the therapeutic responses that emerged within these sessions, explore the therapeutic potential of this approach, and gain insights into collaborative clinical practices. As such, the findings should be understood as an in-depth exploration of specific cases, rather than a broader reflection of outcomes for all children with ACIs. Nevertheless, the methodological design provides a practical reference point for clinicians conducting case-based research in paediatric

neurorehabilitation and demonstrates the potential role of video data in capturing and analysing therapeutic processes within acute clinical environments.

The dual role of clinicians as researchers needs to be considered. The treating MT and SLTs were also responsible for data analysis and the generation of case studies, which provided practitioner insight while also introducing the potential for bias. While this dual role enabled in-depth clinical understanding and real-time adaptation of intervention strategies (Yanos & Ziedonis, 2006), it also meant that a complete separation between clinical and research perspectives was not possible (Hay-Smith et al., 2016). Efforts were made to ensure that the case studies were presented as objective accounts, grounded in data from video recordings. However, it is important to acknowledge that a clinician-researcher perspective may inherently favour the perceived benefits of this collaborative approach. To enhance objectivity, the second author assisted in screening significant moments and was independent of the intervention. Future research could further mitigate potential bias by incorporating external evaluators or observer-rated measures, resources that were not available within the scope of this study.

Another consideration is the inconsistency in therapy sessions across participants. While the programme was designed to provide two collaborative sessions per week, no child received an uninterrupted course of therapy during their admission. Factors such as therapist absences, fluctuations in the child's medical status, and holiday leave resulted in irregularities in session delivery. This variability is unavoidable in real-world clinical settings, where therapy schedules are often influenced by external factors beyond the control of the clinical team. While such disruptions are unavoidable, they do impact the continuity and intensity of the intervention, which may, in turn, have influenced the observed outcomes. A fully controlled research environment, with strictly

adhered-to therapy schedules, would not reflect the realities of clinical practice, yet future studies could explore strategies to minimise disruptions and account for these inconsistencies in data analysis.

Moving forward, there is a clear need for isolated evaluation of collaborative MT-SLT practices using objective assessment measures. This would allow for a rigorous comparison of different therapy modalities, including individual music therapy, individual speech and language therapy, and their combined application. However, such studies will not be feasible until appropriate outcome measures are developed to accurately capture the impact of these interventions. At present, there are no standardised tools specifically designed to assess pre-verbal communication skills across developmental stages and diagnoses (Burns, Keaveney, et al., 2024; Burns, O'Connor, et al., 2024; Burns & O'Connor, 2023). The development of a validated assessment measure addressing this gap would be a critical step in advancing research in this area.

## **8.6 Conclusion**

This study provides valuable insights into collaborative MT-SLT for young children with ACIs. Through a multiple case study approach, it demonstrates how joint interventions can facilitate communicative progress by increasing vocal and verbal output, strengthening foundational interaction skills, and promoting communicative intent. By integrating expertise from both disciplines, collaborative interventions create interactive opportunities for children to practice and develop communication skills within an engaging and responsive environment. This aim of this study is not to position collaborative MT-SLT as a substitute for single-disciplinary interventions but to underscore its potential in augmenting and extending existing therapy approaches. This study offers insights into the added value of a joint approach, providing clinicians with

an additional tool that can be applied where appropriate to enhance therapeutic outcomes for this population.

## 8.7 References

- Aldridge, D. (2005). *Case study designs in music therapy*. Jessica Kingsley Publishers.
- Amir, D. (1996). Experiencing music therapy: Meaningful moments in the music therapy process. In M. Langenberg, K. Aigen, & J. Frommer (Eds.), *Qualitative music therapy research: Beginning dialogues* (pp. 109–130). Barcelona Publishers.
- Anderson, V., Northam, E., & Wrennall, J. (2019). *Developmental neuropsychology. A clinical approach* (2nd ed.). Routledge.
- Bavngaard, M. V., Lüchau, E. C., Hvidt, E. A., & Grønning, A. (2023). Exploring patient participation during video consultations: A qualitative study. *DIGITAL HEALTH, 9*. <https://doi.org/10.1177/20552076231180682>
- Beathard, B., & Krout, R. E. (2008). A music therapy clinical case study of a girl with childhood apraxia of speech: Finding Lily's voice. *Arts in Psychotherapy, 35*(2), 107–116. <https://doi.org/10.1016/j.aip.2008.01.004>
- Besson, M., & Schön, D. (2001). Comparison between language and music. *Annals of the New York Academy of Sciences, 930*, 232–258. <https://doi.org/10.1111/j.1749-6632.2001.tb05736.x>
- Bower, J., Catroppa, C., Grocke, D., & Shoemark, H. (2014). Music therapy for early cognitive rehabilitation post-childhood TBI: An intrinsic mixed methods case study. *Developmental Neurorehabilitation, 17*(5), 339–346. <https://doi.org/10.3109/17518423.2013.778910>
- Bower, J., & Shoemark, H. (2009). Music therapy to promote interpersonal interactions in early paediatric neurorehabilitation. *Australian Journal of Music Therapy, 20*, 59–75.

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.  
<https://doi.org/10.1191/1478088706qp063oa>
- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589–597.  
<https://doi.org/10.1080/2159676X.2019.1628806>
- Braun, V., & Clarke, V. (2021). One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research in Psychology*, 18(3), 328–352.  
<https://doi.org/10.1080/14780887.2020.1769238>
- Brookshire, R. H. (2015). *Introduction to neurogenic communication disorders* (8th ed.). Elsevier.
- Bruscia, K. (1991). *Case studies in music therapy* (K. Brusica, Ed.). Barcelona Publishers.
- Bunt, L., & Stige, B. (2014). *Music therapy: An art beyond words*. Taylor and Francis.  
<https://doi.org/10.4324/9781315817989>
- Burns, J., Bower, J., & Moss, H. (2025). Methodological, practical, and ethical perspectives on music therapy research in paediatric neurorehabilitation. *Music Therapy Perspectives*, 43(1). <https://doi.org/10.1093/mtp/miaf006>
- Burns, J., Healy, H., O'Connor, R., & Moss, H. (2024). Integrative review of music and music therapy interventions on functional outcomes in children with acquired brain injury. *Journal of Music Therapy*, 62(1). <https://doi.org/10.1093/jmt/thae017>
- Burns, J., Keaveney, C., Nieto, N., O'Connor, R., & Moss, H. (2024). Collaborative music therapy and speech-language pathology for pediatric acquired communication impairments: A phenomenological international perspective. *Music Therapy Perspectives*, 43(1). <https://doi.org/10.1093/mtp/miae026>

- Burns, J., O'Connor, R., & Moss, H. (2024). Music therapy for young children with acquired communication impairments: An international survey of clinical practices. *Nordic Journal of Music Therapy*, 33(5), 391–408.  
<https://doi.org/10.1080/08098131.2024.2329898>
- Burns, J., & O'Connor, R. S. (2023). Exploring clinicians' experiences of engaging in collaborative music therapy and speech and language therapy for children with an acquired brain injury. *Approaches: An Interdisciplinary Journal of Music Therapy*.  
<https://doi.org/10.56883/aijmt.2024.37>
- Byrne, D. (2022). A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Quality & Quantity*, 56(3), 1391–1412.  
<https://doi.org/10.1007/s11135-021-01182-y>
- Cermak, C. A., Scratch, S. E., Reed, N. P., Bradley, K., De Launay, K. L. Q., & Beal, D. S. (2019). Cognitive communication impairments in children with traumatic brain injury: A scoping review. *Journal of Head Trauma Rehabilitation*, 34(2), E13–E20.  
<https://doi.org/10.1097/HTR.0000000000000419>
- Cohen, N. S. (1992). The effect of singing instruction on the speech production of neurologically impaired persons. *Journal of Music Therapy*, 29(2), 87–102.  
<https://doi.org/10.1093/jmt/29.2.102>
- Davis, H. A., Kells, M. R., Roske, C., Holzman, S., & Wildes, J. E. (2023). A reflexive thematic analysis of #WhatIEatInADay on TikTok. *Eating Behaviors*, 50, 101759.  
<https://doi.org/10.1016/j.eatbeh.2023.101759>
- Duffy, J. (2013). *Motor speech disorders: Substrates, differential diagnosis, and management* (3rd ed.). Elsevier Health Sciences.
- Fazeli, S., Sabetti, J., & Ferrari, M. (2023). Performing qualitative content analysis of video data in social sciences and medicine: The visual-verbal video analysis

method. *International Journal of Qualitative Methods*, 22.

<https://doi.org/10.1177/16094069231185452>

Gavrielidou, M., & Odell-Miller, H. (2017). An investigation of pivotal moments in music therapy in adult mental health. *The Arts in Psychotherapy*, 52, 50–62.

<https://doi.org/10.1016/j.aip.2016.09.006>

Gilardone, G., Viganò, M., Cassinelli, D., Fumagalli, F. M., Calvo, I., Gilardone, M., Sozzi, M., & Corbo, M. (2022). Post-stroke acquired childhood aphasia. A scoping review. *Child Neuropsychology*, 29(8), 1268–1293.

<https://doi.org/10.1080/09297049.2022.2156992>

Hay-Smith, E. J. C., Brown, M., Anderson, L., & Treharne, G. J. (2016). Once a clinician, always a clinician: A systematic review to develop a typology of clinician-researcher dual-role experiences in health research with patient-participants. *BMC Medical Research Methodology*, 16(1), 95.

<https://doi.org/10.1186/s12874-016-0203-6>

Hécaen, H. (1976). Acquired aphasia in children and the ontogenesis of hemispheric functional specialization. *Brain and Language*, 3(1), 114–134.

[https://doi.org/10.1016/0093-934X\(76\)90009-2](https://doi.org/10.1016/0093-934X(76)90009-2)

Hobson, M. R. (2006a). The collaboration of music therapy and speech-language pathology in the treatment of neurogenic communication disorders: Part I- Diagnosis, therapist roles, and rationale for music. *Music Therapy Perspectives*, 24(2), 58–65. <https://doi.org/10.1093/mtp/24.2.58>

Hobson, M. R. (2006b). The collaboration of music therapy and speech-language pathology in the treatment of neurogenic communication disorders: Part II- Collaborative strategies and scope of practice. *Music Therapy Perspectives*, 24(2), 66–72. <https://doi.org/10.1093/mtp/24.2.66>

- Hora, E. C., Santana, L. V., de Jesus Santos, L., de Oliveira Souza, G., Pimentel, A. V., Bezerra, N. T. C., Rodrigues de Freitas Doria, S., Pinheiro Vaz de Carvalho, T., Abreu Mendes Júnior, A., Almedia Rodrigues, J., Leite Lopes, R. J. P., & Fakhouri, R. (2014). Communication disorders following traumatic brain injury. In F. Sadaka (Ed.), *Traumatic brain injury* (pp. 467–490). InTech. <https://doi.org/10.5772/57321>
- Jones, K., & Odell-Miller, H. (2023). A theoretical framework for the use of music therapy in the treatment of selective mutism in young children: Multiple case study research. *Nordic Journal of Music Therapy*, 32(1), 4–28.  
<https://doi.org/10.1080/08098131.2022.2028886>
- Kennelly, J. (2006). Music therapy in paediatric rehabilitation. In F. Baker & J. Tamplin (Eds.), *Music therapy methods in neurorehabilitation: A clinician's manual* (pp. 219–233). Jessica Kingsley Publishers.
- Kennelly, J. (2013). Brain injuries and rehabilitation in children. In J. Bradt (Ed.), *Guidelines for music therapy practice in pediatric care* (pp. 356–402). Barcelona Publishers.
- Kennelly, J., & Brien-Elliott, K. (2001). The role of music therapy in paediatric rehabilitation. *Pediatric Rehabilitation*, 4(3), 137–143.  
<https://doi.org/10.1080/13638490110067687>
- Kennelly, J., & Edwards, J. (1997). Providing music therapy to the unconscious child in the paediatric intensive care unit. *Australian Journal of Music Therapy*, 8, 18–29.
- Kennelly, J., Hamilton, L., & Cross, J. A. (2001). The interface of music therapy and speech pathology in the rehabilitation of children with acquired brain injury. *Australian Journal of Music Therapy*, 12, 13–20.  
<https://doi.org/10.3109/17518423.2013.778910>

- Kiger, M. E., & Varpio, L. (2020). Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical Teacher*, 42(8), 846–854.  
<https://doi.org/10.1080/0142159X.2020.1755030>
- Kostøl, E. M. F. (2025). Teachers' co-regulation in classrooms: a video-based analysis of teachers' foci of attention in emotional situations. *Journal of Early Childhood Teacher Education*, 1–15. <https://doi.org/10.1080/10901027.2025.2455505>
- Lau, A., & Bratby, M. (2024). Collecting qualitative data via video statements in the digital era. *Labour and Industry*, 34(2), 101–113.  
<https://doi.org/10.1080/10301763.2023.2209923>
- Meadows, A. (2010). *Developments in music therapy practice: Case study perspectives*. Barcelona Publishers.
- Murdoch, B. E. (2011). *Handbook of acquired communication disorders in childhood*. Plural Publishing.
- Nassauer, A., & Legewie, N. M. (2021). Video data analysis: A methodological frame for a novel research trend. *Sociological Methods & Research*, 50(1), 135–174.  
<https://doi.org/10.1177/0049124118769093>
- O'Hare, A. (2016). Management of developmental speech and language disorders. Part 2: Acquired conditions. *Archives of Disease in Childhood*, 101(3), 278–283.  
<https://doi.org/10.1136/archdischild-2014-306153>
- Pennington, L., Parker, N. K., Kelly, H., & Miller, N. (2016). Speech therapy for children with dysarthria acquired before three years of age. *Cochrane Database of Systematic Reviews*, 7. <https://doi.org/10.1002/14651858.CD006937.pub3>
- Ratcliff, D. (2003). Video methods in qualitative research. In *Qualitative research in psychology: Expanding perspectives in methodology and design*. (pp. 113–129). American Psychological Association. <https://doi.org/10.1037/10595-007>

- Ryckaert, J., & Kenworthy, F. (2016). Tune in: Creating confident communicators through music therapy and speech-language therapy collaboration. *New Zealand Journal of Music Therapy, 14*(14), 104–121.
- Stake, R. (2006). *Multiple case study analysis*. Guilford Press.
- Turkstra, L. S., Politis, A. M., & Forsyth, R. (2015). Cognitive-communication disorders in children with traumatic brain injury. *Developmental Medicine and Child Neurology, 57*(3), 217–222. <https://doi.org/10.1111/dmcn.12600>
- Twyford, K., & Watson, T. (2008). *Integrated team working: Music therapy as part of transdisciplinary and collaborative approaches*. Jessica Kingsley Publishers.
- Yanos, P. T., & Ziedonis, D. M. (2006). The patient-oriented clinician-researcher: Advantages and challenges of being a double agent. *Psychiatric Services, 57*(2), 249–253. <https://doi.org/10.1176/appi.ps.57.2.249>
- Yin, R. (2018). *Case study research and applications: Design and methods* (6th ed.). Sage Publications.
- Yin, R., & Davis, D. (2007). Adding new dimensions to case study evaluations: The case of evaluating comprehensive reforms. *New Directions for Evaluation, 2007*(113), 75–93. <https://doi.org/10.1002/ev.216>

## **Chapter 9**

### **Study V**

#### **Methodological, Practical, and Ethical Perspectives on Music Therapy Research in Pediatric Neurorehabilitation**

Burns, J., Bower, J., & Moss, H. (2025). Methodological, practical, and ethical perspectives on music therapy research in pediatric neurorehabilitation. *Music Therapy Perspectives*, 43(1). <https://doi.org/10.1093/mtp/miaf006>

## **9.1 Abstract**

This commentary explores the complexities of advancing research in music therapy for pediatric neurorehabilitation following acquired brain injury. Despite the increasing clinical integration of music therapy in this field, robust evidence remains limited. This discussion explores methodological, practical, and ethical challenges that complicate research design and concludes with recommendations to address these challenges and strengthen the evidence base.

