

IMPACT OF COMMUNITY-BASED BOXING ON NON-MOTOR OUTCOMES FOR INDIVIDUALS WITH PARKINSON'S DISEASE: A SYSTEMATIC REVIEW

ILEANA ARMENDI, SPT

CHRISTIAN HUCKFELDT, SPT, CSCS

DYLAN KANE, SPT, CSCS

DANIELA SPAGNOLI, SPT

DANA MAIDA, PT, DPT, BOARD CLINICAL SPECIALIST IN GERIATRIC PHYSICAL THERAPY

JENNIFER SCHWARTZ, PT, DPT, BOARD CLINICAL SPECIALIST IN NEUROLOGIC PHYSICAL THERAPY



OVERVIEW

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- Background
 - Purpose
 - Methods
 - PRISMA
 - Results
 - Conclusions
 - Clinical Relevance
 - Acknowledgements

OBJECTIVES

By the end of the presentation:

1. Understand the current literature surrounding the impact of Community-Based Boxing (CBB) on non-motor outcomes for individuals with Parkinson's disease (PD).
2. Understand the limitations in current research on CBB.
3. Recognize the clinical relevance and implications of the content discussed.

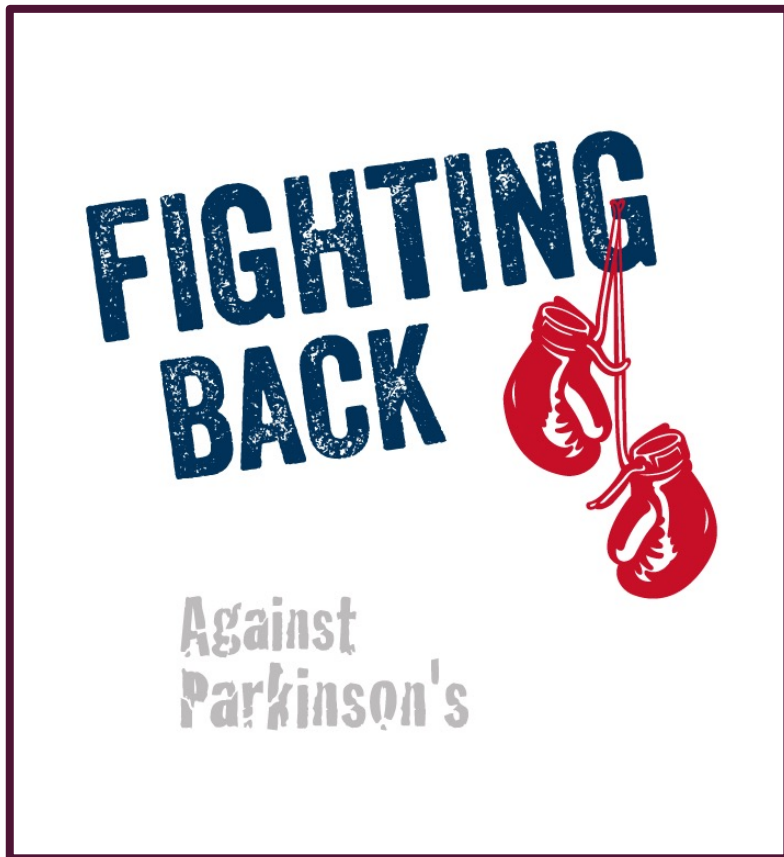
PARKINSON'S DISEASE (PD)

- Neurodegenerative disease of the basal ganglia which results in the loss of dopaminergic neurons in the substantia nigra compacta (SNc).¹
- PD can elicit both **motor and non-motor** impairments.¹
 - **Motor:** include tremor, rigidity, impaired balance¹
 - **Non-motor:** include abnormalities in sleep, mood, cognition, autonomic function, as well as pain and sensory disorders¹
- May increase the susceptibility of individuals with PD to developing mental health issues including depression and anxiety²

BOXING AND PD

- Physical activity universally accepted as an important factor to reduce progression of impairments.³
- Non-contact boxing has become a common intervention for individuals in this community.⁴
 - Incorporates various movements which specifically target PD-specific impairments
- **Community-Based Boxing:** non-contact boxing based in community programs with goal of creating a supportive and interactive environment
 - Rock Steady Boxing (RSB) is one of the most common methods of CBB.

IMPACT OF BOXING ON IMPAIRMENTS



- CBB has been shown to improve motor impairments for individuals with PD.⁵
- Although CBB programs have substantially increased in popularity, the precise impact on non-motor outcomes for individuals with PD remains unclear.⁴

PURPOSE

- Therefore, the purpose of this systematic review was to identify the impact of CBB on non-motor outcomes for individuals with PD.

