

MUSIC THERAPY FOR ADDRESSING IMPULSIVITY  
AMONG CHILDREN AND ADOLESCENTS:  
A SCOPING REVIEW OF THE LITERATURE



Miss Peeraya Saion

จุฬาลงกรณ์มหาวิทยาลัย

CHULALONGKORN UNIVERSITY

An Independent Study Submitted in Partial Fulfillment  
of the Requirements

for the Degree of Master of Arts in Music Therapy  
Inter-Department of Arts Program in Music Therapy

GRADUATE SCHOOL

Chulalongkorn University

Academic Year 2022

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บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย  
ปีการศึกษา 2565  
ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

Independent Study Title      MUSIC THERAPY FOR ADDRESSING IMPULSIVITY  
AMONG CHILDREN AND ADOLESCENTS:  
A SCOPING REVIEW OF THE LITERATURE

By                                      Miss Peeraya Saion

Field of Study                      Music Therapy

Thesis Advisor                    Associate Professor PORNPRAPIT PHOASAVADI, Ph.D.

Thesis Co Advisor                Lecturer JINHYUNG LEE, Ph.D.

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Accepted by the GRADUATE SCHOOL, Chulalongkorn University in Partial  
Fulfillment of the Requirement for the Master of Arts

INDEPENDENT STUDY COMMITTEE

----- Chairman  
(Professor BUSSAKORN BINSON, Ph.D.)

----- Advisor  
(Associate Professor PORNPRAPIT PHOASAVADI, Ph.D.)

----- Thesis Co-Advisor  
(Lecturer JINHYUNG LEE, Ph.D.)

----- Examiner  
(Lecturer NIPAT PICHAYAYOTHIN, Ph.D.)

จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY

พินิจ ชัยอ่อน : -. ( MUSIC THERAPY FOR ADDRESSING IMPULSIVITY  
 AMONG CHILDREN AND ADOLESCENTS: A SCOPING REVIEW OF THE  
 LITERATURE) อ.ที่ปรึกษาหลัก : รศ. ดร.พรประพิตร เผ่าสวัสดิ์, อ.ที่ปรึกษาร่วม :  
 อ. ดร.จิน ทยอง ลี

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สาขาวิชา    ดนตรีบำบัด

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ลายมือชื่อนิติต .....

ลายมือชื่อ อ.ที่ปรึกษาหลัก .....

ลายมือชื่อ อ.ที่ปรึกษาร่วม .....

# # 6488100020 : MAJOR MUSIC THERAPY

KEYWORD: music therapy, impulsivity, scoping review, children, adolescent

Peeraya Saion : MUSIC THERAPY FOR ADDRESSING IMPULSIVITY AMONG CHILDREN AND ADOLESCENTS: A SCOPING REVIEW OF THE LITERATURE. Advisor: Assoc. Prof. PORNPRAPIT PHOASAVADI, Ph.D. Co-advisor: Lecturer JINHYUNG LEE, Ph.D.

Impulsivity is a major symptom of several emotional and behavioral disorders that affect children and adolescents. Uncontrolled impulsivity can hinder normal development in many different areas, making it important to find proper interventions to address impulsive behaviors. Music therapy has been considered an effective approach to managing impulsivity, and a comprehensive review of relevant articles can guide the profession and promote the expanded application of music therapy to address impulsive behavioral issues.

Thus, this paper aims to identify the characteristics of studies that have investigated the use of music therapy for addressing impulsivity in children and adolescents. A scoping review was conducted, and out of 256 studies identified, 13 met the inclusion criteria. These studies were conducted between 1994 to 2022 in various geographical locations and utilized different methodologies. The diagnoses of the participants varied across studies, including ADHD, ODD, CD, depression, and other emotional and behavioral disorders. The settings of the studies included inpatient units, juvenile offenders, foster care, special residential schools, and psychiatric units. Music therapy interventions ranged from individual sessions to group sessions and incorporated various music modalities. The review paper also analyzed the geographical distribution, research methodology, research design and diagnosis categories, the setting and unit of delivery, and the music therapy interventions employed. In summary, this review highlighted the potential and applicability of music therapy for addressing impulsivity, and also recommends areas for further research.

Field of Study: Music Therapy  
Academic Year: 2022

Student's Signature .....  
Advisor's Signature .....  
Co-advisor's Signature .....

## ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to all the individuals and resources that have contributed to the completion of this literature review on addressing impulsivity among children and adolescents. First and foremost, I extend my heartfelt appreciation to the researchers and authors whose valuable studies and publications formed the foundation of this review. Their dedicated work and contributions have significantly enriched the field of music therapy and impulsivity interventions. I would also like to acknowledge the guidance and support provided by my supervisor throughout this independent study. Their expertise, insights, and encouragement have been invaluable in shaping the structure and content of this review. Furthermore, I am grateful to the academic and research institutions that have provided access to the scholarly databases and resources, enabling me to gather a comprehensive range of studies for this review. I would like to express my appreciation to my peers and colleagues who have engaged in meaningful discussions and shared their insights on this topic. Their input and feedback have been instrumental in refining the ideas and arguments presented in this review. Finally, I would like to acknowledge the support and understanding of my family and friends during the completion of this independent study. Their encouragement, patience, and belief in my abilities have been a constant source of motivation. While it is not possible to mention everyone individually, please know that your contributions, whether big or small, have played a significant role in the completion of this literature review. Thank you all for your support and involvement.

Peeraya Saion

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# CHAPTER 1

## INTRODUCTION

Impulsivity is a personality trait characterized by a tendency to act on impulse without considering the consequences of one's actions. It is a complex construct that involves multiple dimensions, including cognitive, affective, and behavioral aspects (Whiteside & Lynam, 2001). Several diagnoses typically include impulsivity as a symptom, such as attention-deficit/hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and conduct disorder (CD) (American Psychiatric Association, 2013). ADHD is a neurodevelopmental disorder characterized by symptoms of inattention, hyperactivity, and impulsivity, while ODD and CD are disruptive behavior disorders that involve problems with aggression, defiance, and rule-breaking behaviors (Frick & Morris, 2004). Additionally, emotional and behavioral disorders, such as adjustment disorders and externalizing problems, may also show symptoms of impulsivity (American Psychiatric Association, 2013).