**Keywords:** music therapy; acquired brain injury; pediatrics; research; commentary

Advancing research in music therapy is crucial for the continued development and validation of therapeutic practices to achieve optimal health and wellbeing outcomes. Music therapy in pediatric neurorehabilitation following acquired brain injury (ABI) has seen increasing integration across clinical settings, including acute and sub-acute hospital settings, community services, and private practices. Despite this rise in clinical engagement, the field is progressing rather slowly in terms of robust research evidence. An integrative review of pediatric ABI identified only eight empirical music therapy intervention studies published over the last 37 years (Burns, Healy, et al., 2024), highlighting a substantial paucity of research and alluding to the challenges of conducting scientifically rigorous research with this population. The need for rigorous research is imperative to substantiate the benefits observed in clinical practice and to guide best practices in the field.

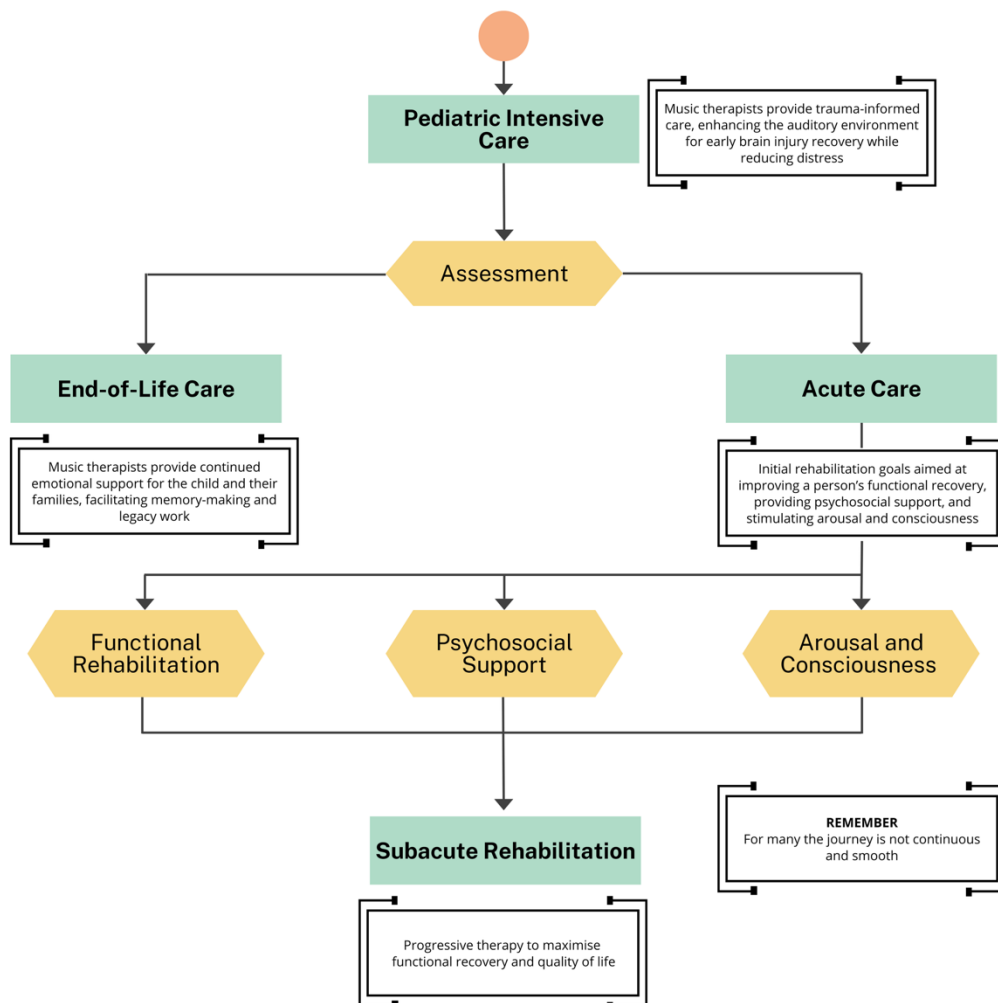
This commentary reflects on experiences in pediatric neurorehabilitation music therapy research and discusses the complexities inherent in this research domain. The aim is to contribute to the ongoing dialogue on advancing the evidence base for music therapy and ultimately improve therapeutic outcomes for children undergoing neurorehabilitation following neurologic injury or illness. Authored by a team with a combined 41 years of research experience and extensive clinical experience, including a PhD Candidate, Postdoctoral Research Fellow, and Professor of Music Therapy, this commentary examines methodological, practical, and ethical challenges in music therapy research within pediatric neurorehabilitation. It offers a perspective on the current state of the field and outlines future directions for advancing research and clinical practice.

## 9.2 Clinical Integration of Music Therapy Across Care Stages

Within the pediatric hospital, the role of the music therapist extends from intensive and acute care through to subacute rehabilitation (Edwards & Kennelly, 2017; Ghetti, 2013). Music therapists must exhibit immense flexibility to work within the interdisciplinary teams and address the multiple, complex, and rapidly evolving needs of patients and their families. See Figure 7 for a visual representation of the clinical integration of music therapy during the acute stages of care following ABI.

**Figure 7**

*Music Therapy During Acute Stages of Care Following ABI*



In the pediatric intensive care unit (PICU), the primary focus is on life-sustaining medical and surgical interventions. Music therapy can be strategically implemented to enhance the auditory environment for early brain injury recovery, optimize sleep cycles, reduce pain perception and distress, and provide procedural support during endotracheal extubation as a child is weaned from mechanical ventilation (Ghetti, 2013; Kennelly, 2013). Additionally, music therapists may provide trauma-informed care, addressing the emotional and psychological needs of both the patient and their families amidst the uncertainty and disruption caused by critical illness (Ghetti & Whitehead-Pleaux, 2015). This approach may be particularly significant in cases of non-survivable ABI, where music therapy can facilitate memory-making and legacy work. As spontaneous recovery progresses, interventions may target a reduction in delirium symptomatology or the early stimulation of arousal and consciousness, aiming to maximize long-term functional recovery (Tamplin et al., 2023).

Following a step down from PICU to acute care, the medical focus shifts toward the continued stabilization of vital functions and neurological status, along with the initial stages of rehabilitation. Depending on the patient's presentation, music therapists may continue addressing early consciousness recovery or focus on functional rehabilitation including motor and communication skills, and/or cognitive processing (Burns, Healy, et al., 2024; Kennelly & Brien-Elliott, 2001; Menén Sánchez et al., 2023). Finally, in sub-acute inpatient rehabilitation the emphasis is on more intensive and long-term rehabilitation strategies to maximize spontaneous recovery and develop necessary compensatory strategies. The sub-acute phase supports consistent, progressive therapeutic work, contributing to improvements in the child's overall functioning and quality of life (Kennelly, 2013).

### 9.3 Considering Research Participants

Children with ABI represent a highly diverse and complex population, presenting unique challenges for research. ABI is an umbrella term for damage to the brain that occurs after birth, encompassing a range of etiologies such as traumatic brain injury (TBI), stroke, tumors, infections, and hypoxic events (Knight et al., 2019). Each etiology results in diverse clinical presentations and recovery trajectories, significantly influenced by the severity and location of the injury (Goldman et al., 2022). For instance, a stroke may cause a localized brain injury resulting in impairments in a single functional domain, whereas a severe TBI is likely to lead to diffuse global brain injury, affecting multiple interconnected functions.

This population spans the entire developmental range from infancy to late adolescence (ages 0-18), an enormous period of growth and development, influenced by both environmental and genetic factors. Key neurodevelopmental processes during this time, such as synaptogenesis, rapid myelination, synaptic pruning, and heightened neuroplasticity, further underscore the complexity of this developmental stage (Marzola et al., 2023; Spear, 2013). The variation in developmental stages and injury characteristics necessitates a nuanced approach to evaluating music therapy's efficacy, making it challenging to design studies that adequately address the unique needs of each individual while accounting for the broad range of developmental and injury-related variables.

A major hurdle in this research area is understanding the interplay between brain development and injury. The developing brain is uniquely vulnerable to ABI, with the timing of the injury playing a critical role in shaping recovery outcomes. Theories such as early plasticity versus early vulnerability illustrate the inherent complexities in studying this population (Anderson et al., 2005, 2011). Early plasticity suggests that the

immature brain has greater capacity for reorganization and adaptation following injury, potentially leading to more favorable recovery outcomes. Conversely, early vulnerability posits that because the developing brain is undergoing critical periods of growth and maturation, it may be more susceptible to long-term deficits following injury (Anderson et al., 2005, 2011). The extent to which a child's brain can recover or reorganize following injury is influenced by the timing of the insult, creating an additional layer of complexity for research studies, especially when assessing the efficacy of interventions like music therapy.

The relatively low incidence of pediatric ABI further complicates research efforts. As a low-incidence population, these children often receive less attention in research compared to more prevalent conditions. This scarcity of research may be partially attributed to difficulties in recruiting a sufficient number of participants to conduct well-powered studies. A number of empirical studies in music therapy have had a sample size as small as one (Bower et al., 2014; Cohen, 1988; Gentle et al., 2015), which limits the generalizability of their findings. While these studies provide valuable contributions, their limited scope affects broader applicability. Moreover, larger and more widely recognized areas of music therapy, such as its application in adult stroke rehabilitation or autism, tends to attract more attention and research funding, leaving pediatric neurorehabilitation underexplored.

## **9.4 Navigating Research Methodologies**

Medical research in pediatric neurorehabilitation often adheres to reductionist, and empirical principles. These methodologies are grounded in positivist or post-positivist stances that emphasize objectivity, quantifiable outcomes, and replicability. The goal is to uncover universal truths through controlled experiments and statistical analyses (Allsop, 2013). In contrast, music therapy research spans multiple theoretical

areas. While it frequently adopts an interpretivist stance, aiming to capture the richness of subjective experiences and nuanced impact of therapy, it also seeks to provide objective evidence supporting its effectiveness and impact (Wheeler & Bruscia, 2016). By integrating diverse methodologies through a pragmatic lens, music therapy research not only explores the personal and contextual dimensions of therapy but also contributes valuable, evidence-based insights into its efficacy (Edwards, 2017). Therefore, the intersection of music therapy and pediatric neurorehabilitation research poses challenges, as the differing research approaches can complicate alignment between fields.

Conducting music therapy research in pediatric neurorehabilitation is fraught with methodological challenges. Randomized control trials (RCTs), widely regarded as the gold standard for clinical research, encounter significant obstacles when applied to acute and subacute care settings. The dynamism and unpredictability of these environments complicates the randomization process and the maintenance of control conditions. For instance, variables such as ongoing medical treatment, varying levels of sedation, and fluctuating medical statuses can disrupt baseline measures, making it challenging to attribute observed changes directly to music therapy interventions.

Furthermore, the traditional emphasis on RCTs has shaped the perception of what constitutes rigorous research. This narrow focus may overlook valuable insights offered by qualitative research methodologies, which are better suited to capturing the subjective and nuanced benefits that quantitative measures may miss. However, in our experience, qualitative research in the realm of brain injury rehabilitation often encounters skepticism. The prevailing bias towards quantitative data, which is perceived as more objective and generalizable, poses a barrier to the acceptance and integration of qualitative findings into the broader evidence base. There is a growing need to advocate

for health services to broaden their definition of rigorous research, incorporating robust qualitative evidence alongside quantitative methods.

Measuring outcomes in specific domains such as physical, cognitive, and communicative functions presents further complexities. Children in neurorehabilitation typically receive interdisciplinary care involving a range of allied health professionals, such as physiotherapists, speech and language therapists, and occupational therapists. This collaborative model, while crucial for comprehensive rehabilitative care, complicates efforts to isolate and evaluate the specific effects of music therapy. The overlapping and synergistic nature of these various interventions means that attributing observed improvements solely to music therapy becomes methodologically complex. Additionally, distinguishing the effects of an intervention from natural recovery poses further challenges, as children's spontaneous progress can confound the evaluation of therapeutic outcomes.

## **9.5 Assessing Intervention Outcomes**

Building on the complexities of research methodologies, a significant challenge in advancing objectivist music therapy research within pediatric neurorehabilitation is the lack of standardized outcome measures. Many tools are not sensitive enough to capture the realistic presentation of children with ABIs, hence not reflecting true capabilities or subtle improvements (Chadwick et al., 2021). Slight improvements in attention span, mood, motor coordination, or communicative progress might go unnoticed by conventional measures, yet these changes can be profoundly meaningful in the context of a child's overall recovery (Bower et al., 2014; Burns, Keaveney, et al., 2024). Many measures often require administration across several sessions to obtain a reliable profile, which is not always feasible given the rapidly changing conditions of these children. Furthermore, balancing the benefit of assessments with the risk of

fatigue is a crucial consideration, as excessive evaluation can hinder participation in rehabilitative therapies. The limitations of existing tools necessitate the development of more nuanced and sensitive measures that can accurately capture the small, yet significant advancements not only facilitated by music therapy but also the wider interdisciplinary team.

## **9.6 Ethical Dimensions**

Research in this field is particularly complex due to the ethical considerations surrounding informed consent and assent. Children and adolescents are regarded as a vulnerable population since they have not reached the legal age to consent to clinical or research interventions. When a brain injury is involved, associated cognitive impairments may further limit a child's ability to assent to participation, requiring parents or legal guardians to make these decisions on their behalf (Donders, 2013). Despite this, it is necessary for clinicians and researchers to respect children's developing autonomy by involving them in age-appropriate discussions about their care and research participation, as this engagement aligns with ethical principles, fostering respect for the child as a person, even though the final legal responsibility for consent rests with parents or guardians. However, this raises an ethical dilemma, particularly in cases where there is a conflict between the child's wishes and the decisions of the parents or guardians. For example, if a child declines participation in a research study, yet their parents wish for the intervention to proceed, should the child's refusal be honored? While children's voices are integral to the decision-making process, their refusal may not reflect a full understanding of the implications, such as potential therapeutic benefits. On the other hand, if parents' wishes override the child's objections, there is a risk of undermining the child's autonomy and trust. This conflict

poses a significant ethical challenge: balancing respect for the child's expressed preferences with the responsibility to act in their best interest.

