Designing a Neurodiversity-Affirming School-Based Music Therapy Program to Support Autistic Students with Auditory Sensitivities

Caitlin Elizabeth Marjorie Miller

A Thesis
in
the Department
of
Creative Arts Therapies

Presented in Partial Fulfillment of the Requirements
for the Degree of Master of Arts (Creative Arts Therapies, Music Therapy Option)
Concordia University
Montreal, Quebec, Canada

September 2025

CONCORDIA UNIVERSITY

School of Graduate Studies

This is to certify that the thesis prepared

By: Caitlin Elizabeth Marjorie Miller

Entitled: Designing a Neurodiversity-Affirming School-Based Music Therapy Program to Support Autistic Students with Auditory Sensitivities

and submitted in partial fulfillment of the requirements for the degree of

Master of Arts (Creative Arts Therapies, Music Therapy Option)

complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the final Examining Committee:

_____ Chair

Laurel Young

_____ Examiner

Cynthia Bruce

_____ Examiner

Laurel Young

_____ Supervisor

Annabelle Brault

Approved by _____

Cynthia Bruce, Chair, Department of Creative Arts Therapies

_____2025 _____

Annie Gérin, Dean, Faculty of Fine Arts

ABSTRACT

Designing a Neurodiversity-Affirming School-Based Music Therapy Program to Support Autistic Students with Auditory Sensitivities

Caitlin Elizabeth Marjorie Miller

This thesis presents a neurodiversity-affirming music therapy program framework designed for autistic students experiencing auditory sensitivities in a specialized school environment. Guided by the Intervention Mapping (IM) framework, this project integrates theory, empirical research, and published accounts of lived experiences of autism to address a gap in practice and create a flexible and inclusive program that values sensory diversity. Drawing from autistic first-voice narratives, as well as literature on music therapy practice and other health-related fields, the program addresses the limitations of traditional desensitization approaches. This is achieved by emphasizing autonomy, predictable sound environments, and ethically grounded assent processes for speaking and non-speaking autistic students who may communicate in a variety of ways. Organized across structural, content and delivery components, the program may offer music therapists concrete strategies which may support sensory regulation through adaptive, student-led engagement with sound. By centering autistic perspectives and integrating cross-disciplinary perspectives, it seeks to contribute to advancing music therapy practice by calling for a refinement of sensory supports in specialized school contexts and informing the development of guidelines that explicitly integrate auditory considerations into therapeutic planning.

ACKNOWLEDGEMENTS

I would like to thank my supervisor, Professor Annabelle Brault, for her continued guidance, heartfelt encouragement, and patience throughout this project. Her unwavering support has been essential in shaping this work in addition to helping me grow as a music therapist and graduate student.

I extend sincere appreciation to Dr. Cynthia Bruce, Chair of the Department of Creative Arts Therapies, for leading a department that values curiosity, critical thinking, and the advancement of our field. Being her student encouraged me to think more critically about disability and to challenge some of my own assumptions, a shift that has informed both my practice and this project.

I would like to also recognize how grateful I am to have received the Concordia University Retired Faculty and Staff Graduate Award – FOFA – which provided overwhelmingly meaningful financial support and allowed me to pursue my studies with greater focus and less strain.

Finally, to my family, thank you for your patience, encouragement, and belief in me during this process. Those who have supported me with unconditional love have been a great source of strength, through life's challenge and loss.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

Chapter 1. Introduction

Framing the Current Gap

Auditory sensitivities are a common experience among autistic individuals, often resulting in overstimulation, distress, or shutdown in environments not designed with sensory diversity in mind (Cascio et al., 2016; H. Davies, 2022). Within school settings, these sensitivities can be particularly challenging, where many forms of noise, unpredictability, and limited accommodations compound the effects (W. Davies, 2022; Lucker, 2013; Taels et al., 2023). Music therapy (MT), when facilitated within a neurodiversity-affirming framework, has the potential to support autistic students navigating these auditory challenges (Cibrian et al., 2017; H. Davies, 2022; G. Kim et al., 2024). However, many current school-based MT practices do not fully reflect neurodiversity-affirming values and instead focus on generalized behavior regulation or symptom management (Chapman & Botha, 2023; Koegel et al., 2004). These practices often fail to address the nuanced auditory realities of autistic students and risk reinforcing deficit narratives rather than promoting sensory autonomy (Brake, 2024; Mullally et al., 2024). This thesis seeks to address this gap by developing a school-based MT program that affirms sensory differences and supports autistic students to cope with auditory sensitivities.

Significance & Need

This study contributes to a growing emphasis on sensory-inclusive and neurodiversity-affirming practice within MT (H. Davies, 2022; Renel, 2018; Shiloh & LaGasse, 2014). Adjacent disciplines, such as occupational therapy and audiology, also offer valuable perspectives on adaptive sound technologies and auditory modulation; however, these have yet to be meaningfully integrated within MT frameworks (Boyd, 2024; Cibrian et al., 2017; Gee et al., 2014; Pfeiffer et al., 2019). Although auditory sensitivity is acknowledged in the literature, few MT interventions reflect affirming principles that prioritize lived experience, autonomy, and individualized pacing (H. Davies, 2022; Graf-Kurtulus & Gelo, 2025; Ross, 2017).

The need for interventions that support autistic people in navigating auditory sensitivities and sensory environments is evident when considering the prevalence of sound complications among autistic individuals. Studies suggest that between 60% and 90% of autistic people experience atypical auditory processing, including hyperacusis, difficulty with filtering sound, or distress triggered by specific auditory stimuli (Hall et al., 2016; Seif et al., 2025; Z. Williams et al., 2021). These challenges can lead to avoidance behaviors, heightened anxiety, and

disengagement in school settings, particularly when environments do not accommodate sensory needs (I. Morris et al., 2025; Nawaz & Speer, 2025; Rance et al., 2017). Moreover, students who are non-speaking, partially speaking, or reliant on alternate communication modalities may face additional difficulty expressing discomfort or requesting accommodations for auditory distress (Stiegler & Davis, 2010). First-person accounts describe the emotional toll of unsupported auditory needs and experiences of *sensory gaslighting*, straining trust with professionals or within therapeutic relationships (Dotch et al., 2023, 2024; Rosas-Pérez et al., 2025). Other first-voice accounts have detailed the cumulative impact of sound exposure in overstimulating environments, emphasizing the need for structured and flexible sensory supports (Botha et al., 2024; Chapman & Botha, 2023).

Personal Relationship to the Topic

My relationship to this topic began during my pre-professional graduate training, when I first observed the Désensibilisation Auditive program as an MT student in a specialized school setting. It became clear that sound sensitivity – whether due to environmental noise or interpersonal interactions – was a common concern across the student population. Many students wore headsets daily or used avoidant behaviors to manage auditory input, often showing signs of dysregulation in unpredictable sound environments. Although formally structured within the school, the program was described to me by one of its creators as not being grounded in research, and it reflected an effort to address this shared challenge. I had also noticed that some students were grouped together in ways that could unintentionally increase distress, highlighting the need for greater attention to sensory compatibility within group interventions. Later, as the school's music therapist, I had more access to the program and its informal structure. Over time, I found myself integrating aspects of it into my own sessions – modifying the approach to better support client autonomy and adjusting the pace and structure to be more responsive to each student's sensory thresholds.

Furthermore, I am fortunate to work in a specialized school where MT has been established for over 30 years. This long-standing presence has enabled the accumulation of diverse instruments and musical resources, including access to technology such as smart boards, though curated therapeutic apps and other advanced tools are not yet widely used. The students I support communicate through a wide range of modalities, including AAC systems, pictograms, hand signs, writing, and verbal speech at varying levels. Our broader school environment

prioritizes visual support and structured routines, which can be integrated effectively into MT to promote accessibility and autonomy. However, like many educational settings, the development of new interventions can be constrained by the immediate demands of client contact, service delivery, and the systemic realities of school-based practice.

Within this context, I became increasingly critical of the historical approaches to auditory intervention, particularly auditory integration training (AIT) and other desensitization models. These methods are often based on the idea that auditory sensitivity is a problem to be corrected, rather than a valid experience. I find this framing incompatible with client-centered practice, especially when I am reflecting on the sensory differences I have observed in working with autistic clients. As such, my interest in this topic has grown out of both practical engagement with students and a desire to contribute to more respectful, flexible approaches to sound sensitivities within MT practice.

Positioning Identity-First language in Autism Discourse

In this thesis, I use the term *autistic students,* rather than *students with autism* because it aligns with rights-based perspectives and first-person accounts that support identity-first language (IFL) (Botha et al., 2021; Flowers et al., 2023). Oliver's (1990) social model of disability is positioned by some researchers in autism and beyond to define disability in relation to societal barriers instead of individual impairment (Bury et al., 2020; Flowers et al., 2023). Here, IFL reflects back to us that autism is an inseparable aspect of identity, where PFL that was originally intended to emphasize the person, unintentionally frames autism as an external force separate from identity (Botha et al., 2021; Bury et al., 2020; Flowers et al., 2023). This is illustrated by the participants in Lei et al.'s (2021) study which emphasized that autism is an *integral component* of identity, reflecting the view that language should affirm this connection. Botha et al. (2021) have also engaged with this notion, further contending that language choices have material consequences, including "stigmatization, dehumanization and violence" (p. 870), and that decisions surrounding terminology should prioritize the autonomy, rights and self-determination of autistic people. Finally, my own engagement with this topic has evolved over time, where during my undergraduate degree in child studies (diversity specialization), I was taught to view PFL as the sole respectful and correct option at the time. In more recent years, my academic and professional experiences have leveraged shifts in mindset that recognize identity-affirming language through better comprehension and openness towards first person research.

Purpose Statement

The purpose of this research was to develop a neurodiversity-affirming school-based music therapy program to challenge deficit models of auditory intervention.

Research Questions

How can a neurodiversity-affirming, school-based music therapy program be designed to support autistic students in coping with auditory sensitivity?

The subsidiary questions were:

- What theoretical and practical principles can guide the use of adaptive sound practices in ways that affirm, rather than pathologize, sensory experiences in autistic students?
- How can the Intervention Mapping (IM) method structure the development of a music therapy program that integrates these affirming and adaptive practices?

Assumptions

This study assumes that affirming approaches are preferable to pathologizing ones, and that autistic students have a right to autonomy over their sensory environments. It assumes that school-based music therapists can benefit from structured program design tools, such as IM, to support the development of interventions that align with neurodiversity-affirming practice.

Definitions of Key Terms

- *Auditory sensitivities:* Heightened or diminished reactions to sounds, frequencies, or patterns of auditory input, often experienced as either hypersensitivity or hyposensitivity (Cascio et al., 2016; Robertson & Simmons, 2015).
- *Affirming practices:* Approaches that validate individuals' lived experiences and support autonomy, in contrast to interventions that aim to normalize or suppress neurodivergent expressions (Botha et al., 2024; H. Davies, 2022).
- *Adaptive practices:* This refers to context-specific modifications that recognize possible environmental, structural or delivery-based changes in support of individual participation (Chapman & Botha, 2023; Twyford et al., 2025; Kathryn. Williams et al., 2024).
- *Neurodiversity-affirming:* Practices grounded in the neurodiversity paradigm, which values diverse neurological profiles and prioritizes first-person perspectives, recognizing sensory and cognitive differences as valid variations (Botha et al., 2024; H. Davies, 2022).

- *School-based music therapy:* MT interventions conducted within school settings, designed to support emotional, sensory, and communicative goals, often in collaboration with educators and other professionals (Blythe LaGasse et al., 2019; McFerran & Rickson, 2014).

Summary of Chapters

- Chapter 1: Introduces the phenomenon of auditory sensitivity in autistic students and the need for neurodiversity-affirming approaches within school-based MT. It also presents the significance of the study, research gaps, theoretical grounding, and research assumptions.
- Chapter 2: Provides a literature review of theoretical models, neurodiversity frameworks, first-person perspectives, and clinical findings on auditory processing, sensory modulation, and MT approaches relevant to the study.
- Chapter 3: Outlines the qualitative, theory-driven methodology used to design a neurodiversity-affirming school-based MT program for autistic students with auditory sensitivities, using Bartholomew Eldredge et al.'s (2016) IM framework. It also details each step of the IM process, emphasizing ethical, flexible, and participatory design informed by peer-reviewed research, first-person narratives, and affirming clinical practices.
- Chapter 4: Describes the development of the MT program using the IM framework. It also details the needs assessment, performance objectives, and theory-based strategies that inform the program's structure, content, and delivery.
- Chapter 5: Discusses the program's contributions to neurodiversity-affirming MT, highlighting its ethical, practical, and interdisciplinary implications. It also examines the strengths and limitations of the design and identifies areas for future development.

Chapter 2. Literature Review: Auditory Sensitivity & Neurodiversity

Introduction

Sensory processing differences are a core aspect of Autism Spectrum Disorder (ASD), with auditory sensitivities often presenting significant challenges (Lord et al., 2018). The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) identifies sensory hyperreactivity and hyporeactivity, including sound, as diagnostic criteria for ASD, highlighting patterns like sensory seeking and avoidance behaviors (*Diagnostic and Statistical Manual of Mental Disorders*, 2013). Although diagnostic frameworks offer clinical insights, they often fail to capture the depth of autistic sensory experiences. First-person accounts emphasize the centrality of sensory differences to identity, viewing behaviors like stimming as meaningful self-regulation strategies rather than clinical markers (Bakan et al., 2018; Mullally et al., 2024). These narratives contrast with models prioritizing observable behaviors over lived experiences, underscoring a need for more inclusive approaches (Cascio et al., 2016). This literature review examines the gaps between clinical paradigms and neurodiversity-affirming practices, focusing on MT's potential to address auditory sensitivity in autism. By integrating theoretical models, empirical findings, and lived experiences, it aims to illuminate affirming approaches to sensory differences while addressing the limitations within existing intervention models. This includes early deficit-oriented interventions such as auditory desensitization and auditory integration training (AIT), followed by a discussion of neurodiversity-affirming frameworks, autistic listening and sensory-safe design. The chapter then presents dignity-affirming interventions grounded in lived experiences, exploring considerations for neurodiversity-affirming practice, and reviews the role of structure and predictability. It then concludes with an overview of MT approaches for auditory sensitivities, including techniques, soundscapes, adaptive tools, and school-based MT applications.

Theoretical Foundations of Sensory Processing

This section outlines theoretical models to inform current understandings of sensory processing, with some focus placed on auditory processing and neurodivergent experiences. Each model, Ayres Sensory Integration® (ASI), Polyvagal Theory, Sensory Modulation and Monotropism is presented alongside the respective foundational principles and may include implications for neurodiversity-affirming practices.

Ayres Sensory Integration®

ASI purports that individuals require effective processing and organization of sensory information from the environment to support adaptive functioning (Ayres, 1972). The theory acknowledges challenges in tactile, vestibular, and proprioceptive systems, identifying that difficulties in sensory integration can impact behavior, learning and participation (Ayres, 1972). Originally, ASI was developed to support children with learning and behavioral challenges, including but not limited to autistic and other neurodivergent individuals (Lane et al., 2019). Although it is more widely applied to neurodivergent contexts today, its foundational principles are not exclusive to autism, and ASI may inform interventions for a broad range of developmental differences (Lane et al., 2019). More recent interpretations, such as those by Cascio et al. (2016), contextualize Ayres' (1972) work by framing sensory hypersensitivity as central to autistic experience and situating sensory challenges within occupational therapy practice. Additionally, Boyd (2024) expands the ASI approach with the sensory accommodation framework, where it is being used to support autonomy and comfort for neurodivergent individuals through assistive and accessible technology design in health. Furthermore, Castro (2019), a western analytic philosopher, incorporates a philosophical dimension, linking Ayres' framework to Kant's (1998) theory of imagination[1], positioning sensory integration as critical for bridging perception and cognition in education. These adaptations across occupational therapy, education, and technology, reflect an evolving understanding and framing of sensory integration that can indeed support neurodiversity-affirming perspectives (Boyd, 2024; Castro, 2019).

Polyvagal Theory

Polyvagal Theory, developed by Stephen Porges (1995), highlights the role of the autonomic nervous system (ANS) in regulating emotional and sensory experiences through three hierarchical neural pathways: ventral vagal, sympathetic, and dorsal vagal (Porges, 2022). The ventral vagal complex, forming the *social engagement system*, promotes co-regulation and stability, particularly through rhythmic auditory stimuli (Porges, 2022). Porges et al. (2014) introduced the Listening Project Protocol, which employs filtered auditory stimuli to enhance neural regulation and reduce auditory hypersensitivities, offering a targeted intervention for

[1] In Kantian philosophy, the imagination is the mental faculty that mediates between sensory input and conceptual understanding, allowing individuals to synthesize raw sensory data into coherent perceptions and knowledge (Castro, 2019; Kant, 1998).

sensory challenges. Polyvagal-informed therapies include the creative arts and play-based therapies, that emphasize co-regulation in supporting sensory and emotional regulation (Goodyear-Brown & Yasenik, 2024). These approaches align with neurodiversity principles by prioritizing individual sensory needs and resilience over normalization (Goodyear-Brown & Yasenik, 2024; Porges, 2022).

Sensory Modulation

Sensory modulation is a theoretical model which highlights an individual's ability to regulate responses to sensory input, ensuring reactions are contextually appropriate (Cascio et al., 2016). Unlike sensory integration, which focuses on organizing sensory information, modulation refers to balancing heightened or diminished responses to stimuli (Ayres, 1972). At face value, this model is not neurodiversity-affirming because it assumes a normative baseline for sensory responses, thus overlooking self-regulation forms that do not follow conventional expectations within society (Chapman & Botha, 2023; Kapp et al., 2013). In MT, sensory modulation can be supported through variations in tempo, texture, and volume, offering individuals space to explore sensory input (Blythe LaGasse et al., 2019; Rickson, 2022). LaGasse et al. (2019) found that MT can support sensory regulation and attention in autistic children by using structured auditory input to enhance sensory gating and reduce overstimulation. Predictable musical patterns may also provide a scaffolded environment that supports modulation of sensory input and promotes engagement at the student's own pace (Rickson, 2022).

Monotropism

Monotropism describes a cognitive style in which attention is narrowly focused on a limited number of interests or stimuli at any given time, rather than attention being broadly distributed (Lawson, 2025b; Murray et al., 2005). For many autistic individuals, this is a core aspect of how they process the world, shaping both learning and sensory experiences (Lawson, 2025b). Since sensory information is often processed sequentially rather than in an integrated way, auditory input may either dominate attention – leading to hypersensitivity – or be filtered out entirely when attention is engaged elsewhere, contributing to hyposensitivity (Lawson, 2025b). The ability to shift attention across competing auditory and visual inputs, often assumed in everyday environments, may not be available in moments of sensory overload or focus (Lawson, 2024; Wood, 2019). This has direct implications for the design of auditory

interventions. Structured, predictable auditory input that aligns with an individual's attentional focus, such as rhythm-based techniques in MT, may foster engagement and reduce sensory overwhelm (Lawson, 2025b). By contrast, unpredictable or competing auditory environments can fragment attention and increase distress (Poulsen et al., 2025). A neurodiversity-affirming approach must account for these attentional dynamics and avoid imposing multitasking demands that conflict with a monotropic processing style (Lawson, 2025b).

Viewing autistic sensory experiences through a monotropic lens helps clarify the dynamic relationship between auditory processing, sensory overwhelm, and the need for sensory-safe environments (Lawson, 2025b; Murray et al., 2005). Autistic listening reflects the variability of auditory attention: certain sounds may become heightened or intrusive when they capture the individual's focused attention, while others may be filtered out entirely (W. Davies, 2022; Lawson, 2025b; Poulsen et al., 2025). This variability contributes to the challenges autistic individuals face in navigating unpredictable auditory environments, where fragmented or competing sensory input can overwhelm attentional resources and trigger distress (Lawson, 2025b; Poulsen et al., 2025). In these moments, stimming and other self-regulation strategies play a critical role in helping individuals manage sensory input and regain control (Lawson, 2025a; Petty & Ellis, 2024). Designing sensory-safe environments that provide predictable auditory input, minimize sensory clutter, and allow for flexible use of sensory supports, directly align with the attentional needs described by monotropism (Lawson, 2025a; Wood, 2021). This perspective reinforces the importance of neurodiversity-affirming practices that prioritize autonomy and sensory well-being, rather than imposing normative expectations of how attention or sensory integration *should* function (W. Davies, 2022; Robertson & Simmons, 2015).

Auditory Processing & Related Disorders

Building on the theoretical models of sensory processing, this next section focuses specifically on auditory sensory input as a key component that influences perception, regulation and participation in autistic individuals (Cascio et al., 2016; Robertson & Simmons, 2015; Z. Williams et al., 2021). Auditory input will be outlined, followed by an overview of common auditory-related conditions that can intersect with autism, and that include auditory processing disorder, hyperacusis, and misophonia.