Impulsivity can have a significant impact on the development and well-being of children and adolescents. Children who display high levels of impulsivity may have difficulty controlling their emotions, behaviors, and thoughts, which can lead to academic, social, and behavioral problems (Barkley, 1997). For example, untreated impulsivity can trigger the following negative social implications. Children and adolescents who struggle with impulsivity often experience difficulties in social interactions. Their impulsive actions, such as blurting out inappropriate comments or not considering the consequences of their behavior, can strain relationships with peers and authority figures (Barkley, 1997). They may struggle to understand social cues,

have difficulties with self-control, and engage in disruptive or aggressive behaviors, which can result in social rejection and isolation.

Jensen et al. (2007) provided information about the limitations of traditional treatments for impulsivity by reporting the long-term outcomes of the National Institute of Mental Health Multimodal Treatment Study on Children with ADHD (MTA Study). The MTA Study compared the efficacy of medication management, behavioral treatment, and a combination of both treatments in children with ADHD. While the study found that medication management was generally more effective than behavioral treatment or a combination of both treatments in reducing core symptoms of ADHD in the short term, the long-term outcomes showed that medication management did not lead to sustained symptom reduction or functional improvement. In fact, the study found that there were no significant differences in outcomes between the medication management group and the other treatment groups after three years of follow-up (Jensen et al., 2007, Banaschewski et al., 2010). These findings highlight the limitations of traditional treatments for impulsivity, particularly in terms of their long-term efficacy and ability to promote sustained functional improvement.

Music therapy has been suggested as a potential alternative therapy for addressing impulsivity in children and adolescents (Rickson, 2006). As a non-invasive and non-pharmacological intervention, music therapy offers a unique approach to addressing impulsivity that may be particularly well-suited for individuals who have not responded well to traditional treatments or who may be hesitant to try medication (Rickson & Watkins, 2003). Music therapy employs various music-related activities, including listening, singing, playing instruments, and improvisation, to assist with emotional, cognitive, and behavioral objectives (Møller et al., 2002).

There are various reasons why music can successfully address impulsive issues. Firstly, music can be used as a tool for emotion regulation, as it has the ability to modulate emotional states (Koelsch, 2014). Secondly, music can facilitate emotional expression by providing a medium for individuals to express themselves through creative means (Fachner, Gold, & Erkkilä, 2013). Thirdly, rhythm in music has been found to have a regulating effect on brain activity, which can in turn help regulate impulsive behavior (Thaut, 2010). Lastly, musical interaction can serve as a communication tool, helping individuals to express themselves in a nonverbal manner (Overy & Molnar-Szakacs, 2009).

Various techniques are used in music therapy for addressing impulsivity. These include improvisation, songwriting, and rhythmic activities (Rickson, 2006). Improvisation allows individuals to express themselves spontaneously through music, while songwriting provides a structured approach to self-expression (Wyatt, 2002). Rhythmic activities, such as drumming, have been found to have a calming effect and can promote regulation of behavior (Ross, 2015).

While there is limited literature on the use of music therapy for addressing impulsivity in children and adolescents, the available studies suggest promising results. One study by Rickson et al. (2003) found that a music therapy program promoting autonomy and creativity helped adolescents interact more appropriately, leading to a reduction in negative behaviors such as impulsivity. Other studies have also explored the use of music therapy for addressing related externalizing issues, such as CD and ODD. For example, a study by McFerran (2009) emphasizes the importance of power and control in the young man's experience of music therapy and suggests that music therapy may have a role in addressing emotional needs and

improving quality of life. The existing literature also suggests various techniques used in music therapy for addressing impulsivity and related externalizing issues. These include the use of rhythm and timing exercises to regulate behavior, improvisation and composition to promote emotional expression and creativity, and music-based social interactions to improve communication and interpersonal skills (Ross, 2015).

In order to guide the profession and promote application of music therapy to address impulsive behavioral issues, there is a need for a comprehensive review of literature. To the best of the author's knowledge, there is currently no review that specifically reviews music therapy interventions on impulsivity. Therefore, the aim of this scoping review is to analyze the key characteristics of existing studies. This will help to promote the application of music therapy as a treatment option for individuals with impulsive behavioral issues. This scoping review intends to provide a comprehensive analysis of the existing literature, identify key research themes, as well as highlight gaps in current literature. Hence, this review can help to inform the development of future research questions and hypotheses, as well as highlight possible directions for future research thereby contributing to the advancement of the field of music therapy.

The function and purpose of a scoping review is to provide a comprehensive analysis of the existing literature on a particular topic or research question and to identify key themes, research gaps, and future directions for research. It allows researchers to map the existing literature and identify key concepts, theories, and research gaps, as well as to assess the overall quality and quantity of the available evidence. This can help to guide the development of future research questions and hypotheses and to identify areas where further research is needed.

The rationale for conducting this scoping review is to provide a comprehensive and systematic overview of the existing literature on the use of music therapy to address impulsive behavioral issues. By conducting a scoping review, the study aims to identify the range of research available in this area, the types of studies that have been conducted, the methodologies used, and the populations and settings involved. This will provide a better understanding of the current state of research on music therapy for impulsive behavioral issues and identify gaps in the literature that need to be addressed in future research. The scoping review will also help guide the profession and promote the use of music therapy in addressing impulsive behavior.

### **1.1 Research questions**

The objective of the scoping review is to identify the characteristics of studies that have investigated the use of music therapy for addressing impulsive behaviors in children and adolescents. For this purpose, the following research questions have been developed:

1. What are the characteristics of studies that have investigated the use of music therapy for addressing impulsive behaviors in children and adolescents (e.g. study design, population)?
2. What are the existing gaps in the current studies and what are the requirements for future research?