Power imbalances are inherent in medical settings, where children and their families must navigate complex healthcare systems that may not account for diverse cultural, socioeconomic, and linguistic backgrounds. Traditional research models typically position clinicians and researchers as the primary decision-makers, with children and their families confined to being research participants rather than active collaborators (Vaughn & Jacquez, 2020). Anti-Oppressive Practice (AOP) and the Public Patient Involvement (PPI) movement advocate for participatory research, engaging healthcare recipients in shaping research questions, methodologies, and outcomes to foster inclusivity, shared decision-making, and cultural responsiveness (Baines, 2013; National Institute for Health and Care Research, 2021). Applying these principles in pediatric neurorehabilitation presents challenges. Children with brain injuries frequently experience cognitive and communicative impairments that limit their ability to participate in conventional research planning. While parents and guardians may be involved as co-designers, the complexities of their experiences and impact of trauma can create barriers, which risk reducing genuine engagement to tokenism. Furthermore, as music therapy research in pediatric neurorehabilitation remains underdeveloped, researchers may be tempted to push their own theoretical frameworks over co-developing research questions with service users. Time and resource constraints further complicate the integration of AOP and PPI, as authentic participatory research demands ongoing collaboration, co-design workshops, and iterative feedback loops, all of which require resources that may be scarce in acute settings where clinical priorities dominate. Nonetheless, while complete adherence to AOP and PPI principles may not always be practical, this does not negate the responsibility to work toward greater

inclusivity. Researchers should strive for meaningful engagement, which could include family advisory groups, flexible communication methods, or ethically guided proxy representation for children with ABI. Recognizing these complexities does not justify inaction but rather calls for nuanced, context-sensitive approaches that balance participation with the realities of acute pediatric neurorehabilitation.

Beyond these considerations, obtaining Institutional Review Board (IRB) approval may present a substantial barrier to conducting research in pediatric neurorehabilitation. Given the vulnerability of the population, IRBs impose stringent requirements to ensure ethical integrity, often resulting in lengthy and complex approval processes. Researchers must carefully justify the risks and burdens of their studies, weighing them against the potential direct benefits to participants and the broader societal impacts. High-risk or high-burden studies are not prohibited, but they require thorough ethical evaluation to ensure appropriate safeguards are in place. In clinical settings, where protected time for research is often limited and resources are stretched, the demands of preparing detailed IRB applications can be a deterrent, dissuading researchers from pursuing studies that could advance the evidence base. While music therapy interventions are generally considered low risk, the data collection methods required to uphold scientific rigor, such as video and audio recording of sessions, neurophysiological measures like EEG, or repeated behavioral assessments, may introduce additional ethical considerations related to data protection and participant comfort. As many IRBs may have limited familiarity with music therapy as a profession, researchers must provide clear and detailed explanations of both the profession and intervention being researched. This ensures that ethical scrutiny is appropriately focused on the potential risks and benefits of the study, rather than misconceptions about the field.

Families facing the decision of whether to participate in a research study involving music therapy may experience significant apprehension, especially when participation in the research may impact access to therapeutically targeted intervention and any perceived benefit it may offer. In many cases, research studies may offer more frequent sessions or specialized interventions, and declining participation might mean the child receives only one session of music therapy per week instead of two. This discrepancy raises ethical concerns about the potential for coercion or undue influence on families' decisions, particularly when they are navigating the profound emotional challenges of managing grief and loss. The fear of limiting access to beneficial therapies due to non-participation underscores broader issues related to funding and resource allocation in healthcare settings. This situation places families in a delicate position where their decision to participate in research affects their child's immediate access to therapy. These complexities can also create ethical strain for researchers, who must respect a family's decision to decline participation while knowing that the child could meaningfully benefit from the intervention being studied, especially when it may not be accessible outside of the research setting but might be readily accepted if offered as part of standard care.

## **9.7 Moral Distress of the Researcher**

The ethical and moral landscape becomes increasingly intricate when seeking consent during acute phases, such as when a child is in the PICU with an acquired neurological impairment. The circumstances leading to the admission to the PICU are often a distressing and overwhelming time for families (Kennelly & Edwards, 1997). Researchers must approach these situations with exceptional sensitivity, acknowledging the trauma families are experiencing and allowing adequate time for them to process information and make an informed decisions regarding research participation

(Showalter et al., 2022). Moreover, encountering terms like “traumatic brain injury” or “disorders of consciousness” on research information sheets can be a stark and confronting reminder of the severity of a child’s condition. Asking parents for permission for the child to participate in research during this acute phase can feel self-serving and insensitive, as they are grappling with profound grief and loss. It is crucial for researchers to recognize this emotional burden and to ensure that the consent process is as compassionate and unobtrusive as possible, prioritizing the family’s emotional state and wellbeing above the needs of the study. Researchers should consider minimizing the imposition of non-clinical interventions that may overwhelm families who are already facing a tumultuous situation. While IRBs conduct risk-benefit analyses, music therapists – who approach their clinical work from a child-led and humanistic perspective – may face moral tensions when requesting participation from families who are already experiencing profound trauma.

## **9.8 Addressing the Complexities of Research in Pediatric**

### **Neurorehabilitation**

Music therapy research in pediatric neurorehabilitation presents a range of methodological, ethical, and practical challenges. To advance the evidence base while maintaining high standards of rigor and ethical responsibility, we have adopted a number of strategies designed to navigate these complexities effectively.

- Qualitative methodologies yield rich insights into the experiences of children and their families, providing depth that complements quantitative measures. Their value should not be underestimated. Integrating qualitative findings into clinical guidelines and policy recommendations will strengthen their influence in shaping evidence-based practice.

- Mixed method approaches provide a comprehensive understanding of rehabilitation outcomes and patient experience by combining measurable indicators of change with the contextual richness of qualitative inquiry.
- Multiple-baseline designs offer a flexible yet rigorous approach to research. By staggered introduction of music therapy intervention across participants, this method allows for more accurate identification of the intervention's effects while minimizing the influence of confounding variables.
- Case studies and case series are highly valuable for gathering detailed, individual-level data. In the absence of large-scale trials, these methodologies provide critical insights and allow for the documentation of complex cases where each child serves as their own control. Although generalizability to a larger population is limited, these studies lay the groundwork for more extensive research.
- Ensuring adherence to reporting standards and guidelines enhances the transparency, replicability, and credibility of research findings. The CONSORT (Consolidated Standards of Reporting Trials) statement (Schulz et al., 2010) strengthens the rigor of RCTs by providing a checklist of essential reporting items. Similarly, the JARS (Journal Article Reporting Standards) (Levitt et al., 2018) offers guidance on what information should be included in each section of a manuscript for quantitative, qualitative, and mixed methods research. Additionally, population-specific standards, such as those for disorders of consciousness (Boerwinkle et al., 2024), further ensure that findings are reported consistently within specialized clinical contexts.

- Claims regarding the effectiveness of music therapy must be carefully substantiated by a robust and evolving evidence base. It is important to avoid overstating its efficacy.
- Best practice principles for gaining consent and assent from children, particularly those with cognitive impairments, should draw upon well-established ethical frameworks, such as those used in research involving children with intellectual disabilities. These principles must be tailored to the pediatric neurorehabilitation context, ensuring that families fully understand the implications of participation, and that consent processes are appropriate and considerate.
- Research protocols should be designed to minimize disruptions to the child's ongoing care and recovery, particularly during the acute phases of rehabilitation when the emotional and physical toll on families is high. To ensure research abides to ethical practice, participation should not compromise the child's access to standard therapeutic interventions.

## **9.9 Conclusion**

Individually targeted music therapy interventions hold considerable promise in the rehabilitation of children following ABI, however more research is required to develop a solid foundation of evidence. The complexities of studying this heterogenous population and the current lack of robust empirical evidence highlight the urgent need for further inquiry. By embracing creative and innovate research methodologies, we can build a stronger evidence base that validates and enhances therapeutic practices. Therefore, we urge researchers and clinicians to remain committed to exploring the therapeutic value of music in pediatric neurorehabilitation, recognizing that while

progress may be incremental, it is both attainable and vital for improving outcomes for children affected by ABI.

## 9.10 References

- Allsop, J. (2013). Competing paradigms and health research: Design and process. In M. Saks & J. Allsop (Eds.), *Researching health: Qualitative, quantitative and mixed methods* (2nd ed, pp. 18–41). Sage.
- Anderson, V., Catroppa, C., Morse, S., Haritou, F., & Rosenfeld, J. (2005). Functional plasticity or vulnerability after early brain injury? *Pediatrics*, *116*(6), 1374–1382. <https://doi.org/10.1542/peds.2004-1728>
- Anderson, V., Spencer-Smith, M., & Wood, A. (2011). Do children really recover better? Neurobehavioural plasticity after early brain insult. *Brain*, *134*(8), 2197–2221. <https://doi.org/10.1093/brain/awr103>
- Baines, S. (2013). Music therapy as an Anti-Opressive Practice. *The Arts in Psychotherapy*, *40*(1), 1–5. <https://doi.org/10.1016/j.aip.2012.09.003>
- Boerwinkle, V. L., Appavu, B., Cediell, E. G., Erklaurer, J., Lalgudi Ganesan, S., Gibbons, C., Hahn, C., LaRovere, K. L., Moberg, D., Natarajan, G., Molteni, E., Reuther, W. R., Slomine, B. S., Aiyagari, V., Akbari, Y., Al-Mufti, F., Alexander, S., Alexandrov, A., Ayham, ... Zink, E. (2024). Common data elements for disorders of consciousness: Recommendations from the working group in the pediatric population. *Neurocritical Care*, *40*(1), 65–73. <https://doi.org/10.1007/s12028-023-01870-7>
- Bower, J., Catroppa, C., Grocke, D., & Shoemark, H. (2014). Music therapy for early cognitive rehabilitation post-childhood TBI: An intrinsic mixed methods case study. *Developmental Neurorehabilitation*, *17*(5), 339–346. <https://doi.org/10.3109/17518423.2013.778910>

- Burns, J., Healy, H., O'Connor, R., & Moss, H. (2024). Integrative review of music and music therapy interventions on functional outcomes in children with acquired brain injury. *Journal of Music Therapy*, 62(1). <https://doi.org/10.1093/jmt/thae017>
- Burns, J., Keaveney, C., Nieto, N., O'Connor, R., & Moss, H. (2024). Collaborative music therapy and speech-language pathology for pediatric acquired communication impairments: A phenomenological international perspective. *Music Therapy Perspectives*, 43(1). <https://doi.org/10.1093/mtp/miae026>
- Chadwick, L., Roth, E., Minich, N. M., Taylor, H. G., Bigler, E. D., Cohen, D. M., Bacevice, A., Mihalov, L. K., Bangert, B. A., Zumberge, N. A., & Yeates, K. O. (2021). Cognitive outcomes in children with mild traumatic brain injury: An examination using the National Institutes of Health Toolbox Cognition Battery. *Journal of Neurotrauma*, 38(18), 2590–2599. <https://doi.org/10.1089/neu.2020.7513>
- Cohen, N. S. (1988). The use of superimposed rhythm to decrease the rate of speech in a brain-damaged adolescent. *Journal of Music Therapy*, 25(2), 85–93. <https://doi.org/10.1093/jmt/25.2.85>
- Donders, J. (2013). Ethical issues in pediatric traumatic brain injury rehabilitation. *Journal of Head Trauma Rehabilitation*, 28(6), 485–488. <https://doi.org/10.1097/HTR.0b013e31829d5492>
- Edwards, J. (2017). Music therapy research: Context, methodology, and current and future developments. In J. Edwards (Ed.), *The Oxford handbook of music therapy* (pp. 709–719). Oxford University Press.
- Edwards, J., & Kennelly, J. (2017). Music therapy for hospitalized children. In J. Edwards (Ed.), *The Oxford Handbook of Music Therapy* (pp. 53–65). Oxford University Press.

- Gentle, E. C., Barker, M., & Bower, J. (2015). Preservation of singing functioning in a 5 year-old following severe right-sided traumatic brain injury: Insights into the neurological resilience of song from pediatric music therapy. *Music and Medicine*, 7(3), 14–19. <https://doi.org/10.47513/mmd.v7i3.405>
- Ghetti, C. (2013). Pediatric Intensive Care. In J. Bradt (Ed.), *Guidelines for music therapy practice in pediatric care* (pp. 152–204). Barcelona Publishers.
- Ghetti, C., & Whitehead-Pleaux, A. M. (2015). Sounds of strength: Music therapy for hospitalized children at risk for traumatization. In C. A. Malchiodi (Ed.), *Creative interventions with traumatized children* (2nd Ed., pp. 324–344). The Guilford Press.
- Goldman, L., Siddiqui, E. M., Khan, A., Jahan, S., Rehman, M. U., Mehan, S., Sharma, R., Budkin, S., Kumar, S. N., Sahu, A., Kumar, M., & Vaibhav, K. (2022). Understanding acquired brain injury: A review. *Biomedicines*, 10(9), 2167. <https://doi.org/10.3390/biomedicines10092167>
- Kennelly, J. (2013). Brain injuries and rehabilitation in children. In J. Bradt (Ed.), *Guidelines for music therapy practice in pediatric care* (pp. 356–402). Barcelona Publishers.
- Kennelly, J., & Brien-Elliott, K. (2001). The role of music therapy in paediatric rehabilitation. *Pediatric Rehabilitation*, 4(3), 137–143. <https://doi.org/10.1080/13638490110067687>
- Kennelly, J., & Edwards, J. (1997). Providing music therapy to the unconscious child in the paediatric intensive care unit. *Australian Journal of Music Therapy*, 8, 18–29.
- Knight, S., Takagi, M., Fisher, E., Anderson, V., Lannin, N. A., Tavender, E., & Scheinberg, A. (2019). A systematic critical appraisal of evidence-based clinical practice guidelines for the rehabilitation of children with moderate or severe

acquired brain injury. *Archives of Physical Medicine and Rehabilitation*, 100(4), 711–723. <https://doi.org/10.1016/j.apmr.2018.05.031>

Levitt, H. M., Bamberg, M., Creswell, J. W., Frost, D. M., Josselson, R., & Suárez-Orozco, C. (2018). Journal article reporting standards for qualitative primary, qualitative meta-analytic, and mixed methods research in psychology: The APA Publications and Communications Board task force report. *American Psychologist*, 73(1), 26–46. <https://doi.org/10.1037/amp0000151>

Marzola, P., Melzer, T., Pavesi, E., Gil-Mohapel, J., & Brocardo, P. S. (2023). Exploring the role of neuroplasticity in development, aging, and neurodegeneration. *Brain Sciences*, 13(12), 1610. <https://doi.org/10.3390/brainsci13121610>

Menén Sánchez, A., Pool, J., Bower, J., Paasch, V., & Magee, W. (2023). Best practice recommendations for using music with children and young people with disorders of consciousness. *Music and Medicine*, 15(1). <https://doi.org/10.47513/mmd.v15i1.885>

National Institute for Health and Care Research. (2021, April 1). *Briefing notes for researchers - public involvement in NHS, health and social care research*. <https://www.nihr.ac.uk/briefing-notes-researchers-public-involvement-nhs-health-and-social-care-research>

Schulz, K. F., Altman, D. G., Moher, D., & CONSORT Group. (2010). CONSORT 2010 statement: Updated guidelines for reporting parallel group randomised trials. *BMC Medicine*, 8, 18. <https://doi.org/10.1186/1741-7015-8-18>

Showalter, B. L., Malecha, A., Cesario, S., & Clutter, P. (2022). Moral distress in clinical research nurses. *Nursing Ethics*, 29(7–8), 1697–1708. <https://doi.org/10.1177/09697330221090613>

- Spear, L. P. (2013). Adolescent neurodevelopment. *Journal of Adolescent Health, 52*(2), S7–S13. <https://doi.org/10.1016/j.jadohealth.2012.05.006>
- Tamplin, J., Bower, J., & Siponkoski, S.-T. (2023). *Music for traumatic brain injury and impaired consciousness* (pp. 37–48). [https://doi.org/10.1007/978-3-031-47092-9\\_4](https://doi.org/10.1007/978-3-031-47092-9_4)
- Vaughn, L. M., & Jacquez, F. (2020). Participatory research methods – Choice points in the research process. *Journal of Participatory Research Methods, 1*(1). <https://doi.org/10.35844/001c.13244>
- Wheeler, B., & Bruscia, K. (2016). Overview of music therapy research. In B. Wheeler & K. Murphy (Eds.), *Music therapy research* (3rd ed., pp. 51–67). Barcelona Publishers.