Auditory Sensory Input

Auditory sensory input refers to the brain's ability to receive, organize, and interpret sounds from the environment, a foundational component of sensory processing (Ayres, 1972). For autistic individuals, auditory processing differences can manifest as heightened sensitivity or difficulty filtering irrelevant sounds, often resulting in sensory overwhelm or avoidance (Nawaz & Speer, 2025; Robertson & Simmons, 2015; Z. Williams et al., 2021). These differences are not uniformly negative; studies suggest unique strengths in pitch and frequency discrimination among autistic individuals, reflecting alternative modes of auditory processing (Allen et al., 2009; Bhatara et al., 2013). Bhatara et al. (2013) found that adolescents with autism often develop strong preferences for musical patterns and report heightened enjoyment of structured auditory experiences, suggesting adaptive pathways for engaging with sound. Cascio et al. (2016) emphasized the interdisciplinary importance of understanding sensory function, highlighting how auditory input affects multisensory integration and behavior. This aligns with Renel's (2018) concept of aural diversity, which reframes auditory hypersensitivities as valid variations rather than deficits. Additionally, Koegel et al. (2004) documented how gradual exposure to aversive sounds in safe contexts reduced hypersensitivity in children with autism, and as a result heightened participation levels in daily activities.

Common Auditory Conditions

Common auditory disorders include auditory processing disorder (APD), hyperacusis, and misophonia, all of which may co-occur with autism, and as such impact the experience of auditory input (Ahmmed & Vijayakumar, 2024; Gonçalves et al., 2021; Lucker, 2013; Swedo et al., 2022). APD refers to difficulties in the neural processing of auditory input although there is typical hearing observed (Gonçalves et al., 2021; Ismen & Emanuel, 2023). While it is widely recognized in audiology and speech-language pathology, APD is not currently listed as a diagnosis in the DSM-5, although related challenges may be reflected under broader neurodevelopmental categories such as specific learning disorders or language disorders (*Diagnostic and Statistical Manual of Mental Disorders*, 2013; Musiek & Chermak, 2014)

Hyperacusis is an increased sensitivity to everyday environmental sounds, which can result in discomfort, pain, or distress, even at moderate volume levels (Danesh et al., 2021). Unlike APD, which primarily involves difficulties in interpreting and making sense of sounds, hyperacusis is characterized by a reduced tolerance to sound intensity without necessarily

impairing comprehension (Lucker & Doman, 2015). For example, a person with hyperacusis may find noises like the hum of a refrigerator painful or damaging, while someone with APD might struggle to distinguish speech from background noise in a room (Danesh et al., 2021; Lucker, 2013).

Misophonia is a condition marked by strong negative emotional, physiological, or behavioral responses to specific *trigger* sounds, such as chewing, pen clicking, or breathing (Swedo et al., 2022). These triggers are often repetitive and human-generated, and are experienced as disproportionately distressing, leading to reactions such as anger, anxiety, or disgust (Spencer et al., 2024). Unlike hyperacusis, which relates to loudness, misophonia responses appear to depend on the individual's emotional association with the sound (Babalola et al., 2024). The underlying mechanisms are still debated, but neuroimaging suggests heightened activity in brain regions tied to salience and emotion processing, such as the anterior insular cortex (Kumar et al., 2017). Misophonia often begins in childhood and can lead to significant impairment, including social avoidance, functional disruption, and diminished quality of life (Spencer et al., 2024). Though not exclusive to any population, it has been reported at elevated rates in autistic individuals, likely due to overlapping sensory sensitivities (Swedo et al., 2022). For example, children may engage in escape behaviors or experience intense distress in response to common classroom sounds, such as sniffing or tapping, which can lead to social conflict or withdrawal (Swedo et al., 2022). Recent findings also suggest that individuals with misophonia may exhibit heightened emotional reactivity not only to negative triggers but also to music, indicating a broader auditory-emotional sensitivity (Babalola et al., 2024).

Sensory overwhelm arises when sensory input becomes excessive, often causing anxiety, discomfort, and a loss of control, particularly in environments designed for neurotypical sound thresholds (Charlton et al., 2021; Petty & Ellis, 2024; Robertson & Simmons, 2015). For many autistic individuals, this can manifest as physical, emotional, or cognitive distress which they often manage through strategies like stimming, repetitive or self-soothing movements (Petty & Ellis, 2024; Robertson & Simmons, 2015). These strategies play a crucial role in emotional and sensory regulation, aiding recovery from overstimulation (Petty & Ellis, 2024; Robertson & Simmons, 2015). Autistic adults have emphasized the positive role of stimming in regulating sensory input and expressing emotion, highlighting how the suppression of these behaviors due to social pressure can result in harm and heightened distress (Charlton et al., 2021).

Neurodiversity-affirming frameworks emphasize valuing these sensory experiences as integral to identity, rather than anomalies to be corrected (Petty & Ellis, 2024).

Early Deficit-Oriented Interventions

Building on the understanding of auditory processing differences and some of the related disorders outlined previously, early intervention efforts often framed these variations through a deficit-based lens (Botha et al., 2024; H. Davies, 2022). This section reviews two prominent examples of this, auditory desensitization and auditory integration training, situating them within a historical context, including attempts to normalize sensory responses (H. Davies, 2022; Koegel et al., 2004; Mudford et al., 2000). It also introduces the critiques from neurodiversity-affirming perspectives that would push through the reshaping of this dynamic in contemporary practice (Botha et al., 2024).

Auditory desensitization

Auditory desensitization, rooted in Joseph Wolpe's systematic desensitization framework, involves gradually exposing individuals to auditory stimuli to reduce hypersensitivity and associated distress (Wolpe, 1968). Originally designed to counter anxiety, this approach pairs-controlled exposure with relaxation techniques to modify undesirable behaviors (Lucker & Doman, 2015). For autistic individuals, structured exposure progressing from tolerable to more challenging stimuli, has been shown in some cases to reduce hypersensitivity and develop coping mechanisms (Koegel et al., 2004). Critiques from neurodiversity-affirming perspectives argue that these hypersensitivities are valid sensory variations and should be respected rather than treated as deficits requiring normalization, which contradicts this approach (Botha et al., 2024; H. Davies, 2022).

Auditory Integration Training (AIT)

Developed by Alfred Tomatis in the 1950s, AIT hoped to *retrain* an individual's auditory processing through the use of electronically filtered music, and claims were made that this method improved listening, attention and communication (Tomatis, 1953, as cited in Gerritsen, 2010; Mudford et al., 2000; Tomatis & Prada, 2005). The protocol involved multiple sessions of listening to the music where sound frequencies were altered to target auditory and behavioral responses (Gerritsen, 2010; Mudford et al., 2000). Over time, adaptations emerged from AIT including the Berard method, which applied standards to the intervention, consisting of 20 half-hour sessions and 2 sessions per day for 10 consecutive days straight (Mudford et al.,

2000; Sinha et al., 2011). Although early results and small-scale studies indicated that improvements were made in attention, behavior and/or language skills, systematic reviews have clarified that there is inconsistent empirical support and theoretical weakness in both AIT approaches by Tomatis and Berard (Mudford et al., 2000; Sinha et al., 2011; Sokhadze et al., 2016).

Historical Dissonance

The history of managing auditory sensitivities in autism reflects a shift from deficit-based models to neurodiversity-affirming practices. Early frameworks, such as Kanner's (1943) concept of early infantile autism[2] ignored sensory sensitivities, framing autism through behavioral deficits and social withdrawal. Within this context, intervention such as Wolpe's systematic desensitization, Tomatis's AIT, and Berard's adaptation share a commonality in attempting to normalize sensory responses rather than accommodating them (Devlin et al., 2008; Mudford et al., 2000; Sinha et al., 2011).

Although there are differences in the delivery of these interventions, their concept remains to alter how an autistic or otherwise neurodivergent individual processes sound, without key consideration for sensory distress, autonomy or consent (Chapman & Botha, 2023; W. Davies, 2022; Koegel et al., 2004; Mudford et al., 2000). Contemporary insights into sensory trauma have reframed the legacy of these interventions, and they recognize that repeated exposure to aversive auditory input could result in persistent dysregulation and sensory trauma (Fulton et al., 2020; Gerritsen, 2010; Mudford et al., 2000).

A notable shift in perspective began in the late 1990s and 2000s, influenced by the rise of neurodiversity, first-person accounts and critiques of medicalized interventions (Mairian & Sally, 1999). Although a positive direction, the shift was not universally adopted, where both healthcare and educational settings continued to operate within deficit-based models, utilizing interventions as described in this section (Cuvo, 2011; Gerritsen, 2010; Schare et al., 2014). Contemporary neurodiversity-affirming perspectives challenge these traditional methods for pathologizing sensory differences instead of recognizing them as valid variations (Botha et al.,

[2] Kanner (1943) identified early infantile autism as a distinct clinical condition marked by profound difficulties in affective contact, echolalia, insistence on sameness, and an apparent preference for objects over people, observable from infancy. By 1955, the condition was more clearly differentiated from childhood schizophrenia, where it had initially been categorized, on the basis of its early onset, lack of regression, and absence of psychotic features (Eisenberg & Kanner, 1956).

2024; W. Davies, 2022). Current approaches in audiology and psychology, as well as in MT, include methods such as sound therapy, cognitive-behavioural interventions and sensory informed music therapy (Bakan, 2018; W. Davies, 2022; Koegel et al., 2004; Wigram et al., 2002). These aim to regulate sensory and emotional responses while emphasizing autonomy, much needed collaboration and alignment with neurodiversity-affirming practices (Cascio et al., 2016; W. Davies, 2022; Porges, 2011; Rosas-Pérez et al., 2025).

Neurodiversity-Affirming Practices

Following this review of historical challenges and deficit-oriented approaches, the next section will expand the introduction of neurodiversity-affirming practices. Note that the inclusion of autistic listening after presenting common auditory disorders is intentional, as it distinguishes pathologizing diagnostic categories and lived sensory experiences, with a purpose to reframe auditory differences as valid expressions of aural diversity (W. Davies, 2022; Renel, 2018). By presenting the neurodiversity framework, autistic listening, and sensory safe design, this section aims to describe some inclusive approaches (Botha et al., 2024; Cascio et al., 2016).

Neurodiversity Framework

The neurodiversity framework redefines sensory differences in autism as natural variations rather than deficits, prioritizing lived experiences over deficit-based models (Bakan et al., 2018). This perspective recognizes sensory behaviors, like stimming, as effective strategies for self-regulation and meaningful engagement with the environment (Bakan et al., 2018; Cascio et al., 2016). Sensory-seeking behaviors, often misinterpreted in traditional paradigms, are viewed as intentional expressions rather than maladaptive responses (Koegel et al., 2004). Neurodiversity-affirming practice resists framing these behaviors as symptoms, emphasizing their value instead framing them as a disjunct problem (Cascio et al., 2016; H. Davies, 2022). Core principles include:

- Recognition of neurological and sensory diversity as natural and valuable (Chapman & Botha, 2023; W. Davies, 2022)
- Rejection of deficit and pathology-based interpretations (Bakan et al., 2018; Ross, 2017)
- Affirmation of stimming and sensory expression as adaptive and intentional (Cascio et al., 2016; H. Davies, 2022)
- Support for autonomy and agency in sensory engagement (Botha et al., 2024; C. Morris et al., 2024)

- Inclusion of first-person narratives in therapeutic models (Botha et al., 2024; Dotch et al., 2023)

Often controversially credited to Judy Singer, but debated as to who first articulated it, the neurodiversity framework emerged collaboratively within early online Autistic communities, such as the Independent Living email list, reflecting its evolving grassroots foundation (Botha et al., 2024). Emphasizing strengths in sensory and cognitive diversity, this framework challenges pathologizing narratives and advocates for practices that affirm neurodivergent identities, shifting the focus away from what might be labeled as dysfunctional (Botha et al., 2024; H. Davies, 2022).

Autistic Listening

Autistic listening explores the diverse ways autistic individuals experience and process sound, framing these differences as integral aspects of aural diversity rather than deficits (H. Davies, 2022; Renel, 2018). The concept of aural diversity, or autistic listening, challenges normative assumptions about hearing, promoting a nuanced understanding of individual auditory profiles and emphasizing their validity within the broader spectrum of human experience (Renel, 2018).

Sensory-Safe

The concept of sensory-safe is primarily used to describe environments intentionally designed to support sensory regulation and comfort, particularly for individuals with heightened sensory sensitivity (Manning et al., 2023). One of the earliest examples of sensory-safe spaces was the development of Snoezelen rooms in the Netherlands in 1974 by Ad Verheul and Jan Hulsegge, later introduced in their book *Snoezelen: Another World* (1979). These calming, multisensory spaces were originally designed for individuals with intellectual disabilities and typically featured dim lighting, bubble tubes, and tactile panels to support relaxation and sensory exploration (Hogg et al., 2001). While adopted in specific educational and clinical settings, critiques of Snoezelen rooms include their high cost, lack of individualized design, and the absence of Autistic voices in their initial development (Manning et al., 2023). Calls for co-designing these environments with Autistic individuals emphasize the need for spaces that reflect lived experience and real sensory preferences (Manning et al., 2023).

Snoezelen rooms emerged in contrast to earlier practices such as sensory extinction, introduced by Lovaas (1965), which aimed to suppress so-called maladaptive sensory behaviors

through repeated exposure to distressing stimuli in applied behavior analysis settings (McGill & Robinson, 2020). Contemporary innovations include Sensory Adaptive Environments (SAEs), such as interactive multisensory environments (iMSEs), which use real-time technologies like motion sensors, pressure switches, and programmable lighting to adapt to user input (Kathryn. Williams et al., 2024). The idea of sensory-safe design has also extended to public accommodations, including quiet hours in stores, sensory-friendly event scheduling, and the use of visual sensory maps in museums or transit hubs to support navigation and comfort (Manning et al., 2023). Overall, the concepts supporting sensory-safe environments can inform interventions within school settings and music therapy, by considering elements of modifiable sound, visual predictability, and co-regulated structure as a function of supporting Autistic students' autonomy (Bakan et al., 2018; Manning et al., 2023).

Affirming Interventions Through Lived Experiences

Autistic perspectives are essential for designing neurodiversity-affirming interventions that respect sensory differences (H. Davies, 2022; Dotch et al., 2024; Kędra, 2023; Rosas-Pérez et al., 2025). Participatory approaches help ensure interventions are collaborative and grounded in lived experiences rather than prescriptive frameworks (Kędra, 2023). For example, Rosas-Pérez et al. (2023) interviewed 12 autistic adults, identifying barriers such as *sensory gaslighting*, where participants' auditory sensitivities were dismissed based on neurotypical assumptions. Participants advocated for accommodations like adjustable noise controls and predictable sensory environments to better meet their needs (Rosas-Pérez et al., 2023). Insights from online autism forums analyzed by Dotch et al. (2023) further underscore the importance of first-person accounts. Their analysis of 137 posts and over 3,000 comments revealed common strategies, including stimming, the use of noise-canceling headphones, and the necessity of autism-friendly spaces such as quiet hours in public settings (Dotch et al., 2023). These findings highlight the need to move beyond deficit-focused models and toward affirming neurodivergent identities and fostering sensory inclusivity (Dotch et al., 2023; Kędra, 2023). This approach shifts the focus from symptom management to person-centered outcomes, ensuring interventions reflect the realities of autistic individuals (W. Davies, 2022; Rosas-Pérez et al., 2025).

Considerations for Neurodiversity-Affirming Practice

Building on Affirming Interventions Through Lived Experiences, the following section applies the neurodiversity framework, illustrating its value through anecdotes from research in

music therapy, occupational therapy, and human-computer interaction. These insights are translated into affirming practice, with the section closing by returning to first-voice accounts to reflect on common complications and ensure proposed strategies remain grounded in lived experience (Hunt, 2016).

The Role of Structure & Predictability.

Predictable auditory sensory input is critical for managing auditory hypersensitivity in autistic individuals, as structured interventions help reduce sensory overload and support regulation (Bakan, 2018; Cibrian et al., 2017; Gee et al., 2014; Stiegler & Davis, 2010). Such interventions are most effective when they align with individual sensory profiles and respect the diverse ways autistic individuals engage with sound (Stiegler & Davis, 2010). For example, Stiegler and Davis (2010) conducted a narrative review of sensory-based occupational therapy strategies, highlighting rhythmic entrainment as a promising approach. Their review included cross-disciplinary sources from occupational therapy and neuroscience, proposing that steady auditory patterns may promote co-regulation between individuals and their environments, despite limited empirical testing (Stiegler & Davis, 2010).

Cibrian et al. (2017), working in the field of human-computer interaction, explored the use of BendableSound, a multisensory interactive tool that combines tactile, auditory, and visual feedback, during MT sessions with 12 autistic participants aged 8 to 14. Through sessions that allowed participants to initiate and modulate sensory input, the tool supported engagement without causing sensory overwhelm (Cibrian et al., 2017). Qualitative and quantitative data analysis showed that predictability in stimulus delivery, such as consistent sound timing and synchronization of sensory feedback, supported regulation and sensory integration (Cibrian et al., 2017). From a sensory integration framework, Gee et al. (2014) evaluated The Listening Program (TLP), which uses psycho-acoustically modified classical music with a purpose to gradually expose participants to structured auditory input. Their 12-week pretest-post-test study with 40 children with autism revealed significant reductions in avoidant behaviors and improvements in sensory processing and attention, emphasizing the benefits of structured auditory exposure for navigating sensory environments (Gee et al., 2014). Although grounded in desensitization, this intervention emphasizes gradual exposure through consistency, illustrating how structured input can support adaptation in auditory environments (Gee et al., 2014) .

Finally, Bakan et al. (2018) provided a detailed case study of "Zena", a child with autism whose MT sessions incorporated predictable drumming patterns. These rhythms created a sensory-safe space that reduced her anxiety and enabled meaningful auditory engagement (Bakan, 2018). Importantly, the intervention was not designed to normalize sensory responses but to affirm Zena's preferred modalities and encourage autonomous expression (Bakan, 2018). This example illustrates how structured rhythm could potentially validate autistic individuals by affirming their sensory and emotional needs without imposing normalization (Bakan, 2018).

Lived Realities & Sensory Barriers

Research suggests that interventions grounded in sensory-safe approaches can effectively reduce sensory dysregulation and support emotional resilience in autistic individuals (Mullally et al., 2024). However, first-person accounts indicate that these interventions may not go far enough when real-world environments remain unpredictable and non-inclusive (Jones et al., 2003). Jones et al. (2003) describe autistic adults reporting that despite developing coping strategies in therapy, entering noisy or brightly lit spaces in public could still lead to immediate sensory overwhelm. While environmental modifications in controlled environments may aid in decreasing distress, it is difficult to prepare for the navigating of nonadopted public spaces, and more specifically, school environments (Jones et al., 2003; Mullally et al., 2024). Until broader societal changes make everyday environments more accessible, interventions can focus on skills, supports and advocacy strategies that still uphold autonomy and sensory preferences.

In Jones et al.'s (2003) analysis, participants described withdrawing internally or using repetitive behaviours to protect themselves from sensory distress. One participant described retreating into a *quiet and peaceful* inner world when the outside became too chaotic, while another described rubbing objects repetitively to 'rub the touch off' their hands – both in response to persistent sensory distress (Jones et al., 2003). Similarly, Mullaly et al. (2024) reported that unexpected sensory input in schools may lead to regular masking or disengagements, particularly when autistic students' needs are not met. Here, masking refers to the strategies autistic individuals use to hide or suppress autistic traits to conform to neurotypical social norms (Hull et al., 2017). Masking behaviors can be conscious or unconscious, often arising in response to social exclusion and/or stigma, in addition to being linked to elevated stress, burnout, and diminished sense of identity (Hull et al., 2017; Jones et al., 2003). The point here, is that when interventions fail to address lived realities, especially in a school environment

or in the presence of neurotypical professionals, evidently there may be obstacles in building trust and strengthening the therapeutic alliance (Chapman & Botha, 2023; Hull et al., 2017; Jones et al., 2003).

Music Therapy for Auditory Sensitivities

In the next section we will be shifting into MT as a context for addressing auditory sensitivities. This is organized in a way to outline some core techniques, introduce a range of approaches within the field, and finally consider adaptive and technological tools in a school MT context.

Approaches & Techniques

MT offers structured auditory experiences that can support regulation, engagement, and social interaction in autistic students, particularly when interventions are designed to accommodate individual pacing (Brake, 2024; W. Davies, 2022). Some MT techniques include rhythmic entrainment, structured improvisation, and musical cueing, which have been employed to scaffold co-regulation and flexible forms of client engagement (Bakan, 2018; Bhatara et al., 2013; Steigner & Ruhlin, 2014). Rhythmic entrainment refers to the process by which an individual's internal physiological rhythms (e.g., heart rate, movement, attention) synchronize with external rhythmic stimuli (Thaut, 2005). In school-based MT, rhythmic entrainment can support regulation during transitions or collaborative tasks by anchoring attention to steady musical pulses (Blythe LaGasse et al., 2019). Structured improvisation can also open space for creative interaction within predictable musical forms, combining predictability with agency (Bakan et al., 2018; Wigram et al., 2002). This may support communication and self-expression while reducing sensory unpredictability (Bakan, 2018). Musical cueing involves the intentional use of consistent sounds to signal session routines or task shifts, such as using a repeated motif to prompt clean-up or signal turn-taking, reducing verbal reliance and promoting reliable routine (Katagiri, 2009).

