

RHYTHMIC DEVICE FOR NEURODEVELOPMENTAL SUPPORT

A DEVICE THAT COMBINES MUSIC AND RHYTHMIC MOVEMENT TO
SUPPORT INDIVIDUALS WITH NEURODEVELOPMENTAL DISORDERS
WHILE ENHANCING THEIR SENSORY EXPERIENCES AND CREATIVITY.

DNB311 ID STUDIO 7 CAPSTONE

RESEARCH REPORT A1 PART 1

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5463 WORDS

AUTHENTICITY STATEMENT

This is to certify that to the best of my knowledge, the content of this report is my own work. This report has not been submitted for any subject or for other purposes. I certify that the intellectual content of this report is the product of my own work.

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06/09/24

AI USE STATEMENT

I have utilised Generative AI in this report, with using the AI tool of Chat GPT to assist with refining my report. This includes using AI to help condense certain sections that were initially word heavy.

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EXECUTIVE SUMMARY

This report details the development of a rhythmic device designed to support young adults with neurodevelopmental disorders, particularly with those with hyperactivity and inattentiveness symptoms. The device aims to provide immediate stress relief and long-term cognitive and behavioural benefits while building a creative outlet using music therapy and rhythmic movement which addresses gaps in current coping tools that often lack customisation.

Key Findings and Device Concept

Research highlights a need for tools that combine rhythmic movement and music therapy without overstimulation. The device features:

- **Customisation:** Adjustable sound control and rhythmic patterns designed for individual needs.
- **Portability:** A discreet, lightweight design inspired by silent drum kits and be suitable for any setting.
- **Affordability:** Cost-effective, durable and eco-friendly materials.
- **Modern Aesthetic:** A sleek design appealing to young adults combining as a therapeutic tool and personal accessory.

Target Audience and Market Potential

Aimed at young adults aged 18-25, the device integrates seamlessly into everyday life by offering a non-medical, tech-driven solution for managing symptoms. Expert feedback indicates strong market potential, particularly if it remains affordable and easy to use.

Conclusion

The rhythmic device presents a unique solution for individuals with neurodevelopmental disorders by enhancing daily life through rhythmic and creative engagement. It addresses current gaps in coping mechanisms by offering a practical, user-friendly and therapeutic tool for young adults.

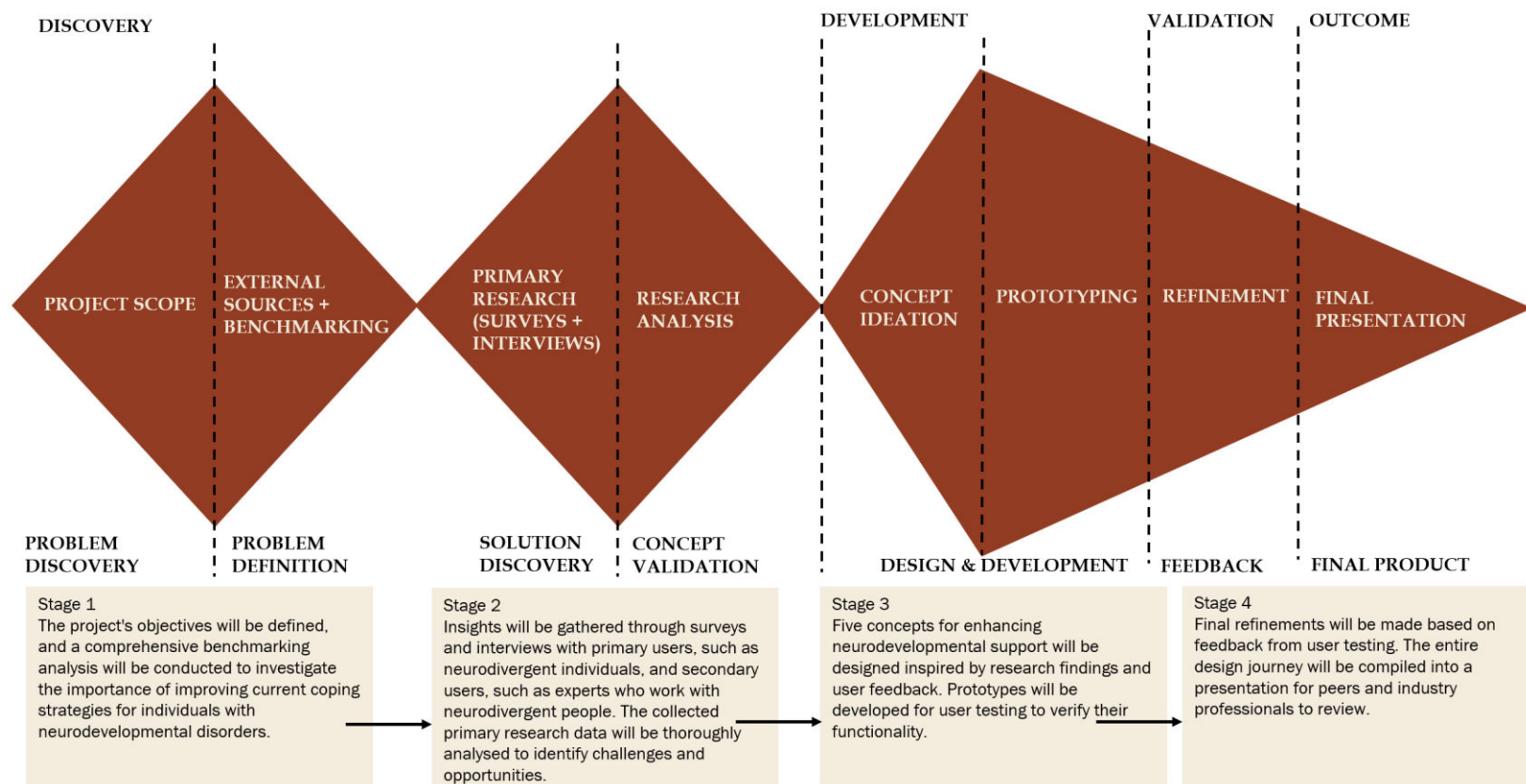
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INTRODUCTION

The purpose of this research report is to explore how rhythmic movement and music therapy can support individuals with neurodevelopmental disorders, focusing on those with Attention Deficit Disorder (ADD) and Attention Deficit Hyperactivity Disorder (ADHD). This topic is of interest as there are many coping mechanisms available for neurodivergent individuals, however, there is a need for interventions that not only address symptoms like hyperactivity and inattentiveness but also provide a purposeful and skill-building experience. By integrating music therapy with rhythmic movement, this approach seeks to utilise the therapeutic benefits of rhythm and sound to improve focus, emotional regulation and motor coordination. It also aims to enhance musicality and form users' interest in music by designing a skillful intervention that not only addresses symptoms but builds on the individual's abilities that will give them both a productive and creative outlet.

OVERALL PROJECT STRUCTURE DIAGRAM



BACKGROUND

INTRODUCTION

This background section will explore the challenges faced by individuals with Attention Deficit Disorder (ADD) and Attention Deficit Hyperactivity Disorder (ADHD), focusing on the symptoms of inattentiveness and hyperactivity that impact daily functioning. It will discuss the difficulties in concentration, impulsivity, and managing tasks that these individuals commonly experience, which affect their personal lives. It will also delve into current coping strategies, including music therapy and rhythmic movement by highlighting their potential benefits in managing these symptoms. Understanding these aspects provides a basis for developing effective interventions to support individuals with ADD/ADHD.

CHALLENGES FACED BY INDIVIDUALS WITH ADD/ADHD AND CURRENT COPING STRATEGIES

Individuals with Attention Deficit Disorder (ADD) or Attention Deficit Hyperactivity Disorder (ADHD) who experience symptoms of inattentiveness and hyperactivity face significant challenges in both their personal and professional lives. Inattentiveness can present challenges such as difficulty concentrating, frequent forgetfulness, losing things, making careless mistakes, and an inability to complete tasks that require prolonged focus (NHS, 2024). Hyperactivity and impulsiveness can include an inability to sit still, excessive talking and fidgeting, having little or no sense of danger, and acting without considering consequences which can disrupt social interactions (NHS, 2024). These symptoms often persist into adulthood which can significantly affect professional and social functioning. They can impact academic performance, job stability and the ability to maintain relationships, while also contributing to mental health challenges such as increased stress, low self-esteem, depression, higher risks of suicide and engagement in risky behaviours (Braden, et al. 2023). Current coping strategies include a combination of non-pharmacological approaches, such as cognitive behavioural therapy (CBT) and psychoeducation, alongside pharmacological treatments like psychostimulants (Braden, et al. 2023). Practical coping techniques for managing daily life include using visual reminders, breaking tasks into manageable steps, practicing mindfulness, engaging in physical activities like exercise or dancing and using organisational tools such as calendars and lists (ADDitude, 2024).

UNDERSTANDING MUSIC THERAPY AND ITS BENEFITS FOR INDIVIDUALS WITH ADHD

Music therapy offers several benefits for individuals with ADHD by addressing various aspects of their condition through structured and creative interventions. This type of therapy helps manage ADHD symptoms by providing engaging, rhythmic activities that improve focus, emotional regulation, cognitive functions and social interactions (Zhang, et al. 2017). It has effectively reduced emotional lability and psychosomatic symptoms specifically through improvisational sessions that provide opportunities for self-expression. Individuals have experienced improved attention, concentration and self-control which has enhanced their ability to engage in group and everyday activities. The therapy has also facilitated better motor coordination and timing which has helped individuals synchronise their movements with auditory cues (Rickson, et al. 2006).

UNDERSTANDING RHYTHMIC MOVEMENT AND ITS BENEFITS FOR INDIVIDUALS WITH ADHD

Rhythmic movement has also shown benefits for individuals with ADHD by leveraging the brain's natural preference for temporal patterns and sensory-motor integration. Music's inherent rhythm engages neural systems involved in timing and coordination which are often impaired in ADHD (Park, et al. 2023). The brain's response to rhythm involves intricate interactions across auditory, motor, and cognitive regions and can help address deficits in attention and motor control. Rhythmic activities align with the brain's temporal processing mechanisms which can enhance attention and reduce impulsivity (Slater, et al. 2018).

SUMMARY

Creating a rhythmic device that integrates rhythmic movement and music therapy presents a promising approach for individuals with ADHD, particularly in managing symptoms of hyperactivity and inattentiveness. Individuals with ADHD often face significant challenges such as difficulty focusing, impulsivity, and excessive activity, which can impact their personal and professional lives. Current strategies to cope with these symptoms include a mix of cognitive-behavioural techniques, medication and practical methods like physical movement and mindfulness. Music therapy, which has been known for its rhythmic activities, has been found to enhance attention, emotional regulation and motor coordination by engaging the brain's timing and coordination systems. By aligning with the brain's natural rhythmic processing, a rhythmic device would provide an engaging and structured method to address these symptoms daily. An analysis of existing products aimed at improving inattentiveness and hyperactivity in individuals with ADHD will be essential to identify effective features and areas for enhancement in the development of this new device.



BENCHMARKING

INTRODUCTION

This section explores the benchmarking and analysis of existing products related to rhythmic devices designed to support individuals with hyperactivity and attentiveness challenges. By examining various fidget gadgets, rhythmic instruments such as the cajón and silent drum kits, the aim of this analysis is to identify both opportunities and gaps in current offerings. This exploration will highlight how to create a more effective rhythmic device, focusing on integrating features that provide not only sensory relief but also enhance cognitive skills, creativity and adaptability.

EXISTING PRODUCTS | FIDGET GADGETS

Existing products that relate to the concept of a rhythmic device designed to support individuals with hyperactivity and attentiveness challenges can be found in the world of fidget gadgets. These gadgets which have a rich history and are widely recognised for their therapeutic and stress-relieving benefits, are primarily targeted at younger generations, including students, children, and young adults (Report Prime, 2023).

Fidget gadgets and mechanisms trace their origins back to ancient cultures such as Greece and China. The ancient Greeks developed the concept of worry stones, which were smooth, flat stones that were believed to soothe nerves and promote relaxation when rubbed. Similarly, the Baoding Balls, developed during the Han Dynasty in China, were small metal spheres rotated in the hand to improve dexterity, relieve stress and promote relaxation. These early tools served as both a form of exercise and a stress-relieving outlet much like modern fidget gadgets (McLachlan, 2023).