# Chapter 10

## Discussion

### 10.1 Introduction

This chapter presents a discussion of this research, drawing on the collective findings of the five studies included in this thesis. It provides a synthesis of these findings, framed in relation to the three overarching research questions posed at the outset of this project. The contributions of this research to the field will be discussed, alongside a critical reflection of its strengths, limitations, and challenges. Recommendations for future research are outlined, and overall conclusions are drawn.

### 10.2 Summary of Key Findings

The five inter-connected studies presented in this thesis collectively sought to explore the use of music therapy as a means of supporting communication outcomes for young children with acquired communication impairments (ACIs). The findings of each study are presented and discussed in relation to the three overarching research questions that guided this research project.

#### *10.2.1 Outcome of RQ1: What is currently known about the impact of music therapy for children with ACIs?*

At present, research on the application and impact of music and music therapy for children with acquired brain injuries (ABIs) and, by extension those presenting with ACIs remains limited. The integrative review (Chapter 4) identified only a small number of empirical studies detailing the impact of music and music therapy interventions on functional outcomes in children with ABI. Within this already scarce body of literature, only two studies directly investigated the use of music therapy in

addressing speech, language, and communication outcomes in children presenting with ACIs (Cohen, 1988; Gentle et al., 2015). Beyond these two empirical studies, a small selection of case vignettes provide further insights into how music therapy has been used to support communication in children with ACIs to date (Bower & Shoemark, 2009; Kennelly et al., 2001; Kennelly & Brien-Elliott, 2001). These accounts describe clinical approaches and interventions used to facilitate language rehabilitation, communicative engagement, and social interaction. While these vignettes offer valuable practitioner perspectives, they lack systematic evaluation, making it difficult to draw firm conclusions. Nonetheless, they serve as important foundations for clinical insight, particularly in the absence of a more extensive evidence base, and may retain relevance for informing practice, even as more robust empirical evidence becomes available.

Since the completion of the integrative review, the case series (Chapter 8) has contributed further insights into how music therapy may support communicative rehabilitation in young children with ACIs. This study explored the therapeutic responses of four young children (aged 2-6 years) with ACIs who participated in a joint music therapy and speech and language therapy (MT-SLT) programme. Across all cases, children demonstrated increased vocal or verbal output, greater consistency in choice-making, and enhanced engagement in communicative exchanges as the programme progressed. The programme provided the children with meaningful opportunities to initiate, sustain, and develop communicative interactions, supporting both pre-verbal and verbal communication.

Collectively, due to the limited number of empirical studies, conclusions regarding music therapy's efficacy in supporting speech, language, and communication recovery and rehabilitation in children with ACIs remain tentative. However, this

research presented new findings which underscore its potential to facilitate communicative progress in this population.

### ***10.2.2 Outcome of RQ2: How do music therapists describe their practice of working with young children with ACIs?***

A substantial body of clinical knowledge exists among music therapists working with young children with ACIs, yet much of this remains unreported. Findings from the international survey (Chapter 5) provide much needed research to catalogue current practices and highlight the diverse range of clinical approaches, interventions, and outcome measures used by practitioners currently working in this field. Respondents demonstrated a predominant preference for humanistic and integrative approaches, reflecting the adaptive and client-centred nature of music therapy practice. Neurologic Music Therapy (NMT) was the most frequently applied clinical model, though the extent to which therapists adhered to specific NMT interventions varied. Among the most utilised interventions, song singing, vocal improvisation, and music and play were perceived as particularly effective in addressing language and communication goals. Additionally, collaborative approaches, particularly joint MT-SLT programmes, were ranked as the most impactful session orientation for supporting communication. The findings also revealed a strong preference for non-standardised evaluation methods, largely due to a scarcity of suitable standardised tools for assessing change in this population. Music therapists primarily relied on observation, video recordings, and self-developed screening tools to measure outcomes. Overall, the findings reveal a high degree of heterogeneity in clinical practice, reflecting the diverse backgrounds, theoretical orientations, and adaptive strategies employed by music therapists. This variability underscores the flexibility and adaptability of music therapy while also

highlighting the need for further research to establish evidence-based best practices for working with young children with ACIs.

### ***10.2.3 Outcome of RQ3: How does collaborative music therapy and speech and language therapy contribute to the rehabilitation of language and communication in young children with ACIs?***

The collaborative interview study (Chapter 7) investigated the combined perspectives of music therapists and speech and language therapists working jointly to support children with ACIs. Findings indicated that collaboration was often initiated in response to the complexity of paediatric ACIs, with clinicians describing joint sessions as particularly valuable for gaining deeper insight into a child's communicative profile and addressing identified speech, language, and communication needs more effectively. Clinicians deemed joint intervention beneficial in supporting early pre-verbal skills and communicative engagement, which were viewed as essential building blocks for later language development. Additionally, the interactive and engaging nature of joint sessions was reported to increase participation and responsiveness, particularly for children who struggled with engagement in individual speech and language therapy. Collaboration was also noted to support professional learning, as working alongside another clinician allowed participants to expand their skillset and integrate new techniques into their own practice, ultimately enhancing their work with children beyond the joint sessions. However, clinicians acknowledged that measuring the direct impact of collaboration on communication rehabilitation was challenging, as few standardised assessment tools exist for this population. Despite this limitation, clinicians viewed joint MT-SLT sessions as favourable, particularly in identifying communicative strengths, increasing participation, and fostering early communicative skills.

The case series (Chapter 8) explored a collaborative MT-SLT programme designed to support the rehabilitation of language and communication in young children with ACIs. Informed by the findings from the international survey (Chapter 5) and collaborative interviews (Chapter 7), the programme incorporated musical experiences alongside total communication strategies to specifically target these skills. Findings from the four case studies demonstrated that joint intervention supported communicative progress through three key mechanisms: (1) leveraging familiar song to facilitate vocal expression, (2) fostering social reciprocity and turn-taking through active musical play, and (3) enhancing choice-making through immediate contextualisation. Across all cases, children demonstrated increased vocal or verbal output, greater engagement in turn-taking and choice-making, and enhanced participation in communicative exchanges. The interactive and dynamic structure of joint sessions allowed children to engage in meaningful communicative interactions, supporting both pre-verbal and emerging verbal communication.

While findings from the collaborative interviews (Chapter 7) and case series (Chapter 8) demonstrate the potential of collaborative MT-SLT in supporting communication rehabilitation in young children with ACIs, assessing the extent of its contribution remains challenging. The commentary (Chapter 9) reflects on the inherent complexities of research in paediatric neurorehabilitation, highlighting the methodological, practical, and ethical challenges complicating the evaluation of music therapy interventions. It underscores the difficulty of isolating the effects of a single therapeutic programme within an integrated rehabilitation framework. In the context of this thesis, this challenge is particularly evident in disentangling the specific contributions of collaborative MT-SLT. These complexities emphasise the necessity for

innovative approaches that bridge the gap between clinical practice and empirical evaluation.

### **10.3 Original Contribution to Research**

#### ***10.3.1 The First Systematic Synthesis of Music and Music Therapy***

##### ***Interventions on Functional Outcomes in Children with ABI***

Music interventions are increasingly recognised as valuable in the rehabilitation of children with ABI, engaging neural processes involved in movement, cognition, speech, emotions, and sensory perception. The integrative review presented in this thesis represents the first systematic synthesis of existing research on music and music therapy interventions on functional outcomes in children with ABI. While this thesis focuses on ACIs, the review adopts a broader scope, examining music and music therapy interventions across multiple domains of functioning. This review systematically identified, appraised, and summarised relevant empirical literature, analysing and synthesising findings to provide a clear understanding of existing evidence. As such, the review serves as a foundation for future inquiry, not only in communication rehabilitation but also in the broader applications of music and music therapy in paediatric neurorehabilitation. It identifies gaps in the literature by highlighting the limited scope of existing research, areas for further exploration, and studies that could be replicated or expanded to strengthen the evidence base. Furthermore, it makes research more accessible to clinicians, researchers, and students, potentially serving as a valuable resource for future inquiry and practice. Additionally, this review serves as a living document, with a methodology designed to facilitate future updates, allowing for the continuous integration of new research and advancements in the field through a systematic and rigorous synthesis. It holds long-

term value, informing ongoing research and shaping future developments in music therapy and paediatric neurorehabilitation.

### ***10.3.2 Establishing the Acute Paediatric Neuro Music Therapy Network***

One of the key recommendations arising from the integrative review was the need to establish a special interest group dedicated to music therapy in paediatric ABI. The review emphasised the need for a structured network to facilitate knowledge exchange and coordinate research efforts, ultimately strengthening evidence-based approaches to music therapy in paediatric neurorehabilitation. In response to this recommendation, the Acute Paediatric Neuro Music Therapy (APNMT) Network was established in 2024 following collegial discussions between the researcher and Dr Janeen Bower. The network was founded to support and connect music therapists working in acute settings with children with acquired neurological conditions, serving as a platform for collaboration, professional development, and advancing evidence-based practice in this field. The primary aims of the APNMT network are to:

- Establish relationships among clinicians and researchers in acute settings working with children with acquired neurological conditions.
- Facilitate knowledge-sharing on clinical methodologies and multi- and interdisciplinary practices to enhance client care.
- Support evidence-based practice by fostering research collaborations.
- Provide mentorship and peer support for music therapists managing complex cases.
- Advance clinical and research knowledge of music therapy interventions in acute paediatric neurorehabilitation.

Since its inception, the network has grown to include 13 music therapists from six countries. The first official meeting was held in November 2024, and quarterly

newsletters are issued to disseminate current research and professional opportunities. Additionally, the APNMT network will present a roundtable discussion at the second International Conference of Music Therapy in Paediatrics in August 2025, titled ‘Music Therapy in Acute Paediatric Neurorehabilitation: Advancing Practice and Research.’ Although the APNMT network is not explicitly discussed elsewhere in this thesis, it emerged as a direct outcome of the integrative review’s recommendation. Looking ahead, the network has the potential to drive collaborative research through multisite studies, contribute to the development of best practice guidelines, and play a key role in advancing the integration of music therapy in paediatric neurorehabilitation.

### ***10.3.3 Familiar Song as a Communicative Scaffold for Children with ACIs***

Familiar song emerged as a recurring and significant feature of music therapy practice for children with ACIs. The integrative review highlighted song-based interventions as a means of supporting speech and language recovery, particularly through the use of pre-morbidly familiar songs. Findings from the international survey further reinforced the prevalence of song singing, as practitioners identified it as the most effective intervention for achieving language and communication goals with young children with ACIs. This was substantiated by the case series, where leveraging familiar song to build vocal expression was a central theme across the four cases.

Within paediatric neurorehabilitation, familiar songs are widely recognised for their engaging and motivating qualities (Kennelly, 2006, 2013). Music therapists have suggested that familiar songs may require less cognitive processing than non-familiar music due to their predictability, structure, and emotional familiarity, making them more accessible to children with neurological impairments (Bower et al., 2014; Kennelly & Edwards, 1997). However, their role extends beyond cognitive ease and emotional

regulation. When used intentionally within therapy, familiar songs can serve as a powerful communicative scaffold. The live presentation of familiar song affords therapists the opportunity to respond immediately to the child, maximising their engagement. Whether through verbalisation, vocalisation, or gesture, the responsive nature of live music, facilitated by a music therapist, allows for adaptation to the child's communicative attempts. This flexibility enables the therapist to shape musical interactions in ways that reinforce spontaneous engagement and provide opportunities for expressive communication. Despite their widespread use in music therapy, little research has examined the structured application of familiar song for speech, language, and communication rehabilitation in either individual or collaborative contexts. The findings of the case series provide a foundation for future research in this area, demonstrating how familiar song could be strategically leveraged to support vocal expression and communicative engagement in children with ACIs through collaborative work with speech and language therapists. All four children engaged in familiar song at various levels. While some children created lyrics, others completed phrases, used vocal attempts, or responded through gestures. The structured yet flexible nature of familiar song enabled each child to interact in ways that aligned with their abilities, fostering a sense of agency and participation while supporting communication and expression.

#### ***10.3.4 The Potential Role of Collaborative Music Therapy and Speech and Language Therapy in Paediatric ACIs***

Interdisciplinary collaboration in music therapy is well-documented in the broader literature (Strange et al., 2016; Twyford & Watson, 2008), yet its specific application in working with speech and language therapists to support children with ACIs remains largely unexplored. Prior to this research project, only one published paper has examined clinician experiences of such collaborative practices (Burns &

O'Connor, 2023), while a handful of valuable, albeit dated, practice-based case studies have documented the clinical application of these approaches (Bower & Shoemark, 2009; Kennelly et al., 2001; Kennelly & Brien-Elliott, 2001). The present research advances understanding by examining how the combined efforts of MT-SLT may support speech, language, and communication outcomes in paediatric ACIs, while also providing actionable recommendations for effective interdisciplinary collaboration.

A distinctive attribute of this study is its multi-perspective approach. By integrating data from an international survey of music therapists, which revealed a strong preference for collaborative sessions with speech and language therapists, with in-depth interviews and a detailed case series capturing therapeutic responses in children with ACIs, this research offers a comprehensive view of collaborative practices. It illuminates the nuanced and multifaceted nature of delivering integrated care and its potential impact on communication outcomes in children. Importantly, this research does not propose replacing individual therapy models with a collaborative framework. Rather, it positions collaboration as an additional approach that music therapists can adopt when deemed clinically appropriate, with the potential to enhance therapeutic outcomes by drawing on expertise from both disciplines. The integration of music therapy with speech and language therapy offers the distinct advantage of immediate contextualisation of communication and interaction. In a collaborative setting, both therapists actively co-construct the therapeutic environment, ensuring that the child's communicative actions shape the musical and interactive context. This joint approach fosters meaningful engagement, enhances participation, and supports improved communication outcomes.

