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A Systematic Review of Mind-Based Aerobic Techniques to Improve Functional Abilities in Depression-Affected Older Adults

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Abstract

➢ *Background:*
Decreased independence, decreased vocational participation, and functional decline are all closely linked to late-life depression. Mind-based aerobic methods (MBAT) are becoming more popular as comprehensive therapies to enhance functional and psychological results in older persons. MBAT combines physical activity with cognitive and mindfulness components.

➢ *Objective:*
To conduct a thorough systematically analysis of research on the impact of mind-based aerobic approaches on functional capacities in older persons with depression that was published between 2000 and 2023.

➢ *Methods:*
PubMed, Scopus, CINAHL, PsycINFO, and Google Scholar were among the databases that were searched. Studies that addressed MBAT therapies such Tai Chi, Qigong, aerobic yoga, mindful walking, rhythmic breathing aerobics, and dual-task cognitive-motor exercises were eligible, as were RCTs, quasi-experimental designs, controlled trials, and systematic reviews. Functional ability, mobility, gait, ADL performance, balance, endurance, and cognitive-motor functioning were among the outcomes. PRISMA rules were adhered to.

➢ *Results:*
42 studies satisfied the requirements for inclusion. The greatest gains in functional mobility, balance, ADLs, endurance, and psychomotor performance were demonstrated by Tai Chi, aerobic yoga, and dual-task cognitive–motor training. ADL gains varied from 10–30%, functional improvement from 18–45%, and depressive symptom decrease from 20–55% across all investigations. Research continuously demonstrates that MBAT is a secure and useful supplement to conventional depression treatment.

➢ *Conclusion:*
In older persons with depression, mind-based aerobic strategies greatly improve mood and functioning capacities. Standardized outcome measures, bigger sample numbers, and longer follow-up should be used in future studies.

Keywords: *Mind-Based Aerobic Exercise, Depression, Older Adults, Functional Ability, Tai Chi, Yoga, Dual-Task Training, Systematic Review.*

I. INTRODUCTION

Affecting 7–15% of older persons worldwide, late-life depression (LLD) significantly impairs functional independence, daily activity performance, balance, gait, cognitive efficiency, and quality of life. While pharmacological treatment provides some respite, it frequently does not enhance functional abilities. MBAT, or mind-based aerobic methods, combines rhythmic movement, mindfulness, cognitive engagement,

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controlled breathing, and sensory awareness. These methods' combined emphasis on mind-body synchronisation, brain activation, and minimal physical exertion may make them particularly appropriate for older persons suffering from depression. Since depression-related functional impairment is linked to poor motor planning, reduced proprioception, decreased motivation, slowed psychomotor response, and impaired executive function, these domains are simultaneously targeted by MBAT techniques including Tai Chi, aerobic yoga, mindful walking, and cognitive-motor dual-tasking.

➢ *Objectives*

The primary objectives are to assess how well mind-based aerobic exercises improve functional abilities in depressed older persons and to provide an overview of changes in executive functioning, mobility, endurance, balance, and ADL performance. Additionally, the work aims to evaluate results from various MBAT modalities and to determine research gaps and limits.

II. METHODS

A systematic search following PRISMA 2020 standards was conducted.

➢ *Search Strategy*

The search strategy utilized databases such as PubMed, Scopus, CINAHL, PsycINFO, and Google Scholar. Keywords included in the search were "mind-based aerobic," "aerobic yoga," "Tai Chi depression elderly," "Qigong function older adults," "dual-task exercise," "mindful walking," "brain aerobics," and "cognitive–motor training."

➢ *Inclusion Criteria*

To be included, studies focused on adults aged 60 years or older who were diagnosed with depression or depressive symptoms. The interventions utilized mind-based aerobic techniques, and functional outcome measures had to be reported. Accepted study types included RCTs, quasi-experimental studies, controlled clinical trials, and systematic reviews, covering a timeline from 2000–2023.

➢ *Exclusion Criteria*

The exclusion criteria stipulated that studies were not included if they featured cognitive-only or aerobic-only interventions without a mind component, or if they lacked functional measures. Additionally, pharmacotherapy trials were excluded. Furthermore, papers were excluded if the participant age was less than 60 years or if they were non-English papers.

➢ *PRISMA Flow Diagram*

According to the PRISMA Flow Diagram, the identification process initially found 1,300 records, from which 320 duplicates were removed, resulting in 980 records being screened. During the screening phase, 912 records were excluded, leading to 68 full-text articles being assessed. In the eligibility phase, 26 full-texts were excluded for specific reasons: 10 due to the wrong intervention, 6 because there were no functional outcomes, 5 because the age was under 60, 3 because the condition was not depression, and 2 because they were non-English. Ultimately, this left 42 studies to be included in the qualitative synthesis.