## **1.2 Definition of Term**

### **1.2.1 Impulsivity**

Impulsivity is a multidimensional personality trait characterized by the inclination to act on immediate urges or desires without considering the potential consequences (Whiteside & Lynam, 2001). It encompasses various facets that contribute to impulsive behavior, including cognitive, affective, and behavioral dimensions.

Cognitively, impulsivity involves difficulties in inhibiting or controlling one's immediate thoughts and urges. Individuals with high levels of impulsivity may struggle with maintaining focus and attention, often displaying distractibility and a tendency to jump from one task or idea to another (Evenden, 1999). They may have challenges in planning, problem-solving, and considering alternative courses of action.

Affective aspects of impulsivity pertain to emotional regulation and impulsivity's association with heightened emotional reactivity. Individuals with impulsive tendencies often experience intense emotional states and have difficulty regulating their emotions effectively (Carver et al., 2008). This emotional dysregulation can lead to impulsive actions driven by immediate emotional responses rather than thoughtful consideration of the situation.

Behaviorally, impulsivity manifests as impulsive actions or behaviors that occur rapidly, often without forethought or consideration of the potential consequences (Moeller et al., 2001). Such behaviors may include engaging in risky activities, violating rules and regulations, or acting on immediate gratification without considering the long-term implications.



Understanding the multifaceted nature of impulsivity is crucial in comprehending its impact on individuals' decision-making, self-control, and overall functioning. By considering the cognitive, affective, and behavioral dimensions of impulsivity, researchers and clinicians can develop targeted interventions and strategies to address impulsivity-related challenges and promote healthier decision-making and self-regulation.



## **CHAPTER 2**

### **METHODOLOGY**

#### **2.1 Scoping Review**

According to Colquhoun et al. (2014), A scoping review is a way to gather and analyze existing research on a particular topic or field. Its goal is to identify the important ideas, areas where more research is needed, and the types of evidence available to help inform policy and practice guidelines. Essentially, it helps researchers and policymakers get a big-picture understanding of what's already been studied and what areas need further exploration (Colquhoun et al., 2014).

To design this scoping review, the researcher followed the methodology recommended by Arksey and O'Malley (2005), which involves avoiding strict search term limitations at the start of the process to ensure all relevant studies are included. This process is iterative and requires thoughtful engagement with each stage to ensure comprehensive coverage of the literature. The methodology has six stages, and in this review, the first five were as the last stage "consultation exercise" is considered optional. These stages include identifying research questions, relevant studies, selecting studies, charting data, and summarizing and reporting the results (Arksey & O'Malley, 2005).

#### **2.2 Data Sources and Search Strategy**

The search strategy used to identify relevant studies for the scoping review on music therapy for addressing impulsivity in children and adolescents included a comprehensive search of the following electronic databases: Academic Search

Ultimate, PubMed, CORE, ERIC, and Scopus. The search terms used were selected based on the research question and included keywords related to music therapy, impulsivity, and children/adolescents. The specific Boolean operators used to search the databases were:

- Music therapy OR music intervention OR music-based intervention
- Impulsi\* OR aggress\* OR offens\* OR assault OR Tantrum OR hostile OR destruct\* OR irrita\*
- ADHD OR attention deficit hyperactivity disorder OR attention deficit-hyperactivity disorder

Boolean operators (AND, OR) and truncation symbols (\*) were used to expand the search and retrieve as many relevant studies as possible. In addition to the electronic database search, the reviewer also conducted a manual search of the reference lists of the included studies and relevant reviews to identify additional studies that may have been missed by the electronic search. The reviewer also searched the websites of music therapy organizations and hand-searched the Journal of Music Therapy and Music Therapy Perspective to identify relevant studies.

### **2.3 Inclusion and Exclusion Criteria**

The inclusion criteria used to screen studies for eligibility in this scoping review were:

- Studies that used music therapy as an intervention to address impulsivity among children and/or adolescents.
- Studies that were published in English.

- Studies that focused on music therapy for populations of children and adolescents.

The exclusion criteria were:

- Studies that did not use music therapy as an intervention to address impulsivity.
- Studies that were not published in English.
- Studies that were not peer-reviewed journal articles (e.g., book chapters, dissertations, etc.).
- Studies that were not available in full text.

#### **2.4 Study Selection Process**

In this scoping review, one reviewer was involved in the screening process. The reviewer used two tools to manage the screening process - Rayyan, a web-based tool for screening and managing studies, and a Google Sheet to track the progress of the screening process. Initially, the reviewer imported all the search results into Rayyan, which removed duplicates and allowed the reviewer to screen the studies based on their titles and abstracts. The reviewer screened each study independently, based on the inclusion and exclusion criteria mentioned earlier. After the initial screening, the reviewer moved the selected studies into the next stage of screening, where full-text articles were assessed for eligibility. The same inclusion and exclusion criteria were used to screen the full-text articles. The reviewer also used a Google Sheet to track the progress of the screening process. The sheet contained information about the number of studies at each stage of the screening process and allowed the reviewer to identify the studies that needed further review.

## 2.5 Data Extraction

The process for extracting and charting data from the included studies involved several steps. First, the researcher extracted relevant data from each study, including study characteristics such as author, year of publication, and study design. Other variables of interest included Study design (e.g., randomized controlled trial, case study), age range of participants, participant demographics, settings of the study (e.g., hospital, school, community), music therapy techniques used (e.g., songwriting, improvisation), and main findings or outcomes of the study. The software used for managing the data charting process was Google Sheets, a cloud-based spreadsheet program. This tool allowed the researcher to easily organize and manipulate the extracted data, and collaborate with the advisor during the review and confirmation process. The sheet included columns for each variable of interest, and each row represented a single study. The researcher entered the extracted data into the appropriate cells of the sheet. To confirm the accuracy of the extracted data, the researcher discussed and reviewed the data with her advisor. Any discrepancies or errors were identified and corrected during this process.