Music therapy is increasingly recognised as a valuable component of paediatric specialist rehabilitation, as reflected in *A National Model of Care for Paediatric*

*Healthcare Services in Ireland* (Health Service Executive, 2015). The model acknowledges the role of music therapists within interdisciplinary rehabilitation teams, recommending dedicated staffing for both acute and long-term rehabilitation settings. However, despite this recognition, access to music therapy remains inconsistent, with services often under-resourced compared to other allied health professions. This research highlights how collaborative MT-SLT intervention can enhance communicative rehabilitation for children with ACIs, offering a compelling rationale for strengthening the integration of music therapy within paediatric neurorehabilitation services. Moreover, the findings from this research align with the core rehabilitation principles outlined in the national model of care, particularly in advocating for early intervention, interdisciplinary collaboration, and high-intensity therapeutic input. As Ireland continues to refine and expand its paediatric rehabilitation services, this study contributes to the growing evidence base supporting the need for increased music therapy provision. Recognising music therapy not just as a supplementary intervention but as an integral component of rehabilitation has the potential to improve access to holistic, child-centred care for children with ABI.

Despite its potential, the implementation of collaborative MT-SLT in clinical practice is not without challenges. A significant limitation is the increased cost associated with dual-therapist sessions, which may not be financially viable for all healthcare settings, families, or services (Burns & O'Connor, 2023; Gilles et al., 2020). Additionally, the allocation of two therapists to a single session means that, in an individual therapy model, two children could be receiving input simultaneously, raising concerns about resource efficiency in high demand settings. Logistical barriers further complicate implementation, with scheduling constraints, increased administrative workload, and the need for additional planning all contributing to the practical burden

of sustaining collaborative practice (Al-Dosari et al., 2022). Institutional structures and professional hierarchies also play a role, as music therapy is often positioned as a supplementary rather than a core rehabilitation service. Without clear frameworks supporting interdisciplinary collaboration, its adoption may depend on individual clinician initiative rather than being embedded into standard practice. While these limitations present considerable challenges, they must be weighed against the potential benefits. When feasible, collaborative MT-SLT offers a unique therapeutic dynamic that individual models may not achieve. The challenge lies in determining when and how such collaboration is both clinically and pragmatically justifiable, ensuring that its advantages are not lost to financial and structural constraints. This emphasises the need for additional research into the efficacy, sustainability, and optimal implementation of collaborative MT-SLT across different clinical contexts.

### ***10.3.5 Methodological, Practical, and Ethical Considerations in Paediatric Neurorehabilitation Research***

The reflective commentary offers a comprehensive overview of the methodological, ethical, and practical considerations that underpin music therapy research in paediatric neurorehabilitation. By deconstructing challenges such as the complexities of conducting randomised controlled trials in acute care settings and navigating ethical dilemmas in working with vulnerable populations, the paper uniquely contextualises the research landscape in this field. To the researcher's knowledge, no other literature has explored these intertwined complexities in such depth, making this contribution a pivotal resource for understanding and overcoming the barriers to robust research. It is hoped that this reflection will urge researchers to remain committed to exploring the therapeutic value of music, inspiring the adoption of innovative, context-sensitive

methodologies that capture the full potential of music therapy in paediatric neurorehabilitation.

## **10.4 Aligning the Research with International Practice**

### **Recommendations in Paediatric Brain Injury**

This research aligns with several key practice recommendations from the International Paediatric Brain Injury Society (IPBIS) (McKinlay et al. 2016), which advocate for a comprehensive, developmentally informed, and collaborative model of care for children with ABI. The findings presented in this thesis illustrate how music therapy can support the realisation of these principles in practice, offering a responsive and relational approach to communication-focused neurorehabilitation.

The collaborative MT-SLT programme described in the case series (Chapter 8) reflects the recommendation of recognising the developmental stage of the child when planning and delivering intervention. Rather than targeting age-normed communicative milestones, the programme was designed to respond to each child's individual level of communicative readiness. Sessions incorporated developmentally appropriate musical play, allowing children to participate meaningfully at their own pace. The structured use of familiar song provided a predictable and emotionally resonant framework that supported early communicative behaviours, including pre-verbal engagement and emerging verbal expression. The programme illustrates how music therapy can be adapted to honour developmental appropriateness while addressing the complex needs of children with ABI. Importantly, it also demonstrates the flexibility of the collaborative programme as an intervention that can be continually adjusted in response to a child's evolving communicative profile. The research mirrors the core recommendation that rehabilitation must evolve in tandem with the child, adapting to changes in ability to remain both relevant and effective over time.

This research also engages with the recommendation that assessments and interventions be family-centred by recognising the central role of families not only as informants, but as partners in rehabilitation. While families were not consistently present during all collaborative therapy sessions, their input played an active role in shaping the delivery of the intervention. Parents and caregivers provided detailed information about their child's communication preferences and identified familiar songs and materials that could be integrated into sessions. In several instances, family members were also present during sessions, where they played an active role in supporting their child. Their presence created opportunities for interaction, often strengthening the child's participation through encouragement and familiarity. These contributions helped ensure that the intervention was both developmentally appropriate and personally meaningful, fostering communicative engagement rooted in the child's lived experience. While the research did not specifically evaluate family-centred practice, it demonstrates how music therapy can provide a practical platform for embedding the family unit into the rehabilitation process. Music therapy may offer a distinctive opportunity to realise family-centred principles, particularly in settings where opportunities for family inclusion are limited or inconsistently available.

The research directly contributes to the realisation of the recommendation to strengthen international collaboration in paediatric ABI. The integrative review (Chapter 4), international survey (Chapter 5), and clinician interviews (Chapter 7) each reflect a commitment to gathering global insights, supporting the aim of building a more connected international knowledge base around music therapy intervention practices for young children with ACIs. These efforts resonate with the broader call on sharing research, compiling effective treatment approaches, and establishing platforms for international dialogue. Most notably, the establishment of the APNMT Network

represents a tangible step towards building sustained global connections between music therapy clinicians and researchers working in specialist paediatric neurorehabilitation, fostering the kind of dialogue, knowledge-sharing, and partnership envisioned by the IPBIS recommendations.

## **10.5 Strengths and Limitations of the Research**

This research has generated new insights regarding the use of collaborative MT-SLT to support language and communication in young children with ACIs, contributing to the limited body of literature on this topic. It advances existing research beyond the documentation of clinical practices and intervention processes to a closer examination of therapeutic engagement and the responses that emerge throughout collaborative intervention. Furthermore, the methodological learning gained from this thesis, as presented in the reflexive commentary, provides valuable considerations for future research designs, helping to address methodological challenges and enhance the robustness of future endeavours. As with all research, this study is not without its limitations, which must be acknowledged when interpreting the findings. While the specific limitations of each individual study have been detailed in their respective chapters, several overarching limitations related to the overall context of the research design must be considered.

This research explored a broad topic, considering how music therapy supports speech, language, and communication in young children with ACIs. Defining the research questions was complex due to the underexplored nature of this field and the limited existing research to guide methodological decisions. Notably, the third research question evolved in response to early findings. Initially, RQ3 sought to explore how music therapy contributes to language and communication rehabilitation. However, insights from Phase 1 indicated a preference from clinicians for interdisciplinary

approaches, leading to a refinement of the question to focus on the joint contribution of collaborative MT-SLT. While this adaptability allowed the research to remain responsive to emerging evidence, it also posed challenges in maintaining a clearly defined research focus and methodological coherence. Future research may benefit from a more narrowly defined scope from the outset, such as a focusing on a specific ACI, such as aphasia or dysarthria, or investigating either music therapy as a standalone intervention or interdisciplinary music therapy practices. This would allow for a more targeted investigation of intervention impact on specific communication impairments.

Given the exploratory nature of this research project, the study is inherently limited by a small sample size, and findings should therefore be interpreted with caution. This study was not designed to measure the efficacy of music therapy in the rehabilitation of children with ACIs but rather to explore its application, how it supports language and communication, and the broader landscape of its use in clinical practice. Nevertheless, the insights generated may serve as a foundation for future research, particularly in informing the design of larger controlled studies, which may consider assessing efficacy.

Researcher bias is an inherent limitation in qualitative and mixed-methods research (Galdas, 2017). While steps were taken to mitigate bias, such as involving multiple researchers in the data analysis and incorporating some member checking, subjectivity remains a consideration. To further reduce the influence of researcher bias, future studies would benefit from an independent research design in which data collection and data analysis are conducted by separate researchers. This approach would ensure a more objective interpretation of the data.

## 10.6 Challenges of the Research

A salient challenge in this research was the design, implementation, and evaluation of the collaborative MT-SLT programme. The initial aim was to develop a quantitatively driven mixed methods study, incorporating standardised outcome measures to evaluate changes in speech, language, and communication skills. However, significant difficulties arose in identifying a suitable assessment tool, necessitating adaptations to the research design. Despite extensive exploration, no validated tools were capable of effectively capturing the nuanced communicative changes in young children with ACIs in response to therapeutic input. The international survey found that some music therapists reported using standardised speech and language assessment tools, including the Diagnostic Evaluation of Articulation and Phonology (Dodd et al., 2002), the Goldman-Fristoe Test of Articulation (Goldman & Fristoe, 2015), and the Dysarthria Impact Profile (Walshe et al., 2009). However, these tools primarily assess speech sound production, articulation, or motor speech function, making them unsuitable for evaluating pre-verbal and emerging communication skills. Similarly, Goal Attainment Scaling (GAS) (Turner-Stokes, 2009) was recommended by a MT-SLT team during the collaborative interview studies. While GAS provides a structured framework for measuring therapeutic progress, goal setting and rating rely on clinician judgement rather than predefined, validated benchmarks, making it unsuitable as a standardised outcome measure. Two additional measures were also considered by the research team: the Rossetti Infant-Toddler Language Scale (Rossetti, 2006) and the Pediatric Voice-Related Quality of Life Survey (Boseley et al., 2006). However, neither tool provided a comprehensive or developmentally sensitive means of capturing the subtle, pre-verbal changes observed in this population.

The Individualised Music Therapy Assessment Profile (IMTAP) (Baxter et al., 2007) was identified as a potential assessment tool to measure changes in speech, language and communication skills. Designed for use in child and adolescent settings, the IMTAP is an in-depth music therapy assessment protocol that encompasses ten domains of functioning, each subdivided into multiple sub-domains to provide a detailed profile of client abilities. Notably, the IMTAP offers flexibility in its application, enabling practitioners to assess only the most relevant domains rather than requiring a full assessment across all ten. For the collaborative MT-SLT programme, four domains were considered: oral motor, receptive communication/auditory perception, expressive communication, and social. However, the adoption of this tool introduced significant methodological challenges. As a music therapy-specific assessment, the IMTAP requires music-based experiences for administration, meaning it could not be applied within standard speech and language therapy sessions. This limitation rendered the implementation of a multiple baseline design unfeasible. Furthermore, due to the multi-faceted nature of each child's rehabilitation, as outlined in the case series study, isolating the specific effects of the collaborative sessions was not feasible. In response to these challenges, the research design evolved into a qualitatively driven mixed methods study, where video data became the primary data collection method, and the IMTAP served as a complementary tool, providing an overarching profile of each child's language and communication skills over the course of their admission. The IMTAP was completed weekly by the music therapist and speech and language therapist in collaboration immediately following the first joint sessions of each week. Weekly results were scored using the IMTAP scoring procedure; however, the data ultimately failed to yield meaningful insights into the effectiveness of the programme as the scores reflected progress across a broader suite of rehabilitative

interventions. Therefore, it was not possible to attribute improvements directly to the collaborative programme, preventing conclusive findings from being drawn.

In response to these methodological limitations, a decision was made to shift the study design from a qualitatively driven mixed methods study to a case series approach. While this thesis adopts an overall multiple methods approach, underpinned by pragmatism, it became evident that a case series would allow for a richer, more contextually grounded exploration of how young children with ACIs responded to the collaborative intervention. This shift, though a departure from the original design, ultimately yielded significant value. The case series approach provided detailed, individualised accounts of therapeutic engagement, offering valuable insights into collaborative clinical practice. Moreover, this transition inspired the commentary, which critically reflects on the complexities of research in paediatric neurorehabilitation and the challenges of evaluating interventions.

## **10.7 Recommendations for Future Research**

Each study within this research project has generated specific recommendations for extending its scope. However, together, these findings highlight broader gaps in the field that warrant further investigation.

A recurring theme across the studies was the absence of standardised outcome measures and observational tools tailored to young children with ACIs. Given the heterogenous nature of ACIs and the variability in developmental trajectories following brain injury, existing tools often fail to capture the nuanced progression of early communication skills. Future research should prioritise the development of a skill-based, pre-verbal observation tool that is independent of chronological age or developmental stage. Such a tool could facilitate the assessment of early communicative behaviours such as turn-taking, choice-making, and vocalisations, providing a more

precise means of profiling a child's communication abilities and evaluating intervention efficacy.

There is a notable gap in the literature concerning speech and language therapy-led contributions to collaborative work with music therapists, particularly within paediatric neurorehabilitation. While a small number of music therapy-led studies have included input from speech and language therapists, these perspectives are typically presented through a music therapy lens. To the researcher's knowledge, all existing clinical reports in the area have also been initiated and led by music therapists, resulting in a limited representation of speech and language therapy viewpoints in the evidence base. Future research should aim to redress this imbalance by encouraging speech and language therapy-led studies that explore collaboration with music therapists from the theoretical and clinical standpoint of speech and language therapy. Documenting how speech and language therapists conceptualise, implement, and reflect on joint work could yield valuable insights and contribute to the development of practice frameworks that are more balanced and representative of both disciplines.

This research prioritised an investigation into collaborative MT-SLT. However, it is equally important to examine the distinct contributions of music therapy as a standalone intervention. Future studies should explore the differential impact of independent and collaborative approaches to better understand how each contributes to communication outcomes and to inform clinical decision-making in different service delivery contexts. However, such comparisons will only be feasible once appropriate outcome measures are developed to accurately capture intervention effects.

Understanding how music therapy supports children with ACIs may require a more targeted approach in future research. While children with ACIs often present with overlapping features that blur distinct diagnostic boundaries, investigating the effects of

music therapy on specific ACIs, such as aphasia, dysarthria, and apraxia, may offer valuable insights into how interventions can be tailored to different communication profiles. A focus on well-defined subgroups may yield more precise insights into the mechanisms underlying intervention efficacy.

Developing studies that align with pre-existing speech and language assessment tools could enhance methodological rigor. Restricting participant selection based on established criteria within these tools would facilitate comparability across studies and contribute to a more standardised approach to evaluating intervention outcomes. While this may necessitate examining slightly older children to ensure appropriate and reliable measurement, it would still advance our understanding of music therapy in paediatric ACIs.