METHODS

- **Search Engines:**

- PubMed, ProQuest Health, CINAHL, ScienceDirect

- **Search Limits:**

- Peer-reviewed, Scholarly Journals, English, Adults (18+), Human Subjects

METHODS

- **Search Terms:**

(Boxing **OR** “Boxing Exercise” **OR** “Boxing Training”)

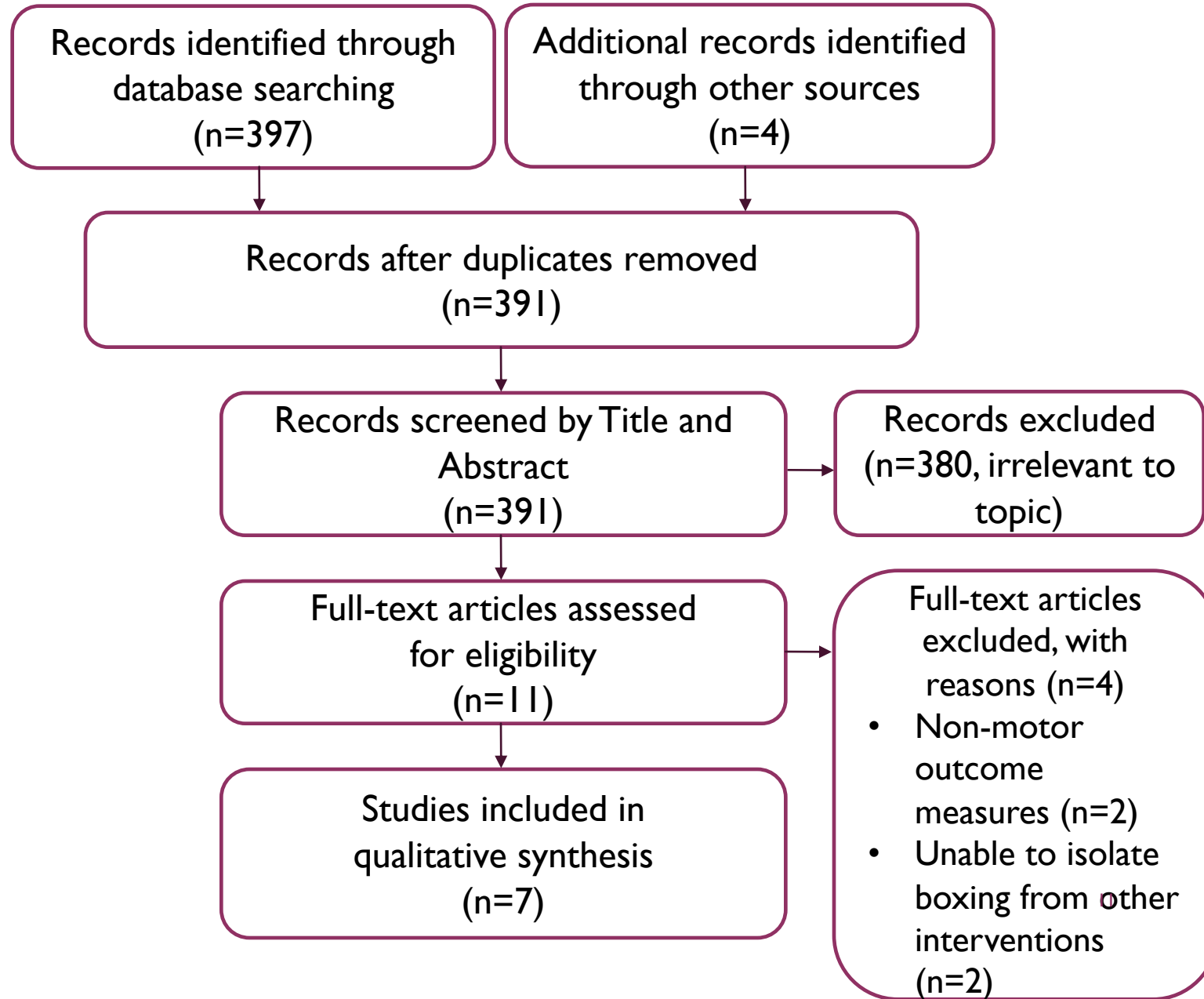
AND

(“Parkinson* disease” **OR** PD)

METHODS

- **Study Designs:** All study designs were accepted.
- **Inclusion Criteria:**
 - Adults aged 18+ with a diagnosis of PD
 - Participation in CBB
 - Report of at least 1 non-motor outcome
- **Evidence Appraisal:** Two reviewers independently assessed each study utilizing the OCEBM Levels of Evidence (2011) and the Joanna Briggs Institute Checklist for Qualitative Research (JBI).