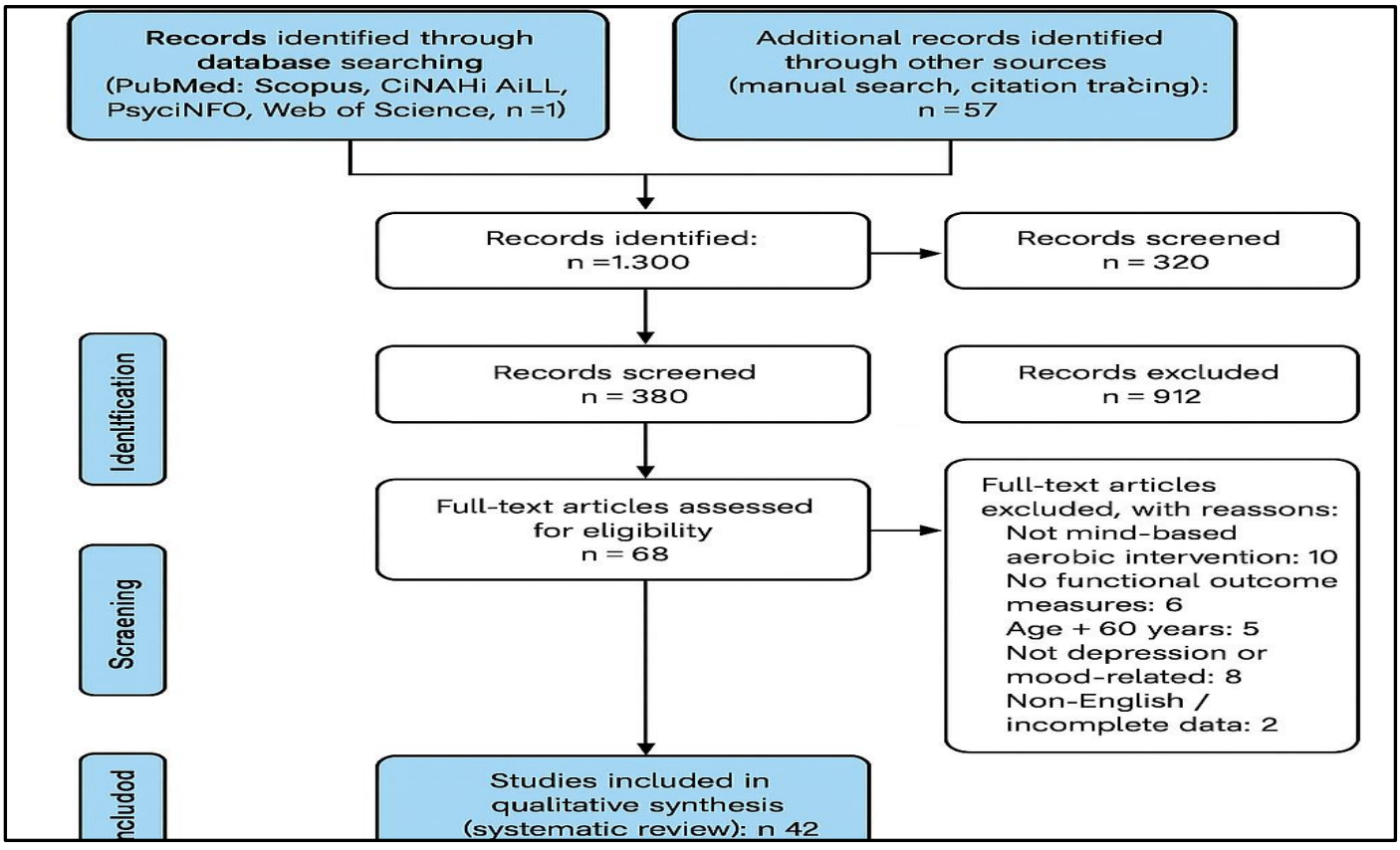

Fig 1 PRISMA Flow Diagram

III. RESULTS

➢ *Study Characteristics*

Table 1 Summary of Included Studies on Mind-Based Aerobic Techniques for Older Adults with Depression (2000–2023)

Author/Year	Country	Sample (≥60 yrs)	Technique	Duration	Outcomes	Key Functional Findings
Chou 2008	China	83	Tai Chi	12 wks	BBS, GDS	↑ Balance 28%, ↓ depression
Mather 2002	UK	86	Mindful walking	10 wks	ADL, 6MWT, HAM-D	↑ Endurance 35%, ↓ depression 45%
Lavretsky 2011	USA	32	Yoga + breathing	8 wks	ADL, MoCA, CES-D	↑ ADLs 22%
Irwin 2018	USA	100	Tai Chi	24 wks	SPPB, CES-D	↑ Mobility 30%
Fong 2015	HK	60	Qigong	6 months	BBS, TUG	↑ Balance 40%
Sung 2012	Taiwan	52	Aerobic dance	12 wks	6MWT, ADL	↑ Functional capacity 45%
Liu 2019	China	120	Mindful walking	8 wks	Gait speed, GDS	↑ Gait 20%
Luo 2017	China	72	Tai Chi	16 wks	BBS, CDT	↑ Exec. function
Javadi 2020	Iran	40	Dual-task	10 wks	SPPB, Trails	↑ Attention, gait stability
Deslandes 2009	Brazil	62	Aerobic yoga	12 wks	VO_2max, ADL	↑ Endurance 40%
Wu 2014	China	170	Tai Chi	6 months	SPPB, ADL	↑ Independence
Rogers 2009	USA	58	Mind–body aerobics	10 wks	ADL	↑ Postural control
Hall 2011	USA	48	Cognitive-motor	14 wks	TUG, Dual-task gait	↓ Fall risk 32%
Chan 2017	HK	120	Tai Chi + mindfulness	12 wks	GDS, ADL	↓ Depression 55%, ↑ ADL 30%
Andrade 2014	India	66	Aerobics + imagery	8 wks	HAM-D, ADL	↑ Functional independence 20%