Future research should also explore whether music-based interventions implemented by other allied professionals such as speech and language therapists or occupational therapists could support communication rehabilitation. Investigating how music can be incorporated into broader therapeutic frameworks may help expand access to music-based interventions, particularly in settings where music therapy is not available, while still supporting functional communication outcomes for children with ACIs.

## **10.8 Conclusion**

The five interconnected studies presented in this thesis represent a significant step forward in understanding the use of music therapy in the rehabilitation of language and communication for young children with ACIs. This thesis offers a systematic synthesis of current knowledge, an international survey of clinical practice, an exploration of collaboration through clinician interviews, and a case series that provides rich insights into how children with ACIs engage in joint MT-SLT interventions. This

research not only contributes empirical findings but also critically engages with the methodological, practical, and ethical challenges of conducting music therapy research in complex clinical settings. While research on music therapy in paediatric neurorehabilitation remains limited, this work highlights the potential for interdisciplinary MT-SLT approaches to enhance communicative rehabilitation in young children with ACIs.

By integrating expertise from music therapy and speech and language therapy, joint intervention provides interactive, developmentally appropriate, and motivating opportunities for children with ACIs to develop communication skills in ways that align with their individual needs. Collaboration fosters an enriched therapeutic environment where communication can be supported through multiple modalities, increasing accessibility for children with diverse communication profiles. While challenges remain in evaluating its direct impact, this research highlights the significant potential of collaborative MT-SLT to optimise therapeutic outcomes by fostering early communicative engagement, enhancing participation, and creating meaningful opportunities for interaction.

It is the researcher's hope that this body of work serves as a foundation for future research exploring music therapy in paediatric neurorehabilitation, particularly in supporting language and communication outcomes for children with ACIs. As paediatric rehabilitation models continue to evolve, it is crucial that music therapy is recognised, not as an ancillary service, but as a key contributor. By building on the findings from this thesis, future research can continue to refine, validate, and expand the evidence base, ensuring that children with ACIs receive responsive music therapy interventions that support their communication and overall recovery.

## 10.9 References

- Al-Dosari, S. F. S., Alatawi, F. H. S., Alrashidi, J. S. E., sofyani, A. A. A., Algaddan, E. A. M., & Aldofayan, T. H. A. (2022). Exploring the benefits and challenges of interdisciplinary collaboration in healthcare. *Journal of Survey in Fisheries Sciences*, 9(4), 132–134. <https://doi.org/10.53555/sfs.v9i4.2571>
- Baxter, H. . T., Berghofer, J. A., MacEwan, L., Nelson, J., Peters, K., & Roberts, P. (2007). *The individualised music therapy assessment profile*. Jessica Kingsley.
- Boseley, M. E., Cunningham, M. J., Volk, M. S., & Hartnick, C. J. (2006). Validation of the Pediatric Voice-Related Quality-of-Life Survey. *Archives of Otolaryngology–Head & Neck Surgery*, 132(7), 717. <https://doi.org/10.1001/archotol.132.7.717>
- Bower, J., Catroppa, C., Grocke, D., & Shoemark, H. (2014). Music therapy for early cognitive rehabilitation post-childhood TBI: An intrinsic mixed methods case study. *Developmental Neurorehabilitation*, 17(5), 339–346. <https://doi.org/10.3109/17518423.2013.778910>
- Bower, J., & Shoemark, H. (2009). Music therapy to promote interpersonal interactions in early paediatric neurorehabilitation. *Australian Journal of Music Therapy*, 20, 59–75.
- Burns, J., & O’Connor, R. S. (2023). Exploring clinicians’ experiences of engaging in collaborative music therapy and speech and language therapy for children with an acquired brain injury. *Approaches: An Interdisciplinary Journal of Music Therapy*. <https://doi.org/10.56883/aijmt.2024.37>
- Cohen, N. S. (1988). The use of superimposed rhythm to decrease the rate of speech in a brain-damaged adolescent. *Journal of Music Therapy*, 25(2), 85–93. <https://doi.org/10.1093/jmt/25.2.85>

- Dodd, B. J., Hua, Z., Crosbie, S., Holm, A., & Ozanne, A. (2002). *Diagnostic evaluation of articulation and phonology*. Psychological Corporation.
- Galdas, P. (2017). Revisiting bias in qualitative research. *International Journal of Qualitative Methods*, 16(1). <https://doi.org/10.1177/1609406917748992>
- Gentle, E. C., Barker, M., & Bower, J. (2015). Preservation of singing functioning in a 5 year-old following severe right-sided traumatic brain injury: Insights into the neurological resilience of song from pediatric music therapy. *Music and Medicine*, 7(3), 14–19. <https://doi.org/10.47513/mmd.v7i3.405>
- Gilles, I., Filiettaz, S. S., Berchtold, P., & Peytremann-Bridevaux, I. (2020). Financial barriers decrease benefits of interprofessional collaboration within integrated care programs: Results of a nationwide survey. *International Journal of Integrated Care*, 20(1), 10. <https://doi.org/10.5334/ijic.4649>
- Goldman, R., & Fristoe, M. (2015). *GFTA3: Goldman-Fristoe test of articulation* (3rd ed.). Pearson Clinical.
- Health Service Executive. (2015). *A national model of care for paediatric healthcare services in Ireland*.
- Kennelly, J. (2006). Music therapy in paediatric rehabilitation. In F. Baker & J. Tamplin (Eds.), *Music therapy methods in neurorehabilitation: A clinician's manual* (pp. 219–233). Jessica Kingsley Publishers.
- Kennelly, J. (2013). Brain injuries and rehabilitation in children. In J. Bradt (Ed.), *Guidelines for music therapy practice in pediatric care* (pp. 356–402). Barcelona Publishers.
- Kennelly, J., & Brien-Elliott, K. (2001). The role of music therapy in paediatric rehabilitation. *Pediatric Rehabilitation*, 4(3), 137–143. <https://doi.org/10.1080/13638490110067687>

- Kennelly, J., & Edwards, J. (1997). Providing music therapy to the unconscious child in the paediatric intensive care unit. *Australian Journal of Music Therapy*, 8, 18–29.
- Kennelly, J., Hamilton, L., & Cross, J. A. (2001). The interface of music therapy and speech pathology in the rehabilitation of children with acquired brain injury. *Australian Journal of Music Therapy*, 12, 13–20.  
<https://doi.org/10.3109/17518423.2013.778910>
- McKinlay, A., Linden, M., DePompei, R., Aaro Jonsson, C., Anderson, V., Braga, L., Castelli, E., de Koning, P., Hawley, C. A., Hermans, E., Kristiansen, I., Madden, A., Rumney, P., Savage, R., & Wicks, B. (2016). Service provision for children and young people with acquired brain injury: Practice recommendations. *Brain Injury*, 30(13–14), 1656–1664. <https://doi.org/10.1080/02699052.2016.1201592>
- Rossetti, L. (2006). *The Rossetti infant-toddler language scale*. LinguiSystems.
- Strange, J., Odell-Miller, H., & Richards, E. (2016). *Collaboration and assistance in music therapy practice: roles, relationships, challenges*. Jessica Kingsley Publisher.
- Turner-Stokes, L. (2009). Goal attainment scaling (GAS) in rehabilitation: A practical guide. *Clinical Rehabilitation*, 23(4), 362–370.  
<https://doi.org/10.1177/0269215508101742>
- Twyford, K., & Watson, T. (2008). *Integrated team working: Music therapy as part of transdisciplinary and collaborative approaches*. Jessica Kingsley Publishers.
- Walshe, M., Peach, R. K., & Miller, N. (2009). Dysarthria impact profile: Development of a scale to measure psychosocial effects. *International Journal of Language & Communication Disorders*, 44(5), 693–715.  
<https://doi.org/10.1080/13682820802317536>

## Appendices

### Appendix A: Integrative Review – Database Search Strategies

#### *Search Strategies for SCOPUS*

1	ALL (“brain injur*”)	515,714
2	ALL (“head injur*”)	170,032
3	ALL (“acquired brain injur*”)	22,534
4	ALL (“traumatic brain injur*”)	255,850
5	ALL (strok*)	1,620,785
6	ALL (“brain haemorrhage”)	112,873
7	ALL (tumo#r)	6,390,964
8	ALL (infection)	5,824,511
9	ALL (anoxia)	134,447
10	ALL (hypoxia)	835,637
11	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10	13,123,179
12	ABS (child*)	1,994,019
13	ABS (p#ediatric)	398,273
14	ABS (paediatric*)	81,253
15	ABS (pediatric*)	441,438
16	ABS (infant*)	462,535
17	ABS (newborn*)	178,680
18	ABS (baby)	105,454
19	ABS (babies)	105,454
20	ABS (adolescent*)	377,967
21	ABS (teenager*)	27,188
22	#12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21	2,817,869
23	ABS (rehabilitat*)	303,925
24	ABS (recover*)	1,732,293
25	#23 OR #24	2,004,781
26	ABS (music*)	161,312
27	ABS (“music therapy”)	5,464
28	ABS (singing)	13,184
29	ABS (sing)	8,118
30	ABS (song*)	60,401
31	ABS (“auditory stimul*”)	10,903
32	ABS (“acoustic stimul*”)	5,547
33	#26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32	223,499
34	#11 AND #22	789,837
35	#25 AND #34	34,352
36	#33 AND #35	129
37	#36 English Only	113

*Search Strategy for EBSCO*

1	TX “brain injur*”	513,310
2	TX “head injur*”	270,902
3	TX “acquired brain injur*”	30,113
4	TX “traumatic brain injur*”	256,284
5	TX strok*	2,560,196
6	TX “brain haemorrhage”	12,655
7	TX tumo#r	4,617,136
8	TX infection	6,457,667
9	TX anoxia	62,149
10	TX hypoxia	571,979
11	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10	9,804,973
12	AB child*	5,523,874
13	AB p#ediatric*	761,102
14	AB infant*	832,235
15	AB newborn*	270,031
16	AB baby	468,640
17	AB babies	468,494
18	AB adolescent*	939,011
19	AB teenager*	222,480
20	S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19	7,526,657
21	AB rehabilitat*	570,629
22	AB recover*	2,144,735
23	S21 OR S22	2,656,719
24	AB music*	1,668,535
25	AB “music therapy”	13,948
26	AB singing	80,908
27	AB sing	56,110
28	AB song*	448,392
29	AB “auditory stimul*”	22,721
30	AB “acoustic stimul*”	9,020
31	S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30	2,072,181
32	S11 AND S20	921,824
33	S23 AND S32	39,293
34	S31 AND S33	113
35	Narrowed by Language – English	104

### Search Strategy for Web of Science

1	“brain injur*” (All Fields)	134,977
2	“head injur*” (All Fields)	42,452
3	“acquired brain injur*” (All Fields)	4,615
4	“traumatic brain injur*” (All Fields)	74, 586
5	strok* (All Fields)	679,909
6	“brain haemorrhage” (All Fields)	198
7	tumor (All Fields)	2,240,545
8	tumour (All Fields)	2,162,436
9	infection (All Fields)	2,028,161
10	anoxia (All Fields)	15,697
11	hypoxia (All Fields)	186,109
12	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11	5,083,865
13	child* (Abstract)	1,289,812
14	pediatric* (Abstract)	253,925
15	paediatric* (Abstract)	56,266
16	infant* (Abstract)	291,476
17	newborn* (Abstract)	105,562
18	baby (Abstract)	58,884
19	babies (Abstract)	58,884
20	adolescent* (Abstract)	277,495
21	teenager* (Abstract)	15,661
22	#13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21	1,837,837
23	rehabilitat* (Abstract)	187,150
24	recover* (Abstract)	1,188,587
25	#23 OR #24	1,354,417
26	music* (Abstract)	93,462
27	“music therapy” (Abstract)	3,266
28	singing (Abstract)	16,863
29	sing (Abstract)	15,825
30	song* (Abstract)	38,700
31	“auditory stimul*” (Abstract)	7,733
32	“acoustic stimul*” (Abstract)	3,628
33	#26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32	143,797
34	#12 AND #22	301,967
35	#25 AND #34	13,790
36	#33 AND #35	41
37	#36 Refined By: Languages: English	40

### Search Strategy for PubMed

1	“brain injur*”[All Fields]	116,055
2	“head injur*”[All Fields]	30,743
3	“acquired brain injur*”[All Fields]	3,304
4	“traumatic brain injur*”[All Fields]	50,444
5	strok*[All Fields]	418,491
6	“brain haemorrhage”[All Fields]	205
7	tumor[All Fields]	4,753,769
8	tumour[All Fields]	4,753,769
9	infection[All Fields]	4,104,305
10	anoxia[All Fields]	191,593
11	hypoxia[All Fields]	187,419
12	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11	9,074,611
13	child*[Title/Abstract]	1,683,985
14	pediatric*[Title/Abstract]	391,208
15	paediatric*[Title/Abstract]	86,303
16	infant*[Title/Abstract]	505,718
17	newborn*[Title/Abstract]	201,353
18	baby[Title/Abstract]	47,352
19	babies[Title/Abstract]	42,288
20	adolescent*[Title/Abstract]	328,522
21	teenager*[Title/Abstract]	17,259
22	#13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21	2,503,408
23	rehabilitat*[Title/Abstract]	222,510
24	recover*[Title/Abstract]	813,441
25	#23 OR #24	1,011,462
26	music*[Title/Abstract]	27,595
27	“music therapy”[Title/Abstract]	3,300
28	singing[Title/Abstract]	4,107
29	sing[Title/Abstract]	1,585
30	song*[Title/Abstract]	13,828
31	“auditory stimul*”[Title/Abstract]	8,703
32	“acoustic stimul*”[Title/Abstract]	4,758
33	#26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32	55,227
34	#12 AND #22	673,197
35	#25 AND #34	25,085
36	#33 AND #35	48
37	#36 English Only	45

*Search Strategy for Ovid*

1	“brain injur*”.af.	295,712
2	“head injur*”.af.	109,549
3	“acquired brain injur*”.af.	10,464
4	“traumatic brain injur*”.af.	142,361
5	strok*.af.	1,243,759
6	“brain haemorrhage”.af.	1,268
7	tumo#r.af.	672,493
8	infection.af	3,353,276
9	anoxia.af	34,538
10	hypoxia.af	455,456
11	1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10	5,529,749
12	child*.ab.	1,712,340
13	p#ediatric*.ab.	100,195
14	infant*.ab.	465,795
15	newborn*.ab.	170,887
16	baby.ab.	46,446
17	babies.ab.	46,863
18	adolescent*.ab.	338,746
19	teenager*.ab.	17,225
20	12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19	2,368,725
21	rehabilitat*.ab.	227,120
22	recover*.ab.	941,591
23	21 OR 22	1,141,398
24	music*.ab.	30,433
25	“music therapy”.ab.	3,168
26	singing.ab.	4,328
27	sing.ab.	1,586
28	song*.ab.	14,778
29	“auditory stimul*”.ab.	9,992
30	“acoustic stimul*”.ab.	5,035
31	24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30	60,155
32	11 AND 20	377,839
33	23 AND 32	18,950
34	31 AND 33	50
35	limit 34 to english language	48