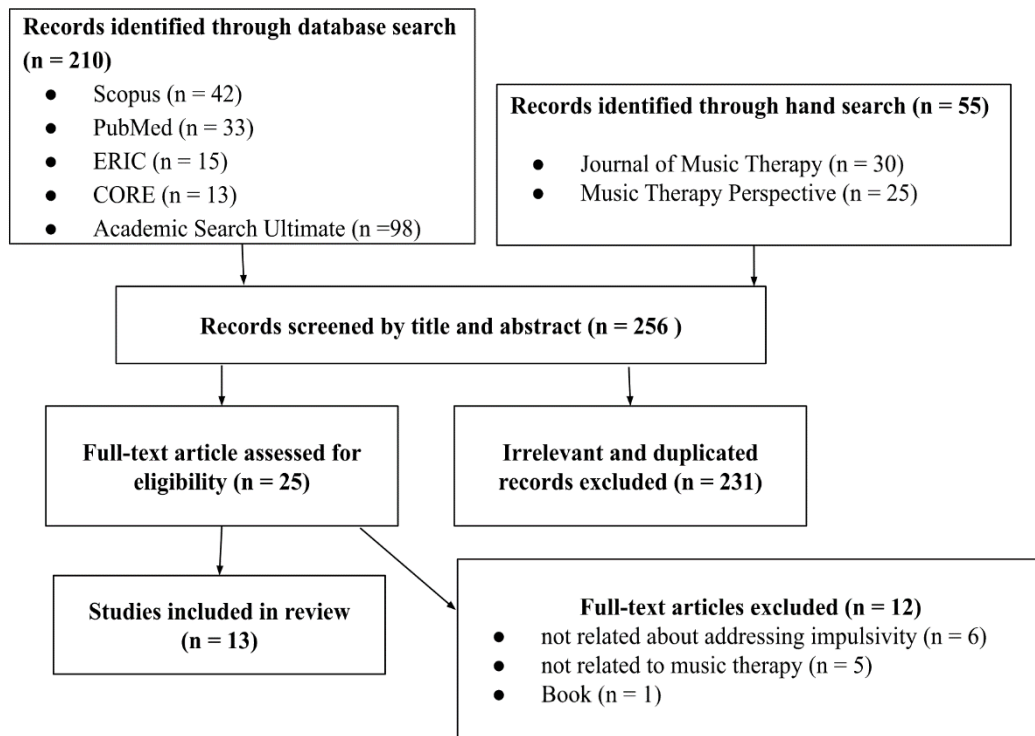
To synthesize the results, the researcher followed a step-by-step approach. After extracting relevant data from each study and ensuring its accuracy through discussions with the advisor, the researcher proceeded to create tables for result synthesis. This involved identifying key themes or variables, grouping the data accordingly, and designing table structures using software like Google Sheets. The extracted data was then populated into the tables, with each row representing a study and columns capturing relevant details. The researcher analyzed the data within each table, identifying patterns and drawing conclusions.

## CHAPTER 3

### RESULTS

#### 3.1 Overview

A total of 256 studies were identified through the literature search of various databases. After removing duplicates and applying the inclusion and exclusion criteria, 13 studies were found to meet the eligibility criteria for this scoping review. A total of 243 studies were excluded from this scoping review based on the following inclusion and exclusion criteria. The inclusion criteria included studies that utilized music therapy as an intervention to address impulsivity in children and/or adolescents, were published in English, and focused on populations of children and adolescents. Based on the exclusion criteria, the reviewer excluded studies that did not utilize music therapy as an intervention for impulsivity, were not published in English, were not peer-reviewed journal articles, and were not available in full text. *Figure 1* provides a summary of the search process and study selection.



**Figure 1** Flowchart of Literature Search Process

### 3.2 General characteristics of included studies

A list of general characteristics of included studies includes the year of publication, study location, research type, and study methodology.

**Table 1** General characteristics of included studies

Author(s), year	Location	Research type	Research methodology	<i>N</i>
Slotoroff, 1994.	USA	Qualitative	Case Study	N/A
Wyatt, 2002.	USA	Opinion paper with intervention examples	N/A	N/A
Layman et al., 2002	USA	Opinion paper with case examples	N/A	N/A
Rickson & Watkins, 2003	New Zealand	Quantitative	Pilot RCT	Gr1=6 Gr2=5 Gr3=4
Rickson, 2006	New Zealand	Quantitative	3-arm RCT	Gr1=5 Gr2=5 Gr3=4
McFerran, 2009	Australia	Qualitative	Case study / Grounded theory	N/A
Hakvoort, 2015.	The Netherlands	Opinion paper with case examples	N/A	N/A
Ross, 2015.	USA	Quantitative	Single group repeated measures design	12
Mahendran & Jagdeesan. 2017.	India	Quantitative	2 groups Pre-posttest design	Gr1=15 Gr2=15
Helle-Valle et al., 2017	Norway	Qualitative	Case study	4
Curreri, 2018.	USA	Qualitative	Case Study	8
dos Santos, 2018	South Africa	Qualitative	Descriptive phenomenology	6
Zhu, 2022	China	Quantitative	RCT	Gr1=60 Gr2=60

The included studies were published over a span of almost three decades, from 1994 to 2022, and originated from a diverse range of countries. These countries include the United States of America (n=5), New Zealand (n=2), South Africa (n=1),



**Table 2** List of study location

Author(s) and Years	Study Location
Slotoroff, 1994.	USA
Wyatt, 2002.	USA
Layman et al., 2002	USA
Ross, 2015.	USA
Curreri, 2018.	USA
Rickson & Watkins, 2003	New Zealand
Rickson, 2006	New Zealand
McFerran, 2009	Australia
Hakvoort, 2015.	The Netherlands
Helle-Valle et al., 2017	Norway
Zhu, 2022	China
Mahendran & Jagdeesan. 2017.	India
dos Santos, 2018	South Africa

The included studies used a variety of research methodologies and designs. The most frequent type of qualitative design was a case study (n=3), followed by one each of phenomenology and grounded theory. In terms of quantitative designs, there were two randomized controlled trials (RCTs) and one pilot RCT, as well as a single-group repeated measures design and a pre-posttest design with two groups. Among the total of 13 studies included in this review, 5 were qualitative, 5 were quantitative, and 3 were opinion papers. Among the 3 opinion papers, two presented case examples and one presented an intervention example.