Some of the most popular fidget toys today are the Fidget Spinner, created by Catherine Hettinger, and the Fidget Cube, developed by Mark and Matthew McLachlan in 2016. The Fidget Cube stands out with its set of tactile features, including buttons, switches, and dials that can be clicked, flipped, rolled, or spun, offering a versatile way to keep hands busy and minds focused. The Fidget Spinner, which gained widespread popularity in the early 2010s, features a central ball bearing and multiple

prongs that spin smoothly between the fingers. Its simple design and soothing motion quickly made it a favourite, aligning with the growing trend toward fidgeting as a tool for stress relief and improved concentration (McLachlan, 2023).

Today, fidget gadgets have evolved into a significant global market by continuing to be popular and useful for a wide audience. The landscape is highly competitive with increasing demands for constant innovation among younger demographics. Research has demonstrated that these devices can improve on-task behaviour in students with ADHD, particularly by reducing disruptive behaviours, however, the effectiveness of fidget toys can vary. While some individuals with ADHD benefit from these tools, others, especially those with inattentive-type ADHD, may find them more distracting than helpful (Aspiranti, et al. 2021).

The science behind fidget toys suggests they can enhance scholastic achievement, alleviate anxiety, help in focusing on tasks and stimulate the brain stem through movement. These tools have shown potential in helping individuals with PTSD by providing a soothing outlet. Research also indicates that tactile fidget tools may assist teens with behavioural and emotional challenges by helping them calm themselves and control impulses (SensoryEdge, 2024). Research has shown that while fidget gadgets can be beneficial for many individuals with neurodevelopmental disorders or symptoms, there remains a need for adaptable approaches to manage hyperactivity and inattention, especially for those with inattentive-type ADHD.



EXISTING PRODUCTS | CAJÓN

The cajón drum serves as a significant source of inspiration for the development of a new rhythmic device designed to support individuals with ADD and ADHD, not only as a coping mechanism but also as a creative outlet. The six-sided, boxlike percussion instrument has gained substantial popularity in the rhythmic and percussion sectors of music. Its origins among Afro-Peruvians, who ingeniously adapted discarded materials into a versatile percussion instrument, highlight the potential of rhythmic tools to provide both practical benefits and creative expression (Newman, 2023).

The cajón's design is simple yet effective and demonstrates how rhythmic movement can be both soothing and engaging. The instrument consists of a wooden box with a thin plywood surface called the "tapa," which players strike with their hands while seated on top. The cajón's design allows for various sound effects based on how the drum is struck with no need for complex setups like drum stands or electronic equipment (Newman, 2023).

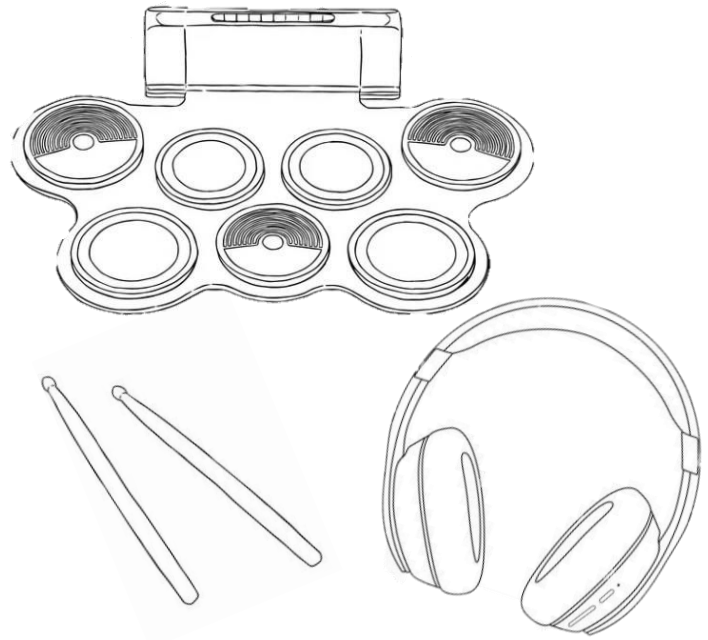


Playing the cajón offers numerous benefits, including improved coordination, enhanced strength and endurance, stress relief and a boost in creativity. Its rhythmic versatility not only creates a better sense of timing and groove but also supports improvisation and the development of percussion techniques that can be applied to other instruments. The cajón's ability to adapt across different musical genres, such as jazz, Latin, rock and folk, further enhances musical diversity and creativity (Kopf, 2024). Through its historical significance and practical advantages, the cajón demonstrates how rhythmic movement can be applied as a powerful form of expression and creativity.

EXISTING PRODUCTS | SILENT DRUM KITS

The silent drum kit acts as a valuable source of inspiration for creating a rhythmic music device customised for individuals with neurodevelopmental disorders. As electronic drum kits that significantly reduce sound output compared to traditional acoustic drums, silent drum kits are ideal for noise-sensitive environments by utilising rubber or mesh pads connected to a sound module to achieve a quieter playing experience (Clarke, 2024).

This concept aligns closely with the goal of creating a rhythmic device that incorporates fidgeting movements and music while keeping the experience individualised and discreet. For people with neurodevelopmental disorders, such as ADHD, who may benefit from rhythmic movement and musical engagement as coping mechanisms, the ability to interact with a device without causing disruption to those around them is essential (Wotherspoon, 2024). The adaptability of silent drum kits, with options like rubber-headed or mesh-headed kits that offer different levels of volume control and realism, provides a framework for developing a personalised device that can be used in various settings, from quiet home environments to public spaces (Clarke, 2024).



By integrating features such as sound customisation, ease of setup, and practice effectiveness found in silent drum kits, the rhythmic device can meet the unique needs of its users, providing an outlet for expression, focus and sensory engagement without outside disruptions.

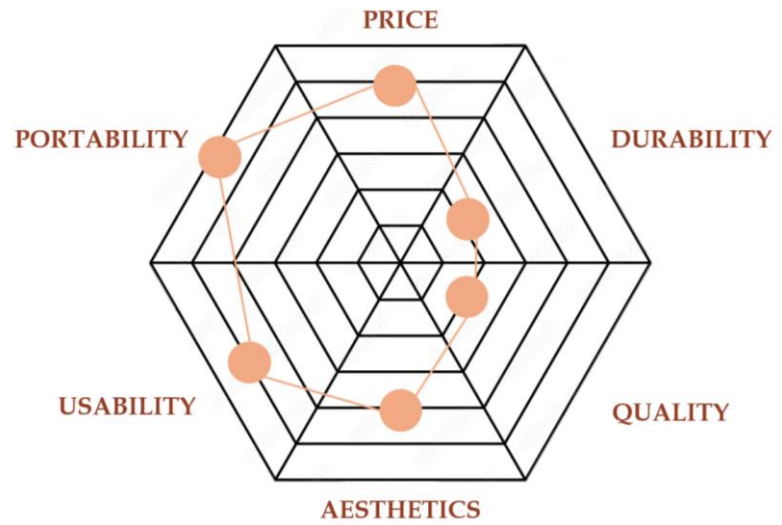


GAPS AND OPPORTUNITIES IN THE EXISTING PRODUCT

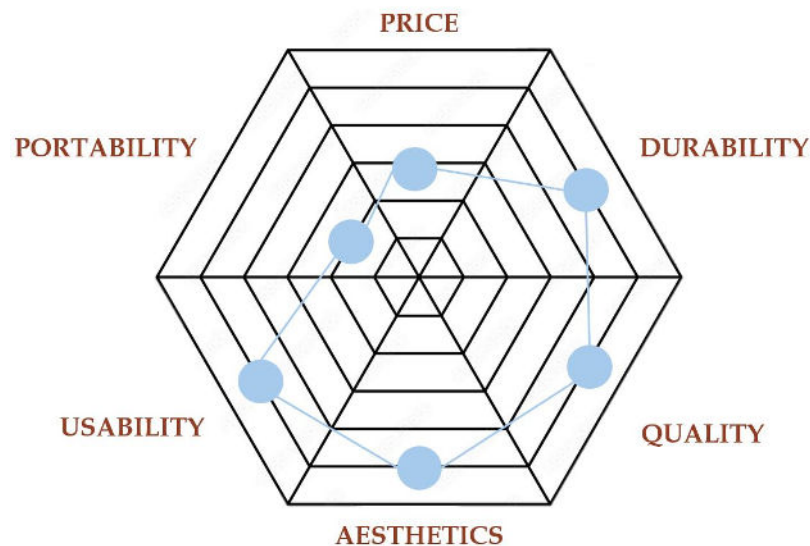
Existing fidget gadgets, such as the Fidget Spinner and Fidget Cube, are effective in providing stress relief and sensory stimulation but often fall short in their overall utility. The gadgets primarily serve as an outlet for nervous energy or stress, however, are lacking additional purpose or developmental value. For individuals with inattentive-type ADHD, these toys may sometimes prove more distracting than helpful due to their limited scope (Aspiranti, et al. 2021). The gadgets also lack adaptability and customisation, and fail to integrate rhythmic engagement which could enhance focus and attentiveness. The existing gadgets' simple designs do not facilitate skill development or offer broader cognitive benefits beyond immediate sensory relief.

Designing a rhythmic device that combines sensory stimulation with skill-building presents significant potential. Incorporating rhythmic elements similar to those found in a cajón drum, which is known for its ability to enhance coordination, timing, musicality and creativity, can offer valuable benefits (Kopf, 2024). By integrating features that promote skill development, such as rhythmic patterns or interactive musical elements, the new device could offer both immediate sensory relief and long-term cognitive growth. Integrating features from silent drum kits, such as sound reduction and customisation, addresses the need for a device that does not disrupt others. This allows the device to be used discreetly in various settings, making it more versatile and accommodating for users who require quiet environments (Clarke, 2024). By combining rhythmic elements, skill-building features and sound control, the new device can offer both immediate sensory relief and long-term cognitive development without disturbing others.

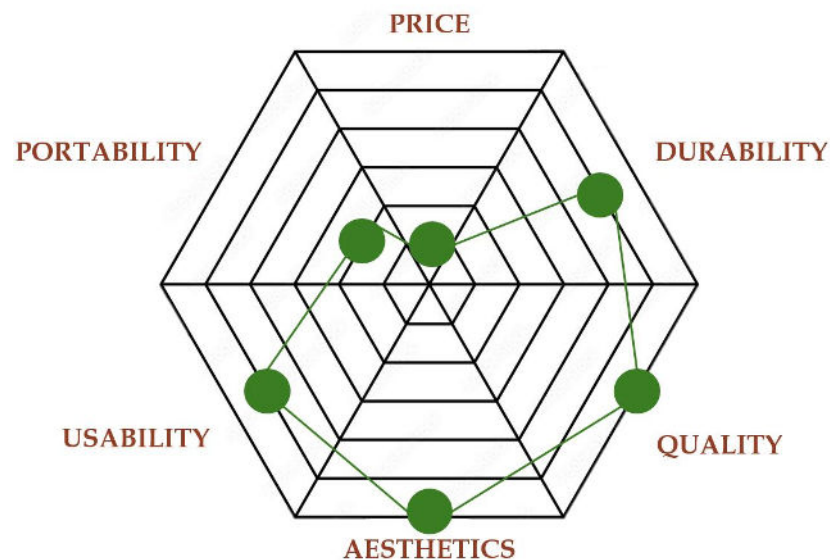
FIDGET GADGET'S RADAR DIAGRAM



CAJÓN'S RADAR DIAGRAM



SILENT DRUM KIT'S RADAR DIAGRAM



SUMMARY

Existing products such as fidget gadgets, cajón drums, and silent drum kits provide valuable insights for designing a rhythmic device targeted to individuals with neurodevelopmental disorders. Fidget gadgets offer therapeutic benefits but may not suit everyone, while the cajón drum demonstrates how rhythmic tools can enhance creativity and coordination. Silent drum kits, with their low sound output and customisable features, highlight the potential for creating a personalised device that is both discreet and effective.

