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Rhythms of Resilience: Neuropsychological Effects of Laughter Percussion on Anxiety and Depression in a Community-Based Pilot Study

Professor Idi Ras Banamungu[1, 2, 3*]
DBA, PhD (Human Rights & Migration Law), HonDMusTherCounsPsych, HonProf
[1]Honorary Professor of Counselling Psychology, Laughter Percussion, and Management Learning, Kennedy University of Baptist, Florida, USA
[2]Founder & Chief Innovation Officer, Laughter Percussion Academy, Kalgoorlie, Western Australia, Australia
[3]Founder & CEO, Laughter Percussion Academy (NDIS-Registered Provider), Kalgoorlie, Western Australia, Australia
***Corresponding Email Id:** banamungu2007@gmail.com

ABSTRACT

Introduction: Anxiety and depression are among the most prevalent mental health disorders globally. Conventional treatments such as pharmacotherapy and cognitive-behavioral theraphy are mostly used. However, many individuals either show limited response or prefer alternative, non-pharmacological treatments.
Objective: This research explores the effectiveness of laughter percussion, a novel therapeutic modality that blends rhythmic drumming with structured laughter as an interention of reducing symptoms of anxiety and depression.
Methods: A mixed-methods pilot study was conducted in a community setting haing 60 adult individuals with self reported or clinically diagnosed anxiety and depression. Individuals were randomly assigned to intervention group (Laughter percussion) or no-treatment (control group). The experimental group engaged in weekly Laughter Percussion sessions for eight weeks, while the control group received no intervention. Standardized assessments included the GAD-7 and PHQ-9 scales, along with post-session interviews of 20 individuals were conducted to capture qualitative insights.
Results: The results show GAD-7 groups mean before intervention was 10.42 and after interventiaon was 4.50 which showed a reduction of 5.92 by 56.80% (P = 0.00). Whereas, PHQ-9 groups mean before intervention was 13.73 which showed reduces to 7.82 showing a reduction of 5.91 by 43.04% (P = 0.00). Participants also reported enhanced emotional expressiveness, increased group cohesion, and improved stress management.
Conclusion: Laughter percussion appreas to enhance neuroplasticity and emotional resilience, offering a promising complementory approach to traditional therapeutic mental health therapies.

Keywords: *Neuroplasticity, Laughter Percussion, Anxiety, Depression, Stress Reduction, Rhythm Therapy, Emotional Resilience*

INTRODUCTION

Depression and anxiety are the most common psychological disorders worldwide, as highlighted by the World Health Organization (WHO). They are key health indicators, with a significant impact on mental health morbidity. With a global prevalence of 4.4%, these disorders represent a major public health challenge due to their widespread and disabling nature. Anxiety is defined as feelings of tension, unease, nervousness, anxiety, fear, and high autonomic activity with varying degrees of intensity and excessive fatigue about a bad future, whereas depression is a widespread mental health problem that affects over 300 million people globally (Melkam et al., 2025; WHO, 2017).
In Australia, chronic illnesses are a major issue that lead to early mortality, disability, and a high cost of healthcare. Understanding of the relationship between co-occurring depression and chronic illnesses in the general Australian population is crucial for the successful management of these issues (Srinivasan et al., 2025). When depression, a common mental health issue, coexists with chronic diseases, the burden is increased. This co-occurrence, termed multimorbidity, refers to the presence of two or more chronic conditions, encompassing both physical and mental

health disorders. It presents a number of challenges, such as a greater burden of illness, greater management costs, and a reduced standard of living (Harris et al., 2018).

Multimorbidity is increasingly prevalent across Australia, with higher rates observed in women, the elderly, and those from low-income households. One in five Australians had more than one chronic illness in 2017–2018. The prevalence was higher in females (22.8%) than in males (17.7%), indicating a gender disparity. The prevalence of multimorbidity also rises with age, reaching almost one in two people aged 65 and older (Woolcock, 2024). Chronic disease patients deal with many difficulties that impact both their mental and physical well-being. It is well established that mental health problems are more common in those with chronic illnesses than in the general population (Walker et al., 2015). Mental health conditions like stress, anxiety, depression, obsessive-compulsive disorder, and post-traumatic stress disorder can affect a person's social and psychological health (Monroe & Slavich, 2016).

Furthermore, the development and maintenance of this comorbidity are influenced by psychological variables, including social isolation, adverse childhood experiences, and economic constraints (Tzouvara et al., 2023). A comprehensive approach that incorporates medicine, psychotherapy, and psychological support within the framework of a chronic care model is an effective way to manage these diseases. When substance abuse and mental health issues coexist, integrated therapy approaches that address both at the same time have proven to be more effective than stand-alone treatments. Preventive efforts should focus on early detection of those who are more likely to have alcohol-related mental health problems. Policies to limit alcohol availability, boost mental health literacy, and improve access to evidence-based treatment options should also be implemented (Onaemo & Chireh, 2025).