**Table 3** List of Research type and Research Methodology

Research Type	Research methodology
Qualitative (n=5)	Case Study, Grounded theory, Descriptive phenomenology
Quantitative (n=5)	2-arm RCT, 3-arm RCT, 2 groups pre-posttest design , single group repeated measures design
Expert opinion paper (n=3)	With case and intervention examples

The average sample size across all the studies is approximately 14 participants. However, it's worth noting that this average is skewed by the relatively large sample size (n=120) in one of the studies. Excluding that study, the average sample size drops to about 6 participants. The majority of the studies had small sample sizes, with 7 out of 11 studies having less than 10 participants. Only one study had a sample size greater than 50, and that was the randomized controlled trial with a total of 120 participants.

#### **Information about Setting and Participant characteristics of included studies**

Included studies had varying settings and participant characteristics. The age range of participants varied across studies, and several studies focused on individuals with specific diagnoses or conditions. The unit of delivery for interventions also varied, with some studies using group interventions and others using individual interventions.

**Table 4** Information about setting and participant characteristics, including studies.

Author(s) & Years	Setting	Unit of delivery	Age of Participants	Population	Diagnosis or Condition
Slotoroff, 1994.	Inpatient Units at a Short-term Psychiatric Institute.	Idv	11 year old from case #2	old Adolescents to adults	PTSD, borderline personality disorder, impulse control disorders, and depression.
Wyatt, 2002.	Juvenile Offenders	N/A	under the age of 18	Adolescents	Substance abuse, ODD, CD, and ADD or ADHD.
Layman et al., 2002	Foster Care	N/A	N/A	Children	No specific diagnosis, Children in foster care
Rickson & Watkins, 2003	& Special Residential School	Gr	11 to 15	Adolescents	ADD / ADHD, General Developmental Delay, and one each of head injury and Depression, ODD or CD
Rickson, 2006	Residential Education School	N/A	11 to 16	Adolescents	ADHD
McFerran, 2009	School	Idv, Gr	12	Adolescents	ADD and ADHD or Emotional Behavioral Disorders (EBD)
Hakvoort, 2015.	Forensic Psychiatry	Idv	N/A	N/A	ADHD

**Table 4** Information about setting and participant characteristics, including studies. (continued)

Author(s) & Years	Setting	Unit of delivery	Age of Participants	Population	Diagnosis or Condition
Ross, 2015.	School	Gr	3 to 5	Children	ODD, ADD, Bipolar Disorder, Anxiety Disorder, and Pervasive Developmental Disorder.
Mahendran Jagdeesan. 2017.	& Occupational Therapy Foundation	Gr	6 to 12	Children to Adolescent	ADHD
Helle-Valle et al., 2017	Norwegian kindergarten.	Gr	5 to 6	Children	No specific diagnosis, Restlessness
Curreri, 2018.	Psychiatric Unit	Idv, Gr	under the age of 18.	Adolescents	MDD, childhood-onset schizophrenia (COS), mood disorder not otherwise specified (MD-NOS), CD, ASD, ADHD, body dysmorphic disorder (BDD), and ODD.
dos Santos, 2018	School	Gr	15 to 18	Adolescents	ADHD
Zhu, 2022	Hospital	Gr	N/A	Children	ADHD

*Note.* ADD: attention deficit disorder; ADHD: attention deficit hyperactivity disorder; ASD: autism spectrum disorder; CD: conduct disorder; Gr: group; Idv: individual; MDD: major depressive disorder; ODD: oppositional defiant disorder; PTSD: Post-Traumatic Stress Disorder.

The list contains various studies that explore the use of music therapy with different populations, including adolescents and children with various diagnoses such as PTSD, borderline personality disorder, impulse control disorders, ADHD, ODD, Conduct Disorder, substance abuse, and emotional behavioral disorders. Some studies did not specify a particular diagnosis, such as those conducted in foster care and forensic psychiatry settings. Music therapy was used as an intervention to improve symptoms related to these diagnoses, such as impulsivity, restlessness, and emotional dysregulation.

**Table 5** List of research studies categorized by research design and diagnosis

Research Type	Research methodology	Diagnosis or Condition
Qualitative (n=5)	Case Study	PTSD, borderline personality disorder, impulse control disorders, and depression. (Slotoroff, 1994)
		MDD, childhood-onset schizophrenia (COS), mood disorder not otherwise specified (MD-NOS), CD, ASD, ADHD, body dysmorphic disorder (BDD), and ODD. (Curreri, 2018)
		No specific diagnosis, Restlessness (Helle-Valle et al., 2017)

**Table 5** List of research studies categorized by research design and diagnosis  
(continued)

Research Type	Research methodology	Diagnosis or Condition
	Grounded theory	ADHD (McFerran, 2009)
	Descriptive phenomenology	ADD and ADHD or Emotional Behavioural Disorders (EBD) (dos Santos, 2018)
Quantitative (n=5)	2-arm RCT	ADD / ADHD, General Developmental Delay, and one each of head injury and Depression, ODD or CD (Rickson & Watkins, 2003)
	2-arm RCT	ADHD (Zhu, 2022)
	3-arm RCT	ADHD (Rickson, 2006)
	2 groups pre-posttest design	ADHD (Mahendran & Jagdeesan. 2017)
	single group repeated measures design	ODD, ADD, Bipolar Disorder, Anxiety Disorder, and Pervasive Developmental Disorder.(Ross,2015)

*Note.* ADD: attention deficit disorder; ADHD: attention deficit hyperactivity disorder; ASD: autism spectrum disorder; CD: conduct disorder; Gr: group; Idv: individual; MDD: major depressive disorder; ODD: oppositional defiant disorder; PTSD: Post-Traumatic Stress Disorder.