To ensure that the rhythmic device meets the unique needs of individuals with neurodevelopmental disorders, further primary research is essential. This research will help identify specific requirements and preferences which will optimise the device for improved focus, creative expression and sensory engagement.

RESEARCH

INTRODUCTION

The aim of this research was to build upon existing secondary sources to explore how music therapy and rhythmic movement can assist individuals with neurodevelopmental disorders, more specifically in addressing significant challenges related to hyperactivity and inattentiveness. The study involved a mixed-methods approach, combining quantitative research through two surveys and qualitative research through three in-depth semi-structured interviews, targeting both primary and secondary users.

METHODOLOGY AND METHODS | SURVEY

The two surveys included multiple-choice questions alongside qualitative methods that allowed respondents to provide short answers to open-ended questions. Both surveys took approximately 5-10 minutes to complete with all questions designed to be unbiased. Google Forms was utilised for its simplicity and ease of navigation for respondents. The two surveys were composed differently to target distinct segments of the primary research audience.

EXPERT INSIGHTS FROM SPECIALISED CLINICS SURVEY

The first survey was distributed to specialised clinics, including neurology, pediatric, psychology, and psychiatry clinics, to gain insights from professionals on how a rhythmic device incorporating music therapy could benefit their patients as a treatment option. The survey aimed to understand the primary research group's familiarity with using music therapy as an alternative treatment. The questions were organised into sections, including:

- Clinic and Treatment Information
- Experience with Alternative Therapies
- Perspectives on Rhythmic and Sensory Devices
- Challenges and Considerations with Implementing a Rhythmic Device
- Final Thoughts

Each section was designed to gather comprehensive insights from professionals regarding the potential integration of rhythmic devices in clinical settings.

A recruitment email was sent to multiple clinics in Brisbane, outlining the project's topic and the purpose of involving these clinics in the research. The email explained how their input would contribute to understanding the needs of individuals with hyperactivity and inattentiveness which would ultimately support in the development of an effective rhythmic device. Attached to the recruitment email was a two-page participant information sheet that provided additional details about the capstone project, including the study's objectives, what participation entails, potential benefits, any possible risks, privacy and confidentiality measures, and contact information for any questions or concerns.

The email included a direct link to the survey which allowed participants to easily access it. The survey began with a brief description of the project and reiterated the purpose of collecting data from the targeted respondents. The next section of the survey contained consent information, contact details, and a statement confirming that there were no associated risks with participation. A mandatory checkbox was included at the end of this section which participants needed to check to consent to participate and proceed with the survey.

NEURODIVERGENT USERS SURVEY

The second survey followed similar procedures in collecting information from respondents but was targeted at a different primary research group. This survey was designed for neurodivergent individuals, including both diagnosed and undiagnosed respondents who experience challenges with hyperactivity and inattentiveness on a daily basis. The goal was to understand the needs of the primary users and gather insights on whether a rhythmic device incorporating music therapy would be beneficial for them. The questions were organised into the following sections:

- Demographics and Background
- Understanding the Respondent's Symptoms
- Perceptions of Music Therapy and Rhythmic Movement
- Interest in a Rhythmic Device
- Final Thoughts

Each section was structured to capture the perspectives and experiences of neurodivergent individuals regarding the potential use of a rhythmic device in their daily lives.

Instead of directly sending the survey link to specific individuals, it was shared on social media platforms like LinkedIn and Instagram to reach a broader audience who might be interested in the capstone project and willing to complete the survey.

The survey started with an overview of the project, outlining the purpose of collecting data from the targeted respondents. The following section covered consent information and contact details, highlighting the following points:

- All responses will remain anonymous.
- Responses will not be publicly published.
- Responses will be used exclusively for research purposes related to the project.

- Participation is voluntary, and respondents can withdraw at any time.
- Collected data will be deleted by the end of the semester in November 2024.
- Data will be securely stored on a personal device.

This section also included a statement confirming that there were no associated risks with participation. To proceed with the survey, participants were required to check a mandatory box to indicate their consent.

Section 5 of 7

Perceptions of Music Therapy and Rhythmic Movement

Description (optional)

11. Are you familiar with music therapy as a form of treatment? *

☐ Yes

☐ No

12. Have you ever tried music therapy? *

☐ Yes

☐ No

13. If yes, how effective did you find it managing your symptoms?

☐ Not effective

☐ Slightly effective

☐ Moderately effective

☐ Very effective

☐ Extremely effective

14. Do you believe that integrating music and rhythmic movement into your daily routine could * help manage your symptoms of inattentiveness and hyperactivity? Why or why not?

Long answer text

15. Which aspects of music therapy or rhythmic movement do you find most appealing? * (Select all that apply)

☐ Reducing stress and anxiety

☐ Improving focus and concentration

☐ Enhancing mood and emotional well-being

☐ Providing a creative outlet

☐ Other...

METHODOLOGY AND METHODS | INTERVIEWS

Three one-on-one semi-structured interviews were conducted to gather data for this study.

Participants were recruited through personal connections with individuals diagnosed with ADHD and by reaching out to the QUT psychology faculty to identify available professionals in the field for interviews. Each interview lasted approximately 20 minutes and was structured with unbiased questions to ensure credible insights and responses were gathered. These interviews provided deeper insights into how a rhythmic device incorporating music therapy could benefit individuals with challenges related to hyperactivity and inattentiveness. The perspectives included primary users, such as individuals diagnosed with ADHD, and a secondary user, a developmental psychologist experienced in working with and treating ADHD individuals.

The first two interviews were conducted with primary users who have been diagnosed with ADHD and experience significant challenges related to hyperactivity and inattentiveness on a daily basis. They were contacted directly through personal connections. Information about the capstone project and the data collection process was communicated verbally and supplemented with a participation information sheet. This sheet detailed the purpose of the survey, what participation would involve, potential benefits and risks for the respondents, privacy and confidentiality measures, consent procedures and contact information for any questions or concerns about the research project.

Before the interview began, respondents were provided with a consent form to sign, confirming that they had read the participation information sheet and agreed to have the interviews audio recorded. This allowed transcripts to be developed afterward for thorough data analysis. The questions directed to respondents with diagnosed ADHD aimed to understand their primary challenges associated with their neurodevelopmental disorder and assess whether

incorporating a rhythmic device could benefit their daily lives. The interview included the following sections:

- Demographics and Background
- Understanding the Respondent's Symptoms
- Exploring Sensory and Rhythmic Engagement
- Exploring Music Therapy and ADHD
- Rhythmic Device-Specific Questions
- Creativity and Self-expression
- Challenges and Opportunities in Current Coping Mechanisms
- Closing Questions and Final Thoughts

The third and final interview was arranged by contacting the head of the QUT Psychology and Counselling Department via email to inquire about professionals in the relevant field who might be interested in participating in a semi-structured interview. A developmental psychologist expressed willingness to participate, and the same procedures were followed, including providing detailed information about the capstone project and the purpose of their input for understanding whether a rhythmic device incorporating music therapy could benefit individuals with hyperactivity and inattentiveness. The developmental psychologist was initially contacted by email, during which the participation information sheet was sent to ensure they were fully informed and prepared to sign a consent form before the interview began. The consent form confirmed that the respondent had read and acknowledged the participation information prior to the interview and provided their consent for the interview to be audio recorded. The interview covered the following sections:

- Background and Expertise
- Understanding Neurodevelopmental Disorders
- Current and Future Coping Mechanisms and Support
- Device Development and Evaluation
- Effectiveness and Improvement of Existing Coping Strategies
- Challenges and Opportunities
- Role of Music Therapy
- Individual Differences
- Future Directions
- Practical Applications

SUMMARY

Using these research methodologies, involving surveys and interviews with both primary and secondary users, provides insights into the current and future opportunities and challenges of coping strategies for neurodevelopmental disorders. This approach helps assess how effectively a rhythmic device could support individuals dealing with hyperactivity and inattentiveness.

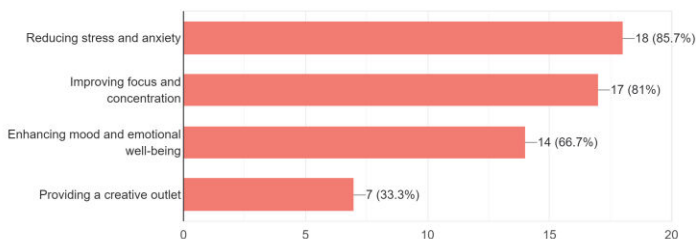
ANALYSIS AND FINDINGS

SURVEY

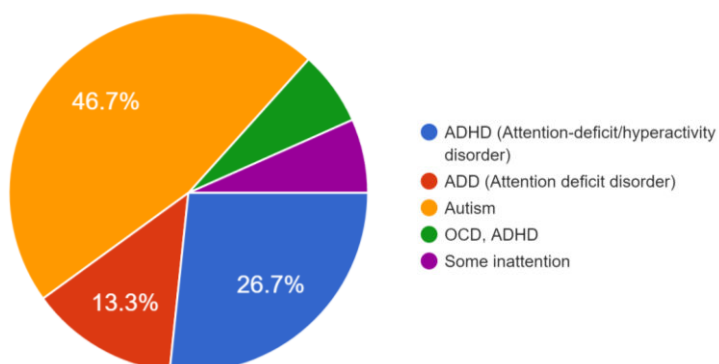
The neurodivergent users survey collected 21 responses which provided valuable insights into the preferences and coping mechanisms of individuals with symptoms of hyperactivity and inattentiveness. The survey, conducted via Google Forms, effectively translated responses into column and pie graphs which offered a clear depiction of the data.

The average age of respondents ranged between 22 and 24 years. Results indicated a general lack of awareness and use of music therapy among participants, however, there was strong interest in a device that combines music therapy with rhythmic movement to support their symptoms. Notably, 85.7% of respondents felt that such a device could significantly reduce stress and anxiety. The survey also revealed that 57.1% of participants have a medical diagnosis of a neurodevelopmental disorder: 46.7% have Autism, 26.7% have ADHD, and 13.3% have ADD which highlighted the overlap between these conditions and their associated coping mechanisms.

15. Which aspects of music therapy or rhythmic movement do you find most appealing? (Select all that apply)
21 responses

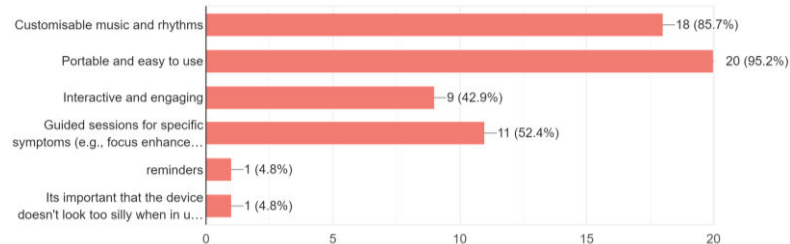


4. If yes, what is your diagnosis?
15 responses



Open-ended responses provided additional insights and concerns, especially regarding the device's portability and public use. Respondents emphasised the importance of considering ergonomics, functionality, size, weight, and shape to accommodate user dexterity. These concerns were supported by a column graph showing that 95.2% of respondents prioritise portability and ease of use, while 85.7% find customisable music and rhythms appealing features. The survey findings suggest that all respondents would likely use such a device regularly as a coping mechanism which reflects a strong interest in exploring this innovative approach to managing their symptoms.

17. What features would you consider important in such a device? (Select all that apply)
21 responses



Despite extensive efforts to contact and follow up with clinics for insights on the Expert Insights from Specialised Clinics survey, only two responses were received. While the limited number of responses was not ideal, they still provided valuable perspectives on the use of a rhythmic device as a coping strategy for patients. The responses came from a psychologist and a pediatrician, both of whom treat at least 100-200+ ADHD patients annually. Neither respondent had used music therapy as part of their ADHD treatment, but both indicated an interest in incorporating a rhythmic and music therapy device. They highlighted cost as the primary challenge to integrating such a device into their clinics' ADHD therapy. Both respondents also emphasised the importance of incorporating creativity and sensory engagement into their treatment approaches. Open-ended questions allowed the professionals to share their insights with the main barriers identified as cost and time commitments for implementing new non-medicated strategies to address ADHD.