## Search Strategy for Cochrane Library

1	("brain injur*")	362
2	("head injur*")	246
3	("acquired brain injur*")	6
4	("traumatic brain injur*")	65
5	(strok*)	84,403
6	("brain haemorrhage")	5,030
7	(tumor)	92,466
8	(tumour)	92,461
9	(infection)	156,177
10	(anoxia)	306
11	(hypoxia)	8,412
12	{OR #1-#11}	331,169
13	(child*):ab	137,075
14	(pediatric*):ab	27,277
15	(paediatric*):ab	7,069
16	(infant*):ab	39,201
17	(newborn*):ab	10,093
18	(baby):ab	10,092
19	(babies):ab	10,008
20	(adolescent*):ab	27,735
21	(teenager*):ab	1,001
22	{OR #13-#21}	194,721
23	(rehabilitat*):ab	39,624
24	(recover*):ab	73,313
25	{OR #23-#24}	106,705
26	(music*):ab	5,761
27	("music therapy"):ab	1,535
28	(singing):ab	779
29	(sing):ab	797
30	(song*):ab	657
31	("auditory stimul*"):ab	319
32	("acoustic stimul*"):ab	137
33	{OR #26-#32}	7,019
34	#12 AND #22	32,145
35	#25 AND #34	1,702
36	#33 AND #35	16

*Search Strategy for ScienceDirect*

#1 Title, abstract, keywords: ("brain injury" OR stroke OR "traumatic brain injury")

AND (child OR infant OR adolescent) AND (music OR singing OR song) 4

#2 Title, abstract, keywords: ("head injury" OR "acquired brain injury") AND (child

OR infant OR adolescent) AND (rehabilitation) AND (music OR singing OR song) No

results found

#3 Title, abstract, keywords: (child OR infant OR adolescent) AND (rehabilitation)

AND (music OR singing OR song) 13

*Search Strategy for Sage*

[[All "brain injur\*"] OR [All "head injur\*"] OR [All "acquired brain injur\*"] OR [All "traumatic brain injur\*"] OR [All strok\*] OR [All "brain haemorrhage"] OR [All tumor] OR [All tumour] OR [All infection] OR All [anoxia] OR All [hypoxia]] AND [[Abstract child\*] OR [Abstract paediatric\*] OR [Abstract paediatric\*] OR [Abstract infant\*] OR [Abstract newborn\*] OR [Abstract baby] OR [Abstract babies] OR [Abstract adolescent\*] OR [Abstract teenager\*]] AND [[Abstract rehabilitat\*] OR [Abstract recover\*]] AND [[Abstract music\*] OR [Abstract "music therapy"] OR [Abstract singing] OR [Abstract sing] OR [Abstract song\*] OR [Abstract "auditory stimul\*"] OR [Abstract "acoustic stimul\*"]] 5

## Appendix B: Integrative Review – Mixed Methods Appraisal Tool Results

### *Mixed Methods Appraisal Tool: Qualitative*

	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q5</b>
<b>Gentle et al., 2015</b>	Y	Y	Y	Y	Y

Q1. Is the qualitative approach appropriate to answer the research question?

Q2. Are the qualitative data collection methods adequate to address the research question?

Q3. Are the findings adequately derived from the data?

Q4. Is the interpretation of results sufficiently substantiated by data?

Q5. Is there coherence between qualitative data sources, collection, analysis and interpretation?

*Mixed Methods Appraisal Tool: Quantitative Non-Randomized*

	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q5</b>
<b>Chong et al., 2014</b>	Y	Y	Y	Y	Y
<b>Cohen, 1998</b>	CT*	Y	Y	Y**	Y
<b>Kelly et al., 2023</b>	Y	Y	Y	Y	Y
<b>Kim et al., 2016</b>	Y	Y	Y	Y	Y
<b>Kobus et al., 2022</b>	Y***	Y	Y	Y	Y

Q1. Are the participants representative of the target population?

Q2. Are measurements appropriate regarding both the outcome and intervention (or exposure)?

Q3. Are there complete outcome data?

Q4. Are the confounders accounted for in the design and analysis?

Q5. During the study period, is the intervention administered (or exposure occurred) as intended?

\* It's uncertain whether the participant accurately represents the target population, given that they are the only participant involved.

\*\* Changes in medication may have influenced outcomes yet have been duly considered in the analysis.

\*\*\* Although 14 out of the 17 participants were male, they are still considered representative of the target population.

*Mixed Methods Appraisal Tool: Mixed Methods*

	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q5</b>
<b>Bower et al., 2014</b>	Y	Y	Y	Y	CT*
<b>Twyford &amp; Watters, 2016</b>	Y	Y	Y	Y	Y

Q1. Is there an adequate rationale for using a mixed methods design to address the research question?

Q2. Are the different components of the study effectively integrated to answer the research question?

Q3. Are the outputs of the integration of qualitative and quantitative components adequately interpreted?

Q4. Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?

Q5. Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?

\* It is uncommon for mixed method studies to involve only one participant, which raises concerns about the quantitative component's adherence to the quality of its tradition.

## Appendix C: International Survey – Participant Information Letter



### FACULTY OF ARTS, HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE INFORMATION LETTER

Dear Sir/Madam,

My name is James Burns, and I am a music therapist and doctoral research student at the Irish World Academy of Music and Dance, University of Limerick, Ireland.

I would like to invite you to participate in an online survey investigating current music therapy approaches, clinical interventions, and outcome measures being used by music therapists in their work with children, aged 2-6, with acquired communication impairments to address language- and communication-oriented goals.

The details of this study are outlined below.

I should be grateful if you would consider taking part. The survey can be completed at any time from January 16th – March 13th 2023 and should not take more than 15 minutes to complete. The survey can be found at:

[https://unioflimerick.eu.qualtrics.com/jfe/form/SV\\_0xOahAvQ7ObMC3Q](https://unioflimerick.eu.qualtrics.com/jfe/form/SV_0xOahAvQ7ObMC3Q)

Many thanks for reading this letter and for considering your participation in this study.

Yours sincerely,



James Burns  
Doctoral Music Therapy Student

If you have any queries or would like more information about the project, please contact me on the details below.

Principal Investigator: James Burns, [James.Burns@ul.ie](mailto:James.Burns@ul.ie)

Supervisor: Prof Hilary Moss, [Hilary.Moss@ul.ie](mailto:Hilary.Moss@ul.ie)

## **PARTICIPANT INFORMATION**

### **What is the purpose of this study?**

The primary aim of this study is to identify the current music therapy approaches, clinical interventions, and outcome measures being used by music therapists in their work with children, aged 2-6, with acquired communication impairments to address language- and communication-oriented goals.

### **What will happen if I agree to participate?**

Your participation is voluntary.

If you agree to take part, you will be asked to complete an anonymous questionnaire asking various questions regarding your previous clinical experience working with children, aged 2-6, with acquired communication impairments.

The survey can be completed at any time from January 16th – March 13th 2023 and should take no more than 15 minutes to complete.

### **What happens if I do not agree to participate?**

You are free to consent or refuse to participate without providing a reason for your decision.

### **Are there any benefits from my participation?**

The results from this survey will be used to enhance knowledge on music therapy intervention for children, aged 2-6, with acquired communication impairments. Music therapists can use this knowledge for future practice decisions.

### **Are there any risks involved in participating?**

There are no identified risks involved with participation in this study.

### **Confidentiality**

No name or contact details will be required. All participants will remain entirely anonymous. Information that may identify a participant will be excluded in this research to ensure anonymity of the participants.

This research project adheres to the Data Protection Policy at the University of Limerick. In accordance with this policy, all electronic data will be held on a password-protected desktop computer, all backup copies will be stored on encrypted devices and held in a locked cabinet, and the data will be stored for seven years.

### **Withdrawal**

The point of withdrawal is at the point of submission. As data collection is anonymous, you will not be able to withdraw your data after this time.

**Ethical Clearance**

This research study has received ethical approval from the Arts, Humanities and Social Sciences Research Ethics Committee (2022-10-090-AHSS). If you have any concerns about this study or your participation and wish to contact an independent authority, you may contact:

Chairperson Arts, Humanities and Social Sciences Research Ethics Committee  
AHSS Faculty Office  
University of Limerick  
Tel: +353 61 202286  
Email: [FAHSSEthics@ul.ie](mailto:FAHSSEthics@ul.ie)

## **Appendix D: International Survey – Survey Instrument**

You are invited to participate in this online survey investigating the current music therapy approaches, clinical interventions, and outcome measures being used by music therapists in their work with children, aged 2-6, with acquired communication impairments to address language- and communication-oriented goals.

The details of this study are outlined in the accompanying information letter.

Thank you for taking the time to consider your participation in this study.

Principal Investigator: James Burns, [James.Burns@ul.ie](mailto:James.Burns@ul.ie)

Supervisor: Prof Hilary Moss, [Hilary.Moss@ul.ie](mailto:Hilary.Moss@ul.ie)

### **Consent**

By consenting to take part you agree to the following:

- I declare that I have been fully briefed on the nature of this study and my role in it and have been given the opportunity to ask questions before agreeing to participate.
- The nature of my participation have been explained to me, and I have full knowledge of how the information collected will be used.
- I am aware that information may be used in future academic presentations and publications about this study.
- I fully understand that there is no obligation on me to participate in this study.
- I fully understand that the point of withdrawal is at the point of submission. I will not be able to withdraw my data after this time.
- I acknowledge that the researcher guarantees that they will not use any information that would identify me in any outputs of the research.

Do you consent to participate in this research study?

- Yes
- No

**I. Professional Background**

1. How many years have you worked as a qualified music therapist?

2. How many years have you worked as a qualified music therapist with children, aged 2-6, with acquired communication impairments (ACIs)?

**II. Music Therapy Clinical Practice**

3. Which of the following best describes your clinical approach when working with a child, aged 2-6, with an ACI towards language and communication goals? (Select one.)

Humanistic (Person-Centred/Holistic) Approach

Psychodynamic Approach

Developmental Approach

Cognitive-Behavioural Approach

Integrative (Eclectic) Approach (Please specify.)

Other (Please specify.)

Unsure

4. Which clinical model(s) have you applied when working with a child, aged 2-6, with an ACI towards language and communication goals? (Select all that apply.)

Nordoff-Robbins Music Therapy (Creative Music Therapy)

Community Music Therapy

Neurologic Music Therapy

Resource-Oriented Music Therapy

Guided Imagery and Music

- Analytical Music Therapy
- Behavioural Music Therapy
- Resource-Oriented Music Therapy
- Other (Please specify.)

Unsure

5. On average, how many times a week do you see the same child, aged 2-6, with an ACI for music therapy when working towards language and communication goals?

- 1
- 2
- 3
- 4
- 5
- 5+

6. In what capacity do you offer music therapy to a child, aged 2-6, with an ACI for language and communication-oriented goals? (Select all that apply.)

- Individual Music Therapy Programmes
- Group Music Therapy Programmes
- Joint Music Therapy and Speech and Language Therapy Programmes
- Joint Music Therapy and Occupational Therapy Programmes
- Telehealth (Online) Music Therapy Programmes
- Other (Please specify.)

7. Which of these do you find is most impactful when addressing language and communication oriented goals in sessions with children, aged 2-6, with ACIs? Rank each item 1-6, where 1 is the most impactful and 6 is the least impactful.

Individual Music Therapy Programmes

Group Music Therapy Programmes

Joint Music Therapy and Speech and Language Therapy Programmes

Joint Music Therapy and Occupational Therapy Programmes

Telehealth (Online) Music Therapy Programmes

Other (Please specify.)

8. On average, how long are your individual, group, or joint sessions with a child, aged 2-6, with an ACI when working towards language- and communication-oriented goals?

Answer in minutes

Individual Sessions

Group Sessions

Joint Sessions

### III. Music Therapy Interventions

9. Which of the following music therapy interventions do you find most effective in addressing language- and communication-oriented goals in your work with children, aged 2-6, with ACIs? (Select a maximum of five.)

Song Singing

Music Listening

Instrumental Improvisation

Vocal Improvisation

Song Discussion

- Music and Movement
- Music and Art
- Music and Play
- Lyric Analysis
- Songwriting / Composition
- Story Song Creation
- Conducting Music
- Computer-based Music Activities (e.g., using music apps)
- Music combined with Visual Media (e.g., Picture Exchange Communication, visual timetable)
- Augmentative and Alternative Communication (e.g., BIGmack switch, GoTalk Now)
- Other (Please specify.)

10. If you engage in interdisciplinary therapy programmes, please provide details on any additional joint therapeutic interventions used in your sessions with children, aged 2-6, with ACIs.

**IV. Outcome Measures**

11. Do you use any standardised outcome measures to evaluate the impact of music therapy on language and communication in your work with children, aged 2-6, with ACIs? (E.g., PLS-5 English, GFTA-3)

- No
- Yes (Please specify.)

12. Do you use any non-standardised outcome measures to evaluate the impact of music therapy on language and communication in your work with children, aged 2-6, with ACIs?

No

Yes

13. If yes, what non-standardised outcome measures do you use? (Select all that apply).

Observation

Videoing

Audio Recording

Own or Developmental Screening Tool

Modified Standardised Outcome Measure

Other (Please specify.)

14. Do you use any other methods to evaluate the outcomes of your music therapy intervention(s) on language and communication in children, aged 2-6, with an ACI?

**V. Case Vignette**

15. Would you like to provide a brief case vignette detailing your work with a child, aged 2-6, with an ACI?

Yes

No

16. Please note that the following question is optional.

Please provide a brief case vignette detailing your work with a child, aged 2-6, with an ACI.

Please include the following:

Description of the client, including age, gender, and type of ACI. Use an alias.

Programme method, including music therapy approach, model, capacity, and clinical interventions.