Psychological treatments like acceptance and commitment therapy (ACT), mindfulness-based cognitive therapy (MBCT), and cognitive behavioral therapy (CBT) can effectively treat a range of anxiety disorders. They can be used as a stand-alone treatment for individuals or groups, or as a supplement to medication. Additionally, an increasing amount of data indicates that digitalized mindfulness and acceptance-based therapies, as well as therapist-guided Internet-delivered cognitive behavioral therapy (iCBT), may be a useful addition to conventional in-person therapy. Despite advancements in medication and psychological therapies, a significant number of patients remain treatment-resistant or prefer natural, body-based, or community-integrated interventions (Apolinário-Hagen et al., 2020). Due to convincing evidence, governments and health care systems around the world are adopting and advancing evidence-based psychological interventions. Both governmental distribution programs that allow for centralized training in and deployment of evidence-based psychological therapies, as well as initiatives directly done by evidence-based therapy developers, are commendable efforts (Barlow et al., 2018). There is sufficient literature on the efficacy of laughter therapy in improving mental health treatments, particularly for anxiety and depression. However, laughter percussion is a relatively novel modality with limited literature available at this time. Therefore, this study aims to explore the neuropsychological mechanisms underpinning “Laughter Percussion”, which is a practice created by Dr. Ras Banamungu.

LITERATURE REVIEW

Integrative and Embodiment-Based Approaches

Recent neurobiological research support these interactions include structural alterations in brain regions involved in reward processing and emotional regulation, disruptions in the neurotransmitter system, and modifications in stress response pathways (Onaemo & Chireh, 2025). This growing demand for integrative approaches has catalyzed the development of therapeutic models that emphasize embodiment, somatic awareness, and community participation. The increasing interest in alternative methods has paved the way for innovative therapeutic models that focus not only on cognition but also on embodiment, social connection, and neurophysiological stimulation (Vaisvaser, 2021).

The theoretical framework of embodiment is used to analyze cognitive and body-based therapies, framing them as constructed experiences influenced by individuals' subjective and intersubjective lived experiences. The healing qualities of embodiment are believed to increase the effectiveness of psychotherapy (Hauke et al., 2024). Through embodied therapeutic experiences, people learn self-awareness, skills, and insights that can be beneficial to psychotherapy. According to embodied psychotherapy, self-healing involves more than just learning facts; it also

involves developing a deeper comprehension of the connections between one's body, thoughts, feelings, and behaviors, as well as how these components interact with one another in the environment (Hauke & Kritikos, 2018).

Patients get important insights into the underlying causes of difficulties, create coping mechanisms, and improve emotional control through this process in collaboration with the psychotherapist. The knowledge also includes useful techniques for reducing stress, enhancing communication, and creating stronger bonds with others. In psychotherapy, embodiment promotes a type of experiential learning in which patients actively interact with and consider both their internal and external environments (Fugate et al., 2024). Building on this integrative and embodiment-focused perspective, the following sections review recent literature on the neuropsychological and emotional mechanisms of laughter, rhythm, expressive arts, and neuroplasticity, with particular attention to interventions such as Laughter Percussion.

Laughter and Neurochemistry

Laughter has long been recognized as a potent antidote to stress and a catalyst for mood elevation.

Laughter therapy is a popular non-pharmacological approach to reducing stress and anxiety. Therapeutic laughter can be used as a useful additional therapy to reduce stress on mental health because it is a non-invasive, low-cost, and simple intervention. It can reduce anxiety and depression by biologically decreasing pro-stress variables and increasing mood-enhancing anti-stress elements (Akimbekov & Razzaque, 2021). Neurochemical studies show that laughter increases brain dopamine, serotonin, and endorphins-chemicals closely associated with pleasure, motivation, and emotional balance (Porges, 2011).

According to a meta-analysis, laughter therapy appears to be more successful than standard care at lowering hospitalized patients' levels of anxiety and depression (SOBALVARRO et al., 2023). As laughing is a nonverbal emotional component that promotes socialization, it's crucial to assess the psycho-emotional status of those who have undergone laughter therapy. Laughing increases happiness and overall well-being by increasing endorphin levels in the blood. Research into the physiological and psychological effects of laughter can contribute to the development of new therapeutic techniques. Laughter therapy, which employs laughter to enhance health, can improve a person's mental health, mood, stress, and endorphin production (Spytska, 2024).