INTERVIEW

After completing the interviews, the audio recordings were transcribed for further analysis. Thematic analysis was then applied by coding key words and discussions to identify recurring themes. Respondent #1, diagnosed with ADHD, revealed key themes, outlined in first table below, including executive dysfunction and organisation challenges, strategies for simplifying tasks and reducing procrastination, positive responses to sensory and rhythmic engagement such as music and rhythm, difficulties with gamification, and interests in creativity, self-expression, and technological solutions like AI and automation. Respondent #2, also diagnosed with ADHD, highlighted themes, shown in second table below, such as difficulties with focus and frequent distractions, coping strategies including goal-setting, timers, physical exercise, music, and quiet environments, and the dual role of music as both helpful and potentially overstimulating. Both respondents, aged 22-24, reflect broader challenges faced by individuals in this age group with hyperactivity and inattentiveness. Respondent #3, a developmental psychologist, provided valuable insights, highlighted in third table below. This respondent emphasised the importance of individualised coping strategies due to varying responses to interventions, the need to balance engagement and focus with sensory tools, and the gaps in current strategies. Both Respondent #2 and Respondent #3 highlighted the importance of quieter environments and minimising disruption to others which demonstrates that any rhythmic device should account for these factors to be effective and considerate of those around the user.

The thematic analysis tables reveal several key commonalities in managing ADHD. Difficulties with focus, organisation and distraction significantly impact daily life. Effective strategies include prioritisation, goal-setting, limiting distractions, using timers, and engaging in physical activities and sensory experiences like music. Music and rhythmic stimuli consistently show positive effects, while individualised interventions are emphasised over generic approaches. Balancing beneficial stimulation with potential distraction is also a concern as is using creativity and self-expression to manage symptoms. Challenges include gaps in awareness of specific therapies and adapting interventions to individual needs which outlines the need for a personalised, creative and flexible approach when designing the rhythmic device.

RESPONDENT #1 THEMATIC ANALYSIS | DIAGNOSED ADHD INDIVIDUAL

THEME	CODE	SUBCODE	QUOTES
Executive Dysfunction and Organisation	Lack of Executive Function	Disorganisation	"It impacts my day-to-day activities by way of my lack of executive function, and that is to say that I struggle with organising ideas and thoughts."
		Hyper-Focus on Non-Productive Activities	"I have a habit of hyper-focusing on certain stimuli that is interesting to me at the time but may not be in line with my general objective for the day."
Management Strategies	Simplifying Tasks	Prioritisation	"I try to keep only a list of three most important things that I need to achieve in the day. That helps me quite a bit."
	Limiting Procrastination Sources	Reducing Distractions	"I try to limit sources of procrastination. For example, on my phone, I don't have any games on my home screen, etc."
Sensory and Rhythmic Engagement	Positive Response to Music and Rhythm	Engagement with Rhythmic Music	"I respond, I suppose, positively to it. It is engaging to me. I like music. I like rhythmic music. I like music that is funky."
		Use of Rhythmic Apps	"I do remember there being the app on iOS, Piano Tiles, and I found that quite engaging and I found it quite soothing in a way."
Gamification as a Challenge	Gamification as a Distraction	Overconsumption	"Yeah, it was too consuming. Yeah, because it was a game, and games are supposed to take all of your attention possible".
		Need to Avoid Gamification	"The problem with phones or computers is that it's very easy to get stuck in a rabbit hole."
Creativity and Self-Expression	Creative Outlets	Composing Music	"I like composing some of my own music in my spare time. I like creating things in general."
	Creativity Helps Manage ADHD	Organisation through Creation	"Sometimes just sort of creating something of my own, I'm able to put any random kind of thing together. And if it's just done in such a way that it makes some sense to someone else, then all that kind of random noise in my brain is actually produced into something that is palatable to everyone."
Technological Solutions	Interest in Technological Aids	AI and Automation	"I imagine that AI, artificial intelligence related products could be quite helpful. Things that automate things for a person with ADHD."
		Openness to New Approaches	"Yes, anything that can help me stay organised, to maintain focus on the important things in life, I am very keen."

RESPONDENT #2 THEMATIC ANALYSIS | DIAGNOSED ADHD INDIVIDUAL

THEMES	CODES	SUBCODES	QUOTES
Challenges of ADHD	Difficulty with Focus and Distraction	Inability to Focus	"Generally, it just makes it difficult to focus and stay focused on single tasks."
		Distraction and Racing Thoughts	"It just makes everything a bit harder when I'm so distracted by everything, and my mind just goes so quickly a lot of the time."
Coping Strategies	Techniques for Managing ADHD	Goal Setting and Timers	"I try really hard to set goals for myself when I'm doing things like studying, where I have to focus. So, I set myself timers and reward myself based on how long I can stay focused on a task."
		Awareness and Self-Management	"Just being aware of having ADHD helps me work on it better."
	Physical Activities	Exercise	"Definitely exercise; it clears my head and helps me think more clearly without having a bunch of thoughts and just things going on."
	Music and Environment	Listening to and Playing Music	"Playing music helps me focus more, and being in quiet environments makes me more productive."
		Impact of Quiet Environments	"Being in quiet environments makes me more productive."
Sensory Engagement and Music	Response to Sensory Stimuli	Music and Tapping	"Listening to music stands out. Even if I'm just tapping along or playing instruments, it helps."
	Use of Music	Listening vs. Therapeutic Use	"I've listened to music, but I haven't specifically used rhythmic movement to treat my ADHD."
		Impact on Focus and Mood	"Music helps me focus my mind and keeps my thoughts from wandering too much."
Impact of Rhythmic Movement	Subconscious Coping Mechanisms	Tapping as a Coping Mechanism	"I might subconsciously tap my feet to music or even without music, which might be a coping mechanism for staying focused and less hyperactive."
	Effects on Focus and Creativity	Music's Impact on Creativity	"Music helps me focus for longer, but sometimes with less focus than if I were not listening to music."
Balancing Focus and Distraction	Balancing Stimulation and Distraction	Music's Dual Role	"Music helps me focus for longer, but sometimes with less focus than if I were not listening to music."
		Task Intensity and Suitability	"If it's intense work, I can't listen to music, but for less intensive tasks, music keeps me in the zone longer."
Design Considerations for Assistive Devices	Functionality and User Experience	Importance of Responsiveness	"The device needs to be discreet, easily carried around, and responsive to inputs without delay."
		Customisation and Flexibility	"If the device is open-ended and allows for creativity, it could definitely help."
	Avoiding Overstimulation	Risk of Becoming a Distraction	"It could help with focus but might also become a distraction if not implemented well."

RESPONDENT #3 THEMATIC ANALYSIS | DEVELOPMENTAL PSYCHOLOGIST

THEMES	CODES	SUBCODES	QUOTES
Individualised Experience	Variability in Coping Mechanisms	Movement and fidgeting	"Movement is one of them, movement, whether that's like actually getting up out of the seat and moving around or fidgeting."
		Daydreaming and hyper-focusing	"There can be sort of off, you know, daydreaming kind of behaviours or hyper-focusing on special, you know, certain things that are enjoyable."
	Differences in Response to Interventions	Effectiveness of wobble stools	"I would say I see some students that are just sitting there wobbling away but doing their work. And others who are wobbling away and falling off."
		Sensory tools effectiveness variability	"I guess that they're not individualised... something that will work for one person to help keep them focused will potentially be a distraction for another person."
Non-Disruption and Distraction Management	Balancing Engagement and Focus	Use of sensory tools without distraction	"Does it support focus on other activities or is it itself becoming a distraction?"
		Sound management in classrooms	"Management of auditory input... some students say, no, that doesn't work for me. I want to listen to my music or I want noise-cancelling headphones or white noise."
	Challenges in Implementing Sound-Based Interventions	Restrictions on sound in classroom settings	"Potentially where it might be unable to be used, like if it does have that sound aspect as well."
		Acceptability and applicability of musical interventions	"I think some of the idea behind things like fidget toys or the purely physical sensory is that the student can do it in class without distracting other people."
Integration of Sensory and Creative Therapies	Potential of Music and Rhythm	Learning instruments and working memory	"I've been looking at... what's the evidence for say something like learning a musical instrument and working memory."
		Drumming and trauma therapy	"Drumming and work for sort of trauma and suggestions around the importance of rhythm and group musical experiences."
	Varied Sensory Preferences	Physical vs. auditory sensory preferences	"Sensory side of things, yeah, I think they say there's some theories that say by engaging in other sensory activities, you can better focus."
		Creative outlets as therapeutic tools	"If you're making music with other people, it could be creative. It could be helping you to be more disciplined around focusing on the task."
Gaps and Limitations in Current Strategies	Lack of Individualisation	Generic approaches vs. personalised needs	"They're not individualised, I suppose."
		Varying impacts of interventions across different individuals	"It's really around what's the aim of it. Something that works for one person may not work for another."
	Emerging Needs and Opportunities	Incorporating music therapy more widely	"I would love to see [music therapy] more integrated, but I suppose I think there is a bit of a not as much awareness around music therapy."

SUMMARY

Overall, the survey responses and interviews provided a range of insights and revealed several commonalities with emphasising the most crucial features, functionalities, and intentions to consider in designing the rhythmic device.

DISCUSSION

The analysis and findings from this research provide valuable insights into the development of a rhythmic device for individuals with neurodevelopmental disorders. The results highlight the need for tools that go beyond soothing effects to offer long-term cognitive and behavioural benefits. While fidget gadgets are popular for their stress-relieving effects, they often lack in addressing the specific needs of individuals with inattentive-type ADHD. The interviews highlighted the importance of sound control which aligns with the popularity of silent drum kits that can be used discreetly without causing disruptions. The versatility of instruments like the cajón in enhancing coordination, creativity and focus suggests that integrating rhythmic elements could significantly strengthen the device's design. The surveys and interviews emphasise the need for creative expression as a coping mechanism for hyperactivity and inattentiveness.

The research also identifies the limitations of current coping mechanisms, which tend to be overly simplistic and lack customisation options, thereby reducing their effectiveness for a broader audience. This highlights an opportunity to develop a device that combines the stress-relief benefits of fidget gadgets with the rhythmic and creative engagement of instruments like the cajón, while incorporating sound control and customisable rhythmic features. Creating a device with these elements would enhance focus, reduce anxiety, and provide a valuable creative outlet.

These findings address a key research gap as the survey responses revealed a lack of awareness and use of music therapy among neurodivergent individuals, despite a strong interest in a device that could merge music therapy with rhythmic movement. The preference for portability and customisation further outlines the need for a device that seamlessly fits into everyday life and adapts to individual preferences.

Expert insights from the Specialised Clinics Survey highlight barriers such as cost and the challenge of integrating new strategies into existing treatment plans, however, the interest expressed by professionals in a rhythmic device indicates a promising market potential. If the device is cost-effective and easy to integrate, it could be well-received in clinical settings. Key themes from the interviews include the importance of engagement without overstimulation, the role of music and rhythm in symptom control and the need for devices that consider the user's environment.

The interviews and surveys conducted indicate that the ideal user group for this rhythmic device would be young adults aged 18-25 years old who are open to non-medical and technology-driven approaches for managing their hyperactivity and inattentiveness symptoms. The feedback suggests that the device would be most beneficial in a variety of situations, including work, stressful environments or even during mundane and relaxing moments which emphasises its potential for regular daily use.

Integrating rhythmic elements, creative expression, and adaptability into the device, with a focus on usability, portability, and enhanced therapeutic value, can address the limitations in current coping mechanisms for individuals with neurodevelopmental disorders. This innovative approach not only provides immediate stress relief but also supports long-term skill development and cognitive benefits which therefore contributes significantly to the research gap in this field.

DESIGN IMPLICATIONS

The research findings play a crucial role in shaping the features, functionality and purpose of the rhythmic device, particularly by addressing the specific needs and preferences of young adults aged 18-25. One of the key insights from the research is the importance of customisation and adaptability, which will directly influence the device's features. The rhythmic device will include adjustable sound control, customisable rhythmic patterns, and multiple interaction modes to offer to individual preferences and varying levels of sensory sensitivity. This customisation not only enhances user engagement but also ensures that the device can provide personalised support for cognitive and behavioural improvements. The research also reveals that many existing tools fail to find a balance between engagement and overstimulation which is crucial in avoiding sensory overload. Therefore, careful attention must be given to the sensory design elements to ensure that the device provides a stimulating yet manageable experience for users.