Several other MT techniques offer valuable insight. Therapeutic Instrumental Music Performance (TIMP), a Neurologic Music Therapy (NMT) technique, uses rhythmically structured instrument play to target gross and fine motor goals, often aligning with occupational therapy objectives (Thaut & Hömberg, 2014; Wigram et al., 2002). Auditory-Motor Mapping Training (AMMT) combines singing, percussion, and visual cueing to facilitate speech emergence in minimally verbal children, offering a rhythmically grounded approach to language

support (Thaut & Hömberg, 2014; Wan et al., 2011). Sensory-based sound play, closely aligned with the present program, emphasizes gentle auditory exploration in controlled environments to support regulation and desensitization without distress (Brake, 2024; Wigram et al., 2002). Embodied music therapy, which draws from somatic and trauma-informed approaches, integrates movement, breath, and body awareness with musical interaction, providing multisensory grounding for students with complex sensory profiles (Aigen, 2013). In parallel, Augmentative and Alternative Communication (AAC) and music pairing have allowed non-speaking students to engage in musical choice-making and expressive participation using augmentative systems such as pictograms or speech-generating devices, when working to expand communication access within musical experiences (Gadberry, 2011).

In some MT contexts, sound-based interventions are used to support regulation and sensory engagement without relying on melody, harmony, or lyrics (Wigram et al., 2002). These interventions emphasize auditory qualities such as frequency, repetition, and texture; using drones, rhythmic pulses, or filtered noise to influence arousal and sensory processing (Wang & Huang, 2023; Wigram et al., 2002). There is also Tailor-Made Notched Music Therapy (TMNMT)[3] which has been used for tinnitus by targeting specific frequency bands, though it has not been adapted for autism-related sensitivities or misophonia (Atipas et al., 2021). While sometimes associated with auditory integration protocols that have been ethically contested, contemporary MT practice can reframe sound-based interventions within a client-centered, neurodiversity-affirming framework (Fulton et al., 2020; Sinha et al., 2011). In the context of sound-based intervention, sound can be used flexibly and safely, with students invited to preview, initiate, or withdraw from auditory input according to their preferences (Brake, 2024; H. Davies, 2022). It is important to note that these interventions do indeed differ from general sound exposure therapies by incorporating intentional pacing, therapist attunement and responsiveness (Mössler et al., 2020). In school-based MT practice, sound-based tools can complement other techniques by helping structure transitions, modulate environmental stimuli,

[3] TMNMT, sometimes simply called notched music therapy, is a specialized auditory intervention where specific sound frequencies in music are removed that are the same or similar to a client's tinnitus (Atipas et al., 2021; Shim et al., 2015). The client then engages with the 'notched' or adjusted music, as the primary driving factor of this approach (Atipas et al., 2021; Shim et al., 2015).

or anchor student attention through steady auditory cues (Blythe LaGasse et al., 2019; Katagiri, 2009).

Intentional Auditory Environments and Soundscapes

Soundscapes and auditory environments have also become increasingly relevant in MT, particularly when designed to support regulation, sound exploration, and flexible engagement. The term *soundscape*, first introduced by Schafer (1977), refers to the auditory environment as perceived and constructed by the listener, encompassing both natural and human-made sounds. Within MT, soundscapes can be intentionally created or explored to support students' sensory awareness and emotional regulation. Pfeifer et al. (2025) found that music therapists viewed listening to nature sounds as beneficial for client well-being and clinical understanding of their clients, highlighting the therapeutic value of ambient, low-arousal auditory environments. Similarly, Greher et al. (2010) demonstrated how autistic adolescents and young adults created and interpreted sound environments using digital and acoustic tools, supporting peer interaction and narrative expression. Techniques such as receptive listening, sound layering, and guided auditory exploration can be utilized to emphasize auditory discrimination, expression of preference, and environmental awareness (Wigram et al., 2002; Thaut & Hömberg, 2014). When grounded in student directed interaction, soundscape-based interventions may align with neurodiversity-affirming practice by offering structured yet open-ended auditory spaces that accommodate sensory needs and promote self-directed engagement (Wigram et al., 2002). Even earlier MT literature recognizes the therapeutic potential of nature sounds and sound exploration, identifying them as tools for enhancing self-awareness, environmental connection, and creative expression in both individual and group work (Schulberg, 1981).

Adaptive & Technological Tools

Technological innovation may provide further opportunities within MT. To illustrate, Wang and Huang (2023) propose a personalized MT information system based on algorithmic composition to support emotional understanding in autistic children. Their system includes a machine-generated composition engine, MT app, and child-friendly design that emphasizes emotion-targeted listening (e.g., music to support emotion identification) (Wang & Huang, 2023). Though still in development, such tools could complement school-based practice when integrated with therapist-guided sessions and ethical safeguards (Wang & Huang, 2023). They may offer new avenues for sound exploration when live instrumentation is limited or when

individualized listening is appropriate (Wang & Huang, 2023). Other existing technology-related approaches within MT tend to emphasize auditory processing and discrimination over hypersensitivity or aversion (Finch et al., 2016; Joel, 2017). This includes tools like the Adaptive Use Musical Instrument (AUMI)[4] to promote digital accessibility for clients with limited mobility, but they do not address sound-related distress (Finch et al., 2016). Additionally, the *Jodivi* prototype introduces a personalized auditory integration training model, but it remains in development and is not yet part of clinical MT practice or other related fields (Joel, 2017).

School-Based Music Therapy

MT has demonstrated specific involvement with autistic students in school settings, where for example educational MT has previously measured outcomes relating to speech production, vocabulary or verbal imitation, an approach grounded in behavioural outcomes (Buday, 1995; Lim, 2010). Classroom-based MT has also been looked at within public school settings, where Mendelson et al. (2016) piloted the *Voices Together* program across four special education classrooms with autistic and intellectually disabled students. Structured songs were designed to facilitate turn-taking, expression and relation between peers, and participation was shown to increase over the 15 weeks of MT sessions (Mendelson et al., 2016). This study measured verbal engagement as a primary outcome, which does create tension with a neurodiversity-affirming framework, where emphasis is placed on multiple modalities of expression and communication instead of prioritizing speech (H. Davies, 2022; Mendelson et al., 2016). Notably, improvisational models of MT within school-based contexts have shown promise in supporting social reciprocity, joint attention and peer engagement through call-and-response singing, instrument and rhythm-based experiences (J. Kim et al., 2009; Sharda et al., 2018). This is shown through Kim et al. (2009), who demonstrated that improvisational MT sessions, with use of spontaneous voice and instrument play, created opportunities for increased joint attention and peer engagement.

Together, these findings illustrate that while educational MT has previously emphasized speech-related outcomes, the improvisational approaches can prioritize a wider variety of communication pathways, recognizing sensory, relational and non-verbal forms of expression

[44] The AUMI is a digital instrument that utilizes camera tracking to support music creation with individuals who have limited mobility through adapted visual and auditory cues to the instrument itself (Finch et al., 2016).

(Brake, 2024; H. Davies, 2022; J. Kim et al., 2009; Mendelson et al., 2016; Sharda et al., 2018). Rickson (2022) further emphasizes that MT in schools also requires balancing the dual roles of therapist and educator, with interventions adapting to institutional structures, curriculum expectations and student needs while maintaining therapeutic integrity. In this way, MT can be well-suited to educational environments, where sessions are often brief, resources may be constrained, and therapeutic work is embedded into the rhythm of a school day (Mullally et al., 2024; Robertson & Simmons, 2015).

Conclusion

This literature review synthesized sensory processing theories, neurodiversity-informed frameworks, and first-person perspectives to deepen understanding of auditory sensitivity in autism. It traced how concepts such as sensory modulation, monotropism, and autistic listening interact with environmental demands, and highlighted how sensory-safe practices, when grounded in predictability and autonomy, can better support regulation. It also examined the evolution of interventions, both historical and current, and how MT techniques can be adapted to reflect affirming, individualized approaches, even in school-based settings. These foundations will directly inform the methodology presented in Chapter 3, which will outline how theoretical, clinical, and experiential knowledge guided the use of the IM framework to design a structured yet flexible MT program.

Chapter 3. Research Methodology

Introduction

This chapter outlines the research methodology used to develop an adapted school-based MT program designed to support autistic students in navigating auditory sensitivities. The program responds to an identified need for neurodiversity-affirming, participatory approaches to address auditory sensitivities identified in the literature. It is guided by IM, a framework that will enable systematic, evidence-based design of interventions that integrate theory, clinical findings, and first-person perspectives (Bartholomew Eldredge et al., 2016). This methodology allows the program development to be flexible, ethically grounded, and aligned with the sensory and attentional needs of autistic students in educational settings.

Delimitations

This study is delimited to theoretical program design and does not include implementation or testing of the proposed intervention. It does not directly gather input from autistic students; instead, it draws on the rich body of existing first-voice accounts and other literature that have yet to be fully integrated into the theoretical foundations of school-based MT interventions. Furthermore, the process is delimited to the completion of IM's Step 4, program design (Bartholomew Eldredge et al., 2016). Finally, the study is delimited to a school-based context, with the program focusing specifically on supporting autistic students with auditory sensitivities.

Design

This study used a qualitative, theory-driven design process to develop a school-based MT program to support autistic students in coping with auditory sensitivity. The methodology framework used was Bartholomew Eldredge et al.'s (2016) IM, which is a six-step process often used in public health, education, and psychosocial intervention design. The six steps involved in IM are as follows:

1. *Needs Assessment:* Identify key challenges, needs, and strengths related to auditory sensitivities in autistic students.
2. *Setting Performance Objectives:* Define goals for what the program should achieve in supporting sensory regulation, participation, and well-being.

3. *Selecting Theory-based Methods and Practical Strategies:* Identify evidence-based strategies and techniques from MT and sensory integration fields to promote sensory well-being.
4. *Program Design:* Develop the structure, content, and delivery components of the adapted MT program.
5. *Implementation Planning:* Outline how the program can be integrated into school-based MT settings *(not addressed in this thesis).*
6. *Evaluation Planning:* Propose methods for assessing whether the program supports the intended outcomes in future applications *(not addressed in this thesis).*

IM differs from conventional research, which typically tests outcomes in a controlled setting. IM, instead, supports the development of interventions that are grounded in theory and evidence while remaining flexible and context-sensitive – making it especially suited for designing neurodiversity-affirming interventions for school-based MT (Bartholomew Eldredge et al., 2016; McFerran & Rickson, 2014; Rickson, 2022).

Rationale for Methodology Choice

This method was chosen for its capacity to bridge theoretical models, practice-based evidence, and reported experience in developing structured interventions (Bartholomew Eldredge et al., 2016). This aligns with a neurodiversity-affirming epistemology, which rejects pathologizing approaches in favor of collaborative, adaptive design (Chapman & Botha, 2023; W. Davies, 2022). Rather than evaluating participant outcomes, this methodology allows for the creation of a program grounded in multiple sources of evidence including peer-reviewed research, first-person narratives, and reflective professional practice (Abrams, 2010).

A qualitative, program design-based methodology is especially appropriate in school-based music therapy, where interventions must be context-sensitive, flexible, and integrated into educational routines (Wood, 2021). IM leans away from more traditional intervention research, which often focuses on quantitative outcome measures and controlled trials. In contrast, IM facilitates an iterative and participatory process through which intervention components are developed in response to empirical evidence, lived experience, and contextual realities – making it well suited to supporting autistic students' diverse sensory and attentional needs (Bartholomew Eldredge et al., 2016; Botha et al., 2024; W. Davies, 2022).

This approach ensures that ethical considerations are not treated as an afterthought but are integrated into the design from the start, with particular attention to consent, autonomy, sensory dignity and autistic experience (Botha et al., 2024; Rosas-Pérez et al., 2025). The program intentionally avoids compliance-based frameworks and instead supports student autonomy and sensory dignity (Botha et al., 2024; Kędra, 2023). In line with critical perspectives in the literature, this orientation seeks to avoid objectifying autistic experience and instead positions lived expertise at the center, as a necessary source of knowledge (W. Davies, 2022; Rosas-Pérez et al., 2025).

Materials

A password-protected laptop with secured local storage and Microsoft excel will be used for data collection and coding. All digital materials will remain stored in compliance with Concordia University's ethics guidelines for confidentiality and data protection (Concordia University, Department of Applied Human Sciences, 2024).

Data Collection and Analysis Procedures

This study employed a literature-based synthesis approach to support the IM process (Bartholomew Eldredge et al., 2016). Academic literature, theoretical models, and first-voice advocacy resources form the foundation of program development, ensuring alignment with neurodiversity-affirming principles (Chapman & Botha, 2023; I. Morris et al., 2025).

The data collection process involves a systematic review of peer-reviewed journal articles, first-person narratives, advocacy publications, interdisciplinary reports focused on auditory sensitivities, sensory regulation, and affirming therapeutic practices (Dotch et al., 2024; Rosas-Pérez et al., 2025). Searches were conducted using Concordia's Sofia Discovery Tool, alongside PsycInfo, PubMed and Google Scholar. Boolean operators (e.g. autism AND auditory sensitivity, music therapy OR sound-based intervention) and filters were applied to refine searches. Keywords included terms related to autism (autism, autistic, neurodiversity), auditory processing (auditory sensitivity, sound sensitivity, hyperacusis, misophonia, auditory processing disorder), intervention frameworks (music therapy, neurologic music therapy, sensory regulation, sensory integration, desensitization, polyvagal theory, assent, co-regulation, therapeutic listening, sound-based interventions, school-based intervention), and affirming perspectives (lived experience, advocacy, neurodiversity, autonomy, identity-first language, language preferences, masking, sensory trauma, trauma-informed practice, monotropism, child-centered approaches,

equity in therapy). In addition to peer-reviewed publications, the review incorporated graduate-level theses, preprints, and advocacy reports, which were included to capture emerging research and first-voice perspectives not always represented in the peer-reviewed literature.

To organize this information, a thematic mapping strategy was used. Findings were categorized according to the six steps of the IM framework: Needs assessment (identifying sensory challenges, strengths, and supports needed by autistic students); objective-setting (establishing intervention goals such as promoting sensory agency and reducing distress); method selection (choosing evidence-based strategies and techniques); program design (structuring MT session content and flow); implementation planning (outlining how the program can be integrated into school-based therapy contexts); and evaluation (proposing future measures to assess program alignment with sensory-affirming principles) (Bartholomew Eldredge et al., 2016). This structure ensures that the literature directly informs each actionable component of the intervention while maintaining fidelity to affirming and inclusive principles (Botha et al., 2024; W. Davies, 2022).

Analysis was conducted using a matrix system, mapping content thematically within the IM steps to support coherence and clarity (Bartholomew Eldredge et al., 2016). For example, environmental modifications identified in the literature are directly applied to method selection, while discussions of autonomy and co-regulation inform program goals and structure (Chapman & Botha, 2023; I. Morris et al., 2025). Each selected strategy is cross-referenced with neurodivergent perspectives to ensure it aligns with the affirming values central to the neurodiversity paradigm.

Ethical Considerations

Although no participants were involved, ethical issues were considered in the intervention design. The program design aimed to intentionally avoid compliance-based frameworks and instead worked to support student autonomy and sensory dignity (Botha et al., 2024; Kędra, 2023). It does not promote forced exposure but instead offered graded engagement with sound, always with student choice.

The decision to align with acritical perspective sought to avoid objectifying autistic experience and center lived expertise as a valid source of knowledge (Kroeker, 2023; Rosas-Pérez et al., 2025). The design also avoided simulating disability or using deficit-based language

while maintaining transparency in its purpose: to support autistic students' coping and participation in sensory-inclusive environments (Rosas-Pérez et al., 2025).

Chapter 4: Program Development

Introduction

This school-based MT program was developed using Bartholomew Eldredge et al.'s (2016) IM framework to systematically address auditory sensitivities in autistic students through affirming and structured intervention planning. Rather than aiming to *normalize* or desensitize students through sessions involving discomfort, this program is grounded in a neurodiversity-affirming approach that values autonomy, co-regulation, and personalized auditory engagement (Chapman & Botha, 2023; Korošec et al., 2025; Pappagianopoulos et al., 2025). Consistent with the sensory-inclusive framework presented in Chapter 1, sound processing is framed as a dimension of neurodivergent experience that requires environmental support, rather than as a deficit (Chapman & Botha, 2023; Rance et al., 2017).

This chapter is organized into four main section following Bartholomew Eldredge et al.'s (2016) IM steps:

1. *Needs Assessment:* Summarizes sensory, communicative, and environmental needs identified in the literature and practice context, with a focus on barriers and supports relevant to auditory sensitivity in school settings.
2. *Setting Performance Objectives:* Defines concrete, observable objectives derived from the needs assessment, framed to facilitate and uphold sensory autonomy, emotional safety, and meaningful participation.
3. *Theory-Based Methods and Practical Strategie*s: Presents evidence-based music therapy and related techniques selected to meet the identified needs, organized into music-based and other relevant strategies.
4. *Program Design:* Details the program's structure, content, and delivery, including intake and assessment procedures, care planning, grouping considerations, therapeutic components, and environmental adaptations.

As previously stated, *Implementation and Evaluation Planning* are not addressed in this thesis.

Step 1 – Needs Assessment

This step establishes the base for the program by clarifying who the intervention is designed to support and the conditions under which participation is appropriate (Bartholomew Eldredge et al., 2016). Here, indications and contraindications will be outlined to ensure

eligibility decisions are well-informed and support safety (Bartholomew Eldredge et al., 2016). Then, the needs assessment itself will be synthesized in Table 1.

Context & Rationale

Auditory differences in autistic students are not deficits, but expressions of a sensory system that processes the world with heightened precision and variation (Botha et al., 2024). Rather than pathologizing sensitivity, a neurodiversity-affirming approach recognizes these responses as embodied communication (Chapman & Botha, 2023; Guo et al., 2023). Challenges arise not from the sensitivity itself, but from environments that are unpredictable, overstimulating, or unresponsive to students' sensory needs (Chapman & Botha, 2023; Charlton et al., 2021). Many autistic students describe experiences of auditory overload, especially in chaotic or echoing spaces where filtering sounds is difficult (Rance et al., 2017; Seif et al., 2025). These situations may lead to distress, shutdown, or behavioral adaptations misinterpreted as defiance (Erinc et al., 2025). Avoidant responses may also be expressions of sensory self-protection, particularly in students described in the literature under the label Pathological Demand Avoidance (PDA) (Newson et al., 2003; O'Nions & Eaton, 2020). These students are perceived to resist structured tasks not out of opposition, but as a means of retaining autonomy in environments that impose overwhelm or coercion (Newson et al., 2003; O'Nions & Eaton, 2020). Interventions that do not respect the client's timing or agency may intensify this avoidance and cause breakdown of the therapeutic alliance (Newson et al., 2003; Pappagianopoulos et al., 2025).

Indications for this program

Eligibility for participation in this school-based MT program is determined through informed observation of how a student engages with auditory input in their learning environment, rather than through fixed labels of functioning (Brake, 2024; Chapman & Botha, 2023). Sensory profiles are not diagnostic tools, nor are they used to over-classify clients; instead, they support the music therapist in identifying patterns of sensitivity, regulation, and interaction that can guide ethical and individualized intervention. These profiles also serve as a practical foundation for grouping and provide insight to inform supports for a student's auditory needs across contexts (Rance et al., 2017; Seif et al., 2025). Indications for participation are present when a student's sensory profile reveals an auditory-related need, whether marked by sensitivity, difficulty with modulation, or sound-seeking / avoidance behaviors (Erinc et al.,

2025; Guo et al., 2023; G. Kim et al., 2024). These profiles can be viewed through the lens of a *zone of proximal development*, where the student demonstrates partial capacity for regulation and engagement that can be supported in collaboration with the therapist (Vygotsky, 1978). In these cases, participation is not only appropriate but opens the door for meaningful opportunities that may build co-regulation, agency, and auditory coping strategies through sound (Cibrian et al., 2017; Wigram et al., 2002).

Contraindications for this program

Contraindications for participation, particularly in group-based formats, arise when the student's current sensory or emotional state renders participation potentially harmful to themselves or others. Based on my current experience in the school-setting, this may include students who exhibit persistent self-injurious or violent behaviors that escalate in response to sound, or whose dysregulation poses a safety risk in shared spaces. Although these students may present with a valid auditory sensitivity, a group format is contraindicated. Other contraindications include profiles marked by profound hypersensitivity, startle responses, or intense physiological or emotional distress in response to even low-level auditory input (Erinc et al., 2025; Swedo et al., 2022). In such cases, the introduction of any auditory stimuli, even in a controlled format, may trigger panic, withdrawal, or shutdown, leading to further dysregulation rather than therapeutic engagement (Fulton et al., 2020). Participation under these conditions' risks violating the student's sensory autonomy and may reinforce negative associations with sound. When that sensory safety is not possible, therapeutic work must first focus on stabilization and sensory integrity (Chapman & Botha, 2023; Manning et al., 2023; C. Morris et al., 2024). Ultimately, inclusion in the program must reflect not only a student's need, but the presence of a reachable therapeutic opportunity where sound can be introduced relationally and respectfully, without harm. Here, contraindication aligns with the ethical principles outlined by the Canadian Association of Music Therapists (CAMT) and the American Music Therapy Association (AMTA), both of which emphasize the responsibility of music therapists to do no harm and to protect the well-being, safety, and dignity of the individuals they serve (*AMTA Code of Ethics*, 2018; *CAMT Code of Ethics*, 2022)

Identified Needs Overview

The following table synthesizes possible needs of autistic students coping with auditory sensitivities relating back to the literature, including first-person accounts. Please note that these categories are not prescriptive checklists, but groupings that highlight common priorities.