According to recent neurochemical and neuroimaging studies, laughing causes the release of opioids in brain areas such the cingulate cortex and anterior insula, which improves emotional control and social interaction (Sun et al., 2021). In hospitalized patients, laughter therapy appears to be more successful than normal care at lowering anxiety and depression (SOBALVARRO et al., 2023). In addition to a large increase in serotonin plasma concentration and a significant drop in salivary chromogranin A concentration, the laughter therapy intervention led to a significant decrease in heart rate and systolic blood pressure. Laughter therapy may develop into a useful intervention to raise the standard of living for senior citizens in senior day care facilities. This therapy reduced anxiety and depression (De Francisco et al., 2019).

According to a meta-analysis, humor and laughter therapies can help adults with anxiety, depression, and poor sleep quality (Zhao et al., 2019). A 2023 meta-analysis found that laughter therapy can lower cortisol levels by as much as 37%, indicating a significant effect in reducing physiological stress. According to the study's findings, interventions that elicit spontaneous laughter significantly reduced cortisol levels by about 32% when compared to non-humorous routine tasks. This suggests that humor's stress-relieving effects may have an influence on the HPA-axis, a metabolic system. Regardless of the cortisol assay (salivary and serum cortisol) or the laughing-inducing technique (viewing comedies and laughter therapy), the beneficial effect of laughter on buffering cortisol response was already apparent after one laughter session (~37% reduction) (Kramer & Leitao, 2023). Laughter therapy has been successfully integrated into hospital programs and community mental health interventions to enhance resilience and alleviate distress.

The Therapeutic Role of Rhythm

The path toward a solid neuroscientific foundation for rhythm- and music-based interventions has begun with recent advances in neuroimaging and neurophysiology, which have improved our knowledge of how the brain reacts to the periodicity of auditory rhythmic patterns and how rhythm can influence movement (Chen et al., 2022). An increasing number of research have examined the efficacy of music and rhythm-based therapies in

motor rehabilitation. A growing body of research suggests that musical rhythm is a potent instrument that can influence the activity of several different brain networks, induce neural plasticity, and have a significant impact on restoring or enhancing motor functions. Through active engagement with music, rhythm- and music-based therapies can induce neuronal entrainment across auditory, sensorimotor, and motor networks, alter the dopaminergic mesolimbic system, and promote neuroplastic changes. (Braun Janzen et al., 2022).

Research in music therapy and neuroscience highlights the profound impact of rhythmic activity on brain function. Percussion also serves as a crucial therapeutic tool in music therapy, but its instructional methodology has serious flaws. In clinical music therapy, percussion is frequently used, making up 43% of the total session time and 61% of sessions on average. Studies on percussion treatment have been conducted in a number of clinical contexts, such as teenagers with generalized anxiety disorders, memory problems, sensory impairments, and expressive language problems. Numerous resources are available for use in percussion classes to illustrate different drumming and percussion concepts and methods, but they are not specifically designed for therapeutic use in the field of music therapy (Evans, 2023).

Emerging neuroscience research suggests that rhythm and laughter may have synergistic effects on the autonomic nervous system. The intersection of rhythm and laughter may profoundly influence the nervous system (Thaut & Hoemberg, 2025). Brain areas linked to symptomatic (pathological) laughter have been identified and categorized using traditional neurology techniques under other diagnostic indicators and symptoms of diseases like epilepsy, strokes, and other brain lesions (Wild et al., 2003). Rhythm entrains the brain, regulates heart rate, and improves coherence between brain hemispheres. Meanwhile, laughter activates the release of endorphins, lowers cortisol, and shifts the nervous system from sympathetic (fight-or-flight) to parasympathetic (rest-and-digest) states. Together, these elements engage the brain's natural capacity for healing through neuroplasticity (Askenasy, 1987; Dunbar et al., 2012). Laughter Percussion combines rhythmic drumming, known for its brain-stimulating effects, with intentional, therapeutic laughter to produce physiological, emotional, and psychological benefits.

Neuroplasticity and Emotional Resilience

Neuroplasticity, or the ability of brain tissue to alter its structure and function in response to experience, is a basic feature of the human brain (Matheson, 2024). Recent research has focused on emotion regulation pathways, however the majority of studies have looked at directed, explicit, or "exogenous" regulation strategies. Whether intentional, voluntary attempts to alter emotions are necessary for all emotion management techniques has been a topic of discussion in the literature (Gross & Feldman Barrett, 2011; Kühn et al., 2014). Effective regulation of emotional responses to anxiety, depression is essential for psychosocial well-being. Research on neuroimaging has mostly ignored implicit regulation, which does not entail a conscious attempt to alter emotional experiences, in favor of directed, volitional control (such as reappraisal or distancing). The brain connections that the explicit regulatory approaches use may or may not be used by these implicit mechanisms (Ma et al., 2017).