Functionality will also be guided by the need for seamless integration into daily life. The device will be designed to be portable, lightweight, compact, and easy to use which will allow users to incorporate it into their routines without disruption. Its discreet design, inspired by the popularity of silent drum kits, will enable users to engage with the device in various settings including public spaces without drawing attention.

Barriers such as the cost and complexity of integrating new tools into existing therapeutic frameworks were also identified in the research which suggests a need for the device to be affordable and straightforward to implement. This presents an opportunity to differentiate the product by focusing on affordability and user-friendliness, while also prioritising the use of cost-effective and sustainable materials. By selecting durable yet eco-friendly components, the rhythmic device can achieve a balance between economic accessibility and long-lasting quality which ensures it remains an appealing and responsible choice for users.

Given the target age group of 18-25, the device's design will prioritise aesthetics and practicality by ensuring it is not only functional but also appealing and suitable for use in public. The research highlights the importance of presenting a device that aligns with the preferences of young adults who are likely to value sleek, modern, and subtle designs. Therefore, the device will have a stylish appearance with an emphasis on clean lines, muted colours and a form factor that blends seamlessly into contemporary settings which will make it as much a personal accessory as it is a therapeutic tool.

The purpose of the device will extend beyond traditional fidget gadgets by combining rhythmic movement with music therapy to support focus, reduce anxiety, and encourage creative expression. It will serve as a multi-functional tool that not only offers immediate stress relief but also contributes to the user's long-term cognitive and behavioural development. By incorporating these elements, the device aims to address the gap identified in current coping mechanisms by providing an engaging solution that is both practical and presentable for young adults navigating the challenges of hyperactivity and inattentiveness in everyday life.

CONCLUSION

The findings from the surveys, interviews, and external sources have highlighted the challenges and opportunities in current coping mechanisms for neurodevelopmental disorders, particularly ADHD with inattentiveness and hyperactivity. These insights outline the benefits of music therapy and rhythmic movement and identifying young adults aged 18-25 as the primary users who would benefit from a non-medical and technology-based approach. The gathered data emphasises that a rhythmic device, designed with the identified considerations, has the potential to significantly enhance daily life for individuals with neurodevelopmental disorders. By addressing the specific needs of those with inattentiveness and hyperactivity, the device would provide a practical and user-friendly solution that integrates seamlessly into everyday routines by offering a distinctive combination of therapeutic benefits that go beyond conventional coping mechanisms.

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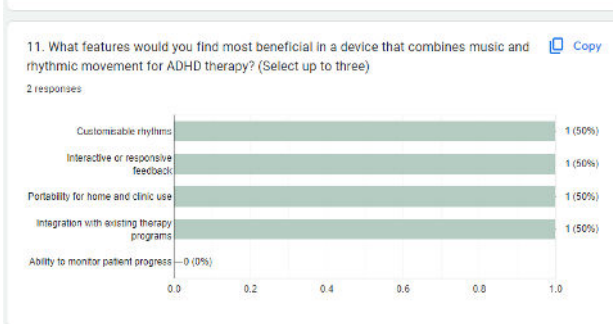
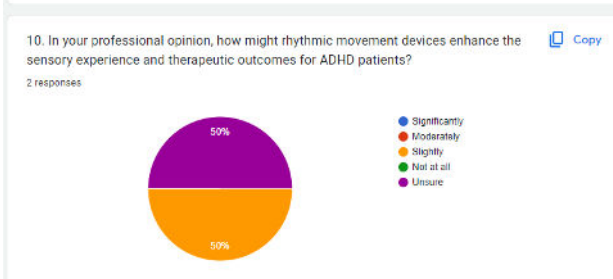
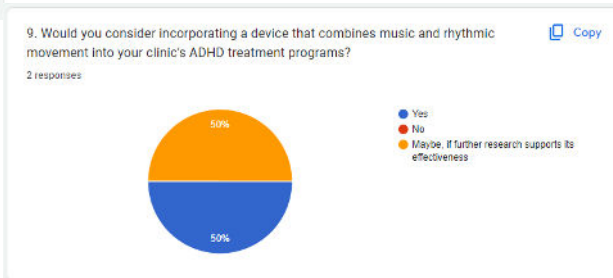
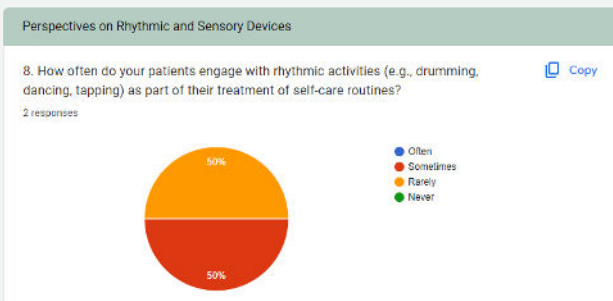
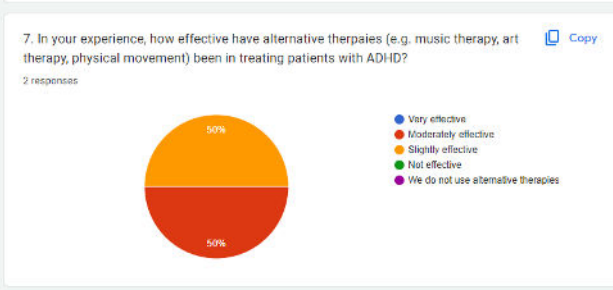
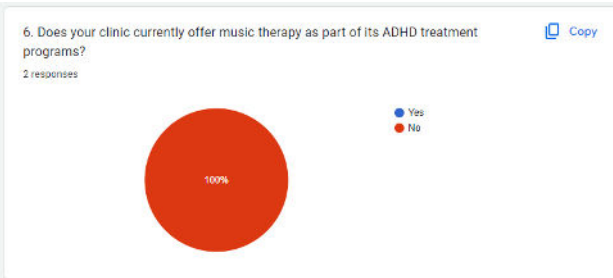
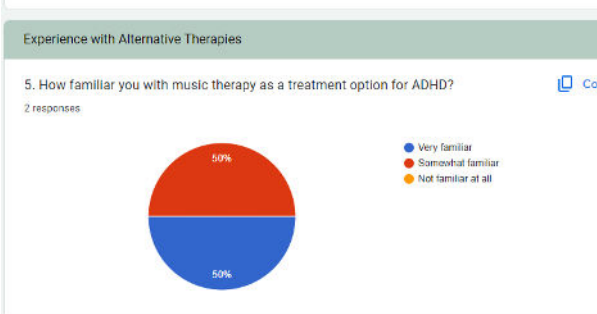
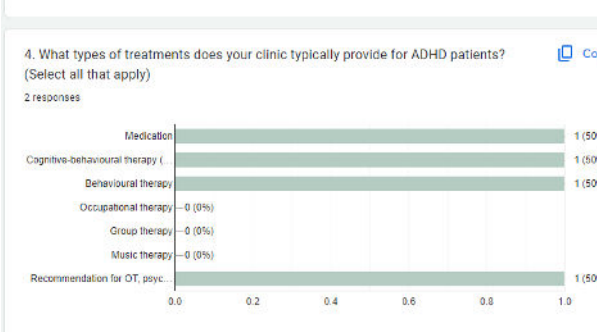
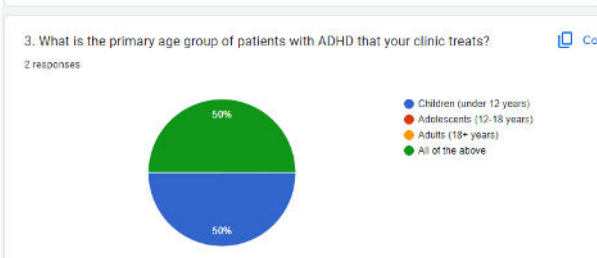
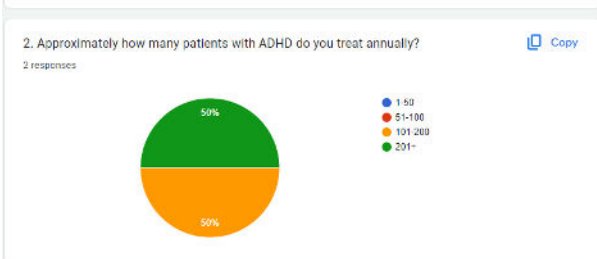
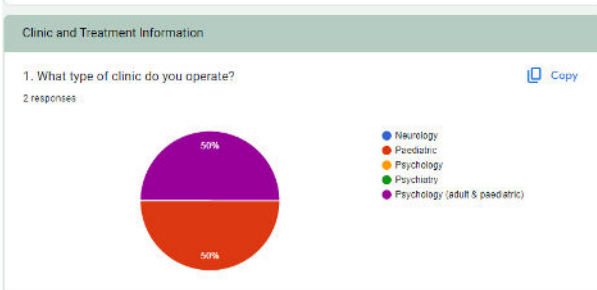
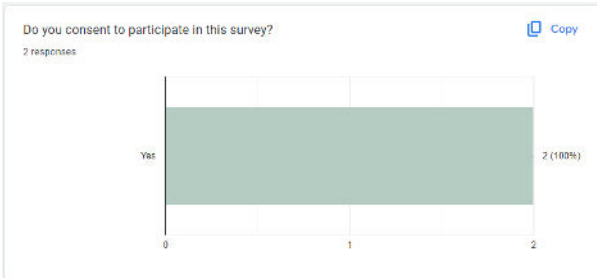
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APPENDICES

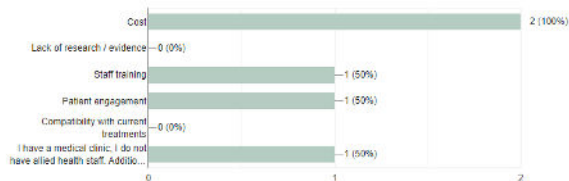
Full Results from Experts Insights from Specialised Clinics Survey:



Challenges and Considerations

12. What challenges do you foresee in incorporating a rhythmic movement device into ADHD therapy at your clinic (Select all that apply) [Copy](#)

2 responses



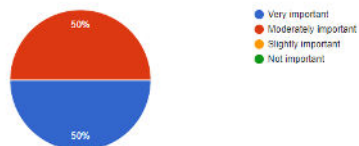
13. In your view, what is the biggest gap in the current treatment options available for ADHD patients?

1 response

Reluctance of families to engage with any form of therapy except medicines.

14. How important is creativity and sensory engagement in your clinic's approach to treating ADHD patients? [Copy](#)

2 responses



15. How open is your clinic to adopting new technologies and approaches in the treatment of ADHD? [Copy](#)

2 responses



Final Thoughts

16. If you were to consider implementing a new device aimed at enhancing sensory experiences for ADHD patients, what key elements would make it most useful in your practice?