Table 1

Needs Assessment Summary

Category	Identified Needs
Sensory Processing & Environment	Predictable auditory environments (G. Kim et al., 2024; Seif et al., 2025; Wigram et al., 2002)
	Access to affirming sensory tools such as headphones, ear defenders, and regulation strategies framed as autonomy supports (Pfeiffer et al., 2019; Kwong et al., 2024),
	Reduction of environmental sensory overload, which may include minimizing echo, visual clutter, and unpredictable noise (Rance et al., 2017; Erinc et al., 2025)
Communication & Expression	Multimodal communication access (AAC, gestures, speech, objects of reference, other visual supports) (Pappagianopoulos et al., 2025; Wozniak & Hutton, 2025)
	Access to nonverbal musical participation where sound, rhythm, and movement support expression in non-speaking students. (Yum et al., 2024; Epstein et al., 2020)
Autonomy & Consent	Preservation of autonomy with flexible, assent-based participation (Newson et al., 2003; O'Nions & Eaton, 2020)
	Therapist recognition of masking and/or sensory trauma, avoiding misinterpretation of passive behaviors (Mullally et al., 2024; Pappagianopoulos et al., 2025)
Emotional & Relational Safety	Avoidance of coercive/retraumatizing practices, especially rejecting models based in behavior compliance (Fulton et al., 2020; Manning et al., 2023)
	Shared interactions between therapist and student to support co-regulation and the therapeutic alliance (Manning et al., 2023; Wigram et al., 2002)
Specialized School Context	Alignment with classroom rhythms and schedules to complement school structure (Rickson, 2022; Hughes, 2016)
	Role clarity between therapist and staff to support student centered therapy without overriding it. (Hughes, 2016; Pappagianopoulos et al., 2025)
	Support for staff consistency and collaboration with interdisciplinary professionals within the school (Hughes, 2016; Rance et al., 2017)
	Navigate physical space and acoustic limitations within the school setting, seeking adaptations where required (Seif et al., 2025; Rance et al., 2017)
	Predictability of MT sessions to form consistency and reliability (Brake, 2024; Robertson & Simmons, 2015)
	Capacity to individualize session pacing and structure to meet the auditory sensory needs within the student population (Hughes, 2016; Rickson, 2022).

The above table identifies needs and objectives supporting this program. Next, Step 2 will use this information as pillars in forming observable and concrete indicators that may respond to the sensory needs, communication, autonomy and safety priorities outlined above

(Bartholomew Eldredge et al., 2016). This is to ensure that the performance objectives are rooted in the literature for the development of the program itself (Bartholomew Eldredge et al., 2016).

Step 2 – Setting Performance Objectives

In Step 2 of IM, performance objectives serve as concrete, observable indicators that guide the design of activities aligned with identified needs and change objectives (Bartholomew Eldredge et al., 2016). The objectives are framed in a way to prioritize students' rights to sensory autonomy, emotional safety, and meaningful participation (Chapman & Botha, 2023; C. Morris et al., 2024). Each was developed from the needs identified in Step 1 and is informed by the literature reviewed to ensure that there is an evidence base in support of the objectives (Bartholomew Eldredge et al., 2016). As such, they articulate specific experiences and individualized engagement, where students can be supported to develop in ways that honor their communication while promoting agency in sensory contexts (Brake, 2024; Fulton et al., 2020; Lawson, 2025a; Petty & Ellis, 2024). Table 2 presents literature-informed performance objectives and their relative focus area, as a function of forming a clear link between the identified needs and intended outcomes (Bartholomew Eldredge et al., 2016).

Table 2

Performance Objectives & Focus

Category	Performance Objective
Sensory Processing & Environment	Support sensory regulation through structured auditory experiences that offer predictability and control (Di Salvo, 2024; Hughes, 2016).
	Increase students' agency, comfort and tolerance with daily environmental sounds in a safe, affirming, manner (Fulton et al., 2020; Guo et al., 2023).
	Offer sensory-consistent, affirming sound-based experiences using musical instruments and controlled soundscapes (Guo et al., 2023).
	Encourage identification or discrimination between different types of sounds to support preference expression and environmental awareness (Guo et al., 2023; Wang & Huang, 2023)
	Engage students in structured auditory routines that enhance predictability and support transitions (Daniel et al., 2025; Rickson, 2022).
Communication & Expression	Promote autonomy by enabling students to communicate auditory preferences using verbal, non-verbal, AAC or other communication strategies (Pappagianopoulos et al., 2025; Wozniak & Hutton, 2025).
	Offer opportunities for safe auditory improvisation and adaptive voice use without pressure to perform musically (Epstein et al., 2020; Yum et al., 2024).
	Facilitate collaborative sound exploration between students, educators, and therapists, encouraging shared sensory language and mutual understanding (Korošec et al., 2025; Twyford et al., 2025).
	Affirm diverse sensory communication styles (e.g., stimming, body-based responses) as valid expressions (Brake, 2024; Petty & Ellis, 2024).
Category	**Performance Objective**
Autonomy & Consent	Develop student capacity to initiate, pause, or decline auditory interactions, strengthening their sense of control in sensory experiences (Lawson, 2025a; C. Morris et al., 2024).
	Support students in establishing personal boundaries in relation to sound exposure and proximity, promoting bodily autonomy and consent (Chapman & Botha, 2023; C. Morris et al., 2024).
Emotional & Relational Safety	Foster relational co-regulation through collaboration with the music therapist, support staff, and educators, using polyvagal-informed auditory strategies (Daniel et al., 2025).
	Affirm emotional safety and reduce anxiety through consistent, student-led routines and structured sound environments (Erinc et al., 2025; Lawson, 2025a).
Specialized School Context	Align session duration and intensity with classroom rhythms and school schedules to support participation without excessive demand (McFerran & Rickson, 2014; Rickson, 2022).
	Clarify roles, boundaries and communications between the music therapist and school staff to protect therapeutic integrity and client autonomy (Hughes, 2016; McFerran & Rickson, 2014).
	Adapt physical space and acoustics, to accommodate sensory needs and unpredictability as aligned with student profiles (Rance et al., 2017; Rosas-Pérez et al., 2025).
	Ensure staff provide consistent support before and after sessions, reinforcing student strategies while still respecting autonomy (Hughes, 2016; McFerran & Rickson, 2014).

Step 3 – Theory-Based Methods & Practical Strategies

This step outlines contextually grounded, evidence-based and theory-driven strategies integrated into the program design (Bartholomew Eldredge et al., 2016). In this thesis, evidence-

based refers to empirical findings, practice-based knowledge and lived experience, aligning with a neurodiversity stance (Abrams, 2010; Chapman & Botha, 2023).

Two tables are presented to illustrate these strategies. Table 3 lists the music-based methods, organized according to Bruscia's (2014) four overarching methods of music therapy, adapted for the sensory and communication needs of autistic students with auditory sensitivities. Table 4 lists the non-musical strategies that provide the environmental, communication, and procedure supports required for students to access and benefit from this MT program. Together these strategies form the structural and environmental basis for the intervention (Bartholomew Eldredge et al., 2016). A dedicated subsection expands the role of assent in school-based MT, outlining how the program upholds student autonomy.

Table 3

Music-Based Methods & Strategies

Method	**Technique**	**Purpose/Function**
Receptive	Musical Cueing	Uses consistent musical phrases to mark transitions, signal routines, and reduce auditory unpredictability (Blythe LaGasse et al., 2019; Katagiri, 2009).
	Somatic Listening / Resonance (Toning)	Uses sustained tones or gentle vibrations to support embodied sensory awareness and grounding (Bruscia, 2014; Grocke & Wigram, 2007).
	Music Relaxation	Supports downregulation of arousal and sensory integration in low-stimulation contexts (Bruscia, 2014; Pfeifer et al., 2025)(Bruscia, 2014; Pfeifer et al., 2025).
	Perceptual Listening	Builds auditory discrimination and attention, supporting recognition of calming vs. overstimulating sounds (Bruscia, 2014; Guo et al., 2023).
	Projective Sound Identification	Encourages playful, low-pressure identification or description of ambiguous sounds to support auditory categorization (Bruscia, 2014; Moore et al., 2025).
	Soundscape Engagement	Creates immersive auditory environments aligned with sensory preferences, introduced gradually to promote autonomy and reduce unpredictability (Aigen, 2005, 2013; Pfeifer et al., 2025; Schafer, 1977).
	Sound Discrimination	Supports awareness of differences between calming and overstimulating sounds through structured exploration (Guo et al., 2023; Moore et al., 2025).
Improvisational	Mixed Media Improvisations	Combines voice, body sounds, and instruments for multisensory engagement (Brake, 2024; Bruscia, 2014).
Hybrid	Sensory-Based Sound Exploration and Play	Offers low-demand, playful interaction with musical or everyday sounds in a safe, affirming format to regulate input based on sensory thresholds (Brake, 2024; Ross, 2017; Wigram et al., 2002).

Table 4

Non-Musical Methods & Strategies

Strategy	Purpose & Function
Visual Scheduling and Cues	Supports predictability and may reduce anxiety by signaling order and transitions of activities (Seif et al., 2025; Wigram et al., 2002).
Structured Environment	Uses low-stimulation room setup, flexible seating, and organized instrument storage to minimize sensory overwhelm (Pfeifer et al., 2025; Wigram et al., 2002).
Environmental Sound Control	Maintains consistent, student-preferred sound levels; avoids sudden volume changes; uses acoustic treatment where required (Geretsegger et al., 2022; Pfeifer et al., 2025).
Communication Scaffolding for Auditory Preferences	Supports multimodal communication of sensory needs (e.g., gesture, AAC, object choices), leading to evolving auditory preference profiles (Pappagianopoulos et al., 2025; Wozniak & Hutton, 2025).
Sensory-Safe Environment Design	Design or adjust spaces to be sensory-informed, where lighting and environmental sound are taken into consideration (Manning et al., 2023, 2023)
Gradual Exposure with Consent / Assent	Introduces sensory challenges only when students are ready, with opt-out mechanisms to prevent re-traumatization (Daniel et al., 2025; Fulton et al., 2020; Vincent et al., 2025).
Recognition and Support of Stimming	Create spaces and relationships that reduce pressure to mask where possible, supporting authentic identify expression for autistic students (Hull et al., 2017; Mullally et al., 2024)
Autistic Listening Awareness	Adapt intervention pacing to reflect auditory processing, which includes monotropic attention needs (H. Davies, 2022; Lawson, 2025a).
Environmental Advocacy Skills	Empower students to learn how to request or implement environmental modifications relating to sound (H. Davies, 2022; Rosas-Pérez et al., 2025)
Assent in School-Based Music Therapy	Prioritizes active and ongoing student assent, recognizing diverse forms of willingness to engage (AMTA, 2013; Birchley, 2023; C. Morris et al., 2024).

Understanding Assent

In school-based MT, guardian consent is required, but neurodiversity-affirming practice must also prioritize the student's active and ongoing assent (C. Morris et al., 2024). According to the AMTA, music therapists are ethically obligated to obtain informed consent from clients or their legal guardians and, "in cases in which the client is unable to provide consent, assent will nonetheless be sought" (AMTA, 2013, Principle 1.5). Assent refers to a student's voluntary willingness to engage and should be recognized in forms that are meaningful and accessible to the individual (Birchley, 2023; C. Morris et al., 2024). For neurodivergent students, particularly those who are non-speaking, partially speaking, or who use augmentative and alternative communication, assent may be expressed through gesture, musical interaction, eye gaze, vocalization, or self-regulatory behaviors such as disengagement. In the context of auditory sensitivity, enabling students to opt in or out of sound-based activities without consequence helps safeguard autonomy and sensory integrity (Hernandez-Ruiz, 2025; Yum et al., 2024). This

flexibility affirms students' rights to shape their participation in ways aligned with their needs, and prevents misinterpretation of silence, stillness, or compliance as consent (C. Morris et al., 2024). Creating accessible pathways for assent – through visuals, consistent routines, or embodied interactions – also helps ensure that silence or compliance is not misinterpreted as willingness (C. Morris et al., 2024). Recognizing assent and dissent in diverse forms is essential to maintaining ethical, respectful relationships (C. Morris et al., 2024).

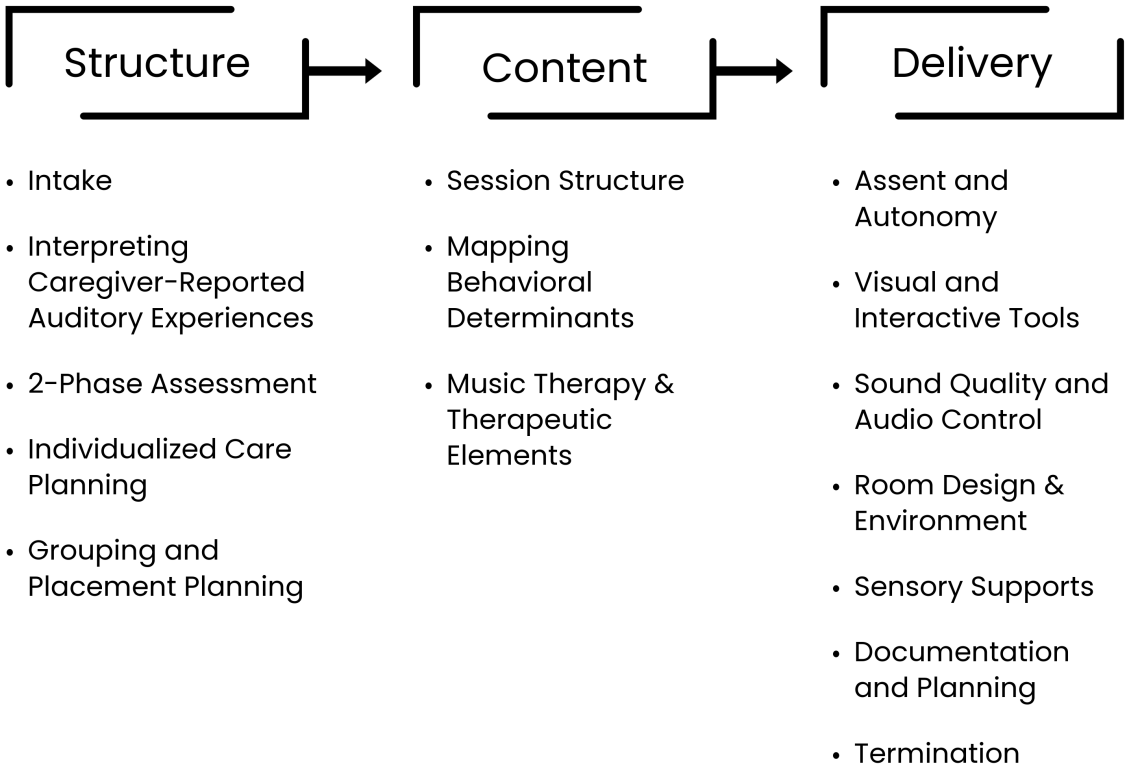
Step 4 – Program Design

This adapted MT program affirms the sensory and communication needs of autistic students with auditory sensitivities through flexible, student-led engagement with sound. It is designed around three interconnected components: structure, content, and delivery. The program draws on IM (Bartholomew Eldredge et al., 2016) and integrates interdisciplinary findings with lived experience, first-person perspectives, and MT literature (Chapman & Botha, 2023; H. Davies, 2022). Each component will be described, outlining purpose and key elements with practical consideration within the program. Structure will address the Sequencing

The program itself will be presented through the organized components illustrated in Figure 1, which provides a visual outline.

Figure 1

Program Design Overview



Structure

Intake. In developing a school-based MT program that supports autistic students with auditory sensitivities, intake procedures serve a dual function: identifying individualized sound processing characteristics and establishing a foundation for ethical intervention (Chapman & Botha, 2023). A multi-source intake process can be used to gather relevant data across settings, with particular emphasis on contextual information provided by caregivers. This process is presented within a package including consent procedures for caregivers and assent opportunities for the student, ensuring that student voices guide the program from the start (Koegel et al., 2004; Wigram et al., 2002).

Interpreting Caregiver-Reported Auditory Experiences. Caregiver-reported information can offer meaningful insight into how sound-related experiences manifest in home environments, such as during transitions, mealtimes, or exposure to unexpected noise (Brake, 2024; Seif et al., 2025). These observations support the development of an auditory profile that is both ecologically grounded and specific to the student's lived sensory context (Hughes, 2016;

Robertson & Simmons, 2015). Questionnaires or intake forms (see Appendix A) can also document tools used at home (e.g., ear protection, headphones, white noise machines), typical behavioral responses to sound, and any co-occurring sensory or neurological considerations (Daniel et al., 2025).

Considering the Neurodiversity-Affirming Lens. It is essential to critically reflect on the interpretation of caregiver input, which is inherently a perception of others who are not the individual going to be receiving therapy (Robertson & Simmons, 2015). That being said, these perspectives could be shaped by normative expectations of behavior or communication and may not fully reflect the client's sensory experience (Chapman & Botha, 2023). For example, a parent may report a reaction as *disruptive*, while the same response may function as a self-regulatory strategy or communication of distress (Chapman & Botha, 2023). This highlights the need to consider caregiver data alongside therapist observations and client-led indicators, particularly when the student expresses preferences through non-speaking or alternative communication modalities (C. Morris et al., 2024; Wozniak & Hutton, 2025).

2-Phase Assessment. According to the CAMT (2020), the clinical process begins with referral and review of medical/educational records, interviewing the client or family and observing responses to MT techniques in individual or group settings. This program meets and expands upon those expectations by placing auditory functioning at the center of assessment, while considering sensory boundaries (Berger, 2002; Seif et al., 2025). Elements of assessment include a classroom observation, but then once expanded into the MT space, may be widened into auditory exploration and preferred sound qualities (Berger, 2002; Seif et al., 2025).

As such, assessment will be considered as a two-phase, neurodiversity-affirming process designed to understand how the client experiences and/or uses sound (Chapman & Botha, 2023; Grocke & Wigram, 2007). The music therapist may approach this process as a sensory detective, gathering evidence from observations and details from contact made during assessment that consider masking behaviors, variations of communication, and other regulation strategies (Chapman & Botha, 2023; I. Morris et al., 2025). As such, sensory responses can be interpreted as communication, whether they involve engagement, withdrawal or other client-directed strategies (Chapman & Botha, 2023; I. Morris et al., 2025). These two phases are as follows: *Phase 1* develops an individualized auditory sensitivity profile drawing on school-based observations, caregiver input, and existing documentation, while *Phase 2* involves a baseline

music therapy assessment in the therapy room to explore regulation, communication, engagement, and autonomy.

Phase 1 - Auditory Sensitivity Profile. To support group placement, an individualized auditory sensitivity profile is created for each student. This profile draws on multiple sources of information, including parent-report data, in-school observations, and existing professional documentation (e.g., psychoeducational assessments, IEPs, speech-language or occupational therapy notes) (Botha et al., 2021; Wigram et al., 2002). Observations should occur in the school context, where the student's sensory responses can be directly assessed across different environments (e.g., classroom, hallway, gymnasium, MT space) (Wigram et al., 2002; Wood, 2021). These observations allow the music therapist to evaluate real-time sensory responses, identify modulation challenges, and gather cues about auditory triggers and regulatory behaviors that may not be evident in clinical or home settings (Gundogdu et al., 2023; Jamal et al., 2021). This intake framework aligns with a neurodiversity-affirming approach that centers the student's observed behaviors and expressions, verbal or non-verbal, as valid forms of communication (Chapman & Botha, 2023). While parental and professional input supports ecological understanding, in-context responsiveness is essential for ensuring the program adapts to each student's unique sound sensitivities, modulation capacities, and coping strategies (Chapman & Botha, 2023; Wozniak & Hutton, 2025). Table 5 below outlines key domains and guiding questions to support therapist understanding, used specifically for the intake process.

Table 5

Questions Guiding Intake Observation for Music Therapist

Focus Auditory Area	Observation Question
Auditory environment	How does the student respond to low or distant sounds in the environment? Are they attuned or minimally responsive? (Gundogdu et al., 2023).
Response to social vs. mechanical sounds	Does the student show interest or regulation when exposed to human voices versus mechanical or environmental sounds? (Dawson et al., 2004).
Reaction to high-volume or sudden Sounds	How does the student respond to sudden, loud, or layered auditory inputs (e.g., alarms, peer vocalizations)? (Khalfa et al., 2004).
Behavioral indicators of auditory overload or underload	What observable behaviors emerge when the auditory environment shifts? Are there signs of distress, withdrawal, or reduced engagement? (Jamal et al., 2020).
Modulation pattern: habituation vs. sensitization	Does the student appear to adapt over time to repetitive sounds, or do their responses increase in intensity? (Thye et al., 2018).
Stimming or repetitive behaviors related to sound	Are stimming behaviors present when engaging with or avoiding sound? (G. Kim et al., 2024).
Expression of sensory preferences or discomfort	In what ways does the student communicate sensory preferences or discomfort? (e.g., moving away, gestures, AAC, verbal cues) (Wozniak & Hutton, 2025).
Compatibility with peer sound profiles	Would this student likely experience distress if placed with peers who vocalize loudly or use unpredictable sound sources? (Seif et al., 2025)

Table 6

Sensory Profiles

Category	Indicators	Contraindications
Sensory Tolerance	Tolerates low-level sound with regulation (Brake, 2024; Guo et al., 2023)	Distress or shutdown with any sound (Erinc et al., 2025; Fulton et al., 2020)
Sound Engagement	Shows interest in sound play or routines (Cibrian et al., 2017; Hughes, 2016)	Avoids or resists auditory interaction (Newson et al., 2003)
Assent	Can express assent via speech, AAC, or gesture (C. Morris et al., 2024; Wozniak & Hutton, 2025)	Unable to express assent or dissent (Birchley, 2023)
Group Compatibility	Compatible with peer auditory profiles (Chapman & Botha, 2023; Yum et al., 2024)	Overwhelmed by peer sound behaviors (Seif et al., 2025)
Emotional Regulation	Stable in predictable, structured settings (Bakan, 2018; Seif et al., 2025)	Displays masking or dysregulation (Manning et al., 2023)

Phase 2 – In Room Music Therapy Assessment. The second phase is a brief baseline music therapy assessment designed to explore and inform the details surrounding the client's auditory sensitivity in a low-demand environment (Berger, 2002; Bruscia, 2014). While Bruscia (2014) includes musical assessment as an integral part of MT assessment, this program extends that domain by centering auditory functioning and hypersensitivity as areas to explore. Traditional forms of music engagement, such as composition or improvising over an extended duration may

not be feasible or appropriate in all cases for students with auditory hypersensitivities, and as such will require adaptation (Brake, 2024; Bruscia, 2014; Chapman & Botha, 2023). These domains listed below supplement the standard physical, emotional and cognitive domains typically contained in MT assessment frameworks (Bruscia, 2014; Wigram et al., 2002).