This information includes a list of research studies categorized by research design and diagnosis. There are five qualitative studies that use case study, grounded theory, and descriptive phenomenology research designs, and focus on diagnoses such as PTSD, borderline personality disorder, depression, ADHD, and restlessness. The quantitative studies, also numbering five, include 2-arm and 3-arm randomized controlled trials, pre-posttest designs, and single group repeated measures designs, and they focus on diagnoses such as ADHD, general developmental delay, head injury, depression, ODD, ADD, bipolar disorder, anxiety disorder, and pervasive developmental disorder.

**Table 6** Dependent Variables or Operational Definitions Related to Impulsivity

	Measurement tools	Description
Formalized tools	Synchronised Tapping Task (STI) (Humphrey, 2003)	Physical task performance of tapping a button in time with a metronome beat
	Conners' Rating Scales (Conners, 1997)	a 48 item questionnaire tool to assess the impulsive behavior filled out by parents
	The ADHD rating scale for parents (ADHD-RS-IV) (Ai et al.2020)	a 18 item questionnaire tool to assess the hyperactivity impulsiveness and attention filled out by parents

**Table 6** Dependent Variables or Operational Definitions Related to Impulsivity

(continued)

	Measurement tools	Description
	The Developmental Behaviour Checklist (DBC) (Einfeld and Tonge, 1995)	a 34 item questionnaire tool to Disruptive Behavior and Antisocial Behavior filled out by parent, teacher, or other caregiver
	The 2001 Teacher's Report Form (TRF) (Thomas, 2001)	a 118 item questionnaire tool to emotional and behavioral problems filled out by parent, teacher
Qualitative data	The researcher observed the music therapy sessions through video footage and recorded progress notes at the conclusion of each session. (McFerran, 2009)	
	The collection of data through observational recordings to assess changes in student behavior (Ross, 2015)	



**Table 7** Operational definitions of Impulsivity in Included Studies

Terms	Definitions	Author(year)
Impulsivity	Impulsivity was specifically defined as motor impulsivity, which refers to the tendency to act without thinking or to act quickly without considering the consequences.	Rickson, 2006
	Impulsivity can manifest in various ways, such as interrupting others, acting without thinking, difficulty waiting for one's turn, and engaging in risky behaviors without considering the consequences.	Helle-Valle et al., 2017
	Impulsivity in trauma survivors can manifest in various behaviors, including but not limited to, difficulties with anger management and exhibiting violent tendencies towards themselves, others, and property.	Slotoroff, 1994.
Destructive impulse	Destructive impulses refer to the urge or desire to engage in harmful or aggressive behavior towards oneself or others.	dos Santos, 2018
Impulse control	Impulse control refers to the ability to resist or delay an impulsive action or behavior.	Wyatt, 2002.

The dependent variables related to impulsivity include measurement tools such as the Synchronized Tapping Task (STI), Conners' Rating Scales, the ADHD rating scale for parents (ADHD-RS-IV), the Developmental Behavior Checklist (DBC), and the Teacher's Report Form (TRF). In addition, some studies also used researcher-developed methods such as the collection of data through observational recordings to assess changes in student behavior.

The definitions of impulsivity varied across the studies. Rickson (2006) defined it as motor impulsivity, while Wyatt (2002) titled it impulse control as the ability to resist or delay impulsive actions. Helle-Valle et al. (2017) associated impulsivity with attention deficit hyperactivity disorder (ADHD), while Zhu (2022)

used a scale that included items related to impulsivity. Slotoroff (1994) described "destructive impulses" as harmful or aggressive behavior towards oneself or others, while dos Santos (2018) linked impulsivity in trauma survivors with difficulties in anger management and violent tendencies

**Table 8** Music Therapy Interventions in the Included Studies

	Music Intervention	Authors (years)
Compositional	Rap-based intervention	Hakvoort, 2015.
	Musical story creation	dos Santos, 2018
	Songwriting	dos Santos, 2018; Layman et al., 2002; Rickson & Watkins, 2003; Wyatt, 2002.
Improvisational	Free improvisations	dos Santos, 2018; Zhu, 2022
	Improvisation (unspecified)	Helle-Valle et al., 2017; McFerran, 2009; Rickson, 2006; Wyatt, 2002
	Improvisational drumming	Slotoroff, 1994
Receptive	Themed improvisations	dos Santos, 2018
	Lyric analysis	Layman et al., 2002; Wyatt, 2002
	Music listening	Mahendran & Jagdeesan, 2017; Wyatt, 2002
	Relaxation techniques	Mahendran & Jagdeesan, 2017
	Song choice	Rickson & Watkins, 2003
	Sound-based interventions	Curreri, 2018
	Recreative	Instrumental-Related
Echo playing and interaction		Zhu, 2022
Learning by music		Layman et al., 2002
Live music		Layman et al., 2002; McFerran, 2009
Playing an instrument		Helle-Valle et al., 2017; Mahendran & Jagdeesan, 2017; Zhu, 2022
Song-Related		
Musical role-playing		Layman et al., 2002
Personalized song		Rickson & Watkins, 2003
Recreational song singing		McFerran, 2009
Rhythm-based activities		Rickson & Watkins, 2003; Ross, 2015

The studies included a variety of music therapy interventions with corresponding authors and years. These interventions ranged from active approaches like improvisational drumming (Slotoroff, 1994), songwriting (dos Santos, 2018; Layman et al., 2002; Rickson & Watkins, 2003; Wyatt, 2002), live music production (Layman et al., 2002; McFerran, 2009), and rhythm-based activities (Rickson & Watkins, 2003; Ross, 2015), to a combination of active and passive interventions such as playing instruments (Helle-Valle et al., 2017; Mahendran & Jagdeesan, 2017; Zhu, 2022), singing (McFerran, 2009), and listening to music (Mahendran & Jagdeesan, 2017; Wyatt, 2002).