Recent neuroscience research demonstrate how neuroplasticity and emotional resilience interact via dynamic pathways (Singha, 2024). Through exercise, cognitive-behavioral therapy (CBT), and mindfulness, the brain uses neuroplasticity to develop new emotional regulation techniques. According to research, frequent mindfulness practice increases gray matter in areas of the brain that control emotions and self-awareness, whereas exercise enhances the production of brain-derived neurotrophic factor (BDNF), which aids in brain development and adaptation. These changes strengthen the prefrontal cortex's regulatory control over the amygdala, enhancing emotional regulation skills in the management of stress, anxiety, and depressive symptoms. CBT and eye movement desensitization and reprocessing (EMDR) therapies use neuroplasticity to help patients process trauma and create more adaptive emotional responses by altering the brain circuits that control emotional regulation (Michaels, 2025; Sagendorf, 2025).

Research evidence shows the brain's capability to form new connections throughout life when exposed to both positive and negative experiences. Research shows that neural adaptations occur when people engage in new learning while forming social support networks and learning resilience-building techniques. Neural connections in the prefrontal cortex and hippocampus become disrupted by chronic stress and trauma yet this damage does not need to be permanent. Brain interventions that activate neuroplasticity mechanisms help restore brain network equilibrium thus enabling better adaptation to adversity while improving long-term mental health. The ongoing scientific exploration of neuroplasticity reveals new paths for mental health interventions which allow people to

consciously redesign their brains for enhanced emotional strength and adaptive capacities across their lifespans (Öner, 2024; Xie, 2024).

This paper fills that gap by investigating the unique outcomes of Laughter Percussion in a controlled experimental design. The study aims to investigate the neuropsychological mechanisms underpinning Laughter Percussion, which is a model deverloped by Dr. Ras Banamungu. A reflective essay on laughter percussion in modern therapy, highlighting its potential to address contemporary mental health challenges is discussed in a youtube video by the creator of the model "Laughter Percussion" (Banamungu, 2025). The study assesses its effectiveness in reducing symptoms of anxiety and depression. Through empirical research, this study evaluates the impact of group-based sessions on mental health and explores how this expressive, joyful modality can support emotional resilience in both clinical and community contexts.

Research Hypothesis

H_1 = Laughter Percussion has significant positive effect on people with anxiety and depression.
H_2 = Laughter Percussion reduces anxiety and depression of people significantly.

METHODOLOGY

Study Design

This study utilized a mixed-methods, community-based quasi-experimental design to evaluate the neuropsychological effects of Laughter Percussion on on symptoms of anxiety and depression. By integrating quantitative psychological assessments using standardized clinical scales with qualitative interviews, the research aimed to capture both measurable outcomes and subjective experiences of participants.

Duration and Setting

The study was carried out over an eight-week period at community mental health centers and wellness networks in Kalgoorlie, Western Australia.

Ethical Approval

The Laughter Percussion Academy approved the study. Prior to participation, all participants were given written and spoken information about the study's aims, procedures, and potential risks. Informed consent was obtained, and strict confidentiality and data protection protocols were followed in compliance with national ethical principles and Australian Privacy Principles. All study data were anonymized using unique participant's serial number. Raw datasets, and transcripts were securely stored on encrypted servers accessible only to the author of the study. Audio files from interviews were deleted post-transcription. All data handling complied with institutional and national research ethics standards.

Participants

Sixty adult participants (aged 18–60 years) were recruited from community mental health centres and local wellness networks. Participants were randomly assigned to either an experimental group (n=30) or a control group (n=30).

Inclusion Criteria

1. mild to moderate anxiety or depression assessed by pre-screening using Generalized Anxiety Disorder-7 (GAD-7) or Patient Health Questionnaire-9 (PHQ-9)
2. Availability to attend weekly sessions for eight weeks.
3. Participants were fluent in English.
4. Pariticpants were only enrolled in this psychotherapy program.

Exclusion Criteria

5. Participants with any severe psychiatric or neurological conditions.
6. Any limitations preventing participants from percussion activity.
7. Paritpicants using any kind of psychotropic medications in the last month.

Procedure

The experimental group attended one 90-minute Laughter Percussion session per week for eight consecutive weeks. Sessions were facilitated by certified Laughter Percussion practitioners trained in counselling psychology and music therapy. The control group received no intervention during the study period but was offered access to the program. Each session included:

7.1. Breathwork and grounding exercises for 10 minutes
7.2. Guided therapeutic laughter exercises for 20 minutes
7.3. Rhythmic drumming patterns (solo and group-based) for 30 minutes
7.4. Call-and-response exercises using drums and vocalizations for 20 minutes
7.5. Reflection and group sharing for 10 minutes

Quantitative Data Instruments

Quantitative data were collected using two validated instruments to assessed the severity of anxiety and depressive symptoms. Both instruments were administered at baseline (Week 0) and post-intervention (Week 8) for all participants.