2 responses

Accessibility and cost for families

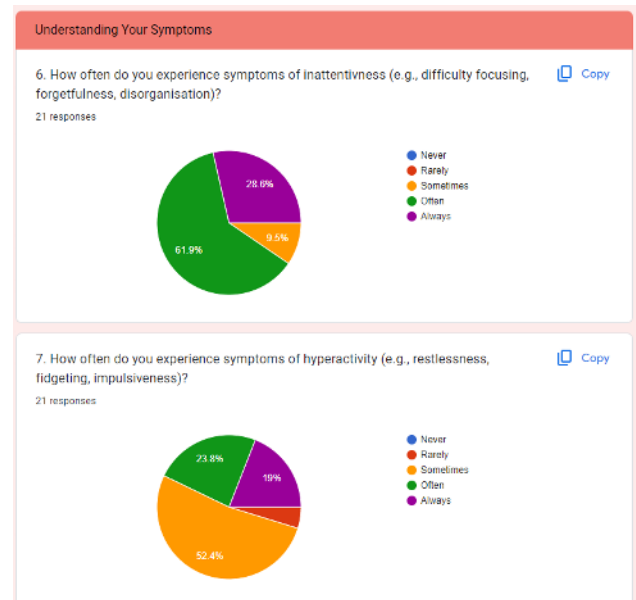
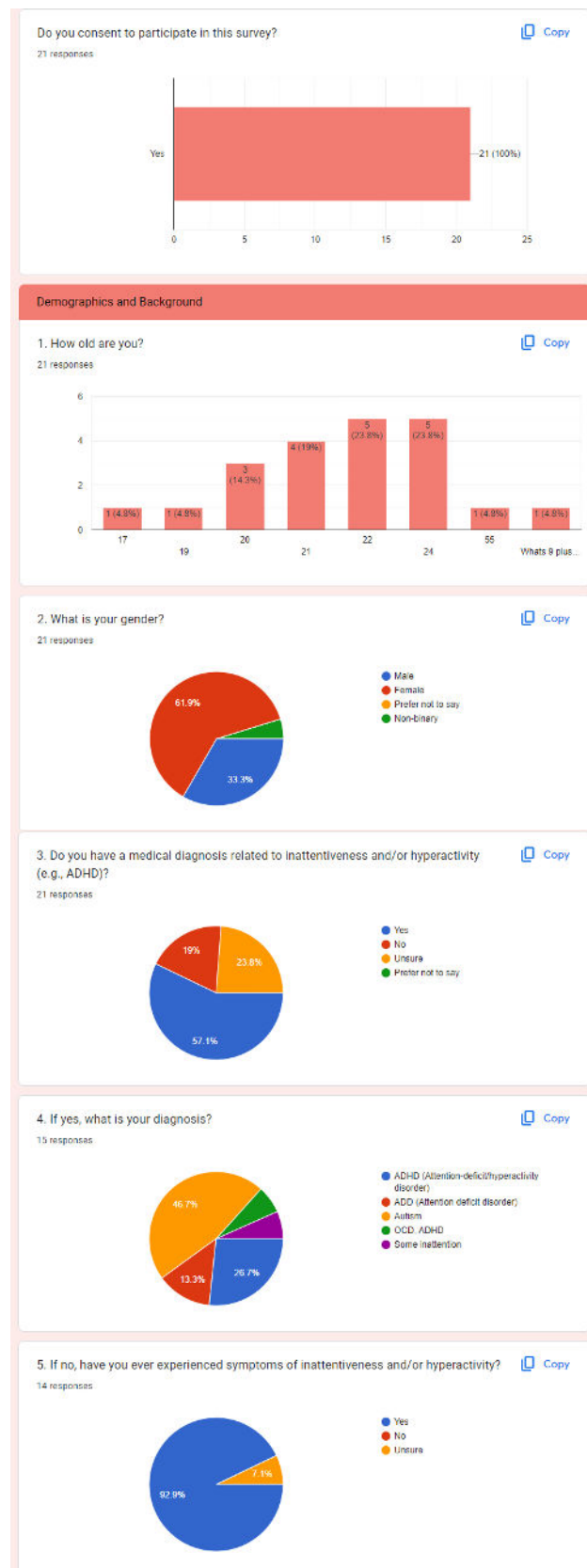
Must be user-friendly and engaging for clients and affordable

17. Are there any additional comments or insights you would like to share regarding the potential role of music and rhythmic devices in ADHD treatment?

1 response

It is very difficult to convince families to try non-medication strategies. Cost and time commitments appear to be the greatest barriers.

Full Results from Neurodivergent Individuals Survey:



8. How do these symptoms impact your daily life?

21 responses

time management and executive function is hard

heavily effect study/academics and getting things done

Trouble focusing and getting things done

I have difficulties focusing so I procrastinate a lot which makes it a struggle to get work done.

Makes it harder for me to focus and makes my work tasks take x 10 longer than they need to.

Impacts mostly professional self at work due to struggles with working memory and appearing incompetent when I can't recall information on the spot

A lack of focus hinders what little study time I have as it takes a long time for me to get in the "zone"
It's often the pressure of stress that compels me to do the things I need to do

Concentrating and procrastination

9. Have you tried any therapies or interventions to manage these symptoms? If so, please describe them.

21 responses

No

Cognitive Behaviour Therapy

no

Fidget toys and music

No I haven't

Yes therapy and medication

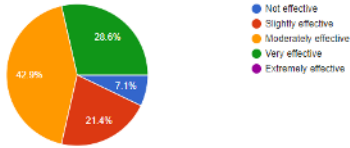
Yes - note down everything. Memory still bad though

Medication

I watch shows while I work to keep my attention on my screen

10. How effective have these therapies or interventions been for you?

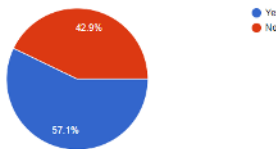
14 responses



Perceptions of Music Therapy and Rhythmic Movement

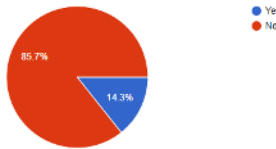
11. Are you familiar with music therapy as a form of treatment?

21 responses



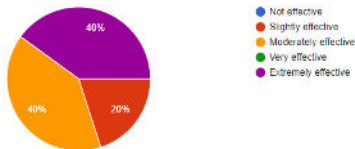
12. Have you ever tried music therapy?

21 responses



13. If yes, how effective did you find it managing your symptoms?

5 responses



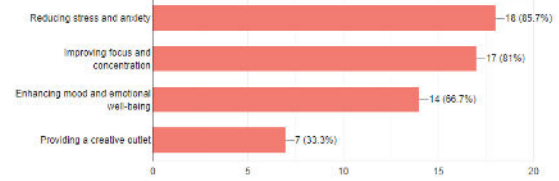
14. Do you believe that integrating music and rhythmic movement into your daily routine could help manage your symptoms of inattentiveness and hyperactivity? Why or why not?

21 responses

- Definitely. I wish I took musical instrument practice more seriously because I love music.
- maybe
- Listening to music can help distract, helping to concentrate.
- Yes I do believe it can as I have read quite a few medical papers on the way that music can reach different parts of the brain.
- Potentially, my symptoms tended to be better when I used to play an instrument and exercise.
- I hyperfocus and prefer silence so I'm not sure if music would help
- I think so because rhythm and music helps me focus on the task at hand instead of every little thing around me
It also can centre my mind and thoughts
- Probably, I like music to listen to and concentrate

15. Which aspects of music therapy or rhythmic movement do you find most appealing? (Select all that apply)

21 responses



Interest in a Rhythmic Device

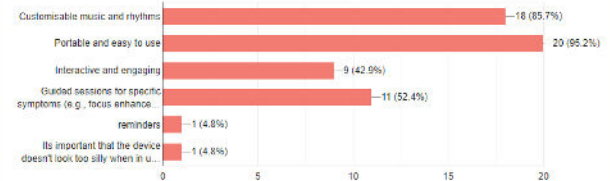
16. Would you be interested in trying a device that combines music therapy with rhythmic movement to support your symptoms?

21 responses



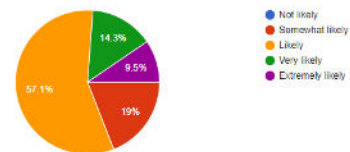
17. What features would you consider important in such a device? (Select all that apply)

21 responses



18. How likely would you be to use this device regularly if proved effective?

21 responses



19. Do you have any concerns or reservations about using a music and rhythmic movement device for therapeutic purposes?

21 responses

- No
- I'm still not exactly sure what this thing is haha but I am curious for certain
- no
- It being more effective than more simple options
- Make sure that the device doesn't cause any undue strain or injury during movement.
- music and movement can trigger strong emotions which can cause a negative emotional reaction, especially with people who've experienced trauma or mental health conditions. So be careful when considering the type of music.
- Probably just wondering how time consuming it would be to use the device.
- No - maybe that it might not be as helpful as I'd hope it to be
- If portable, battery life would be a concern

Final Thoughts

20. What other coping strategies or interventions would you like to see integrated with music therapy and rhythmic movement?

21 responses

It would be cool to start a band.

not sure

Learning to play instruments or sing

Have an option to make the device customisable for the individuals needs

Not sure, cannot think of anything sorry

I'd need to know more about what it involves first before suggesting anything else

If one had ASD something that could act a stimulatory outlet
Possibly sound vibrations

Not sure

Unsure

21. Please share any additional comments or suggestions you have regarding this research.

5 responses

This sounds cool and hopefully helps people!! Especially people with ADHD

Good luck babes

Good luck! It sounds great!

Please make the device look nice. That would make it into something I could show people, and something I would enjoy looking at and carrying with me.

Music relaxes and helps to focus as long as it is music that appeals to the particular individual hearing it

INTERVIEW TRANSCRIPTS

ADHD Respondent #1 Transcript

Gender: Male

Duration: 20.47 minutes

Date: 20/08/24

START AUDIO

Interviewer: To start off, how old are you?

Respondent: I'm 24 years old.

Interviewer: How long have you been diagnosed with ADHD?

Respondent: For about 2 years.

Interviewer: What is your gender?

Respondent: Male

Interviewer: So, could you describe your experience living with ADHD and how it impacts your day-to-day activities?

Respondent: Yes, it impacts my day-to-day activities by way of my lack of executive function, and that is to say that I struggle with organising ideas and thoughts. That means that without particular effort made by me, my day can become quite disorganised. I have a habit of hyper-focusing on certain stimuli that is interesting to me at the time but may not be in line with my general objective for the day, so that would mean that it might be something fun that I can do on my phone or my computer. When I should be studying, I end up playing the game and not studying, and that is partly because my brain is seeking some dopamine source and the game is providing that dopamine source, but trying to organise my life and study is not providing me the dopamine that my brain would like at the time.

Interviewer: Okay, continuing on. So, what strategies or tools do you currently use to manage your ADHD symptoms?

Respondent: I try to keep things simple when it comes to organising my day. One of the main problems I have is with prioritisation, so I try to keep only a list of three most important things that I need to achieve in the day. That helps me quite a bit. I try to limit sources of procrastination. For example, on my phone, I don't have any games on my home screen, etc.

Interviewer: I think this next question might be a bit the same, but are there any specific activities that you find particularly helpful for improving focus or relaxation?

Respondent: Yeah, I like meditation. Meditation is quite good. The problem with phones or computers is that it's very easy to get stuck in a rabbit hole. Meditation is good in that it allows my mind to be still and quiet and not get drawn into any rabbit holes.

Interviewer: Cool. Okay, so the next section is exploring sensory and rhythmic engagement. So, this question is, how do you generally respond to different sensory stimuli such as music or movement?

Respondent: I respond, I suppose, positively to it. It is engaging to me. I like music. I like rhythmic music. I like music that is funky, so that means it has syncopated rhythms. And those to me are lots of fun to listen to as a general leisurely pastime.

Interviewer: And have you ever used the music or rhythmic music in any capacity? And if so, how did it affect you?

Respondent: Well, yeah, I have not used any type of device as such that is with the specific intention of creating rhythms or being rhythmically engaging, but I do enjoy playing on GarageBand on my phone and playing around with the piano on it, and that is just because of my general interest in music.

Interviewer: Can you share any experiences where rhythmic activities such as like tapping or drumming or dancing have influenced your concentration or stress levels?

Respondent: Well, I do remember there being the app on iOS, Piano Tiles, and I found that quite engaging and I found it quite soothing in a way. It was a nice way to do something that was musical and rhythmic and engaging. In fact, it was so engaging as to be somewhat a distraction, but I did enjoy it.

Interviewer: So it was more like a distraction?

Respondent: Well, it was something that was more distracting because it took up all of my focus. It was on my phone. It was the only thing I could see on my phone. Was that sort of like, did that take away from like... It was something I enjoyed.

Interviewer: Yeah, so you enjoyed it? So I would think that some way of being...

Respondent: I also often have earworms. I have songs playing in my head. So I suppose if there is some sort of bridge between an all-consuming type activity like a game on my phone and just sort of background musical chatter in my mind, some kind of device that was the bridge between those worlds, I would find it helpful and would be able to provide me with somewhat a stream of dopamine that might help me concentrate on my main task that I'm doing, if it's a secondary task. I see.