Domains can be assessed over two or more assessment sessions, in individual or group formats, that may include:

1. *Sound Exploration and Regulation.* Offering carefully chosen yet contrasting sounds which may allow the music therapist to observe interest, comfort and self-regulation strategies (Guo et al., 2023; Seif et al., 2025)
2. *Communication modalities.* Upon the presentation of predictable musical cues, notice verbal, non-verbal, AAC-supported, gesture-based responses (Grocke & Wigram, 2007; Pappagianopoulos et al., 2025).
3. *Musical Engagement.* provide a shared musical or sound-based moment, which may include instruments, voice, soundscapes, or a specific musical structure. This component of assessment combines several components indicated in the behavioural determinants located in Table *7* (Bruscia, 2014; G. Kim, 2022; Wozniak & Hutton, 2025).
4. *Autonomy and Assent.* Creating clear opportunities for the student to accept, choose, change, pause or end their participation (Chapman & Botha, 2023).

The assessment session structure follows that which is described in Figure 2, but moveable segments may be shortened, removed, re-ordered or changed depending on client engagement.

Individualized Care Planning. In accordance with ethical standards, music therapists develop individualized care plans that outline therapeutic goals, interventions, and supports based on client needs and strengths (*AMTA Code of Ethics*, 2018; *CAMT Code of Ethics*, 2022). In this program, care plans are informed by auditory sensitivity profiles, observed regulatory behaviors, and interdisciplinary input gathered during intake and assessment (Guo et al., 2023; Seif et al., 2025). Unlike standardized educational or clinical care plans that may prioritize task completion or behavioral compliance, MT care planning in this context centers on sensory regulation, self-directed interaction, and communication through music and sound (Chapman & Botha, 2023; Wozniak & Hutton, 2025). Specific therapeutic focuses may include increasing tolerance to predictable auditory input, expressing sensory preferences through AAC or gesture, and building co-regulation through structured music-making (Manning et al., 2023; C. Morris et

al., 2024). Care plans are not static documents but evolve through session documentation, observed assent, and collaborative planning with school teams to ensure relevance and alignment with each student's experience as it unfolds over time (Low et al., 2023; Yum et al., 2024).

Grouping and Placement Planning. Decisions around group placement in this school-based MT program must be grounded in each student's auditory profile. While group settings can foster co-regulation and sharing of space, they are not suitable for all participants (Yum et al., 2024). For some autistic students, especially those requiring extended time to regulate or engage, individual sessions offer a more ethical and effective context for engagement within the MT session (J. Kim et al., 2009). In my current practice, individual sessions are prioritized when a student demonstrates distress in group settings, needs highly individualized pacing, or engages meaningfully only after prolonged periods of routine and co-regulation. Group placement in such cases may risk masking, withdrawal, or sensory dysregulation, undermining therapeutic goals. Sensory-seeking students who gravitate toward high-intensity input may unintentionally overwhelm sensory-avoidant peers with lower thresholds (Guo et al., 2023). While affirming sensory expressions remains essential, group design requires balancing individual regulation needs (Chapman & Botha, 2023).

Key grouping considerations include:

- Sensory-seeking students may benefit from structured, rhythmic group sessions with access to high-sensory instruments, provided their output does not exceed the tolerance of others (Guo et al., 2023; Yum et al., 2024).
- Sensory-avoidant students often require low-stimulation environments, clear transitions, and opt-out structures; individual or dyadic formats may be more appropriate (Brake, 2024; I. Morris et al., 2025).

Placement decisions should be revisited over time, reflecting changes in sensory modulation, self-advocacy, or peer compatibility (J. Kim et al., 2009). Grouping must be based not on functioning labels but on observed interaction with sound, space, and others.

Content

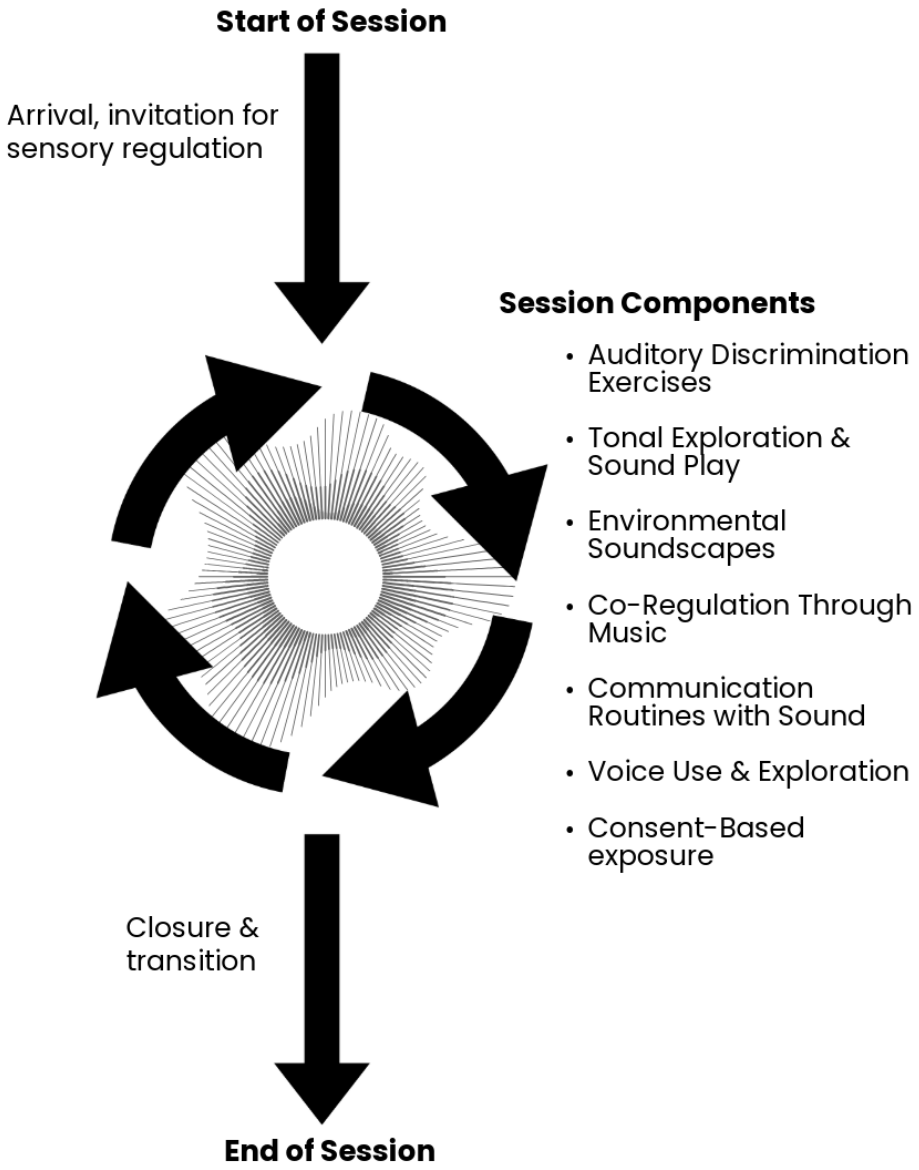
This next section details the therapeutic components of the program, explaining how session structure, behavioral determinants, and specific music therapy elements are organized. It begins with the structure of a typical session, followed by the mapping of primary content to

targeted behavioral determinants, and concludes with a description of therapeutic elements and instruments that support individualized, affirming practice.

Session Structure. Sessions follow a consistent 30-minute format adapted to the student's pacing and sensory thresholds. Predictability is prioritized through structured routines and visual cues (Seif et al., 2025). Sessions are offered individually or in small groups (2–3), depending on the student's regulation capacity and sensory profile understood by the music therapist. Activities can be re-ordered or shortened based on the student's engagement, sensory needs, and assent, ensuring the session length remains responsive rather than fixed (Chapman & Botha, 2023). A sample sequence with key components of a typical sessions is illustrated in Figure 2.

Figure 2

Sample - Session Structure Flowchart



Behavioural Determinants. These are both individual and contextual factors that may shape or influence adoption of a specific behaviour; but, for this program we are also considering the sensory, emotional and relational capacities that may direct students through auditory and musical input (Bartholomew Eldredge et al., 2016). In alignment with Step 4 of IM the content of this school-based MT intervention is structured to directly influence behavioral determinants identified in the needs assessment and performance objectives (Bartholomew Eldredge et al., 2016). Based on the neurodiversity-affirming theory and MT literature, these content elements

are not generic activities, but therapeutic components intentionally designed to support auditory modulation, predictability, advocacy and autonomy (Chapman & Botha, 2023; Hughes, 2016; J. Kim et al., 2009; Wigram et al., 2002). Each musical experience, from exploratory instrument play to structured routines, serves a distinct function (Guo et al., 2023; Moore et al., 2025). The content is also flexible and non-prescriptive, allowing for student-led interaction, multi-modal communication, and moment-to-moment adaptation based on regulatory needs (C. Morris et al., 2024; Wozniak & Hutton, 2025). Table *7* below organizes the primary therapeutic content categories and links them to the relevant behavioral determinants they support.

Table 7

Mapping Behavioural Determinants

Content	Behavioral Determinant	Rationale/Function
Auditory Discrimination Exercises	Auditory awareness, sensory decision-making (see Figure 3 and Figure **4**)	Helps students identify, categorize, and regulate sound input (Epstein et al., 2020; Wigram et al., 2002).
Tonal Exploration & Sound Play	Autonomy, expressive control, use of voice (see Figure **5** and Figure **6**)	Allows student-led interaction and discovery through musical choice (Bakan et al., 2018; J. Kim et al., 2009).
Environmental Soundscapes	Sensory awareness, modulation in controlled setting (see Figure 3 and Figure **4**)	Offers graded exposure and soothing sound environments (Bettarello et al., 2021; J. Kim et al., 2009; Schafer, 1977).
Co-Regulation Through Music	Shared affect regulation, therapeutic engagement	Builds synchrony and trust via attuned interaction (Wigram et al., 2002).
Communication Routines with Sound	Self-advocacy, auditory preference expression (see Figure 7Figure 8Figure 9)	Supports expression using AAC, object choices, or sound cues (Vincent et al., 2025; Wozniak & Hutton, 2025)
Voice Use & Exploration	Vocal confidence, expansion and self-expression (see Figure 9)	Encourages exploration of vocal range, tone, and dynamics to support communication, self-expression and sensory regulation (Bakan et al., 2018; Bhatara et al., 2013; Wigram et al., 2002)
Consent-Based Exposure	Autonomy, flexible engagement	Respects individual pacing and opt-out needs (Graber, 2016; I. Morris et al., 2025; Vincent et al., 2025).

Therapeutic Elements. Each component in this program reflects a deliberate use of MT techniques and structures designed to support auditory processing, co-regulation, and autonomous interaction (J. Kim et al., 2009; Wigram et al., 2002). The selection of instruments, tools and techniques is informed by their sensory accessibility, acoustic nuance, and capacity to invite client-led exploration, although there can be other instruments applicable depending on setting (Guo et al., 2023; Yum et al., 2024). Rather than offering generic interventions, the

program integrates strategies that minimize unpredictability, to promote rhythmic and tonal consistency, and prioritize agency in sound-based engagement (Chapman & Botha, 2023; Thaut, 2005). These approaches are consistent with MT models that emphasize emotional regulation through structured auditory input, particularly for autistic students navigating sensory overwhelm. Therapeutic decisions also consider how students communicate – whether through echolalia, movement, AAC, or silence, and create space for flexible pacing and non-verbal assent (I. Morris et al., 2025; Wozniak & Hutton, 2025). Table 8 offers a detailed view of these therapeutic elements and instruments, highlighting their specific contributions to affirming, individualized MT practice.

Table 8

Music Therapy & Therapeutic Elements

Elements	Description	Examples of Instruments/Tools
Auditory Discrimination	Supports students in distinguishing between sound qualities (e.g., pitch, timbre) and identifying sound sources, with building awareness for sensory preferences (Guo et al., 2023; Moore et al., 2025).	Small percussion (e.g., shakers, castanets), tuned bells, Orff instruments
Auditory Grounding	Provides consistent, low-frequency rhythmic input that aids sensory regulation and body awareness (Manning et al., 2023; Wigram et al., 2002).	Tongue drum, Orff bass bars, rhythmic Orff ostinatos, low-tone hand drum with mallet, bass synthesizers.
Tonal Exploration	Encourages controlled auditory exploration using instruments with varied pitch and vibrational properties, allowing self-guided sensory interaction (J. Kim et al., 2009; Seif et al., 2025).	Theremini, tuning forks, pitched tongue drums, Suzuki tone bars
Dynamic Regulation	Modulates arousal through attention to volume and intensity; caution is required with instruments like ocean drums to avoid overstimulation (Gundogdu et al., 2023; J. Kim et al., 2009)	Ocean drum, Orff timpani, hand drums with visual cues
Predictable Structure	Familiar musical routines create structure and predictability, reducing auditory unpredictability and fostering emotional safety (J. Kim et al., 2009; Wozniak & Hutton, 2025)	Sequence-based xylophone patterns, Smartboard prompts, handbells used in routine-specific contents or paired with pictograms
Sensory Curiosity & Play	Invites exploration within safe auditory limits, supporting self-directed sensory play and agency (Chapman & Botha, 2023; Gee et al., 2014).	Castanets, small chimes, Theremin, exploratory percussion with adjustable volume or sound dampening control
Mirroring & Rhythmic Synchrony	Shared musical engagement enables attunement and regulation through mirroring and rhythmic synchrony, a process of therapist-client co-regulation that fosters both verbal and non-verbal communication with mutual or shared pacing (J. Kim et al., 2009; Wigram et al., 2002)	Tongue drum, Orff metallophones, mirroring activities using percussion or melodic motifs
Transition Signaling	Consistent auditory cues signal beginnings and endings, supporting transitions and temporal understanding (Pappagianopoulos et al., 2025; Wigram et al., 2002)	Handbells, tuned triangles, soft chimes, Smartboard audio cues

Delivery

This section outlines how the program is carried out, emphasizing procedures, tools, and environmental factors that keep participation affirming and responsive to each student. It moves from assent and autonomy to interactive tools, sound and environmental controls, sensory supports, documentation, and ends with approaches to termination.

Assent and Autonomy. All participation is opt-in, with ongoing attention to student assent and dissent, regardless of verbal ability. Students are supported in expressing preferences or refusal through any modality, including gesture, AAC, echolalia, or withdrawal (Marom et al., 2024; C. Morris et al., 2024). Silence is never presumed to indicate consent (Low et al., 2023; C. Morris et al., 2024). To reiterate, sessions may be shortened or ended early based on the student's sensory thresholds and engagement level, ensuring that pacing remains responsive to the student's needs (Chapman & Botha, 2023; C. Morris et al., 2024).

Visual and Interactive Tools. A smartboard serves as a visual schedule, choice board, and interactive interface for sound-based games and listening tasks (Kwong et al., 2024). Other interactive tools may include pictograms, tablets, digital instruments, computer programs used alongside the smartboard, a computer and a microphone or related sound output device, and interactive components that be reinforce participation or learning (see **Error! Reference source not found.**, **Error! Reference source not found.**, Appendix DAppendix E) (Gadberry, 2011; Kwong et al., 2024).

Sound Quality and Audio Control. A surround sound system is installed for clear, evenly distributed sound. The sound system's volume, equalization (EQ), and sound directions must be adjustable by the therapist to aid in matching student preferences and sensory needs (Manning et al., 2023; Pfeiffer et al., 2019). Sudden or unmodulated volume shifts are avoided, respecting the sensory thresholds of all students. If the school has access to an audiologist, they may provide specific input as to the sound quality and tools relating to managing this (Manning et al., 2023; Kathryn. Williams et al., 2024).

Room Design & Environment. Sessions occur in a dedicated MT room where possible, with ambient or dimmable lighting, minimal visual distractions, organized instrument storage, flexible seating options and acoustic treatment where required (Bettarello et al., 2021; Manning et al., 2023). These environmental factors are crucial for preventing sensory overwhelm and ensuring a calming space, especially when considering external sound that may penetrate the

walls, or safety for clients within the room (Bettarello et al., 2021; Manning et al., 2023). Although the CAMT does not specify things such as room design, acoustic treatment or environmental setup of the MT space, these considerations do align with the CAMT's Code of Ethics (2022) where the music therapist must "maximize benefits and minimize the potential for harm to clients and others" (p. 2), as it pertains to their professional practice.

Sensory Supports. Students have individualized access to tools such as noise-reducing headphones, visual volume/loudness scales and pictograms (see **Error! Reference source not found.**, Appendix DAppendix E). These supports are made available without stigma and can be used at any time during the session (Pfeiffer et al., 2019; Kathryn. Williams et al., 2024). Tools are introduced collaboratively and stored in a consistent location, and students may have other sensory supports integrated into their school routine that may accommodate them during session (Pfeiffer et al., 2019; Kathryn. Williams et al., 2024).

Documentation and Planning. Documentation in this program reflects the professional standards of practice in MT, supporting both ethical accountability and clinical responsiveness (Canadian Association for Music Therapists [CAMT], 2020; American Music Therapy Association [AMTA], 2020). Music therapists maintain structured notes following each session, documenting student engagement, auditory preferences, regulatory responses, and the use of supports such as headphones, opt-out tools, or volume scales (Kathryn. Williams et al., 2024; Wozniak & Hutton, 2025). These records inform dynamic care planning and are used to update each student's auditory profile over time (Guo et al., 2023; Seif et al., 2025).

Consistent with MT competencies, documentation includes reflection on musical choices, padding adjustments, co-regulation strategies, and responses to student cues (G. Kim, 2022; Wigram et al., 2002). Sharing with other professionals within an interdisciplinary scope is prioritized when appropriate, which can allow for an expanded understanding of student regulation and engagement (*CAMT Code of Ethics*, 2022; Yum et al., 2024). Moments of dissent also must be recorded as valid expression of autonomy and sensory self-protection (*CAMT Code of Ethics*, 2022; Chapman & Botha, 2023; Low et al., 2023; C. Morris et al., 2024). Finally, all documentation remains confidential, protected and only accessible to authorized personnel that aligns with both the school's regulations and the CAMT Code of Ethics (2022).

Termination. Termination is approached as a planned and supportive process that respects student autonomy and ensures therapeutic continuity (*AMTA Code of Ethics*, 2018;

CAMT Code of Ethics, 2022). Consistent with CAMT and AMTA ethical guidelines, music therapists are responsible for conducting termination in a way that upholds the safety, dignity, and well-being of each student (AMTA, 2013, Principle 2.8; CAMT, 2022, Article III.2). In this program, termination is introduced gradually and supported through visual cues, consistent routines, and reflective music activities that facilitate student understanding and emotional processing (Brake, 2024; C. Morris et al., 2024; Wozniak & Hutton, 2025). When beneficial, termination may aligned with the end of the school year to support predictability and integration into broader routines (Brake, 2024; Hughes, 2016). Students may express responses to transition through sound play, AAC, gesture, or nonverbal behaviors such as silence or disengagement, all of which are recognized as valid forms of communication (Chapman & Botha, 2023; Low et al., 2023). The music therapist allocates time to complete a final summary of student progress, regulatory strategies, and recommendations for future accommodations, in alignment with professional documentation standards (Guo et al., 2023; Seif et al., 2025). Interdisciplinary collaboration supports continuity of care beyond MT (Yum et al., 2024). Termination is not treated as an abrupt conclusion, but as a thoughtfully integrated phase of the therapeutic process (Manning et al., 2023).

Chapter Summary

Chapter 4 presented the development of a school-based music therapy program for autistic students with auditory sensitivities, applying Bartholomew Eldredge et al.'s (2016) IM framework, linking it to identified needs, MT and therapeutic components. The program design integrates the neurodiversity framework and other approaches introduced in the literature review, such as components from polyvagal theory, monotropism, sensory integration while realizing them through MT and other relevant therapeutic strategies. This chapter established the program's structure, content and delivery, emphasizing adaptable and affirming practices that prioritize autonomy. Across four of the six IM steps, it identified performance objectives, outlined theory-based methods and practical strategies, and described how these were defined through intake, assessment, care planning and environmental adaptations to create a school-based MT intervention (Bartholomew Eldredge et al., 2016)

Chapter 5. Discussion

This chapter explores the conceptual, ethical, and practical insights that emerged through the process of designing a neurodiversity-affirming, school-based MT program for autistic students with auditory sensitivities. Building upon the IM framework, the program was designed to respond to sensory, communicative, and contextual needs in specialized school settings. This discussion critically reflects on how the model aligns with its theoretical and ethical foundations, highlights potential challenges in implementation, proposes directions for future research, and reviews potential implications.

