12 - 2025

UNLOCKING THE RIGID SPINE

Preliminary Clinical Findings from Parkinson Mobility Study

01

Executive Summary

Breaking out of the "Concrete Body"

Parkinson's Disease is characterized by a progressive loss of dopamine, but its most debilitating physical symptom is often **axial spinal rigidity**—the feeling of being trapped in a "concrete body."

This study investigated a novel mechanical intervention for the symptoms of Parkinson's Disease: **BackHug.**

By using 26 robotic fingers to deliver consistent, deep spinal mobilization, we tested the hypothesis that **releasing spinal rigidity directly improves systemic mobility.**

The results from this 16-participant case series are compelling. We observed rapid, measurable improvements in gait speed, functional strength, and pain reduction, suggesting that BackHug is a viable, non-invasive adjunct to standard pharmacological care.

Principal Investigators:
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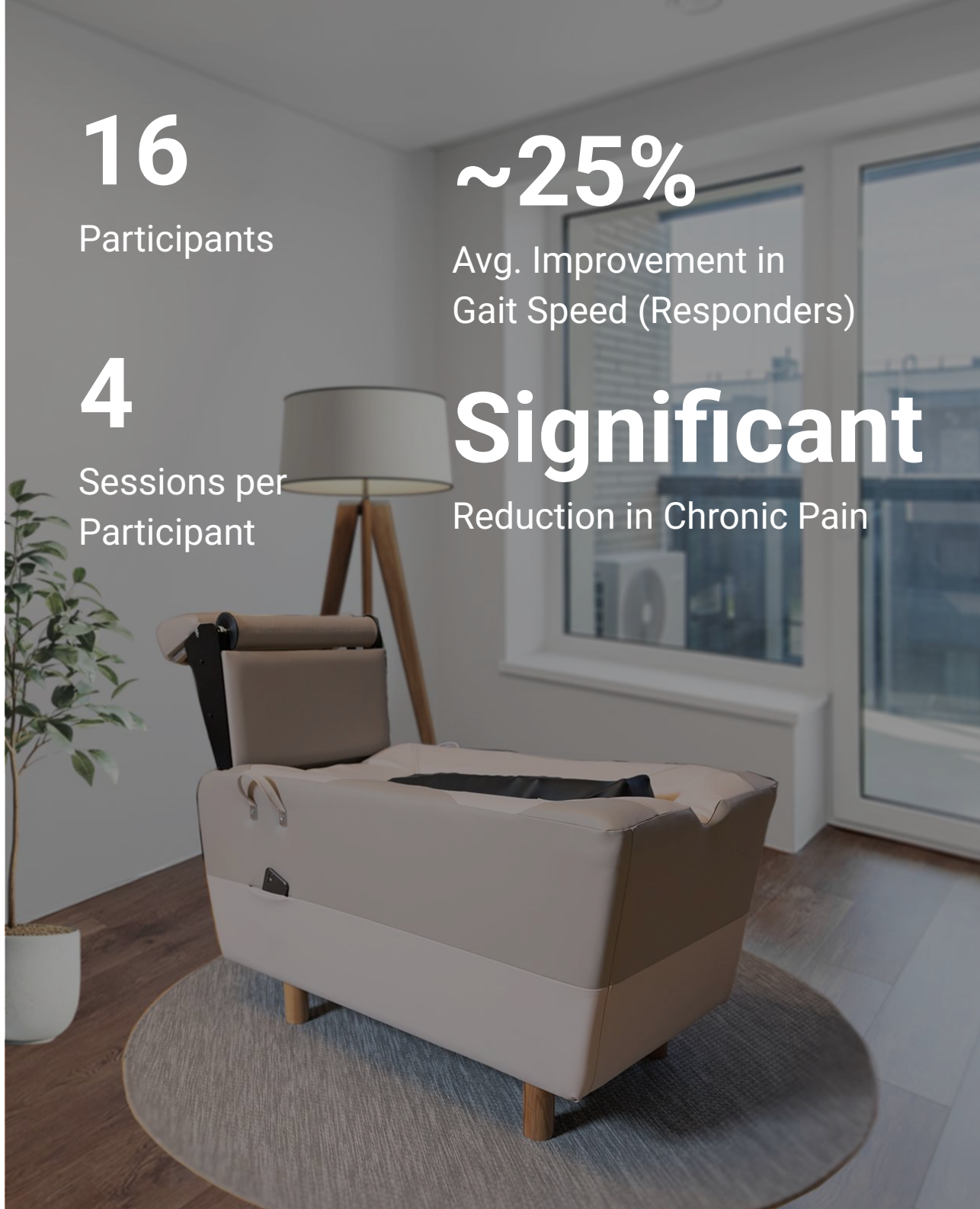


02

Study Design

Breaking out of the "Concrete Body"