PRISMA



CRITICAL APPRAISAL TOOLS

- OCEBM Levels of Evidence⁶
- Utilized for quantitative studies

Oxford Centre for Evidence-Based Medicine 2011 Levels of Evidence

Question	Step 1 (Level 1*)	Step 2 (Level 2*)	Step 3 (Level 3*)	Step 4 (Level 4*)	Step 5 (Level 5)
How common is the problem?	Local and current random sample surveys (or censuses)	Systematic review of surveys that allow matching to local circumstances**	Local non-random sample**	Case-series**	n/a
Is this diagnostic or monitoring test accurate? (Diagnosis)	Systematic review of cross sectional studies with consistently applied reference standard and blinding	Individual cross sectional studies with consistently applied reference standard and blinding	Non-consecutive studies, or studies without consistently applied reference standards**	Case-control studies, or "poor or non-independent reference standard**"	Mechanism-based reasoning
What will happen if we do not add a therapy? (Prognosis)	Systematic review of inception cohort studies	Inception cohort studies	Cohort study or control arm of randomized trial*	Case-series or case-control studies, or poor quality prognostic cohort study**	n/a
Does this intervention help? (Treatment Benefits)	Systematic review of randomized trials or <i>n</i> -of-1 trials	Randomized trial or observational study with dramatic effect	Non-randomized controlled cohort/follow-up study**	Case-series, case-control studies, or historically controlled studies**	Mechanism-based reasoning
What are the COMMON harms? (Treatment Harms)	Systematic review of randomized trials, systematic review of nested case-control studies, <i>n</i> -of-1 trial with the patient you are raising the question about, or observational study with dramatic effect	Individual randomized trial or (exceptionally) observational study with dramatic effect	Non-randomized controlled cohort/follow-up study (post-marketing surveillance) provided there are sufficient numbers to rule out a common harm. (For long-term harms the duration of follow-up must be sufficient.)**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning
What are the RARE harms? (Treatment Harms)	Systematic review of randomized trials or <i>n</i> -of-1 trial	Randomized trial or (exceptionally) observational study with dramatic effect			
Is this (early detection) test worthwhile? (Screening)	Systematic review of randomized trials	Randomized trial	Non-randomized controlled cohort/follow-up study**	Case-series, case-control, or historically controlled studies**	Mechanism-based reasoning

* Level may be graded down on the basis of study quality, imprecision, indirectness (study PICO does not match questions PICO), because of inconsistency between studies, or because the absolute effect size is very small; Level may be graded up if there is a large or very large effect size.

** As always, a systematic review is generally better than an individual study.

CRITICAL APPRAISAL TOOLS

- JBI⁷
 - Utilized for qualitative studies

JBI Critical Appraisal Checklist for Qualitative Research

Reviewer _____ Date _____

Author _____ Year _____ Record Number _____

	Yes	No	Unclear	Not applicable
1. Is there congruity between the stated philosophical perspective and the research methodology?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Is there congruity between the research methodology and the research question or objectives?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Is there congruity between the research methodology and the methods used to collect data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Is there congruity between the research methodology and the representation and analysis of data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Is there congruity between the research methodology and the interpretation of results?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Is there a statement locating the researcher culturally or theoretically?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Is the influence of the researcher on the research, and vice-versa, addressed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Are participants, and their voices, adequately represented?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal: Include Exclude Seek further info

RESULTS

- 391 studies were screened
- 7 studies met all inclusion criteria:
 - 5 quantitative studies⁸⁻¹²
 - 2 qualitative studies^{13,14}
- **Quantitative Articles:** ranged from Level II – Level IV on the OCEBM Appraisal tool⁸⁻¹²
- **Qualitative Articles:** scored $\geq 8/10$ on the JBI checklist^{13,14}

OUTCOME MEASURES

- Parkinson's Disease Questionnaire (PDQ)^{8,11,12}
- Unified Parkinson Disease Rating Scale (UPDRS)¹¹
- Activities-Specific Balance Confidence Scale (ABC)^{8,11}
- Epworth Sleepiness Scale (ESS)¹⁰
- Parkinson's Disease Sleep Scale (PDSS)¹⁰
- Hamilton Depression Scale (HDS)¹⁰

