



THE LONG-TERM IMPACT OF COMMUNITY-BASED BOXING FOR BALANCE AND MOBILITY IN PERSONS WITH PARKINSON'S DISEASE



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○ **Collaboration:**

- University of Scranton
 - Department of Physical Therapy
- Daemen College
 - Department of Physical Therapy
- Rock Steady Boxing Bucks County



OBJECTIVES

- By the end of the presentation, the audience will:
 1. Understand the current literature in support of a Community-Based Boxing (CBB) program.
 2. Recognize the relationship between number of boxing sessions attended and improvement in balance and mobility outcome measures.
 3. Determine the importance of early referral to CBB for individuals with PD.



BACKGROUND

- **Parkinson's disease (PD)** is a neurodegenerative disease that affects individuals' physical, cognitive, and psychological function.¹
- Characterized by a loss of dopaminergic neurons in the substantia nigra compacta (SNc), this disease leads to both **motor** and **non-motor impairments**.¹
 - **Motor:** tremor, rigidity, akinesia, postural instability
 - Primarily lead to **balance deficits, fall risk** and **decreased social participation**



BACKGROUND

- Exercise has shown to be a simple, yet effective intervention to improve impairments.²
- The National Parkinson's Foundation QII Registry identified a correlation between exercise levels and disease severity.
 - Persons who exercised regularly (>150 minutes/week) had improved **mobility** and **physical function**, better **quality of life (QOL)**, and decreased **disease progression** after one year.²



BACKGROUND

- **Community-based boxing (CBB)** has become a commonly utilized intervention as it aims to **maximize exercise intensity** by incorporating:³
 - Boxing movements
 - Footwork drills
 - Strength training
 - Flexibility exercises



BENEFITS OF CBB

- Improved QOL⁴
- Improved sleep⁵
- Cognitive and emotional benefits⁵
- Decreased depression⁵
- Improved physical objective measures:^{6,7}
 - Balance
 - Mobility
 - Endurance
- Supports ability to sustain active lifestyle



WHAT IS ROCK STEADY BOXING (RSB)?

- Founded by Scott C. Newman & Vince Perez in 2006
- Non-Profit, Nationwide, CBB program for people who have received a medical diagnosis of PD
- Mission: "Empower people with Parkinson's Disease to fight back!"⁸
- Class intensity depends on the level of function



PURPOSE

- Therefore, the **purpose** of this study was to:
 - Describe the impact of **long-term participation (≥ 6 months)** in CBB on balance and mobility for persons with PD.
 - Describe **characteristics** of those experiencing a positive outcome with this training method.



METHODS

- Data from thirty-one (n=31) individuals with a medical diagnosis of PD who participated in a RSB training program between 1/1/2006 and 3/1/2020 was collected and retrospectively analyzed.
- Informed consent was signed by each participant and obtained prior to data collection and analysis.



METHODS



- 90-minute sessions including:
 - Boxing drills
 - Traditional stretching
 - Strengthening
 - Endurance exercises



METHODS

○ Physical performance measures assessed at Initial Evaluation and at least 6 months following the completion:

- Fullerton Advanced Balance Scale (FAB)
- 30 Second Sit to Stand (STS)
- Timed Up and Go (TUG)



STATISTICAL ANALYSIS

- Multiple paired *t*-tests were used to compare participants' measures of balance and mobility prior to and following CBB.
- T-tests and chi-square tests were used to compare those who had a positive outcome to those that did not according to:
 - Age
 - Gender
 - Length of time with PD
 - Number of training sessions completed
 - Duration of follow-up
- The alpha value was set to 0.05.



PATIENT DEMOGRAPHICS

Variable	Mean
Age	67.8 ± 7.2
Gender	21 males, 10 females
Time between PD Diagnosis and Initial Evaluation	3.9 ± 5.0 years
Range	6 months to 25 years



COMPARISON OF BALANCE AND MOBILITY PRE- AND POST- BOXING

- When comparing **physical performance** prior to and following the CBB exercise program, statistically significant improvements were seen in all measures.

Variable	Pre-Boxing	Post-Boxing
TUG	9.2 ± 3.8 seconds	7.3 ± 1.9 seconds
FAB	32.9 ± 6.7 points	35.7 ± 5.2 points
30 STS	13.1 ± 3.7 reps	15.9 ± 5.0 reps

CHARACTERISTICS OF A POSITIVE OUTCOME

- **Positive Outcome:** defined as exceeding the previously established minimal detectable change (MDC) for 2 of the 3 outcome measures at follow-up⁹⁻¹¹
 - TUG: 3.5 seconds
 - FAB: 2
 - 30 STS: 2 repetitions
- **23/31 (74%)** of patients had a positive outcome



COMPARISON OF PATIENTS WITH A POSITIVE OUTCOME (PO) VS NON-POSITIVE OUTCOME (NPO)

- Individuals with a **positive outcome** (n=23):
 - More recently diagnosed with PD
 - Attended more training sessions

Variable	Average Positive Outcome (PO)	Average Non-Positive Outcome (NPO)
Time between PD diagnosis and evaluation	2.8 years	7.2 years
Number of RSB training sessions attended	79.6 sessions	71.1 sessions

COMPARISON OF PATIENTS WITH A POSITIVE OUTCOME (PO) VS NON-POSITIVE OUTCOME (NPO)

- **No significant differences** for:
 - Age
 - Gender
 - Length of follow-up
- **No adverse outcomes or events**, such as falls or mechanical injuries reported during CBB exercise training sessions, suggesting that the RSB exercise program was safe for participants.



CONCLUSIONS

- The **majority** of participants in this study showed modest but **clinically significant long-term improvements** in **balance** and **mobility** after CBB.



LIMITATIONS

- Limitations included:
 - Relatively small sample size
 - Lack of a control group
 - Lack of report on Hoehn & Yahr Stage
 - Sparse reporting on cointerventions or breaks between sessions



FUTURE RESEARCH

- Future research should seek to:
 - Examine the mechanisms underlying the benefits of CBB.
 - Further describe characteristics of individuals who have a positive outcome.



CLINICAL RELEVANCE

- CBB programs provide **safe, viable options** for participants to **combat** the **progressive effects** of PD.
- Individuals **should be encouraged** to participate to **improve balance and mobility**, especially early in the course of the disorder.



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THANK YOU!

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- Jennifer Schwartz, PT, DPT, Board Clinical Specialist in Neurologic Physical Therapy
- Mike Ross, Board Clinical Specialist in Orthopedic Physical Therapy
- The University of Scranton Physical Therapy Department faculty and staff
- Rock Steady Boxing Bucks County



THANK YOU!



ANY QUESTIONS?