Programme results and how you evaluated these outcomes

--

## Appendix E: International Survey – Supplemental Survey Results

### *Professional Background*

<b>Question</b>	<b>No. of Responses</b>	<b>Sum Responses</b>	<b>%</b>
Country of work	54		
United States		18	33.3
Australia		9	16.7
Ireland		9	16.7
United Kingdom		8	14.8
Canada		4	7.4
Germany		2	3.7
Bahrain		1	1.9
Denmark		1	1.9
Norway		1	1.9
Spain		1	1.9
Number of years as a music therapist	54		
Less than 1 year		2	3.7
1-5		16	29.6
6-10		6	11.1
11-20		16	29.6
21-29		8	14.8
30+		6	11.1
Number of years working with children, aged 2-6, with acquired communication impairments	52		
Less than 1 year		4	7.7
1-5		18	34.6
6-10		13	25
11-20		11	21.2
21-29		3	5.8
30+		3	5.8

*Session Length*

<b>Session Orientation</b>	<b>No. of Responses</b>	<b>Range</b>	<b>Mean</b>	<b>Mode</b>	<b>Median</b>
Individual Music Therapy	54	20-60 mins	33.8 mins	30 mins	30 mins
Group Music Therapy	36	20-60 mins	41.1 mins	45 mins	42.5 mins
Interdisciplinary Music Therapy	43	20-60 mins	35.5 mins	30 mins	30 mins

## Overview of Case Vignettes

Case Study	Client Overview	Communication Difficulties	Intervention	Results
1	Maria 5-year-old female	Dysarthria Poor articulation	Humanistic, person-centred approach	Audio and video recordings were used to evaluate outcomes
	ABI; Acquired cerebral palsy	Frustrated by her communication difficulties	Song singing adapted to facilitate and target breath support and control, sustained phonation, pacing, and articulation.  NMT techniques (Rhythmic Speech Cueing; Oral Motor and Respiratory Exercises)	Improvements in breath control, sustained phonation, pacing, and articulation  Less frustrated when communicating
2	Julie 4-year-old female	Cognitive communication impairment (processing, attention)	Joint MT / SLT sessions once per week. 20 – 30 minutes.	Evaluated by measuring how many vocalisations and words were completed in each session
	ABI	Receptive and expressive communication difficulties	Using visual timetable  Song singing to elicit vocalisations  Vocal improvisation to promote prologued phonation and pitch bends (swallow strength)  Instrumental improvisation to promote non-verbal communication skills such as turn taking, listening, leading, and following.	Engaged in sentence completion  Requested songs using visual cue cards
3	Lucy 3-year-old female	Expressive communication difficulties	Joint MT / SLT sessions	Detailed observation and videoing to evaluate sessions
	ABI		Humanistic, person-centred approach  Song singing to elicit vocalisations	Improvements in expressive language noted
4	Ryan 6-year-old male	No speech acquisition upon admission	Joint MT / OT sessions twice per week. 1:1 MT sessions once per week. Joint MT / SLT sessions following reassessment	Displaying increased single-step command with echolalia (Say 'thank you', client says 'thank you')
	ABI; Encephalitis		Musical Sensory Orientation Training to engage attention  Hand-over-hand placement of client's hand on MT voice box to increase tactile / proprioceptive understanding of resonance creation	Identifying colours with 70% accuracy  Engaged in sentence completion

## Appendix F: Collaborative Interviews – Information Letter



### FACULTY OF ARTS, HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE INFORMATION LETTER

Dear Clinician,

My name is James Burns, and I am a music therapist and doctoral research student at the Irish World Academy of Music and Dance, University of Limerick, Ireland. I am currently conducting a research project entitled: *Collaborative music therapy and speech-language pathology for pediatric acquired communication impairments: A phenomenological international perspective*.

As part of this research, we would like to invite pairs of music therapists and speech and language therapists who have experience working collaboratively with young children with acquired communication impairments. We are interested in gaining first-hand insights into the unique role of this collaborative effort, its challenges, and the opportunities it offers.

The interview will not exceed **60 minutes**.

There is no obligation to participate in this interview in any way. All information given is given in full confidentiality and voluntarily. Should you choose to take part in this study, you will have the right to refrain from answering any questions you do not feel comfortable answering. All participants also have the right to withdraw from the research project at any time, up to and including 14 days after completion of interview. All interviews will be audio recorded; however, this can be stopped at any point during the interview, if requested.

*If you have any queries or would like more information about the project, please do not hesitate to contact myself or the chairperson of the ethics committee on the details below.*

Best wishes,

A handwritten signature in black ink that reads 'James Burns', written over a horizontal line.

James Burns  
Music Therapist and PhD Candidate  
[James.Burns@ul.ie](mailto:James.Burns@ul.ie)

This research study has received ethical approval from the Arts, Humanities and Social Sciences Research Ethics Committee (2023-10-20-AHSS). If you have any concerns about this study or your participation and wish to contact an independent authority, you may contact:

Chairperson Arts, Humanities and Social Sciences Research Ethics Committee  
AHSS Faculty Office  
University of Limerick  
Tel: +353 61 202286  
Email: [FAHSSEthics@ul.ie](mailto:FAHSSEthics@ul.ie)

## Appendix G: Collaborative Interviews – Consent Form



### FACULTY OF ARTS, HUMANITIES AND SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE CONSENT FORM

I, the undersigned, declare that I am willing to take part in research for the project entitled:

*Collaborative music therapy and speech-language pathology for pediatric acquired communication impairments: A phenomenological international perspective*

- I declare that I have been fully briefed on the nature of this study and my role in it and have been given the opportunity to ask questions before agreeing to participate.
- The nature of my participation has been explained to me, and I have full knowledge of how the information collected will be used.
- I am aware that my participation in this study will be audio recorded and I agree to this. However, should I feel uncomfortable at any time, I can request that the recording software be switched off.
- I am aware that such information may also be used in future academic presentations and publications about this study.
- I fully understand that I am free to withdraw my participation without having to explain or give a reason, up to a period of two weeks after data collection is completed.
- I acknowledge that the researcher does guarantee that they will not use my name, or any other information, that would identify me in any outputs of the research.
- I declare that I have read and fully understand the contents of the Research Privacy Notice.

---

Signature of Participant

---

Date

---

Signature of Investigator

---

Date

## Appendix H: Collaborative Interviews – Interview Topic Guide

### *Interview Topic Guide*

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#### **Topic Guide**

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Topic Areas to be Explored:

- General information about the collaborating pairs
    - Pediatric ACI experience*
    - Collaborative practice experience*
  - Role of collaboration
    - Motivation for collaboration*
    - Perceived role of collaboration*
  - Elements of successful collaboration
    - Facilitators and opportunities*
    - Challenges and barriers*
  - Evaluating outcomes
    - Methods used to measure change*
-

## Appendix I: Case Series – Information Letter



### INFORMATION LETTER

#### **RE: Participation in music therapy research study**

Dear \_\_\_\_\_,

My name is James Burns, and I am a music therapist and doctoral research student at the Irish World Academy of Music and Dance, University of Limerick and National Rehabilitation Hospital.

I have attached the details of the study: *Exploring collaborative music therapy and speech and language therapy for young children with acquired communication impairments*.

I have spoken with your child's consultant and speech and language therapist and your child was identified as someone who could potentially benefit from this study. I would like to invite you to a meeting to discuss the study further and to see if you and your child would be interested in participating.

Kind regards,



James Burns  
Music Therapist and PhD Candidate  
[James.Burns@NRH.ie](mailto:James.Burns@NRH.ie)

## Appendix J: Case Series – Information Sheet



### INFORMATION SHEET

#### Study Title:

Exploring collaborative music therapy and speech and language therapy for young children with acquired communication impairments.

#### What is music therapy?

Music therapy is an evidenced based profession. It is the planned and intentional use of music-based methods to support individuals to improve, restore, or maintain health, functioning, and wellbeing. Music therapy is becoming an increasingly popular form of intervention for children with acquired brain injury, having been used to support physical functioning, communication rehabilitation, psychosocial care, and behavioural and cognitive skills.

#### What is the purpose of this study?

This research study is taking place at the NRH to explore the use of collaborative music therapy and speech and language therapy for children with acquired communication impairments. It aims to assess changes in language and communication skills over time in response to this collaborative approach.

The intervention will be based upon each participants' age, interests, and preferences. The intervention will comprise of active and receptive types of music therapy experiences with additional speech and language therapeutic input:

- Receptive (music listening)
- Re-creative (singing and/or playing pre-composed songs)
- Improvisation (on instruments)
- Composition (improvised songs and songwriting)

This study will lead to a written evaluation in the form of a PhD thesis and presentations. The principal investigators for this project are Dr Irwin Gill and Dr Susan Finn. The clinical work for this study will be carried out by a team of professionals including: James Burns, music therapist and PhD candidate; Rebecca O'Connor, senior music therapist; Julianna Little, clinical specialist speech and language therapist; and Rebecca Woods, senior speech and language therapist. James will liaise closely with parents/legally guardians and all members of the interdisciplinary team throughout the course of this study. Intervention will take place twice per week for the duration of your child's rehabilitation programme.

During the therapeutic programme one assessment will be conducted:

- The research team will complete the Individualised Music Therapy Assessment Profile (IMTAP) which is an in-depth assessment protocol providing a clear profile of your child's receptive and expressive communication. This will be completed weekly by the music therapist and speech and language therapist following the collaborative intervention.

### **Do I have to participate?**

Your participation is voluntary. You are free to consent or refuse to participate without providing a reason for your decision.

### **Are there any benefits from my participation?**

The results from this study will be used to enhance knowledge on collaborative music therapy and speech and language therapy intervention for children, aged 2-6, with acquired communication impairments. Clinicians can use this knowledge for future practice decisions.

### **Are there any risks involved in participating?**

There are no identified risks involved with participation in this study.

### **Withdrawal**

Participants can withdraw consent at any time, without giving reason, and without this decision affecting the future treatment or medical care. To withdraw, please do so by writing to the Medical Consultant in charge of your child's care at the National Rehabilitation Hospital.

### **Video Recording**

The collaborative music therapy and speech and language therapy sessions are video recorded so that the research team can closely analyse the participants' responses to the collaborative intervention and monitor developments and changes over time. However, these video recordings are confidential and are not released to anyone without permission.

If you have any queries or would like more information about the project, please contact me on the details below.

A handwritten signature in black ink that reads "James Burns". The signature is written in a cursive style and is positioned above a horizontal line.

James Burns  
Music Therapist and PhD Candidate  
[James.Burns@NRH.ie](mailto:James.Burns@NRH.ie)

## Appendix K: Case Series – Consent to Study



### CONSENT TO PARTICIPATE

#### Study Title:

Exploring collaborative music therapy and speech and language therapy for young children with acquired communication impairments.

#### **Please tick the appropriate answer.**

I confirm that I have read and understood the information leaflet dated April 2023 attached, and that I have had ample opportunity to ask questions all of which have been satisfactorily answered.

**Yes**  **No**

I understand that my child's participation in this study is entirely **voluntary** and that I may withdraw consent at any time, without giving reason, and without this decision affecting the future treatment or medical care.

**Yes**  **No**

I understand that my child's records may be viewed by individuals with delegated authority from Dr Gill and Dr Finn.

**Yes**  **No**

I understand that my child's identity will remain confidential at all times. Pseudonyms will be used in all published material.

**Yes**  **No**

I give my informed consent for the researchers to have access to my child's medical notes in the National Rehabilitation Hospital. I understand that the contents of my child's confidential medical notes will not be disclosed to a third party.

**Yes**  **No**

I have been given sufficient time to consider my child's participation in this study.

**Yes**  **No**

I understand that my child's healthcare records will be viewed by researcher, James Burns.

**Yes**  **No**

I have been given a copy of the information leaflet and my child's consent form for my records.

Yes  No

#### **FUTURE USE OF ANONYMOUS DATA**

I agree that I will not restrict the use to which the results of this study may be put. I give my approval that unidentifiable data concerning my child may be stored or electronically processed for the purpose of scientific research and may be used in related or other studies in the future. (This would be subject to approval by an independent body, which safeguards the welfare and rights of people in biomedical research studies – the National Rehabilitation Hospital Ethics Committee.)

Yes  No

**Name of Patient** \_\_\_\_\_

**Date of Birth** \_\_\_\_\_

**Legal Guardian** \_\_\_\_\_

(of children)

**Signature and dated**

\_\_\_\_\_  
**Name in block capitals**

#### **To be completed by the Principal Investigator or their nominee.**

I the undersigned have taken the time to fully explain to the above patient's parents, or legal guardians, the nature and purpose of this study in a manner that he/she could understand. I have explained the risks involved, as well as the possible benefits and have invited him/her to ask questions on any aspect of the study that concerned them.

**I have obtained written consent from the subject (subject's legally authorised representative) prior to the subject's participation in this study.**

\_\_\_\_\_  
**Signature:**

\_\_\_\_\_  
**Name in Block Capitals:**

\_\_\_\_\_  
**Qualification:**

\_\_\_\_\_  
**Date**

## Appendix L: Case Series – Consent to Video Record



### CONSENT TO VIDEO RECORD

#### Study Title:

Exploring collaborative music therapy and speech and language therapy for young children with acquired communication impairments.

For the purposes of assessment, video recording sessions is very helpful in order to analyse and assess participants' responses and behaviours correctly. It is also very useful to use the videos to collate a record of the specific music used in the sessions as well as to inform treatment plans. The video recordings also provide data to observe and monitor changes in participants by comparing pre-rehabilitation video data, completed on admission, and post-rehabilitation video data, completed at the end of a participants' rehabilitation before discharge, which is an important aspect of this study.

In order to protect the confidentiality of participants, no names will be used. Individual participants' data will be stored under reference numbers which will be known only to the researchers. The video recordings will be stored in a locked filing cabinet in the locked music therapy office at the NRH. Any videos stored on a computer will be stored on the password protected music therapy computer, which is in a locked office. If for the purposes of presentations, the video extracts will need to be taken out of the room on a NRH laptop, this laptop will be password protected and encrypted. Following the presentation, the videos will be deleted from the laptop. For the purposes of this research project, all data will be stored as per NRH standards, protocols, and guidelines.

On the consent form below there are three levels of consent. The level of consent requested for this project is the third level of consent, level (C) where video recordings may be used publication in a journal, textbook, as part of presentations, a display of information leaflet. Once images and data are released for open publication they cannot effectively be withdrawn from circulation. Your choice of consent level will not affect your treatment within this hospital in any way as participants without consent to video may still take part in this study.

If you do not understand any of the below, please ask. If, in the future you wish to withdraw this consent, you have the right to do so at any time by writing to the Medical Consultant in charge of your child's care at the National Rehabilitation Hospital.

**To be filled out by parent / legal guardian:**

**Under no circumstances should you feel obliged to give your consent if you do not wish to do so.**

***A) Consent Level 1: Case Notes Only***

I understand that the video recordings requested here, to which I have agreed, will form part of my child's confidential medical record only and used as part of his/her treatment.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Name of parent/legal guardian \_\_\_\_\_ Status: parent / legal guardian

Name of participant \_\_\_\_\_ MRN \_\_\_\_\_

***B) Consent Level 2: Research/Teaching***

I also understand that the video recordings requested here may be useful for the purposes of medical teaching and research within the hospital and in view of the explanation given to me as per Family Member Information Leaflet, I agree that the video recordings may be shown to appropriate professional staff working within the hospital and students to facilitate medical/professional teaching.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Name of parent/legal guardian \_\_\_\_\_ Status: parent / legal guardian

Name of participant \_\_\_\_\_ MRN \_\_\_\_\_

***C) Consent Type 3: Publication***

I understand that the video recordings requested here may be used for publication in a journal, textbook, as part of presentations, a display or information leaflet, which may be seen by members of the general public as well as medical professionals. In this case, all video footage will be less than 5 minutes in length. I understand that once these images are released for open publication they cannot effectively be withdrawn from circulation. To this I give my consent.

Signature \_\_\_\_\_ Date \_\_\_\_\_

Name of parent/legal guardian \_\_\_\_\_ Status: parent / legal guardian

Name of participant \_\_\_\_\_ MRN \_\_\_\_\_

**To be filled out by clinician**

Name (Block Capitals) \_\_\_\_\_

Job Title \_\_\_\_\_ Signature \_\_\_\_\_

Department \_\_\_\_\_ Date \_\_\_\_\_