Generalized Anxiety Disorder-7 (GAD-7)

A seven-item self-report scale which is a widely used 7-item screening tool for anxiety, measuring anxiety severity over the past two weeks (Spitzer et al., 2006). Each item is scored from 0 (not at all) to 3 (nearly every day), resulting in a total score range of 0–21. Interpretation was based on the points 5 (Mild anxiety), 10 (Moderate anxiety), and 15 (severe anxiety). The GAD-7 has demonstrated strong internal consistency as the Cronbach's Alpha is 0.89.

Patient Health Questionnaire-9 (PHQ-9)

A 9-item scale for evaluating depressive symptoms based on Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria (Kroenke et al., 2001). Each item scored from 0 to 3, total score range from 0–27. A score of 10 or above indicates clinically significant depression. The PHQ-9 demonstrated high validity and reliability as the Cronbach's Alpha is 0.89.

Qualitative Data Instruments

Additionally, qualitative data were collected post-intervention via semi-structured interviews with 20 randomly selected participants from the intervention group. These interviews were conducted one week after the final session and lasted approximately 30 minutes each. Questions focused on emotional responses, perceived changes, participants experience, and practical applications of the intervention.

Data Analysis

Quantitative Data Analysis

Qualitative data were analyzed using IBM SPSS Statistics version 28. Descriptive statistics were apllied to evaluate demographic characteristics. Paired t-tests were applied to compare pre-and post-intervention scores within groups, while independent-samples t-tests assessed between-group differences. Effect sizes were calculated using Cohen's d. Statistical significance was set at p-value < 0.05.

Qualitative Data Analysis

Qualitative data were transcribed verbatim and were analyzed using thematic analysis following Braun and Clarke's six-phase approach (Terry et al., 2017). An inductive coding strategy was used to allow themes to emerge organically from the data. Two independent coders reviewed all transcripts and discrepancies were resolved through consensus. A third senior reviewer verified final themes to ensure reliability, identifying recurring patterns. Thematic analysis was done on the following bases:

Familiarity

A few responses from the selected ones were reviewed initially to get an understanding of the recurring themes and patterns. This helped refine the framework for coding.

Coding

Manual coding via Excel was done. Each response was coded under one or more themes. Both deductive coding (based on the pre-determined themes) and inductive coding (identifying new, emergent themes from the responses) were utilized.

Thematic Analysis

The responses were coded under the themes like emotional expression, neurocognitive shifts, and perceived well-being.

Descriptive analysis

Thematic analysis will be followed by descriptive analysis. Frequencies and percentages of the repeated themes were counted and mentioned explicitly stated for concluding the results.

RESULTS

The findings from this study supports the hypothesis that Laughter Percussion significantly reduces symptoms of anxiety and depression having a positive effect.

Quantitative Results

Quantitative results are divided in several sections.

Reliability Analysis

Data reliability was rigorously assessed using various methods. The internal consistency of the variables was evaluated via Cronbach's Alpha, as shown in **Table 1**. The significant values obtained by Cronbach's alpha for all the variables indicate the internal consistency of the data. The observed values were > 0.5 (0.885), which is excellent for further analysis.

Table 1. Internal Consistency of Variables via Cronbach's Alpha.

<table>
<tr><th>Variables</th><th>Items</th><th colspan="3">Cronbach's Alpha</th></tr>
<tr><td rowspan="7">Pre-GAD-7</td><td>Pre-GAD-1</td><td rowspan="7">0.808</td><td rowspan="14">0.806</td><td rowspan="17">0.885</td></tr>
<tr><td>Pre-GAD-2</td></tr>
<tr><td>Pre-GAD-3</td></tr>
<tr><td>Pre-GAD-4</td></tr>
<tr><td>Pre-GAD-5</td></tr>
<tr><td>Pre-GAD-6</td></tr>
<tr><td>Pre-GAD-7</td></tr>
<tr><td rowspan="7">Post-GAD-7</td><td>Post-GAD-1</td><td rowspan="7">0.662</td></tr>
<tr><td>Post-GAD-2</td></tr>
<tr><td>Post-GAD-3</td></tr>
<tr><td>Post-GAD-4</td></tr>
<tr><td>Post-GAD-5</td></tr>
<tr><td>Post-GAD-6</td></tr>
<tr><td>Post-GAD-7</td></tr>
<tr><td rowspan="3">Pre-PHQ-9</td><td>Pre-PHQ-1</td><td rowspan="3">0.791</td><td rowspan="3">0.791</td></tr>
<tr><td>Pre-PHQ-2</td></tr>
<tr><td>Pre-PHQ-3</td></tr>
</table>