Authors	Type of Study (Level of Evidence)	Training Description	Boxing Parameters	Non-Motor Outcomes
Combs et al. ⁸	Quantitative (OCEBM Level II)	RSB (warm up, circuit boxing training, general endurance)	90 minutes/session 2-3x/week 12 weeks	Balance Confidence: ABC QOL: PDQOL
Dawson et al. ⁹	Quantitative (OCEBM Level II)	RSB (warm up, circuit boxing training, core cool down)	90 minutes/session 1x/week 16 weeks	QOL: EQ-5D
Urrutia et al. ¹⁰	Quantitative (OCEBM Level IV)	Community boxing gym (warm up, high intensity boxing, cool down)	60 minutes/session 2x/week 6 weeks	Sleep Quality: PDSS, ESS Depression: HDS
Combs et al. ¹¹	Quantitative (OCEMB Level IV)	RSB (warm up, agility, strengthening, endurance, boxing, and cool down)	90 minutes/session 2-3x/week 12 weeks	Balance Confidence: ABC QOL: PDQOL Impairment: UPDRS
Sangarapilia et al. ¹²	Quantitative (OCEBM Level II)	RSB (warm up, high intensity boxing, endurance, and cool down)	60 minutes/session 3x/week 10 weeks (10)	QOL: PDQ-39
Humphrey et al. ¹³	Qualitative (JBI = 8/10)	PD specific class at community boxing gym (non-contact boxing)	75 minutes/session 3-4x/week 3-5 months	Subjective Interview: QOL, balance confidence, social engagement, cognition
MacCosham et al. ¹⁴	Qualitative (JBI= 9/10)	RSB affiliate CBB gym (gait training warm up, stretching, posture, endurance, boxing circuit, functional training)	60 minutes/session 2x/week 1-12 months	Subjective Interview: Perception of physical, ¹⁶ social, and psychological symptoms

RESULTS

- **Sample Size:** ranged from 6-47 participants (n=152)⁸⁻¹⁴
- **Participant Demographics:** 51-89 years old with a diagnosis of PD (H&Y stages I-IV)
- **Intervention Overview:** Quantitative study interventions included participation in CBB 1-3x per week, 60-90 minutes for 6-36 weeks.⁸⁻¹⁴
- **Adverse Events:** No adverse events were reported.

RESULTS

- At least 1 non-motor outcome improved in all 7 studies.⁸⁻¹⁴
- **Decreased Impairment:**
 - **UPDRS:** 1 study (level IV) showed most individuals improved UPDRS ADL sub-scores (average change=-5.2).¹¹
- **Improved QOL:** 6/7 studies^{8,9,11-14}
 - **PDQ:** 3 studies (level II/IV) improved PDQ scores [average=-23.7pts (p=0.012), -4.0pts, -5.2pts (p<.001) respectively].^{8,11,12}
- **Qualitative Interviews:** 2 qualitative interviews (JBI=8-9/10) and 1 post-test survey noted improved mood, fatigue, and social participation.^{13,14}

RESULTS

- **Improved Balance Confidence:**
 - 2 quantitative studies [level II/IV, ABC scores (average increase 2.5%)]^{8,11}
 - 1 qualitative study¹³
- **Better Sleep:**
 - Improved daytime sleepiness and sleep quality found in 1 level IV study via:
 - Epworth Sleepiness Scale (ESS) (average decrease -3.1 pts, MCID -2.65)¹⁰
 - Parkinson's Disease Sleep Scale (average increase 13.9)¹⁰
- **Decreased Depression:**
 - 1 study (level IV) via Hamilton Depression Scale [average decrease -4.7 pts (p=0.003)]¹⁰

CONCLUSIONS

- Varied, limited evidence exists to support the utilization of CBB to improve or maintain non-motor outcomes.

LIMITATIONS

- Small sample sizes
- Lack of reporting on Hoehn & Yahr Stage
- Inconsistent training parameters
- Varied outcome measures
- Sparse existing research on the effects of CBB

FUTURE RESEARCH

- Definitive and consistent outcome measures and training paradigms to determine both motor and non-motor benefits of this type of programming.
- Determine the dose-response relationship of CBB interventions for persons diagnosed with PD.

CLINICAL RELEVANCE

- CBB programs are safe, feasible options for persons with PD to remain active and slow associated non-motor and previously established motor impairments.
- Any degree of participation may result in meaningful statistical or clinical improvements.⁸⁻¹⁴
- Clinicians may consider referring patients to such programs to promote wellness, combat the degenerative nature of PD, improve function, and quality of life.

ADDITIONAL RESOURCES

- CBB can be found in a variety of locations (YMCA, boxing gyms, local fitness centers, and RSB)
- Local RSB Contact Information:
 - Kathy Reap (owner and coach of Rock Steady Boxing Northeast PA)
 - Email: rsboxingnepa@gmail.com
 - Phone: 570-817-4307
- Local RSB gym locations:
 - RSB Northeast PA Gym Headquarters: 1 Maxson Drive, Old Forge, PA 18518
 - RSB Northeast PA Tunkhannock: 112B River St., Tunkhannock, PA 18657
- To learn more and find a RSB gym near you:
 - Visit <https://www.rocksteadyboxing.org/find-a-class/>

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ANY
QUESTIONS?