One study specifically explored a rap-based intervention involving performing, mastering, recording, expressing, composing, and creating (Hakvoort, 2015). Another unique intervention incorporated avant-garde-inspired sound-based techniques, including elements like silence, environmental sounds, and non-predictable rhythms (Curreri, 20).

## **CHAPTER 4**

### **DISCUSSION**

#### **4.1 Summary of Results**

A total of 256 studies were initially screened, and only 13 studies met the inclusion criteria. These 13 studies were conducted between 1994 to 2022 and were conducted in various geographical locations. The studies employed different methodologies to investigate the use of music therapy for addressing impulsive behaviors in children and adolescents.

#### **4.2 Year of Publication**

From the results, the distribution of the publication years of included studies indicates that there was only one study published in the 1990s, five published in the first decade of the 2000s, six published in the second decade, and just one study published in 2022. This suggests that there has not been a significant increase in the number of publications on the topic over time, but rather a steady publication rate.

According to the Centers for Disease Control and Prevention (CDC), the prevalence of ADHD has been steadily increasing over the past few decades, with an estimated 9.4% of children in the United States being diagnosed with ADHD in 2016 (CDC, 2021). This rise in the number of ADHD cases suggests that many children and adolescents continue to suffer from the behavioral problems associated with impulse control issues.

Behavioral problems associated with ADHD can include difficulties with attention, hyperactivity, impulsivity, and poor social skills (American Psychiatric

Association, 2013). These symptoms can have a significant impact on the child's academic and social functioning, as well as their overall quality of life. If the impulsive issues are not addressed, children with ADHD will likely continue to struggle to pay attention in classes, complete assignments late or incomplete, and interact inappropriately with peers and adults. The rising number of ADHD cases and a steady publication rate suggest the need for further research and publication on the use of music interventions for children and adolescents with impulse control issues.

#### **4.3 Geographical distribution of study**

In terms of geographical distribution, the studies were conducted in four different continents: North America (n = 5), Europe (n = 2), Asia (n = 2), Oceania (n = 2), and Africa (n = 1). North America had the highest representation, with five studies originating from the United States.

The distribution of the studies across different continents reveals some interesting patterns. The majority of the studies (five out of thirteen) were conducted in North America, with the United States being the most represented country. This could be attributed to a range of factors such as greater research funding opportunities, more number of active music therapists, more established research institutions, or a higher prevalence of music therapy programs in the region. Nevertheless, considering the high prevalence of behavioral issues observed among children and adolescents with impulsivity worldwide, it is crucial to conduct more research across different regions globally.

#### 4.4 Research Methodology

The studies reviewed here used a variety of methodologies, including qualitative case studies, quantitative experimental designs, and opinion papers with case examples.

The qualitative studies examined in this review yielded valuable findings about the participants' experience regarding the impacts of music therapy interventions. For instance, Slotoroff (1994) explored the effects of improvisational drumming on impulsivity, highlighting the potential of active drumming activities to facilitate self-expression, emotional regulation, and impulse control. In this study, details of the music therapy progression was found, such that, the participant in the case was able to demonstrate longer self-control, where the participant was able to take a longer time to say stop to the music therapist's continuous playing. This demonstrated his experience of self-control.

Quantitative studies, such as those conducted by Rickson & Watkins (2003), Rickson (2006), Ross (2015), Mahendran & Jagdeesan (2017), and Zhu (2022), used numerical data to investigate the efficacy of music therapy. For example, Mahendran & Jagdeesan (2017) demonstrated students with ADHD who engaged in both active and passive participation in music therapy had a significant impact on decreasing their social and emotional difficulties. While it is common that usual quantitative studies involve larger sample sizes, the sample sizes in these articles may have been relatively small due to the sensitivity and complexity while working with this target group. With a relatively small number of participants; approximately 14 participants, excluding a study by Zhu (2020), it is recommended to future studies should consider increasing sample sizes to enhance statistical power and improve the generalizability of findings.

Increasing sample sizes in future research can contribute to building a stronger evidence base for the effectiveness of music therapy in addressing impulsivity among children and adolescents. However, due to specificity and limitations of obtaining result based on different diagnosis, the research methodology in relationship to appropriate diagnosis will be discussed next.

#### **4.5 Research studies categorized by research design and diagnosis**

##### **Quantitative Studies**

Firstly, within all quantitative studies in this review, diagnoses mostly were with on the children and adolescents with ADHD and ADD, while other diagnoses used more qualitative research methodology. This could be due to a higher accessibility and prevalence of children and adolescences diagnosed with ADHD and ADD (CDC, 2021), whereas with other diagnoses it could be harder to obtain a high number of cases for quantitative studies.

With other diagnoses, apart from ADHD and ADD, although their qualitative data can demonstrate the valuable experiences of the participants, quantitative results is nevertheless important as it helps to support the efficacy of music therapy treatment. Therefore, to provide the benefits of music therapy for other diagnosis apart from ADHD and ADD based on quantitative methodology, due to its difficult to obtain a high number of participants, the use of simple case designs can be considered and expanded.

##### **Qualitative Studies**

Other diagnoses, apart from ADD and ADHD often use more qualitative methodology as the research methodology. These studies often examine music

therapy in different settings, resulting an overview of music therapy for a variety of diagnoses. Although the studies my demonstrate a variety of data amongst the different diagnoses, future studies may focus on one type of client to go further in depth in the experiences of clients in music therapy. This is possible as qualitative studies require a smaller number of sample sizes.