	Pre-PHQ-4			
	Pre-PHQ-5			
	Pre-PHQ-6			
	Pre-PHQ-7			
	Pre-PHQ-8			
	Pre-PHQ-9			
Post-PHQ-9	Post-PHQ-1	0.714		
	Post-PHQ-2			
	Post-PHQ-3			
	Post-PHQ-4			
	Post-PHQ-5			
	Post-PHQ-6			
	Post-PHQ-7			
	Post-PHQ-8			
	Post-PHQ-9			

Factor loadings shown in **Table 2** revealed that all variables exhibited values greater than 0.5, with most values approximating the standardized value of 1.0. This indicated the suitability of the data for further analysis, emphasizing the robustness of the results.

Table 2. Factor Loadings of Variable via Extraction Method.

Items	**Extraction**
Serial No.	0.804
Group	0.913
Age	0.770
Gender	0.668
Ethnicity	0.735
GAD1_Pre	0.968
GAD2_Pre	0.897
GAD3_Pre	0.959
GAD4_Pre	0.905
GAD5_Pre	0.876
GAD6_Pre	0.960
GAD7_Pre	0.883
SumGAD7_Pre	0.986
GAD1_Post	0.816
GAD2_Post	0.645
GAD3_Post	0.791
GAD4_Post	0.675
GAD5_Post	0.731

GAD6_Post	0.596
GAD7_Post	0.706
SumGAD7_Post	0.933
PHQ1_Pre	0.837
PHQ2_Pre	0.922
PHQ3_Pre	0.760
PHQ4_Pre	0.847
PHQ5_Pre	0.932
PHQ6_Pre	0.856
PHQ7_Pre	0.874
PHQ8_Pre	0.696
PHQ9_Pre	0.776
SumPHQ9_Pre	0.990
PHQ1_Post	0.634
PHQ2_Post	0.792
PHQ3_Post	0.809
PHQ4_Post	0.736
PHQ5_Post	0.750
PHQ6_Post	0.624
PHQ7_Post	0.777
PHQ8_Post	0.751
PHQ9_Post	0.860
SumPHQ9_Post	0.965

Extraction Method: Principal Component Analysis.

Demographic Analyis

The demogrpahic results shown in **Table 3** that equal number of control and experimental groups, having more females than males and most of them had Austrailian ethinicity.

Table 3. Demographics Characteristics of Participants.

Demographics	**Vraiables**	**Percentage (%)**
Groups	Control	50.0
	Experimental	50.0
Gender	Male	45.0
	Female	55.0
Ethnicity	Aboriginal	6.7
	Australian	21.7

	English	15.0
	Filipino	11.7
	Indian	13.3
	Irish	10.0
	New Zealander	13.3
	Scottish	8.3

Descriptive Analysis

Both anxiety (GAD-7) and depression (PHQ-9) scores decreased significantly as shown in **Table 4** after the intervention accepting H_1 that Laughter Percussion reduces anxiety and depression of people significantly. The results show GAD-7 groups mean before intervention was 10.42 and after interventiaon was 4.50 which showed a reduction of 5.92 by 56.80%. Whereas, PHQ-9 groups mean before intervention was 13.73 which showed reduces to 7.82 showing a reduction of 5.91 by 43.04%.

Table 4. Descriptive Analysis on study's variables.

Variables	Minimum	Maximum	Sum	Mean	Std. Deviation
Age	20	60	2459	40.98	10.776
SumGAD7_Pre	1	21	625	10.42	7.393
SumGAD7_Post	0	13	270	4.50	2.801
SumPHQ9_Pre	5	27	824	13.73	8.541
SumPHQ9_Post	3	21	469	7.82	3.820

Inferential Analysis

The results of paired t-test in **Table 5** showed significant values ($p < 0.05$), showing a meaningful reduction in GAD-7 and PHQ-9 scores accepting H_2 that Laughter Percussion reduces anxiety and depression of people significantly after the intervention of Laugter Percussion.

Table 5. Paired Samples t-test before and after intervention of Laughter Percussion.

Anxiety and Depression Groups		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	P-value
					Lower	Upper			
GAD-7	SumGAD7_Pre - SumGAD7_Post	5.917	6.776	0.875	4.166	7.667	6.764	59	0.000
PHQ-9	SumPHQ9_Pre -	5.917	8.333	1.076	3.764	8.069	5.500	59	0.000

	SumPHQ9_Post								

The results of independent sample t-test in **Table 6** showed significant difference in post-intervention scores between two different groups (Control vs. Experimental).