Alignment with Theoretical and Ethical Foundations

Rooted in a neurodiversity-affirming paradigm, this program pushes against normative expectations that seek to eliminate sensitivity or expect masking (Bakan et al., 2018). Instead, it proposes a flexible system where autonomy is respected even when verbal consent is not available. Following Morris et al. (2024), this program adopts a non-verbal assent framework that does not equate silence with agreement. Key challenges here include navigating institutional time constraints, ensuring that staff recognize and respect non-verbal cues, and the persistence of systemic attitudes that misinterpret refusal as a cognitive deficiency (C. Morris et al., 2024). This foundation additionally rests on a convergence of theories related to sensory processing, auditory modulation, and neurodiversity-affirming practice. The use of predictive auditory cues, flexible exploration, and multi-modal communication strategies directly addresses core challenges identified in the literature such as unpredictability, communication barriers, and autonomy without coercion (Chapman & Botha, 2023; Di Salvo, 2024; Seif et al., 2025).

However, this raises significant questions about consent in school contexts, particularly for students labeled as profoundly autistic, or profoundly disabled. Within healthcare and educational systems, the assumption that profound disability limits agency must be challenged with caution and nuance. To align theoretically and ethically, this requires the insight and consideration on the part of the music therapist themselves to be reflective, be advocacy-oriented, engage in professional supervision and continuing education in MT; and understanding of other helping professions (*AMTA Code of Ethics*, 2018; *CAMT Code of Ethics*, 2022). This includes advocating for flexibility within educational systems or otherwise, for example, adapting session times in the event a clients' dissent is recognized. Additionally, therapists in these settings must critically reflect on how institutional constraints may unintentionally strip students of their

autonomy thus calling for the therapist to assume an advocacy role (C. Morris et al., 2024). Schools, by nature, are hierarchical and schedule-driven, this often conflicts with the pacing needed for sensory recovery or self-directed participation (Robertson & Simmons, 2015). In recognizing these tensions, the model prioritizes slow engagement, non-coercive sound exploration, and flexible structures that give space for dissent.

Potential Challenges for Program Implementation

While group sessions can promote co-regulation and shared experience, they may not be suitable for all clients – particularly those who become dysregulated or violent in response to auditory triggers. In my own observations from MT practice, dysregulation due to sound may not be resolved through behavioral approaches alone. There is a need to acknowledge the underlying sensory trauma and allow students to engage at their own pacing. I have seen consequences of over-filling groups, which is why I recommend small groups in this program, and emphasize that individual sessions may sometimes represent the most ethical placement. The dilemma is that schools often seek to maximize access to services, especially when considering the differences between educator-informed objectives (reaching more students, budget or staffing expectations) and neurodiversity-informed objectives that prioritize student well-being and sensory safety (McFerran & Rickson, 2014). This forms real tension between what is logistically possible in schools and ethical responsibility, to align sessions formats with students auditory needs (McFerran & Rickson, 2014).

Other potential challenges include inconsistent staff training surrounding sensory needs, varying levels of administrative support for a flexible schedule, and limited availability for suitable spaces that have the acoustic requirements indicated in this program. Not to mention, that if a location does exist, there may be specific funding required for acoustic treatment or other specialized equipment for seating, music creation, or relaxation. This highlights the potential for these spaces to be shared, or serve multiple purposes to help encourage administrative buy-in. Additionally, a key insight from this project is that group-based programming should never be assumed as default, especially when working with students whose auditory profiles suggest vulnerability to overload or trauma (Fulton et al., 2020).

Limitations

This projects design and conclusions are shaped by several limitations. The program has not yet undergone formal implementation or outcome evaluation as per the IM framework, thus

limiting the ability to assess its effectiveness in practice. The design is additionally informed by my professional observations, and what I have included here does not directly include co-design with autistic individuals, which could strengthen the application, and better support the ongoing inclusion of first-person perspectives (Botha et al., 2024; Chapman & Botha, 2023). The program itself is context-specific, tailored for a specialized school environment, which is not available in all school boards. Some schools decide to integrate their students in adopting a Universal Design for Learning (UDL)[5], in which case the school environment itself is differently organized and would require additional consideration. This is where questions surrounding funding, access or general logistics may emerge. Finally, it could be argued that in using the IM process, forming categories and behavioural determinants that serve the therapist's assessment and treatment may create friction with a neurodiversity framework (Bartholomew Eldredge et al., 2016; Chapman & Botha, 2023). This tension reflects broader concerns around labels, hierarchy, oversimplification, and reinforcement of neurotypical expectations (Chapman & Botha, 2023). A neurodiversity-affirming approach would instead emphasize collaboration, supporting individuals in realizing their personal potentials rather than situating the work strictly within a treatment paradigm (Chapman & Botha, 2023).

Implications for Future Research

Current professional MT practice encourages collaboration with professionals who can offer complementary insights into sensory functioning (*CAMT Code of Ethics*, 2022). Audiologists can support diagnostic clarity; occupational therapists can offer sensory-based intervention recommendations; and speech-language pathologists can help interpret non-verbal communication in some contexts (Henry et al., 2022; McGreevy, 2025; Pfeiffer et al., 2019). Future research should explore the implementation of this model in practice, with adaptations made through co-design approaches involving autistic students where possible (Mullally et al., 2024). Attention must also be paid to how students interpret and make meaning from sound, not just behaviorally, but emotionally and relationally (Chapman & Botha, 2023)

Emerging research in the field of human-computer interaction and music technology further highlights the potential of adaptive musical interfaces to support this collaborative work.

[5] Universal Design for Learning (UDL) is a top-down framework emphasizing broad accessibility for all learners (CAST Inc, 2018). In contrast, specialized school environments may provide in depth sensory and communication supports, aligning more closely with neurodiversity-affirming practice (Chapman & Botha, 2023)

Arora et al. (2025) propose sensory principles such as New Interfaces for Musical Expression (NIME) that prioritize user-directed modulation of auditory, tactile, and visual inputs in real time, enabling autistic users to self-regulate sensory input while maintaining creative autonomy. Their interdisciplinary review emphasizes rhythm, play, and customization as essential for addressing sensory over- and under-responsivity, particularly in children (Arora et al., 2025). While the advanced technologies described may not currently be feasible in all school-based settings, the research offers a valuable direction for future development. Integration of such tools that are open source could enhance the adaptability and responsiveness of MT programs, particularly when paired with ongoing collaboration among therapists, educators, and technologists.

Implications for Music Therapy Practice

This program offers clear implications for MT in school settings, particularly with autistic students who experience auditory sensitivities. I see the framework as a resource other music therapists can draw from – both in how sessions are structured and in how we understand sensory processing and client autonomy (C. Morris et al., 2024). By emphasizing predictable sound environments, opt-in participation, and student-led pacing, the program supports emotional regulation without imposing exposure or rigid expectations (C. Morris et al., 2024; Seif et al., 2025). It also invites reflection on how sensory interventions are currently framed and how they intersect with other established MT approaches. This model prioritizes collaboration, sensory respect, and affirming engagement over behavioral control, and could inform the development of clinical guidelines that could explicitly integrate auditory considerations into music therapy practice. This may prompt auditory processing considerations when it comes to room planning that could be outlined by the CAMT / AMTA, or auditory considerations within intervention design and assessment as well. It could also support the growth of a specialized practice area that bridges MT with occupational therapy, audiology, and neurodiversity-affirming care. I believe it strengthens the case for music therapists to participate meaningfully in interdisciplinary teams, particularly when addressing sensory needs as both clinical and ethical priorities. With further evaluation, this program could help inform best practices for serving students whose goals may not align with traditional therapy models that focus on treatment and/or elimination of behaviours and symptoms. It also encourages more flexible, inclusive service delivery that centers sensory preferences and supports each student's right to engage on their own terms (C. Morris et al., 2024).

Implications for Music Therapy Education

This project offers important implications for MT education and training, both in terms of clinical application and theory. Throughout the process of designing this program, I developed my own nuanced understanding of what it means to build an intervention that is neurodiversity-affirming. Engaging with first-voice research and with the voices of neurodivergent individuals shifted the way I approached the literature, reinforcing the importance of integrating the lived experiences of autistic persons (Hunt, 2016). Developing the goals, session content, and theoretical foundations of this program became a meaningful learning process, one that clarified what ethical, responsive practice can look like when it prioritizes autonomy and sensory respect.

I believe this program could be shared with MT students in training as a case example of intervention design in school-based contexts. Rather than positioning it as a universal model, it could serve as an entry point for students to explore how interventions can be adapted to address specific sensory and communicative needs. It also highlights the value of learning to work across disciplines, understanding the institutional dynamics of school systems, and anchoring one's clinical decisions in affirming, client-centered values. Importantly, this project may help MT students reconsider how program goals are framed. By focusing on participation, choice-making, and accessibility rather than compliance or normalization, students are invited to ask deeper questions about the purpose of therapy and the meaning of progress. These pedagogical shifts could encourage future music therapists to think more critically about the frameworks they inherit and to take an active role in shaping practice. As music therapists we need to place ourselves as well-informed advocates.

Personal Implications

This program holds personal significance for me as both a music therapist and a practitioner within a specialized school setting. I began this project after observing the existing desensitization program at my workplace. While well-intentioned, the approach lacked a focus on student autonomy and sensory affirmation in certain moments. Developing this intervention has allowed me to reframe that experience, both in how I support students and how I advocate for the functioning of MT within this space.

Much of my motivation for this work came from a desire to update that earlier program and shift its foundation toward something that was ethical, research-supported, and respectful of the lived experiences of autistic students. I plan to use this intervention framework myself and

share it with colleagues, with the hope that it will encourage more interdisciplinary dialogue and a shared commitment to affirming students' sensory needs rather than suppressing them. At the same time, I recognize the ethical complexity of creating spaces that foster agency in music therapy, where students may not experience the same autonomy in other contexts whether it be spaces such as home, school or other programs. This inconsistency could be confusing and highlights the importance of advocating across systems, so affirming practices does not solely exist in on setting.

Working on this project also shaped how I think about program design in general. It challenged me to think critically about consent, assent, sound, and sensory complexity – especially in environments where students' choices can easily be overlooked. I hope to carry this awareness forward in my practice and continue growing my capacity to create MT spaces that are grounded in the realities of the students I serve.

Conclusion

This program began from a place of observation: seeing a gap in an existing desensitization model during practicum and noticing that something essential was missing. What I witnessed wasn't intentional neglect or harm, but at times it may have been harmful to students, which, is an outcome of a system seeking to service without the necessary frameworks or knowledge to apply this in a neurodiversity-affirming way. This program observes ongoing conversation and may ask: What if we designed from the inside out, from the sensory world of the student rather than the institutional structure around them?

I'm still at an early stage in my professional path, and this program reflects some of that. It is not the product of decades of experience, but of proximity and interest to learn. Being close to students who were overwhelmed or communicating in ways that did not align with typical models of progress shaped my understanding of what needed to change. It reflects my training, my values, and my desire to do right by clients. I believe is that this program offers a starting point, with required responsiveness, consent, and sound ethics. It asks us as music therapists to listen not just musically, but with a human-focus: to observe how power operates in schools, where students show us their limits and their capacities. I hope this work encourages other emerging therapists to notice what can be overlooked, to questions what we inherit, and to recognize that being new to the field can sometimes mean being attuned to things other no longer see. Ultimately, this project is not just about auditory sensitivity but a focus on how we design

care. I hope it contributes to a broader comprehension in MT toward affirming, client-centered practices that prioritize autonomy over compliance and presence over performance.

References

Abrams, B. (2010). Evidence-based music therapy practice: An integral understanding. *Journal of Music Therapy*, *47*(4), 351–379. https://doi.org/10.1093/jmt/47.4.351

Ahmmed, A., & Vijayakumar, S. (2024). A retrospective study distinguishing between hyperacusis and misophonia in children with auditory processing disorder (APD). *International Journal of Pediatric Otorhinolaryngology*, *186*, 112119. https://doi.org/10.1016/j.ijporl.2024.112119

Aigen, K. (2005). *Music-centered music therapy*. Barcelona Publishers.

Aigen, K. (2013). *The study of music therapy: Current issues and concepts*. Routledge. https://doi.org/10.4324/9781315882703

Allen, R., Hill, E., & Heaton, P. (2009). The subjective experience of music in autism spectrum disorder. *Annals of the New York Academy of Sciences*, *1169*(1), 326–331. https://doi.org/10.1111/j.1749-6632.2009.04772.x

AMTA Code of Ethics. (2018). American Music Therapy Association. https://www.musictherapy.org/

Arora, A., Tandori, E., Marshall, J., & Favilla, S. (2025). *Designing sensory NIME for autism*. https://www.nime.org/proc/nime2025_63/

Atipas, S., Therdphaothai, J., Suvansit, K., Prakairungthong, S., Thongyai, K., & Limviriyakul, S. (2021). A randomized, controlled trial of notched music therapy for tinnitus patients. *The Journal of International Advanced Otology*, *17*(3), 221–227. https://doi.org/10.5152/iao.2021.9385

Ayres, A. J. (1972). *Sensory integration and learning disorders*. Western Psychological Services.

Babalola, O., Van Hedger, K., & Van Hedger, S. C. (2024). Misophonia is associated with heightened emotion evocation by music. *Current Psychology*, *43*(47), Article 47. https://doi.org/10.1007/s12144-024-07050-w

Bakan, M. (2018). Zena Hamelson. In M. Bakan (Ed.), *Speaking for ourselves: Conversations on life, music, and autism* (pp. 21–30). Oxford University Press. https://doi.org/10.1093/oso/9780190855833.003.0002

Bakan, M., Chasar, M., Gibson, G., Grace, E., Hamelson, Z., Nitzberg, D., Peterson, G., Pytlik, M., Rindale, D., Sequenzia, A., & Silar, A. (2018). *Speaking for ourselves: Conversations on life, music, and autism* (Vol. 1–1 online resource). Oxford University Press.

https://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=1800472

Bartholomew Eldredge, L., Markham, C., Ruiter, R., Fernández, M., Kok, G., & Parcel, G. (2016). *Planning health promotion programs: An intervention mapping approach*. John Wiley & Sons.

Berger, D. (2002). *Music therapy, sensory integration, and the autistic child*. Jessica Kingsley.

Bettarello, F., Caniato, M., Scavuzzo, G., & Gasparella, A. (2021). Indoor acoustic requirements for autism-friendly spaces. *Applied Sciences*, *11*(9), Article 9. https://doi.org/10.3390/app11093942

Bhatara, A., Quintin, E.-M., Fombonne, E., & Levitin, D. (2013). Early sensitivity to sound and musical preferences and enjoyment in adolescents with autism spectrum disorders. *Psychomusicology: Music, Mind, and Brain*, *23*(2), 100–108. https://doi.org/10.1037/a0033754

Birchley, G. (2023). Anything goes? Analyzing varied understandings of assent. *Cambridge Quarterly of Healthcare Ethics*. https://doi.org/10.1017/S0963180122000524

Blythe LaGasse, Manning, R., Crasta, J., Gavin, W., & Davies, P. (2019). Assessing the impact of music therapy on sensory gating and attention in children with autism: A pilot and feasibility study. *Journal of Music Therapy*, *56*(3), 287–314. https://doi.org/10.1093/jmt/thz008

Botha, M., Chapman, R., Giwa Onaiwu, M., Kapp, S., Stannard, A., & Walker, N. (2024). The neurodiversity concept was developed collectively: An overdue correction on the origins of neurodiversity theory. *Autism*, *28*(6), 1591–1594. https://doi.org/10.1177/13623613241237871

Botha, M., Hanlon, J., & Williams, G. (2021). Does language matter? Identity-first versus person-first language use in autism research: A response to Vivanti. *Journal of Autism and Developmental Disorders*, *53*(2), 870–878. https://doi.org/10.1007/s10803-020-04858-w

Boyd, L. (2024). *Timing is everything: Temporal processing and multisensory integration*. https://doi.org/10.1007/978-3-031-48843-6_7

Brake, J. (2024). “My struggles are largely sensory processing:” The sensory world of autistic people. *Journal of Human Behavior in the Social Environment*, *0*(0), 1–23. https://doi.org/10.1080/10911359.2024.2382108

Bruscia, K. (2014). *Defining music therapy* (Third edition.). Barcelona Publishers.

Buday, E. M. (1995). The effects of signed and spoken words taught with music on sign and speech imitation by children with autism. *Journal of Music Therapy*, *32*(3), 189–202. https://doi.org/10.1093/jmt/32.3.189

Bury, S., Jellett, R., Spoor, J., & Hedley, D. (2020). “It defines who I am” or “it’s something I have”: What language do [autistic] Australian adults [on the autism spectrum] prefer? *Journal of Autism and Developmental Disorders*, *53*(2), 677–687. https://doi.org/10.1007/s10803-020-04425-3

CAMT Code of Ethics. (2022). https://www.musictherapy.ca/about-camt-music-therapy/camt-ethics/

Cascio, C., Woynaroski, T., Baranek, G., & Wallace, M. (2016). Toward an interdisciplinary approach to understanding sensory function in autism spectrum disorder. *Autism Research*, *9*(9), 920–925. https://doi.org/10.1002/aur.1612

CAST Inc. (2018). *The UDL Guidelines*. Cast UDL Guidelines. https://udlguidelines.cast.org

Castro, S. (2019). *A Kantian theory of the sensory processing subtype of ASD*. https://www.academia.edu/45120543/A_Kantian_Theory_of_the_Sensory_Processing_Subtype_of_ASD_Autism_Spectrum_Disorder_

Chapman, R., & Botha, M. (2023). Neurodivergence-informed therapy. *Developmental Medicine & Child Neurology*, *65*(3), 310–317. https://doi.org/10.1111/dmcn.15384

Charlton, R., Entecott, T., Belova, E., & Nwaordu, G. (2021). “It feels like holding back something you need to say”: Autistic and non-autistic adults’ accounts of sensory experiences and stimming. *Research in Autism Spectrum Disorders*, *89*, 101864. https://doi.org/10.1016/j.rasd.2021.101864

Cibrian, F. L., Peña, O., Ortega, D., & Tentori, M. (2017). BendableSound: An elastic multisensory surface using touch-based interactions to assist children with severe autism during music therapy. *International Journal of Human-Computer Studies*, *107*, 22–37. https://doi.org/10.1016/j.ijhcs.2017.05.003

Concordia University, Department of Applied Human Sciences. (2024). *Guidelines to help you think ethically*. Concordia University. https://www.concordia.ca/content/dam/artsci/applied-human-sciences/docs/Guidelines_Ethically.pdf

Cuvo, A. J. (2011). *Training children with autism and pervasive developmental disorders to comply with healthcare procedures: Theory and research*. https://doi.org/10.1007/978-1-4419-8065-6_24

Danesh, A., Howery, S., Aazh, H., Kaf, W., & Eshraghi, A. (2021). Hyperacusis in Autism Spectrum Disorders. *Audiology Research*, *11*(4), Article 4. https://doi.org/10.3390/audiolres11040049

Daniel, S., Berkovits, L., Eisenhower, A., & Blacher, J. (2025). Child-centred play therapy and rhythmic relating improves emotion regulation in autism: A single-N pilot intervention study. *Counselling and Psychotherapy Research*, *25*(1), e12671. https://doi.org/10.1002/capr.12671

Davies, H. (2022). 'Autism is a way of being': An 'insider perspective' on neurodiversity, music therapy and social justice. *British Journal of Music Therapy*, *36*(1), 16–26. https://doi.org/10.1177/13594575221090182

Davies, W. (2022). Autistic Listening. In *Aural Diversity*. Routledge.

Dawson, G., Toth, K., Abbott, R., Osterling, J., Munson, J., Estes, A., & Liaw, J. (2004). Early social attention impairments in autism: Social orienting, joint attention, and attention to distress. *Developmental Psychology*, *40*(2), 271–283. https://doi.org/10.1037/0012-1649.40.2.271

Devlin, S., Healy, O., Leader, G., & Reed, P. (2008). The analysis and treatment of problem behavior evoked by auditory stimulation. *Research in Autism Spectrum Disorders*, *2*(4), 671–680. https://doi.org/10.1016/j.rasd.2008.02.001

Di Salvo, M. (2024). *Music and autism: New ways of research for neuroscience*. https://doi.org/10.1007/978-3-031-68338-1_14

Diagnostic and statistical manual of mental disorders: DSM-5^{TM}, 5th ed (pp. xliv, 947). (2013). American Psychiatric Publishing, Inc. https://doi.org/10.1176/appi.books.9780890425596

Dotch, E., Johnson, J., Black, R., & Hayes, G. (2023). Understanding noise sensitivity through interactions in two online autism forums. *Proceedings of the 25th International ACM*

SIGACCESS Conference on Computers and Accessibility, 1–12. https://doi.org/10.1145/3597638.3608413

Dotch, E., Mavrovounioti, A., Du, W., Ankrah, E., Johnson, J., Min, A., & Hayes, G. (2024). Accessibility through awareness of noise sensitivity management and regulation practices. *Proceedings of the 26th International ACM SIGACCESS Conference on Computers and Accessibility*, 1–12. https://doi.org/10.1145/3663548.3675630

Eisenberg, L., & Kanner, L. (1956). Childhood schizophrenia; symposium, 1955. VI. Early infantile autism, 1943-55. *The American Journal of Orthopsychiatry*, *26*(3), 556–566.