#### **4.6 The setting and unit of delivery**

Based on the information presented in Table 5, the delivery of music therapy for addressing impulsivity varied across different settings; schools, psychiatrist units, and medical settings. Firstly, in school settings, four articles out of five articles (80%) conducted in group format, and the remaining one article involved both group and individual format. Group sessions in schools may be because schools provide a social context where students can interact with their peers and receive social support (Baker & Jones, 2006). Group sessions in the school setting also offer opportunities for children and adolescents to engage in collaborative musical activities, fostering social interaction and the development of interpersonal skills (Brooks, 2018). The presence of peers in group sessions can create a supportive and inclusive atmosphere, promoting a sense of belonging and enhancing the therapeutic benefits of music therapy interventions (Baker et al., 2005)).

Next, in medical settings, including a hospital and an occupational therapy context, it was found that the music therapy sessions were delivered in a group format. This finding aligns with previous research indicating that group-based interventions are commonly used in medical settings (Silverman, 2015). Group sessions in medical settings offer the opportunity for individuals with similar



conditions or challenges to come together, share experiences, and provide mutual support (Leszcz & Malat, 2011). Group dynamics and peer interactions in medical settings can create a sense of camaraderie and reduce feelings of isolation, thereby enhancing the overall therapeutic experience and outcomes (Castelein et al., 2015).

On the other hand, in psychiatric units, two out of three articles (67%) delivered individual basis, while the one remaining is both group and individual. This preference for individual sessions in psychiatric units may be influenced by the specific needs and therapeutic goals of individuals with psychiatric conditions. Individual sessions allow for personalized attention, tailoring the intervention to address the unique needs and challenges of each individual (Välimäki & Lantta, 2018). In psychiatric settings, individuals may require a more focused and individualized approach to address their impulsivity and related emotional and behavioral difficulties. Individual sessions provide a safe and confidential space for individuals to explore their emotions, work on specific goals, and receive individualized support from the therapist (Connor & Doerfler, 2021).

Therefore, as discussed above the choice of session format in different settings may be influenced by various factors, including the social context, therapeutic goals, and individual needs of the participants. Group sessions in school settings may capitalize on the social environment and peer support, while group sessions in medical settings can foster a sense of camaraderie and reduce feelings of isolation. Individual sessions in psychiatric units allow for personalized attention and address specific needs.

#### **4.7 Music therapy intervention**

Most of the interventions used in the reviewed studies had a rhythmic focus. Rhythm, as an inherent element of music, has been recognized for its potential to address impulsivity among children and adolescents. The predictable and structured nature of rhythm provides a foundation for individuals to regulate their impulses and establish a sense of stability and control (Thaut, 2013). The rhythmic elements of music engage individuals on a sensory and motor level, promoting self-awareness, emotional regulation, and adaptive behavior. Consequently, music therapists have utilized rhythm-based interventions to harness these therapeutic qualities in addressing impulsivity.

Drumming and rhythm-based interventions have emerged as prominent approaches within music therapy to address impulsivity. These interventions aim to facilitate self-regulation, emotional expression, and impulse control through rhythmic activities. Improvisational drumming, for instance, allows participants to engage in active drumming, providing them with a platform for rhythmic and creative expression. The rhythmic patterns and beats created during drumming sessions are harnessed to promote impulse management and emotional regulation. Additionally, rhythm-based strategies, such as clapping, tapping, or body movements, are employed to facilitate self-regulation and attentional control. The repetitive and structured nature of rhythm-based interventions helps individuals with impulsivity develop a sense of predictability, enhance focus, and improve impulse management.

Several studies have highlighted the effectiveness of drumming and rhythm-based interventions in addressing impulsivity. Slotoroff (1994) implemented improvisational drumming as an active music therapy intervention, allowing

participants to express themselves rhythmically and creatively. Rickson and Watkins (2003) integrated drumming within a broader music therapy framework that included songwriting, personalized song creation, and active rhythm-based activities. These interventions provided a holistic approach to address impulsivity, incorporating multiple therapeutic elements. Ross (2015) employed rhythm-based strategies, such as clapping and tapping, to promote self-regulation and attentional control. These examples illustrate how drumming and rhythm-based interventions offer unique avenues for individuals to develop self-control, enhance attentional skills, and cultivate emotional regulation through engaging with rhythmic patterns, beats, and musical interactions.



## **CHAPTER 5**

### **CONCLUSION**

#### **5.1 Summary of findings**

The review of 13 studies on the use of music therapy to address impulsive behavior in children and adolescents found that research on this topic has been steady rather than increasing over time. The studies were conducted in various locations globally, with North America having the most representation. The studies employed different research methodologies, including qualitative case studies and quantitative experimental designs. The settings where these studies were conducted varied, including clinical and non-clinical settings, and the unit of delivery varied across different contexts.

#### **5.2 Recommendations for future research**

This review demonstrates that current studies have small sample sizes. Future studies, therefore, should prioritize increasing sample sizes to strengthen the evidence base for the effectiveness of music therapy in addressing impulsivity among young populations. Next, due to current research that examine the overall results of different diagnosis, it is essential for future research to carefully align the research methodology with the appropriate diagnosis to give more insights into specific impulsivity-related disorders, such as ADHD, ODD, CD, and others. Researchers may choose to focus on a particular type of client in future studies to delve deeper into their experiences with music therapy. Future research may also consider doing single-subject design studies as it may be difficult to obtain a high number of participants.

### 5.3 Limitations

This review was the outcome of a manual search of five online databases and two music therapy journals. Therefore, it is possible that some relevant articles published elsewhere were excluded. Moreover, the review is limited to English language articles, which may have resulted in the exclusion of articles published in other languages. Additionally, the search terms used were restricted to music therapy, impulsivity, and ADHD. As a result, some studies that used different key terms may have been missed.



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## VITA

**NAME** Peeraya Saion

**INSTITUTIONS ATTENDED** Bachelor of Arts in Music with First Class Honours at Superstar College of Arts, Siam University, Thailand (2018-2021)

Masters of Arts in Music Therapy at Chulalongkorn University, Thailand (2021-Current)