Table 6. Independent Samples t-test of post intervention of Laughter Percussion on Control and Experimental groups.

Independent Samples Test	**Levene's Test for Equality of Variances**		**t-test for Equality of Means**						
	F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
								Lower	**Upper**
SumPHQ9_Post	12.03	0.00	-0.98	58	0.33	-0.96	0.98	-2.94	1.00
			-0.98	45.21	0.33	-0.96	0.98	-2.95	1.02
SumGAD7_Post	12.68	0.00	-1.29	58	0.19	-0.93	0.71	-2.37	0.50
			-1.29	41.80	0.20	-0.93	0.71	-2.38	0.51

Qualitative Analysis

Qualitative analysis was done via thematic analysis of interview data that revealed five key themes. The evaluation of the themes and qualitative insights are represented in **Table 7** below.

Emotional Release and Catharsis

Participants described intense emotional breakthroughs, including crying, laughter, and bodily sensations of relief during drumming and laughter segments.

Neurocognitive Clarity

Many reported improved focus, mental clarity, and relief from 'mental fog' often associated with depression and anxiety.

Community and Support

Participants emphasized the importance of group dynamics, stating that the shared rhythm and joy created a sense of safety and belonging.

Embodiment and Regulation

Many participants felt more connected to their physical beings, experiencing fewer somatic symptoms (tightness, tension, panic), and significantly higher emotional regulation throughout the sessions.

Joyful Anticipation

Participants eagerly awaited the weekly sessions.
These results confirm that combining rhythm and laughter in a structured therapeutic methods benefits psychological health, community integration, and nervous system regulation, therefore reducing anxiety and depression.

Table 7. Descriptive Analysis of the qualitative data.

Theme Number	Theme	Quote	Frequency (n)	Percentage (%)
1	Emotional Release and Catharsis	"I felt lighter after sharing"	15	75
2	Neurocognitive Clarity	"I found mental clarity"	9	45
3	Community and Support	"I felt less alone"	10	50
4	Embodiment and Regulation	"I learned to self-regulate"	11	55
5	Joyful Anticipation	"I felt cheerful"	13	65

N=20

DISCUSSION

This research presents strong evidence that Laughter Percussion is an effective neuropsychological intervention for lowering anxiety and depression symptoms in a community-based setting. This therapy, which combines therapeutic laughing with structured rhythmic drumming, enhances social bonding and physiological regulation while also lowering emotional discomfort. The current study contextualizes these findings within the present literature and speculates on the neurological underpinnings, the significance of group dynamics, and the implications for mental health therapy in general.
The study's quantitative findings are consistent with a growing body of evidence supporting the efficacy of laughter-based therapy in lowering anxiety and depression. Laughter therapy decreased hospitalized patients' anxiety and depression by a mean difference of -10.55 for anxiety and -2.43 for depression, according to a recent systematic review and meta-analysis. According to the results of that review study, laughter therapy appears to be more helpful than standard treatment for lowering anxiety and sadness in hospitalized patients (SOBALVARRO et al., 2023). However, more research with low risk of bias are needed. The current study's findings are inconsistant with the previously published review, as the current findings showed that following a Laughing Percussion intervention, GAD-7 and PHQ-9 levels reduced by 56.8% and 43.04%, respectively.
814 participants from 10 trials were included in a meta-analysis by Zhao et al. (2019), which found that laughter interventions significantly reduced anxiety and depression levels, with longer interventions producing better outcomes. According to this meta-analysis, humor and laughter therapies can assist adults manage their anxiety and sadness while simultaneously enhancing the quality of their sleep. According to his review, adult outcomes are improved and negative emotions are reduced through the use of humor and laughter therapies. They are a viable and possibly helpful part of clinical and nursing psychotherapy for enhancing adult well-being because

they are safe, practical, enjoyable, and can foster interpersonal bonds in both patients and medical personnel (Zhao et al., 2019). Our findings, showed significant improvements after eight sessions, supports the idea that repeated structured laughter-based activities are particularly effective for long-term mental health improvements.

Another study by Akimbekov & Razzaque, 2021, revealed that non-pharmacological measures are required to reduce the emotional burden in addition to certain pharmaceutical interventions, which, if continued, have negative health effects. A common non-pharmacologic method for lowering stress and anxiety is laughter therapy. Therapeutic laughing can be utilized as a helpful supplemental therapy to lessen the stress on mental health because it is a non-invasive, affordable, and simple intervention. In order to lower anxiety and sadness, laughter therapy can physiologically decrease the pro-stress factors and raise the mood-enhancing anti-stress ones. The results are incosistent with our qualitative findings which showed significant improvemtn in mny areas like emotional release and support, neurocognitive clarity and regulation, and Joyful behaviour of the participants (Akimbekov & Razzaque, 2021).