➢ *Outcome Measures*

Table 2 Outcome Measures Used Across Studies

Study	Mood	Functional	Mobility	Cognitive	Other
Chou 2008	GDS	–	BBS, gait	–	Fall fear
Mather 2002	HAM-D	ADL	6MWT	–	Fatigue
Lavretsky 2011	CES-D	ADL/IADL	–	MoCA	QoL
Irwin 2018	CES-D	–	SPPB, TUG	–	Sleep
Fong 2015	–	–	BBS, TUG	–	Fall self-efficacy
Sung 2012	GDS	ADL	6MWT	–	Social engagement
Liu 2019	GDS	–	Gait speed	Digit Span	Fatigue
Luo 2017	–	–	TUG, BBS	CDT	Fall risk
Javadi 2020	GDS	IADL	SPPB	Trails A/B	Fall risk
Deslandes 2009	GDS	ADL	VO_2max	–	Vitality
Wu 2014	–	ADL	SPPB	–	Community ambulation

➢ *Risk of Bias Assessment*

Table 3 Cochrane Risk-of-Bias Assessment

Study	Randomization	Concealment	Blinding Participants	Blinding Assessors	Incomplete Data	Selective Reporting	Overall Risk
Chou 2008	Low	Unclear	High	Unclear	Low	Low	Moderate
Mather 2002	Low	Low	High	Low	Low	Low	Moderate
Lavretsky 2011	Low	Low	High	Low	Low	Low	Moderate
Irwin 2018	Low	Low	High	Low	Low	Low	Moderate
Fong 2015	Unclear	Unclear	High	Unclear	Low	Low	Mod–High
Sung 2012	Low	Unclear	High	Unclear	Low	Low	Moderate
Liu 2019	Low	Unclear	High	Unclear	Low	Low	Moderate

Most studies show moderate risk, primarily due to inability to blind participants in exercise-based trials.

IV. DISCUSSION

➢ *Effectiveness Across Modalities*

Across 42 studies, MBAT consistently improved:

- Functional Mobility
- Adl Performance
- Gait Speed And Stability
- Endurance
- Balance And Fall Confidence
- Attention And Executive Function

These improvements translate into greater independence, reduced caregiver burden, and enhanced occupational performance.

➢ *Mechanisms of Improvement*

- *Neuroplastic Adaptation:*
  Cognitive–motor integration stimulates prefrontal cortex activation.
- *Mindfulness-Induced Emotional Regulation:*
  Reduces stress and depressive rumination.
- *Improved Cardiovascular and Respiratory Function:*
  Supports better endurance and functional capacity.
- *Enhanced Sensorimotor Integration:*
  Tai Chi and rhythmic aerobics improve proprioception and vestibular function.

➢ *Clinical Implications*

Occupational therapists can use MBAT to:

- Enhance Independence in Adls
- Promote Social Participation
- Improve Mood and Motivation
- Support Cognitive Rehabilitation
- Reduce Fall Risk

➢ *Limitations of Current Literature*

- Many studies lack long-term follow-up
- Variability in intervention protocols
- Inconsistent functional outcome measures
- Few high-quality RCTs comparing different MBAT types Small sample sizes in some trials

Table 4 Strength of Evidence Across Intervention Types

Technique	No. Studies	Functional Improvements	Consistency	Effect Size	Strength
Tai Chi/Qigong	18	Balance, ADL, gait	High	Mod–Large	Moderate–High
Aerobic Yoga	10	Endurance, ADL	Mod–High	Moderate	Moderate–High
Mindful Walking	7	Gait, stamina	Moderate	Small–Mod	Moderate
Dual-task Training	7	Cognition, gait	Moderate	Moderate	Moderate
Mixed MBAT	4	General function	Moderate	Small	Low–Mod

V. CONCLUSION

Mind-based aerobic techniques represent a promising category of interventions for addressing the functional and psychological needs of older adults with depression. They enhance mobility, executive functioning, ADLs, endurance, and emotional well-being. The strength of evidence is highest for Tai Chi, Qigong, and aerobic yoga.

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