Interviewer: And so with like playing piano tiles and stuff, when you did that in sort of like your outlet, was that a bit too consuming?

Respondent: Yeah, it was too consuming. Yeah, because it was a game and games are supposed to take all of your attention possible. I had to focus that I was being very precise and that I was tapping the tiles correctly, otherwise I would lose some points and then lose the game entirely and start over again.

Interviewer: I see. Thank you so much for that section. So now we are going to go more into like the music therapy. So have you heard of or participated in music therapy before? And if so, what was your experience like?

Respondent: I have participated in music therapy once when I was 13 years old and I don't recall much of the music therapy session. I remember it being pleasant, but I didn't find it to be, either because of the therapy itself or the therapist, especially helpful. So it wasn't helpful? In my particular instance.

Interviewer: Right. Okay. How do you feel music affects your focus mood or creativity? Do you notice any particular patterns or changes?

Respondent: I do very much enjoy music and I find that it is helpful in all respects. Yep. To my general well-being even. Yep.

Interviewer: And could you describe any instances where musical sound has played a role in managing your ADHD symptoms, such as impulsivity or difficulty with attention?

Respondent: Yes. I mean, I, again, do very much enjoy music and it is something that I spend a lot of time of my life listening to. And so I would say that it's almost a companion for me in life. It is something that helps my mood and by way of that, to some extent, helps my concentration and creativity.

Interviewer: So now into the next section. It's more specific on the device I was to create one. So if there was a device designed to combine music and rhythmic movement, what features would you consider important?

Respondent: I would think it would be important for the device to vibrate. I'm not really sure of your exact ideas about what the device would look like in the end, but I can imagine a device that would help with attention deficits, etc. It would be something that might vibrate and one would tap along to. Yep. To match the beat given by the vibrations. Yep.

Interviewer: And do you think like different sounds as well?

Respondent: Yeah, different sounds as well. Yep. Maybe different pitches would correspond to different pressures with which you squeeze the device.

Interviewer: How do you think a device like this could impact your sensory experience, focus or creativity?

Respondent: I think it could positively impact it if it were something that didn't require too much of my attention, but enough of it to keep me engaged to interact with.

Interviewer: And in what situations, if any, do you think a rhythmic device could assist you? Like for example, during work or studying a real exhibition?

Respondent: Yeah, if it is something that can be easily managed in conjunction with whatever I'm trying to do at the time. If I'm trying to do a specific activity, but at the same time I can use this rhythmic device just to keep my attention from lapsing on the main task that I'm dealing with, then I would think it would be quite helpful. Like a fidget spinner, for example.

Interviewer: Now going into the creativity and self-expression. So what role, if any, does creativity play in managing your ADHD symptoms? Are there any specific creative activities that you find beneficial?

Respondent: I very much enjoy creative exercises and activities. I like composing some of my own music in my spare time. I like creating things in general. I find it quite good because my mind can be somewhat disorganised and filled with ideas, and sometimes just sort of creating something of my own, I'm able to put any random kind of thing together. And if it's just done in such a way that it makes some sense to someone else, then all that kind of random noise in my brain is actually produced into something that is palatable to everyone and feels like an accomplishment to me.

Interviewer: Do you think a device that promotes creativity through music and rhythm would be helpful, and if so, in what ways?

Respondent: Yes, I think it would be very helpful. And from the standpoint of music theory, I think that because there are so many different rhythms, and on YouTube there are even many videos about polyrhythms, as someone who likes to learn about music, a device that gives different rhythms to the user to be engaged by, it might help them actually learn certain rhythms and also increase their musical knowledge.

Interviewer: Which do you think that would then, obviously, more people that understand music knowledge than popularity?

Respondent: Yes, it might have many tangential benefits. It might allow for certain people to become more engrossed in music itself, and from the device having inspired them with its various rhythms, they might take music more seriously and endeavour on a musical journey as a career.

Interviewer: Awesome. I guess this question is pretty similar to how you usually express yourself creatively, and does this impact your ADHD management?

Respondent: Yes, I like music. Again, I like composing music. I used to do, and still am interested by, photography. So that's more of a visual activity.

Interviewer: Awesome. So now we're going into the challenges and opportunities that could be faced. So what are some of the challenges you face when it comes to maintaining focus or managing hyperactivity?

Respondent: Yes, I find it very difficult not to become sidetracked by extraneous details. I find that it's hard to not get sort of led astray by tiny details and lose track of the bigger picture. So I might intend to, I don't know, study for an assignment, but in the end I end up looking into how to make the assignment look pretty or something like that. And I can get so sort of engrossed in that that I really completely forget about what time of the day it is. I just don't actually do what I should be doing. It's very hard to maintain a high level overview of what I should be doing.

Interviewer: How do you feel about the current tools and resources available for ADHD management, and are there any areas where you think improvements could be made?

Respondent: I think that there are lots of tools available for ADHD, and one that comes to mind is habit trackers or just general list making apps to write down what you need to do during the day. There is a particular one, I forgot the name, that is specifically targeted toward people with ADHD, and it also encourages habits like I talked about before with keeping a list for the day very simple, not having too many things written down to do for the day so that a person doesn't get too distracted. As far as possible new kinds of things that could help people with ADHD that could be invented, I imagine that AI, artificial intelligence related products could be quite helpful. Things that automate things for a person with ADHD, maybe automatically replying to emails for example, rather than I having to reply to an email because I might forget to do it or just be too lazy to do it as such.

Interviewer: Are you open to exploring new technologies or approaches for managing your ADHD symptoms?

Respondent: Yes, anything that can help me stay organised, to maintain focus on the important things in life, I am very keen to explore different ways of helping with that.

Interviewer: Cool, there are just a few more questions left. Is there anything else you would like to share about your experience with ADHD or your thoughts on music, rhythm and movement as tools for support?

Respondent: I think that music, rhythm and movement, for everyone, not only those with ADHD, it is something that is enjoyable and so really there is always a market for devices that encourage people to be musical, rhythmic and move because it is very important in life to be somewhat upbeat and happy and it is very easy to become sad and a device that brings some joy through those very primary parts of the human brain, it can't really fail, it will automatically bring some joy to people if it taps into those parts of the brain.

Interviewer: If you were to imagine an ideal tool to help manage ADHD symptoms, what key elements would it include?

Respondent: It would be engaging, it would be fun, gamified, it would probably have some sort of automation built into it to reduce the number of steps required to achieve something.

Interviewer: Last question, how do you envision a device that integrates music, rhythm and movement fitting into your daily routine?

Respondent: I imagine it to be a device that is pretty, that has a very nice aesthetic, something that I would want to hold, that I would want to look at because of its design and that is tactile, responsive and overall is engaging. I find design is something that is very important for everyone but it is something that would want, if it is something that I

enjoy looking at as well as using then it is more likely to stay with me in my daily routine. I think aesthetics are really important. Size as well. Size should be small, I imagine it would be like a pebble.

Interviewer: Is there anything you would like to add?

Respondent: No.

Interviewer: Thank you so much for participating and your responses have been insightful for me.

END AUDIO

ADHD Respondent #2 Transcript

Gender: Male

Duration: 22.15 minutes

Date: 20/08/24

START AUDIO

Interviewer: Good morning! Thank you so much for taking the time to do this interview. I just have quite a few questions I would like you to answer and thank you for signing the consent form. First, I have some introductory questions. So, what is your age?

Respondent: 22.

Interviewer: Nice, and how long have you had these ADHD symptoms for? How long have you been dealing with that?

Respondent: My whole life.

Interviewer: So, could you please describe your experience living with ADHD and how it impacts your day-to-day activities?

Respondent: Generally, it just makes it difficult to focus and stay focused on single tasks. It just makes everything a bit harder when I'm so distracted by everything, and my mind just goes so quickly a lot of the time.

Interviewer: What strategies or tools do you currently use to manage your ADHD symptoms?

Respondent: I try really hard to set goals for myself when I'm doing things like studying, where I have to focus. So, I set myself timers and reward myself based on how long I can stay focused on a task. Just being aware of having ADHD helps me work on it better.

Interviewer: Are there any specific activities that you find particularly helpful for improving focus or relaxation?

Respondent: Definitely exercise; it clears my head and helps me think more clearly without having a bunch of thoughts and just things going on. It makes me feel less hyperactive; when I'm sitting still, I feel fidgety. Also, listening to music helps a lot. Playing music helps me focus more, and being in quiet environments makes me more productive.

Interviewer: These next few questions are exploring the sensory and rhythmic engagement. How do you generally respond to different sensory stimuli such as music or movement? Are there any that stand out to you in terms of being helpful or challenging?

Respondent: Listening to music stands out. Even if I'm just tapping along or playing instruments, it helps. I haven't really tried fidget toys, but music and tapping along definitely work for me.

Interviewer: Have you ever used musical rhythmic movement in any capacity? If so, how did it affect you?

Respondent: I've listened to music, but I haven't specifically used rhythmic movement to treat my ADHD. I play music but never with the sole intent to treat ADHD.

Interviewer: Can you share any experiences where rhythmic activities such as tapping, drumming, or dancing have influenced your concentration or stress levels?

Respondent: I might subconsciously tap my feet to music or even without music, which might be a coping mechanism for staying focused and less hyperactive.

Interviewer: Have you heard of or participated in music therapy before, and if so, what was your experience like?

Respondent: I've heard of music therapy but never participated in a program. I've only used music for listening or playing, not specifically as therapy for ADHD.

Interviewer: How do you feel music affects your focus, mood, or creativity? Do you notice any particular patterns or changes?

Respondent: Music helps me focus for longer, but sometimes with less focus than if I were not listening to music. If it's intense work, I can't listen to music, but for less intensive tasks, music keeps me in the zone longer.

Interviewer: Could you describe any instances where musical sound has played a role in managing your ADHD symptoms, such as impulsivity or difficulty with attention?

Respondent: Music helps me focus my mind and keeps my thoughts from wandering too much.

Interviewer: If there were a device designed to combine music and rhythmic movement, what features would you consider important?

Respondent: The device needs to be discreet, easily carried around, and responsive to inputs without delay. Haptic feedback would be beneficial to provide physical stimulation, making it more engaging.

Interviewer: How do you think a device like this could impact your sensory experience, focus, or creativity?

Respondent: It could help with focus but might also become a distraction if not implemented well. It would be helpful for calming hyperactivity and racing thoughts. For creativity, if it allows open-ended use like an instrument, it could definitely enhance creativity.

Interviewer: In what situations, if any, do you think a rhythmic device could assist you, for example, during work or study or relaxation?

Respondent: During work and study, it could help regain focus, especially when my mind wanders. For relaxation, it could assist in winding down.

Interviewer: What role, if any, does creativity play in managing your ADHD symptoms? Are there specific creative activities that you find beneficial?

Respondent: I don't see a strong link between creativity and helping ADHD, but playing instruments helps.

Interviewer: Do you think a device that promotes creativity through music and rhythm would be helpful, and if so, in what ways?

Respondent: If the device is open-ended and allows for creativity, it could definitely help. It would be more beneficial if it offers more than just pressing buttons and instead provides tools for creative exploration.

Interviewer: How do you feel about the idea of a rhythmic device designed specifically for individuals with ADHD?

Respondent: I think it's worth exploring and could be helpful, but the balance between being productive and not distracting is important. Overall, it's a concept that could help a lot of people.

Interviewer: Thank you so much! That wraps up the interview. I appreciate your time and all of your insights. Thank you!

END AUDIO

Respondent #3 Transcript

Occupation: Developmental Psychologist

Duration: 23.29 minutes

Date: 21/08/24

START AUDIO

Interviewer: So I am just going to start the interview and you've picked the consent form and everything's all good to go. So at the start, I'm just going to do more of like just background and expertise questions. So can you please describe your background and experience in neurodevelopmental psychology?

Respondent: Sure. I am an educational and developmental psychologist. So I did a master's degree here starting around 10 years ago. And since that time, I have worked with probably majority children, many of whom might come to me for a query around, usually attention, but I've also worked in a research capacity with children who are at greater risk of neurodevelopmental differences, difficulties, because there might be, for example, a population of children with cerebral palsy who are at much increased risk of also attentional and executive function difficulties, or children who've had surgery for congenital heart disease as well. They're like my research backgrounds. In my clinical role, I mainly do assessment, which often incorporates the question of, is a student also experiencing maybe attention difficulties.