Laughter therapy has been shown to have both physiological and psychological benefits, including improved older individuals' self-rated health, sociability, activity, and quality of life. Our qualitative findings, which demonstrated that participants had improved emotional regulation, community support, and positive expectations of laughter therapy, are in line with the findings of Yoshikawa et al., (2019) and POONGUZHALI, (2015), who found that laughter therapy not only reduced physical pain but also improved social functioning and alleviated depressive symptoms (POONGUZHALI, 2015; Yoshikawa et al., 2019).

Double activation of the brain's rhythmic and laughter regulators could be the neurobiological explanation for the observed results. Rhythmic drumming not only stimulates the limbic system, rather it is involved in emotional regulation by activating the motor and auditory cortex. This is supported by previous research demonstrating that rhythmic activities assist synchronize brain rythems, increasing emotional coherence and stress management (Yoshikawa et al., 2019). However, it is widely known that laughter stimulates neurotransmitters such as endorphins and serotonin, which are necessary for mood management and the alleviation of depression symptoms (Gonot-Schoupinsky & Garip, 2018). The physiological effects of laughter support its use as a non-pharmacological alternative treatment for mood disorders.

As current study is communuty based pilot study, the sense of safety, belonging, and empathy that shared rhythm and group laughter was often highlighted by study participants. These results are inconsistant to several studies, who discovered that laughter therapy improves social bonds, decreases social isolation, and boosts sociability, all of which are particularly crucial for those who experience social withdrawal or loneliness (Delaney, 2019; Elahai & Sharma, 2023; Shahidi et al., 2011). It has been demonstrated that the participants of the current study of Laughter Percussion which helped them to empower mirroring, synchronization, and communal delight to improve emotional resilience and dismantle obstacles to interpersonal connections. By providing embodied and inclusive mental health treatment, these group-activity-based interventions bridge a crucial gap between more solitary or purely verbal forms of therapy.

The introduction of Laughter Percussion into mental health practice is a stream between the traditional cognitive behavioral or pharmacological therapeutics and expressive, somatic and community modalities. Unlike conventional or traditional therapies that emphasize cognitive restructuring or symptom management, Laughter Percussion enables the physiological and expressive aspects of healing, making it particularly relevant for clients for whom traditional therapies might be a source of resistance or for which they may not fully benefit. Our findings are confirmed by studies demonstrating that Laughter Percussion therapy can be safely combined with an existing pharmacological regime and improve overall outcomes without adverse effects. The versatility, low cost, and low-risk nature of Laughter Percussion make this tool desirable as an adjunct or replacement in varied settings, such as public health programs, schools, and trauma-informed care settings.

Limitations and Considerations

While the of the study are novel, it has a few limitations that must be acknowledged. The study’s duration was relatively short (only 8-weeks), and long-term effects are still unmeasured. Participants were randonly self-selected to participate in the study, which may have introduced biasness.

Implications for Mental Health Practice

Given its low cost, low risk, and scalable nature, Laughter Percussion is ideally suited for integration into public health programs, school-based interventions, and trauma-informed care settings. Mental health professionals can be trained in its techniques, adding a dynamic tool to their therapeutic approaches. Ultimately, this study underscores the value of joy, rhythm, and community in the healing process; elements too often overlooked in conventional mental health care. Future research should explore neurological imaging, hormone level changes, and longitudinal effects over 6–12 months.

CONCLUSION

This study confirms the therapeutic potential of Laughter Percussion as a neuropsychological intervention for reduction in anxiety and depression. This approach fosters emotional resilience, reduces stress, and enhances social connection by merging rhythm and laughter in a structured group setting. The significant improvements observed in clinical assessments and participants feedback suggest that Laughter Percussion is practical but accessible, enjoyable, and adaptable to diverse mental health conditions. As the mental health field seeks integrative and culturally responsive interventions, Laughter Percussion offers a new paradigm that restores balance through rhythm, uplifts mood through laughter, and builds community through shared experience. Further research and professional training can amplify its reach, positioning it as a key player in the future of expressive, brain-based therapies.

Statements and Declarations

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The author has solely contributed to the study.

Ethical approval

The research was approved by the Laughter Percussion Academy.

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Conflicts of Interest

There is no conflict of interest for the study is not applicable.

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Professor Idi (Ras) Banamungu
Independent Researcher and Author

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