Epstein, S., Elefant, C., & Thompson, G. (2020). Music therapists' perceptions of the therapeutic potentials using music when working with verbal children on the autism spectrum: A qualitative analysis. *PubMed*. https://pubmed.ncbi.nlm.nih.gov/31815286/

Erinc, M., Szczepek, A., & Song, J.-J. (2025). Hyperacusis. In *Otology updates*. https://doi.org/10.1007/978-3-031-76173-7_33

Finch, M., Quinn, S., & Waterman, E. (2016). Improvisation, adaptability, and collaboration: Using AUMI in community music therapy. *Voices: A World Forum for Music Therapy*, *16*(3), Article 3. https://doi.org/10.15845/voices.v16i3.834

Flowers, J., Dawes, J., McCleary, D., & Marzolf, H. (2023). Words matter: Language preferences in a sample of autistic adults. *Neurodiversity*, *1*, 27546330231216548. https://doi.org/10.1177/27546330231216548

Fulton, R., Richardson, K., Jones, R., & Reardon, E. (2020). Sensory trauma: Autism, sensory difference and the daily experience of fear. *Autism Wellbeing CIC*. https://ndconnection.co.uk/resources/p/sensory-trauma-autism-sensory-difference-and-the-daily-experience-of-fear

Gadberry, A. (2011). A survey of the use of aided augmentative and alternative communication during music therapy sessions with persons with autism spectrum disorders. *Journal of Music Therapy*, *48*(1), 74–89. https://doi.org/10.1093/jmt/48.1.74

Gee, B., Thompson, K., & St John, H. (2014). Efficacy of a sound-based intervention with a child with an autism spectrum disorder and auditory sensory over-responsivity. *Occupational Therapy International*, *21*(1), 12–20. https://doi.org/10.1002/oti.1359

Gerritsen, J. (2010). The effect of Tomatis therapy on children with autism: Eleven case studies. *International Journal of Listening*, *24*(1), 50–68.

Gonçalves, L., Paiva, K., Patatt, F., Stolz, J., & Haas, P. (2021). *Association between autism spectrum disorder and changes in the central auditory processing in children*. https://doi.org/10.1590/1806-9282.67.01.20200588

Goodyear-Brown, P., & Yasenik, L. (Eds.). (2024). *Polyvagal power in the playroom: A guide for play therapists*. Routledge. https://doi.org/10.4324/9781003352976

Graber, A. (2016). Autism, intellectual disability, and a challenge to our understanding of proxy consent. *Medicine, Health Care and Philosophy*, *20*(2), Article 2. https://doi.org/10.1007/s11019-016-9745-y

Graf-Kurtulus, S., & Gelo, O. (2025). Rethinking psychological interventions in autism: Toward a neurodiversity-affirming approach. *Counselling and Psychotherapy Research*, *25*(1), e12874. https://doi.org/10.1002/capr.12874

Grocke, D., & Wigram, T. (2007). *Receptive methods in music therapy: Techniques and clinical applications for music therapy clinicians, educators and students* (1st pbk. ed). Jessica Kingsley Publishers.

Gundogdu, U., Aksoy, A., & Eroglu, M. (2023). Sensory profiles, behavioral problems, and auditory findings in children with autism spectrum disorder. *International Journal of Developmental Disabilities*, *69*(3), 442–451. https://doi.org/10.1080/20473869.2023.2200592

Guo, J., Kang, J., & Ma, H. (2023). Sound perception of children aged 2–6 years with autism spectrum disorder. *Applied Acoustics*, *213*, 109623. https://doi.org/10.1016/j.apacoust.2023.109623

Hall, A., Humphriss, R., Baguley, D., Parker, M., & Steer, C. (2016). Prevalence and risk factors for reduced sound tolerance (hyperacusis) in children. *International Journal of Audiology*, *55*(3), 135–141. https://doi.org/10.3109/14992027.2015.1092055

Henry, J., Theodoroff, S., Edmonds, C., Martinez, I., Myers, P., Zaugg, T., & Goodworth, M.-C. (2022). Sound tolerance conditions (hyperacusis, misophonia, noise sensitivity, and phonophobia): Definitions and clinical management. *American Journal of Audiology*, *31*(3), 513–527. https://doi.org/10.1044/2022_AJA-22-00035

Hernandez-Ruiz, E. (2025). Parental demand, learning, and satisfaction with virtual parent coaching of music interventions. *Journal of Music Therapy*, *62*(1), thaf004. https://doi.org/10.1093/jmt/thaf004

Hogg, J., Cavet, J., Lambe, L., & Smeddle, M. (2001). The use of 'Snoezelen' as multisensory stimulation with people with intellectual disabilities: A review of the research. *Research in Developmental Disabilities*, *22*(5), 353–372. https://doi.org/10.1016/S0891-4222(01)00077-4

Hughes, J. (2016). Therapeutic listening communication in children with autism and hyperacusis. *Doctoral Projects*. https://doi.org/10.31979/etd.pmmc-ur2q

Hull, L., Petrides, K., Allison, C., Smith, P., Baron-Cohen, S., Lai, M.-C., & Mandy, W. (2017). "Putting on my best normal": Social camouflaging in adults with autism spectrum conditions. *Journal of Autism and Developmental Disorders*, *47*(8), Article 8. https://doi.org/10.1007/s10803-017-3166-5

Hunt, A. (2016). First-Person Research. In B. Wheeler & K. Murphy (Eds.), *Music therapy research* (3rd ed., pp. 1056–1091). Barcelona Publishers. https://barbarawheelermt.com/books/?utm_source=chatgpt.com

Ismen, K., & Emanuel, D. (2023). Auditory processing disorder: Protocols and controversy. *American Journal of Audiology*, *32*(3), 614–639. https://doi.org/10.1044/2023_AJA-23-00035

Jamal, W., Cardinaux, A., Haskins, A., Kjelgaard, M., & Sinha, P. (2020). Reduced sensory habituation in autism and its correlation with behavioral measures. *Journal of Autism and Developmental Disorders*, *51*(9), 3153–3164. https://doi.org/10.1007/s10803-020-04780-1

Joel, S. (2017). *Jodivi: An application to target sound sensitivity features in people with autism spectrum disorder*. https://ruor.uottawa.ca/items/e60767aa-b622-442a-9969-aa1444e78559

Jones, R., Quigney, C., & Huws, J. (2003). First-hand accounts of sensory perceptual experiences in autism: A qualitative analysis. *Journal of Intellectual & Developmental Disability*, *28*(2), 112–121. https://doi.org/10.1080/1366825031000147058

Kant, I. (1998). *Critique of pure reason* (P. Guyer & A. Wood, Eds.). Cambridge University Press. https://doi.org/10.1017/CBO9780511804649

Kapp, S., Gillespie-Lynch, K., Sherman, L., & Hutman, T. (2013). Deficit, difference, or both? Autism and neurodiversity. *Developmental Psychology*, *49*(1), 59–71. https://doi.org/10.1037/a0028353

Katagiri, J. (2009). The effect of background music and song texts on the emotional understanding of children with autism. *Journal of Music Therapy*, *46*(1), 15–31. https://doi.org/10.1093/jmt/46.1.15

Kędra, A. (2023). Do we need autistic autism researchers to understand autism? *ETHICS IN PROGRESS*, *14*(2), Article 2. https://doi.org/10.14746/eip.2023.2.2

Khalfa, S., Bruneau, N., Rogé, B., Georgieff, N., Veuillet, E., Adrien, J.-L., Barthélémy, C., & Collet, L. (2004). Increased perception of loudness in autism. *Hearing Research*, *198*(1), 87–92. https://doi.org/10.1016/j.heares.2004.07.006

Kim, G. (2022). *Calming effects of repetition in music for children with sensory sensitivities*. https://doi.org/10.26183/gswt-pa43

Kim, G., Chmiel, A., & Garrido, S. (2024). Calming effects of repetition in music for children with sensory sensitivities: Findings from two experimental studies. *The Arts in Psychotherapy*, *87*, 102115. https://doi.org/10.1016/j.aip.2023.102115

Kim, J., Wigram, T., & Gold, C. (2009). Emotional, motivational and interpersonal responsiveness of children with autism in improvisational music therapy. *Autism: The International Journal of Research and Practice*, *13*(4), 389–409.

Koegel, R., Openden, D., & Koegel, L. K. (2004). A systematic desensitization paradigm to treat hypersensitivity to auditory stimuli in children with autism in family contexts. *Research and Practice for Persons with Severe Disabilities*, *29*(2), 122–134. https://doi.org/10.2511/rpsd.29.2.122

Korošec, K., Backman Bister, A., & Bojner Horwitz, E. (2025). "A space to be myself": Music and self-determination in the lives of autistic adults. *Psychology of Music*, 03057356241305558. https://doi.org/10.1177/03057356241305558

Kroeker, S. (2023). *How lived autistic experience can inform considerations of potential harm in music therapy with autistic people: A philosophical inquiry* [Masters, Concordia University]. https://spectrum.library.concordia.ca/id/eprint/992991/

Kumar, S., Tansley-Hancock, O., Sedley, W., Winston, J., Callaghan, M., Allen, M., T Cope, P Gander, & T Griffiths. (2017). The brain basis for Misophonia. *PubMed*. https://pubmed.ncbi.nlm.nih.gov/28162895/

Kwong, T., Yuan, H., Mung, S., Chu, H., Chan, C., Lun, D., Yu, H., Cheng, L., & Choy, Y. (2024). Healthcare headset with tuneable auditory characteristics control for children with

autism spectrum disorder. *Applied Acoustics*, *218*, 109876. https://doi.org/10.1016/j.apacoust.2024.109876

Lane, S., Mailloux, Z., Schoen, S., Bundy, A., May-Benson, T., Parham, D., Smith Roley, S., & Schaaf, R. (2019). Neural foundations of Ayres Sensory Integration®. *Brain Sciences*, *9*(7), Article 7. https://doi.org/10.3390/brainsci9070153

Lawson, W. (2025a). *External senses and their relationship to monotropism*. https://doi.org/10.1007/978-981-96-2564-2_5

Lawson, W. (2025b). Monotropism theory. In *Autism and being monotropic.* (pp. 17–27). https://doi.org/10.1007/978-981-96-2564-2_2

Lim, H. (2010). Effect of "developmental speech and language training through music" on speech production in children with autism spectrum disorders. *Journal of Music Therapy*, *47*(1), 2–26. https://doi.org/10.1093/jmt/47.1.2

Lord, C., Elsabbagh, M., Baird, G., & Veenstra-Vanderweele, J. (2018). *Autism spectrum disorder*. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)31129-2/abstract

Low, M., McFerran, K., Viega, M., Carroll-Scott, A., McGhee Hassrick, E., & Bradt, J. (2023). Exploring the lived experiences of young autistic adults in Nordoff-Robbins music therapy: An interpretative phenomenological analysis. *Nordic Journal of Music Therapy*, *32*(4), 341–364. https://doi.org/10.1080/08098131.2022.2151640

Lucker, J. (2013). Auditory hypersensitivity in children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, *28*(3), 184–191. https://doi.org/10.1177/1088357613475810

Lucker, J., & Doman, A. (2015). Neural mechanisms involved in hypersensitive hearing: Helping children with ASD who are overly sensitive to sounds. *Autism Research and Treatment*, *2015*(1), 369035. https://doi.org/10.1155/2015/369035

Mairian, C., & Sally, F. (1999). *Disability discourse*. McGraw-Hill Education (UK).

Manning, C., Williams, G., & MacLennan, K. (2023). Sensory-inclusive spaces for autistic people: We need to build the evidence base. *Autism*, *27*(6), 1511–1515. https://doi.org/10.1177/13623613231183541

Marom, M., Gilboa, A., & Bodner, E. (2024). Conversations on echolalia: A qualitative inquiry into autistic adults' views on echolalia, language, and music. *Nordic Journal of Music Therapy*, *33*(3), 169–188. https://doi.org/10.1080/08098131.2023.2268690

McFerran, K., & Rickson, D. (2014). Community music therapy in schools: Realigning with the needs of contemporary students, staff and systems. *International Journal of Community Music*, *7*. https://doi.org/10.1386/ijcm.7.1.75_1

McGill, O., & Robinson, A. (2020). "Recalling hidden harms": Autistic experiences of childhood applied behavioural analysis (ABA). *Advances in Autism*, *7*(4), 269–282. https://doi.org/10.1108/AIA-04-2020-0025

McGreevy, A. (2025). How music is used to facilitate communication in speech-language and music therapy for children with a diagnosis of autism spectrum disorder. *Honors College Theses*. https://digitalcommons.murraystate.edu/honorstheses/214

Mendelson, J., White, Y., Adebari, R., Schmid, L., Riggsbee, J., Goldsmith, A., Ozler, B., Buehne, K., Jones, S., Shapleton, J., & Dawson, G. (2016). A preliminary investigation of a specialized music therapy model for children with disabilities delivered in a classroom setting. *Autism Research and Treatment*, *2016*, 1284790. https://doi.org/10.1155/2016/1284790

Moore, J., Farquharson, K., & Lotter, C. (2025). "Grooving in my body": A mixed-methods pilot study of vibroacoustic therapy's effects on emotion regulation and attention in autistic children. *Healthcare*, *13*(5), Article 5. https://doi.org/10.3390/healthcare13050465

Morris, C., Oliveira, J., Perrin, J., Federico, C., & Martasian, P. (2024). Toward a further understanding of assent. *Journal of Applied Behavior Analysis*, *57*(2), 304–318. https://doi.org/10.1002/jaba.1063

Morris, I., Sykes, J., Paulus, E., Dameh, A., Razzaque, A., Esch, L., Gruenig, J., & Zelazo, P. (2025). Beyond self-regulation: Autistic experiences and perceptions of stimming. *Neurodiversity*, *3*, 27546330241311096. https://doi.org/10.1177/27546330241311096

Mössler, K., Schmid, W., Aßmus, J., Fusar-Poli, L., & Gold, C. (2020). Attunement in music therapy for young children with autism: Revisiting qualities of relationship as mechanisms of change. *Journal of Autism and Developmental Disorders*, *50*(11), 3921–3934. https://doi.org/10.1007/s10803-020-04448-w

Mudford, O., Cross, B., Breen, S., Cullen, C., Reeves, D., Gould, J., & Douglas, J. (2000). Auditory integration training for children with autism: No behavioral benefits detected. *American Journal on Mental Retardation*, *105*(2), 118–129. https://doi.org/10.1352/0895-8017(2000)105%253C0118:AITFCW%253E2.0.CO;2

Mullally, S., Wood, A., Edwards, C., Connolly, S., Constable, H., Watson, S., Rodgers, J., Rose, K., & King, N. (2024). *Autistic voice: Sharing autistic children's experiences and insights*. https://doi.org/10.1101/2024.07.22.24310796

Murray, D., Lesser, M., & Lawson, W. (2005). Attention, monotropism and the diagnostic criteria for autism. *Autism*, *9*(2), 139–156. https://doi.org/10.1177/1362361305051398

Musiek, F., & Chermak, G. (2014). *Handbook of central auditory processing disorder* (Second edition.). Plural Publishing.

Nawaz, S., & Speer, S. (2025). What are the experiences and support needs of families of autistic children with extreme (or 'pathological') demand avoidance (E/PDA) behaviours? *Research in Autism Spectrum Disorders*, *119*, 102515. https://doi.org/10.1016/j.rasd.2024.102515

Newson, E., Le Marechal, K., & David, C. (2003). Pathological demand avoidance syndrome: A necessary distinction within the pervasive developmental disorders. *Archives of Disease in Childhood*, *88*(7), 595–600. https://doi.org/10.1136/adc.88.7.595

O'Nions, E., & Eaton, J. (2020). Extreme/'pathological' demand avoidance: An overview. *Paediatrics and Child Health*, *30*(12), 411–415. https://doi.org/10.1016/j.paed.2020.09.002

Pappagianopoulos, J., Brunt, S., Smith, J., Menezes, M., Howard, M., Sadikova, E., Burroughs, C., & Mazurek, M. (2025). Therapy through the lens of autism': Qualitative exploration of autistic adults' therapy experiences. *Counselling and Psychotherapy Research*, *25*(2), e12861. https://doi.org/10.1002/capr.12861

Petty, S., & Ellis, A. (2024). The meaning of autistic movements. *Autism*, *28*(12), 3015–3020. https://doi.org/10.1177/13623613241262151

Pfeifer, E., Aigner, S., Stolterfoth, C., Dale, R., Ostermann, T., Probst, T., & Humer, E. (2025). Music therapists' perspectives on nature-connecting methods and the integration of nature in music therapy: Results of a survey among German and Austrian music therapists. *The Arts in Psychotherapy*, *92*. https://doi.org/10.1016/j.aip.2025.102252

Pfeiffer, B., Stein Duker, L., Murphy, A., & Shui, C. (2019). Effectiveness of noise-attenuating headphones on physiological responses for children with autism spectrum disorders. *Frontiers in Integrative Neuroscience*, *13*. https://doi.org/10.3389/fnint.2019.00065

Porges, S. (2011). *The polyvagal theory: Neurophysiological foundations of emotions, attachment, communication, and self-regulation* (pp. xvii, 347). W. W. Norton & Company.

Porges, S. (2022). Polyvagal theory: A science of safety. *Frontiers in Integrative Neuroscience*, *16*(May 2022). https://doi.org/10.3389/fnint.2022.871227

Poulsen, R., Tan, D., Sowman, P., McAlpine, D., & Pellicano, E. (2025). Auditory environments influence the link between autistic traits and quality of life. *Scientific Reports*, *15*(1), 10612. https://doi.org/10.1038/s41598-025-94585-y

Rance, G., Chisari, D., Saunders, K., & Rault, J. (2017). Reducing listening-related stress in school-aged children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *47*(7), Article 7. https://doi.org/10.1007/s10803-017-3114-4

Renel, W. (2018). 'Auraldiversity': Defining a hearing-centred perspective to socially equitable design of the built environment. *Built Environment*, *44*(1), 36–51. https://doi.org/10.2148/benv.44.1.36

Rickson, D. (2022). *Music therapy is perceived to support regulation*. https://doi.org/10.1007/978-3-031-05233-0_17

Robertson, A., & Simmons, D. (2015). The sensory experiences of adults with autism spectrum disorder: A qualitative analysis. *Perception*, *44*(5), 569–586. https://doi.org/10.1068/p7833

Rosas-Pérez, C., Galbrun, L., Payne, S., Dickson, A., & Stewart, M. (2025). More than noise: Lived experiences of autistic people in real-life acoustic environments. *Applied Acoustics*, *233*, 110581. https://doi.org/10.1016/j.apacoust.2025.110581

Ross, V. (2017). Crafting electroacoustic music for sensory integration therapy. *The International Journal of Health, Wellness and Society*, *7*(1), 23–29. https://doi.org/10.18848/2156-8960/CGP/v07i01/23-29

Schafer, R. (1977). *The tuning of the world*. Knopf. https://catalog.hathitrust.org/Record/000086818

Schare, M., Wyatt, K., Skolnick, R., Terjesen, M., Bohnenkamp, J., Lai, B., Berry, R., & Ehrlich, C. (2014). *Cognitive and behavioral interventions*. https://doi.org/10.1007/978-1-4939-1972-7_13

Seif, A., Guerville, R., Rajab, M., Marceau-Linhares, C., Schaaf, K., Schmid, S., & Stevenson, R. (2025). *Auditory brainstem development in autism: From childhood hypo-responsivity to adult hyper-reactivity*. https://doi.org/10.1101/2025.04.22.650041

Sharda, M., Tuerk, C., Chowdhury, R., Jamey, K., Foster, N., Custo-Blanch, M., Tan, M., Nadig, A., & Hyde, K. (2018). Music improves social communication and auditory–motor connectivity in children with autism. *Translational Psychiatry*, *8*(1), 1–13. https://doi.org/10.1038/s41398-018-0287-3

Shiloh, C., & LaGasse, A. (2014). *Sensory Friendly Concerts: A community music therapy initiative to promote Neurodiversity*. https://doi.org/10.1386/ijcm.7.1.113_1

Shim, H., Kwak, M., An, Y., Kim, D., Kim, Y., & Kim, H. (2015). Feasibility and safety of transcutaneous vagus nerve stimulation paired with notched music therapy for the treatment of chronic tinnitus. *Journal of Audiology & Otology*, *19*(3), 159–167. https://doi.org/10.7874/jao.2015.19.3.159

Sinha, Y., Silove, N., Hayen, A., & Williams, K. (2011). Auditory integration training and other sound therapies for autism spectrum disorders (ASD). *The Cochrane Database of Systematic Reviews*, *12*, CD003681. https://doi.org/10.1002/14651858.CD003681.pub3

Sokhadze, E., Casanova, M., Tasman, A., & Brockett, S. (2016). Electrophysiological and behavioral outcomes of Berard auditory integration training (AIT) in children with autism spectrum disorder. *Applied Psychophysiology and Biofeedback*, *41*(4), 405–420.