Interviewer: Right, I see. And how long have you been in this field for?

Respondent: I've been practicing as a psychologist for 10 years now. Yeah.

Interviewer: Yeah, that's awesome. Alrighty, so I guess this next section is just more like understanding the neurodevelopmental disorders. So how do you define neurodevelopmental disorders, and what are the primary challenges faced by individuals with these conditions, mostly people with like ADHD or ADD who have symptoms of hyperactivity and inattentiveness?

Respondent: I guess I'm sort of midway between a more medical model in that we do refer to our manual, the DSM, which lists these as neurodevelopmental disorders when we're maybe writing a formal report or talking in a more research or clinical sense. And I feel that that model does acknowledge that some people experience greater difficulties with these things and may fit particular patterns, like someone might experience more the hyperactivity, impulsivity, or the inattentiveness, or sometimes both, and that it's really impacting their learning or their day-to-day life in a significant way. But I would also say that I do also sort of walk the other line, which is more around acknowledging individual difference and affirming that it's fine to be different, but sometimes we're asking people to do things that are just really hard, like sit at school all day.

Interviewer: Right. Yeah. And I guess in your experience, how does ADHD or ADD disorders typically affect daily functioning and quality of life?

Respondent: It can be quite significant. I mean, in the classroom, for example, if you're not able to pay attention or sit still and focus, you're not really engaging with the learning opportunities. And so you may not be learning what you should be learning for that grade and fall behind, and then that brings a whole host of other issues around your concept of yourself as a learner and opportunities in future. And I guess there is research around trajectories of really significant, poorer outcomes if things are just

left and someone behaves quite impulsively, they might be at more risk of all sorts of things, or inattention, they might just miss out on opportunities to learn as they could.

Interviewer: Awesome. So now in this next section of questions, I'm just going to talk more about like understanding the coping mechanisms and the current support. So what are some common coping mechanisms that individuals with these neurodevelopmental disorders use?

Respondent: I guess you're sort of like coping is different to treatment in it's, you're more interested in what the individual person might do. Yeah. I suppose movement is one of them, movement, whether that's like actually getting up out of the seat and moving around or fidgeting or, you know, I don't know that it's a coping mechanism, but there can be sort of off, you know, daydreaming kind of behaviours or hyper focusing on special, you know, certain things that are enjoyable and more immediately rewarding I suppose.

Interviewer: Yeah. Can you discuss any therapeutic interventions or support systems that have been particularly effective for individuals with neurodevelopmental disorders? Are there any that you've like taken notice that are beneficial and effective?

Respondent: I mean, there's a lot of things that I tried, I guess, in classrooms like more visual cueing and check-ins from, you know, other people. And of course, there are the things like the wobble stools and sensory type toys and things which, you know, anecdotally I would hear from people like parents and teachers either do help or make things worse. We use, we have the option when we're doing assessment of students can sometimes choose the sort of little stools that allow and sort of require movement. And I would say I see some students that are just sitting there wobbling away but doing their work. And others who are wobbling away and falling off, you know, falling over and you're like, okay, no. Yeah, so it just depends on some people. Some people can kind of multitask having that sort of distraction while focusing on their work. And I guess the idea is not even that they're, you know, having it as a distraction but that the very act of moving is helping them to, you know, the theory is it would help them to focus better on other tasks if they can stay in motion kind of thing.

Interviewer: Yeah, definitely. Awesome. And how do you think integrating music and rhythmic movement into therapeutic interventions might benefit individuals with neurodevelopmental disorders?

Respondent: I am very interested in integrating music into therapeutic intervention like overall. But I suppose it's a very broad field. I mean, something I've been looking at is what's the evidence for say something like learning a musical instrument and working memory as opposed to these working memory training programs. I mean, you know what? I would prefer the answer to be. Yeah. But in terms of movement, I mean, music can be all sorts of things. It can be listening to music or it can be making it. It can be making it on a drum kit or it can be, you know. Yeah.

Interviewer: Yeah, I guess you just have to have more sort of evidence to show how that would actually be beneficial. With like the current coping strategies for managing hyperactivity and intensiveness, how do these strategies vary between different age group and developmental stages? Is there a big difference or are they all kind of similar?

Respondent: I think overall like you see more obvious movement in younger children like difficulty sitting still and actually running around the classroom. And I think you don't see that as much as, you know, students get older, whether it's because they do manage to

have a bit more sort of of their own regulation or there's peer influence or the expectations at school are just that you will be able to sit still and they're just internally struggling with that need to move. And that may be options for integrating physical activity become more discreet. Like you hear about things like rubber bands around the base of chairs and but not jumping up and having dance breaks between classes like primary school might. Yeah.

Interviewer: Yeah. So this next couple of questions is more about device development and evaluation. So what criteria would you consider important for evaluating the effectiveness of a new therapeutic device aimed at supporting these individuals?

Respondent: I guess one thing would be does it support focus on other activities or is it itself becoming a distraction? But if the idea isn't to use it while you're doing other things, I guess that's not as important. If it was, you know, to be used in itself, then I guess it's, you know, a little bit more around acceptability for the person using it. Yeah.

Interviewer: How do you think sensory experiences and creative play a role in therapeutic interventions?

Respondent: I think they could play a really, really important role. And again, I'm thinking of random sort of things that I've read that have jumped out at me like, you know, drumming and work for sort of trauma and suggestions around the importance of rhythm and group musical experiences. But the sensory side of things, yeah, I think they say there's some theories that say by engaging in other sensory activities, you can better focus. But then other things say, but do they become a distraction in themselves?

Interviewer: Exactly. Yeah, that's the thing. It's like you want it to be engaging, but not so engaging that it completely distracts them from the actual task.

Respondent: But just thinking about that, I mean, other things in the classroom involve like management of auditory input. So whether that's recommendations that a student work in a quiet place, but then some students say, no, that doesn't work for me. I want to listen to my music or I want noise cancelling headphones or white noise. So it's not just the physical sensory. It's also what you're hearing as well is often part of that discussion.

Interviewer: Definitely. I see. Yeah. And I guess what are the common challenges or limitations that you see with existing coping strategies at the moment? Is there any sort of like gap that you see that could be improved?

Respondent: I guess that they're not individualised, I suppose. And as I sort of mentioned, I guess is that something that will work for one person to help keep them focused will potentially be a distraction for another person.

Interviewer: Exactly. Yeah. And have you seen any emerging methods or interventions that show promise in improving the current strategies? Like have you seen any sort of other devices or interventions that are coming in or not really?

Respondent: Not really. I think there is this focus on schools in managing movement, I suppose. Yeah. Yeah. I see. And a bit around managing sound and environment more generally.

Interviewer: Right. I see. So this question is more of like challenges and opportunities with my project. So what challenges do you foresee in developing and implementing a device that combines music and rhythmic movement for neurodevelopmental support?

Respondent: Just, I guess, potentially where it might be unable to be used, like if it does have that sound aspect as well. Yeah. But that's, you know, that's okay. Yeah. You know, if it's incorporating that musical and creative aspect, then that's its own benefit as well.

But I guess I think some of the idea behind things like fidget toys or the purely physical sensory is that the student can do it in class without distracting other people. Yeah. So it's again, it's around what's the aim of it.

Interviewer: Right. Yeah. I see. Awesome. I guess this is more just like an idea of what your opinion is with like the role of music therapy. But how do you think music therapy can be integrated into existing treatment plans for individuals with neurodevelopmental disorders?

Respondent: I would like to say quite easily because I find myself wanting to write in recommendations, perhaps learn a musical instrument or, you know, engage in whether it could bring the social interaction. If you're making music with other people, it could be creative. It could be helping you to be more disciplined around focusing on the task. Like it has so many opportunities for, you know, we've come up with programs to teach skills and you think, well, you get better at that skill when you're doing that program. Maybe learning an instrument or playing music is the same, but at least you get the music as well. Yeah. Yeah. I think I would love to see it more integrated, but I suppose I think there is a bit of a not as much awareness around music therapy. Yeah, definitely. Other areas.

Interviewer: Do you have any sort of like specific aspects of music therapy that have shown the most benefit in managing symptoms such as hyperactivity and inattentiveness?

Respondent: I haven't seen it myself. Yeah. Other than I guess if it is something that a student does find rewarding for themselves that they can direct their focus into that. Yeah. And it is a positive, you know, activity to do. You know, I have heard anecdotally around certain instruments being a good fit for, you know, more physical and rhythmic instruments, maybe being a good outlet for a lot of energy and need to move. But I haven't really read research on that.

Interviewer: I think these next two questions, I might kind of skip over it. Because I feel like you've kind of talked about how coping strategies can be improved by being more individualised for people. I guess, do you have any ideas or ways that treatment plans can be personalised to better address these individual differences?

Respondent: I suppose you might see a bit of a difference between the more hyperactive, impulsive presentation and maybe more inattentive and consider how that might play into what's needed in a device. Some students who might meet the criteria for ADHD really don't need to be moving a lot at all, but might find other aspects of a device that incorporates music helpful.

Interviewer: So, with future directions, what future research or developments would you suggest to enhance therapeutic approaches for individuals with neurodevelopmental disorders?

Respondent: I think, and it sounds like something you might have done, but more involvement of the population in designing any sort of treatment plans or devices, more consumer input. And less of a blanket approach, whether it's like any child gets this fidget toy or no child in the class. You know, it's hard with schools because they can be a little bit classroom level, but yeah.

Interviewer: How do you envision the integration of new technologies and methods improving the treatment and support for individuals with neurodevelopmental disorders in the coming years?

Respondent: I mean, I could hardly begin to imagine, to be honest, whether you're coming from sort of tools and technological tools to support things like memory and executive functioning and attention.

Interviewer: Definitely. Who knows? It could be anything. Technology is really evolving, so honestly anything can be made up. Can you provide any examples of successful case studies or interventions where coping strategies were significantly improved? Have you seen any sort of similar sort of project idea or any sort of product that has significantly helped? Or has it all just been very traditional in terms of the current strategies?

Respondent: Yeah. I mean, when I've gone to try and update my recommendations, I find a little bit with the literature that you can find the studies that say one thing and the studies that say another. Like, yes, give a child a stress ball or a fidget toy and that will improve their focus and attention. And I was like, it has no impact or it has a negative impact, which is, I guess, why I go back to that individualised. I mean, the guidelines that came out in 2022 for Australian sort of best practice around ADHD say what you should offer initially at diagnosis is an option, is a combination of medical, like medication and environmental strategies. But those environmental strategies, I mean, a quiet place to work or movement breaks. I guess there's a bit more around the movement breaks side of things, like making sure you can get up and move at regular times.

Interviewer: I see. I guess with your opinion, what do you think would be really important elements for creating some sort of rhythmic device for any sort of specific aspects of design functions or anything that you think could be really beneficial? Do you see something handheld?

Respondent: I feel like at the moment I'm thinking more of something that's handheld that you can just transport, like portable. Yeah. Not too big. Yeah. Not too big. But with the good, like when it feels satisfying to hold, you know. I mean, there is also, you know, things around weighted objects and things. I don't know. I don't know even less of the evidence base for that, but there's certainly a lot of devices out there. So I don't know. I would think handheld, but kind of satisfying. Like, you know, you feel like you're holding something or just like a tiny little thing that, because I think otherwise you're not really getting much physical movement.

Interviewer: Right. Yeah. Interesting. That's good to know. And I guess, what advice would you give to practitioners looking to incorporating new strategies of therapies into their work?

Respondent: Try and see what, if there's not an evidence base for that product, is there at least a theoretical base for it?

Interviewer: Yeah. Cool. And yeah, do you have anything else to add to any of this interview?

Respondent: I have seen more integration of rhythmic research wise and how it is more beneficial. Yes there is lots of discipline and focus around the melodic aspect of music therapy however there is a body focus more on the rhythmic aspect.

Interviewer: Everything that you've been saying has been really helpful and insightful. So thank you so much. But yeah, I think that's pretty much everything that I've needed to ask.

END AUDIO