Spencer, S., Petersen, J., Schneider, R., Guzick, A., & McGuire, J. (2024). Clinical considerations for integrating ethical principles of beneficence in the development of evidence-based interventions: The case of pediatric misophonia. *Research on Child and Adolescent Psychopathology*, *53*(5), Article 5. https://doi.org/10.1007/s10802-024-01247-0

Steigner, J., & Ruhlin, S. (2014). Systematic desensitization of hyperacusis and vocal pitch disorder treatment in a patient with autism. *Internet Journal of Allied Health Sciences and Practice*, *12*(1). https://doi.org/10.46743/1540-580X/2014.1469

Stiegler, L., & Davis, R. (2010). Understanding sound sensitivity in individuals with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, *25*(2), 67–75. https://doi.org/10.1177/1088357610364530

Swedo, S., Baguley, D., Denys, D., Dixon, L., Erfanian, M., Fioretti, A., Jastreboff, P., Kumar, S., Rosenthal, Z., Rouw, R., Schiller, D., Simner, J., Storch, E., Taylor, S., Werff, K., Altimus, C., & Raver, S. (2022). *Consensus definition of misophonia: A Delphi study*. https://doi.org/10.3389/fnins.2022.841816

Taels, L., Feyaerts, J., Lizon, M., De Smet, M., & Vanheule, S. (2023). 'I felt like my senses were under attack': An interpretative phenomenological analysis of experiences of hypersensitivity in autistic individuals. *Autism*, *27*(8), 2269–2280. https://doi.org/10.1177/13623613231158182

Thaut, M. (2005). *Rhythm, music, and the brain: Scientific foundations and clinical applications*. Routledge.

Thaut, M., & Hömberg, V. (2014). *Handbook of neurologic music therapy* (First edition). Oxford University Press. http://www.myilibrary.com?id=653421

Thye, M., Bednarz, H., Herringshaw, A., Sartin, E., & Kana, R. (2018). The impact of atypical sensory processing on social impairments in autism spectrum disorder. *Developmental Cognitive Neuroscience*, *29*, 151–167. https://doi.org/10.1016/j.dcn.2017.04.010

Tomatis, A., & Prada, R. (2005). *The ear and the voice*. Scarecrow Press.

Twyford, K., Taylor, S., Valentine, J., Pool, J., Baron, A., & Thornton, A. (2025). Functional outcomes in children and adolescents with neurodisability accessing music therapy: A scoping review. *Developmental Medicine & Child Neurology*, *67*(4), 428–442. https://doi.org/10.1111/dmcn.16135

Vincent, V., Skaczkowski, G., Hughes-Barton, D., & Gunn, K. (2025). Effectiveness of sound-based interventions for improving functional outcomes in children: A systematic review of the evidence. *Occupational Therapy International*, *2025*(1), 1693722. https://doi.org/10.1155/oti/1693722

Wan, C., Bazen, L., Baars, R., Libenson, A., Zipse, L., Zuk, J., Norton, A., & Schlaug, G. (2011). *Auditory-motor mapping training as an intervention to facilitate speech output in non-verbal children with autism: A proof of concept study*. https://doi.org/10.1371/journal.pone.0025505

Wang, C., & Huang, L. (2023, July 9). *Personalized Music Therapy Information System Based on Algorithmic Composition in the Treatment of Autism Spectrum Disorder*. https://doi.org/10.1007/978-3-031-35681-0_44

Wigram, T., Pedersen, I., & Bonde, L. (2002). *A comprehensive guide to music therapy: Theory, clinical practice, research, and training*. Jessica Kingsley Publishers.

Williams, Kathryn., Dumont, R., Schiano, N., Lawlor, K., Greaney, K., Kim, R., Duryea, E., Rios-Vega, L., Simms, K., & Schaaf, R. (2024). Use of sensory adaptive environments with autistic children: A scoping review. *Research in Autism Spectrum Disorders*, *114*, 102362. https://doi.org/10.1016/j.rasd.2024.102362

Williams, Z., He, J., Cascio, C., & Woynaroski, T. (2021). A review of decreased sound tolerance in autism: Definitions, phenomenology, and potential mechanisms. *Neuroscience and Biobehavioral Reviews*, *121*, 1–17. https://doi.org/10.1016/j.neubiorev.2020.11.030

Wolpe, J. (1968). Psychotherapy by reciprocal inhibition. *Conditional Reflex : A Pavlovian Journal of Research & Therapy*, *3*(4), Article 4. https://doi.org/10.1007/BF03000093

Wood, R. (2021). Autism, intense interests and support in school: From wasted efforts to shared understandings. *Educational Review*, *73*(1), 34–54. https://doi.org/10.1080/00131911.2019.1566213

Wozniak, J., & Hutton, S. (2025). Autism-informed mindfulness: Collaborative practitioner experiences. *Canadian Journal of Autism Equity*, *5*(1), Article 1. https://doi.org/10.15173/cjae.v5i1.5902

Yum, Y., Poon, K., Lau, W., Ho, F., Sin, K., Chung, K., Lee, H., & Liang, D. (2024). Music therapy improves engagement and initiation for autistic children with mild intellectual disabilities: A randomized controlled study. *Autism Research*, *17*(12), 2702–2722. https://doi.org/10.1002/aur.3254

Appendix A

Parent Questionnaire Sample

1. Is your child overly sensitive to everyday sounds?
2. Is there a sound your child dislikes?
3. Are there any sounds your child finds painful?
4. Is there a sound that makes your child agitated or upset?
5. Does your child cover their ears in response to certain sounds?
6. Have you noticed your child changing their behavior when they hear a specific sound?
7. Does your child react with intense emotion (anger, fear, sadness) to certain sounds?
8. Do loud sounds cause physical reactions in your child (crying, shaking, restlessness)?
9. Have you observed your child avoiding certain places because of noise?
10. Does your child's sensitivity to sounds change depending on the time of day?

Note. I organized these questions myself this past year, prior to beginning this thesis. Upon further inspection, the questions above are conceptually similar if compared to validated sensory questionnaires, including the Parent-Completed Glasgow Sensory Questionnaire, the Sound Sensitivity Symptoms Questionnaire Version 2, and the Sensory Profile, but are not reproduced

Appendix B

Interactive Components Created Using Apple Keynote

Figure 3

What is this? Storm, Sound Discrimination

Figure 4

What is this? Playing Piano, Sound Discrimination

Figure 5

Tap and Listen, Musical Instruments

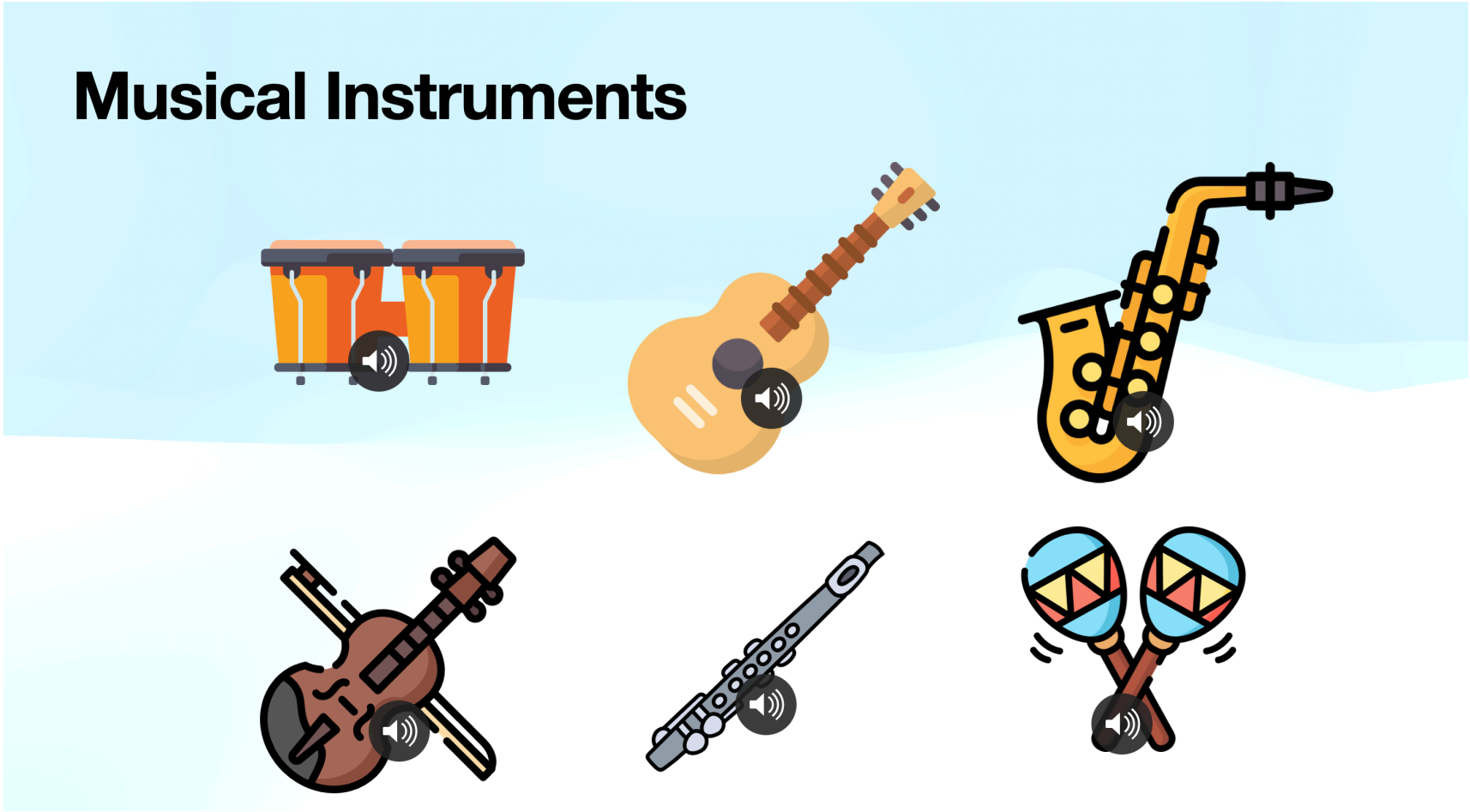
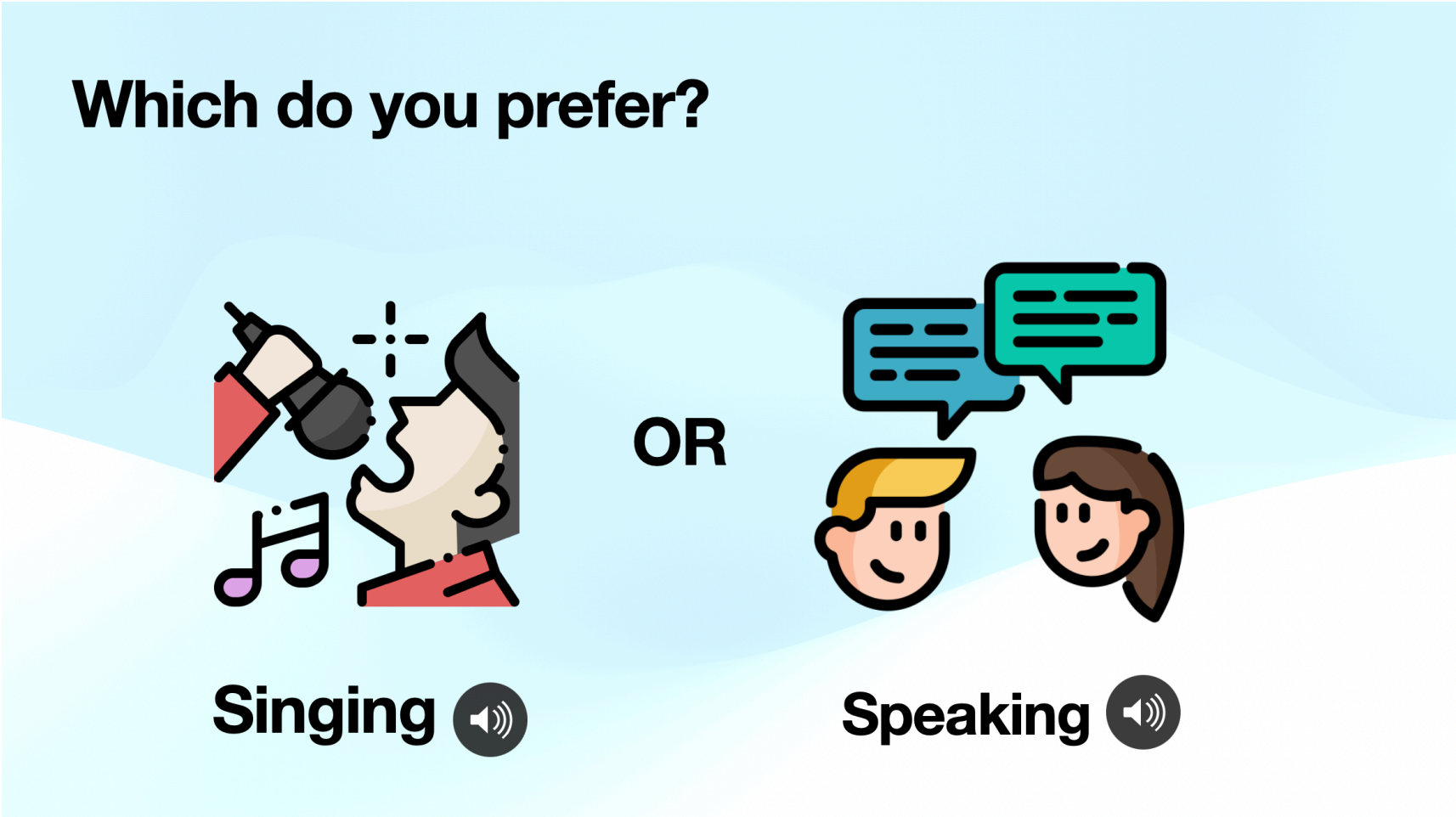


Figure 6

Which do you prefer? Sound Prefer?

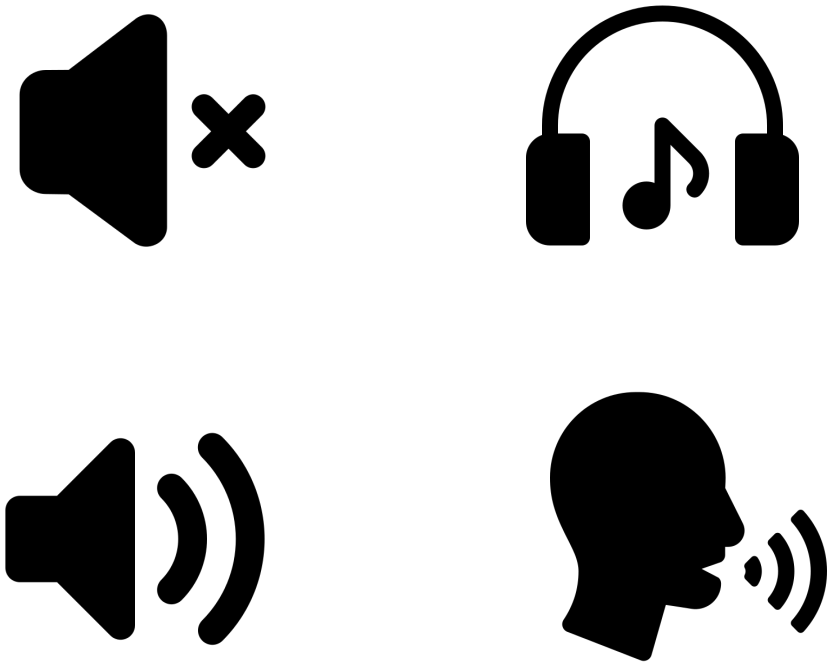


Appendix C

Visual Aids: Pictograms and Symbols in Black and White

Figure 7

Pictogram Symbols: No Sound, Sound Playing, Music in Headphones, Voice Production



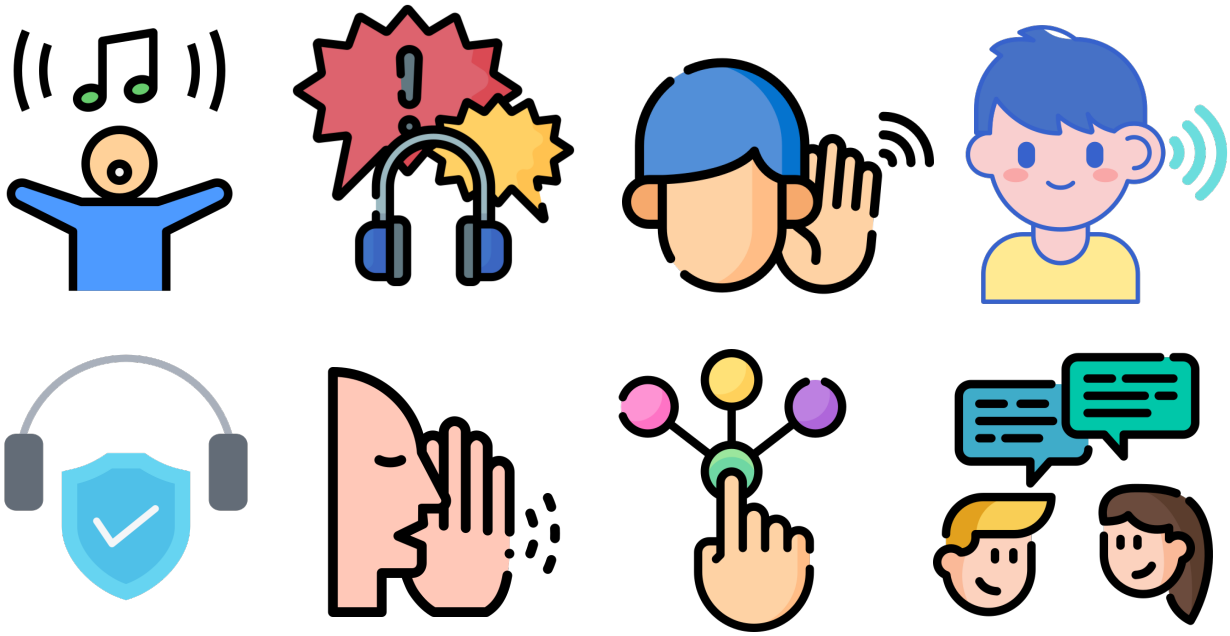
Note. Some specialized school environments may already have AAC services or licenses where specific pictograms may already be used. Pictograms such a Dynavox AAC may not have all images required to execute this program effectively, as a function of communicating sound and music. All images sourced from Flaticon.com, free commercial license with attribution.

Appendix D

Visual Aids: Pictograms and Symbols in Color

Figure 8

Collection of Pictograms and Symbols in Color

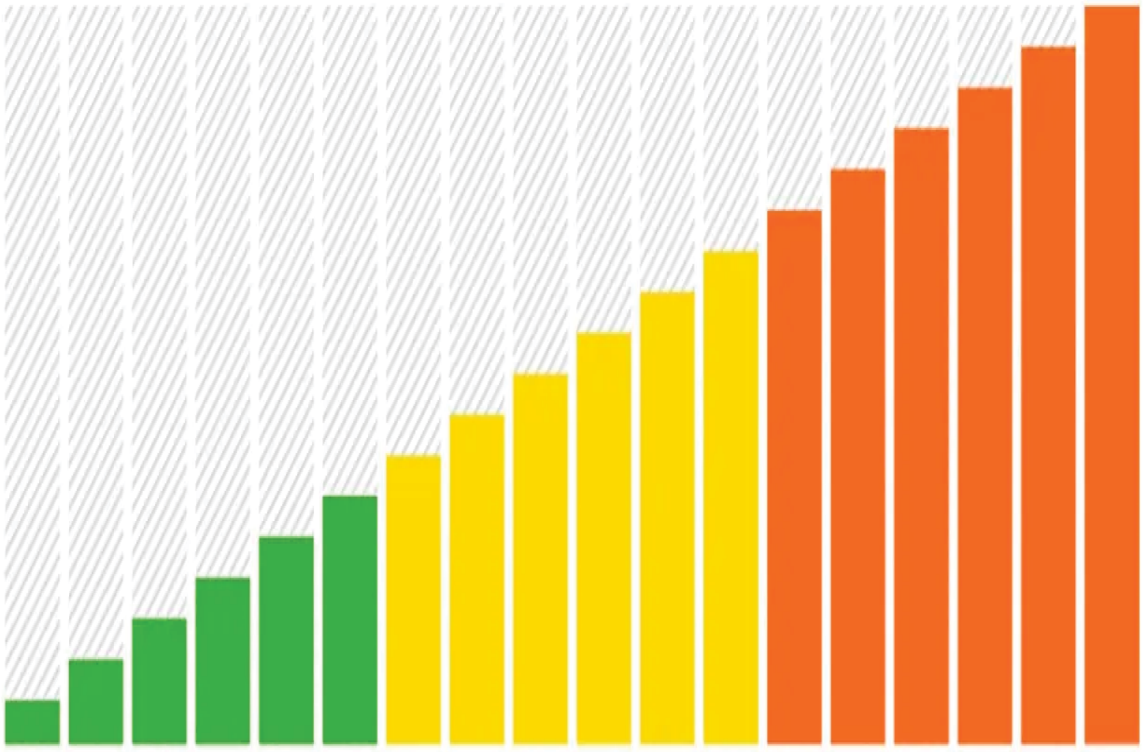


Note. All images sourced from Flaticon.com, free commercial license with attribution.

Appendix E

Figure 9

Simple Increasing Chart, Applicable for Sound



Note. Image retrieved from Adobe Stock Images (free license).