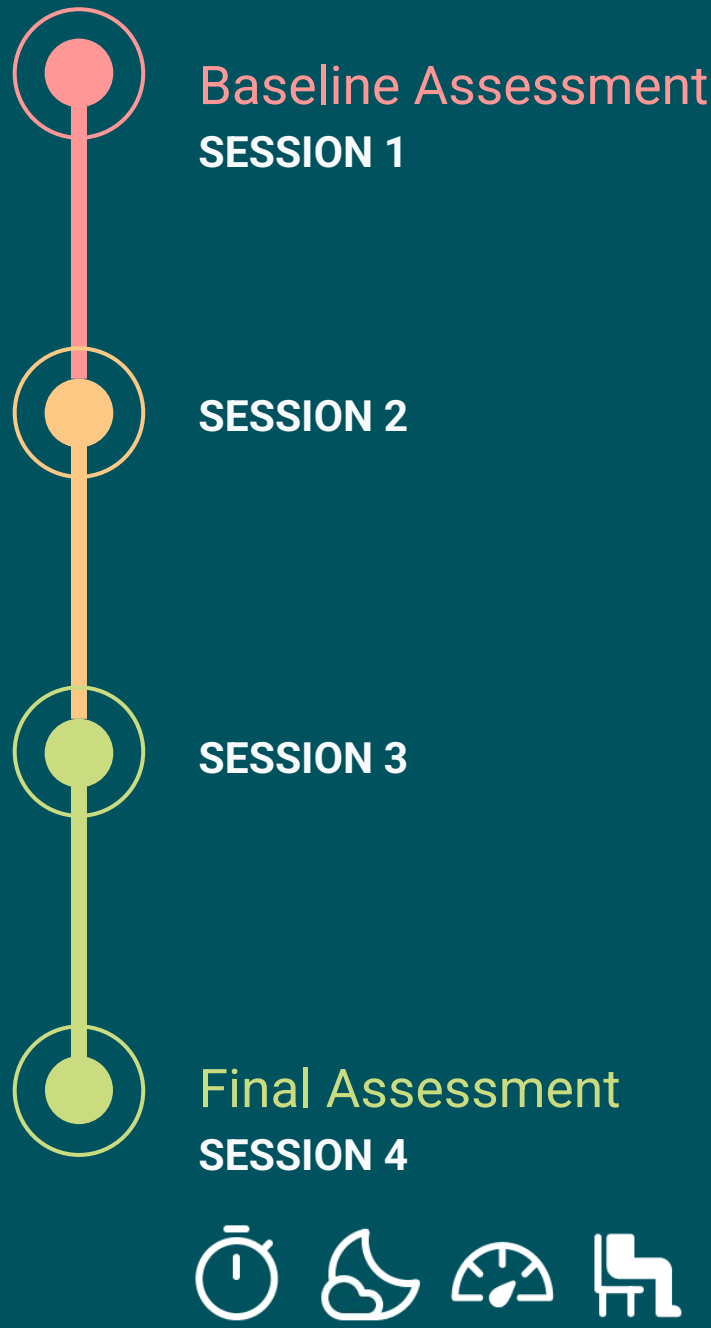
This observational case series was conducted at the BackHug Clinical Centre in Edinburgh.

The Protocol: Each participant underwent **four 40-minute robotic therapy sessions**, most of them over a two-week period.

The Intervention: The BackHug device delivers a personalized "Deep Tissue Pressure" treatment program, targeting the paraspinal muscles and vertebral joints from the cervical to the lumbar spine.

The Measurements: We utilized gold-standard clinical tests to track motor symptom changes before and after the intervention period:

1. **3-Meter Return Walk Test:** Measuring gait speed and freezing.
2. **30-Second Sit-to-Stand:** Measuring functional core/leg strength, balance and fall risk.
3. **VAS Pain Scale (0-10):** Measuring subjective discomfort.
4. **Sleep Quality Index (0-5):** Self-reported sleep restoration.



03

Participant Profile

The Cohort

The study recruited 16 individuals with a confirmed diagnosis of Parkinson's Disease.

The cohort represents a broad spectrum of the PD community, ranging from early-stage diagnosis (2024) to long-term management (diagnosed 2012). The key eligibility criteria was that the participant had to be able to walk for 5 minutes independently.

This diversity is critical. It demonstrates that spinal rigidity is a universal burden across different stages of the disease, and that mechanical mobilization is tolerated well by varied age groups (birth years ranging from 1953 to 1985).

Chart 1
(Gender Split)

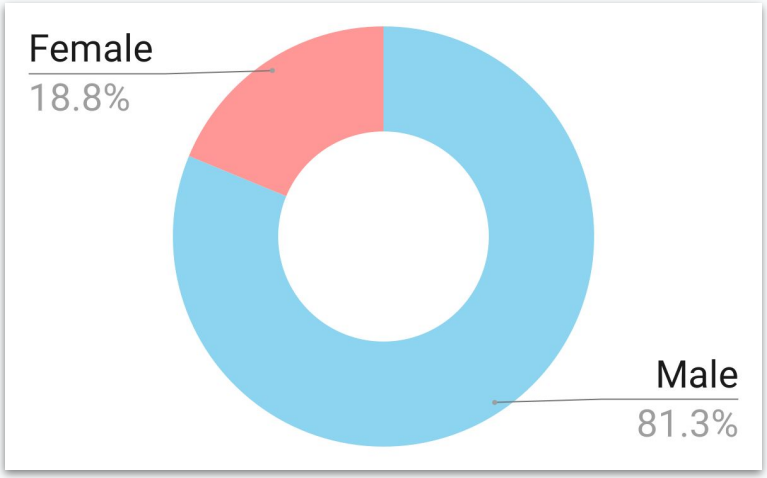


Chart 2
(Age Distribution)

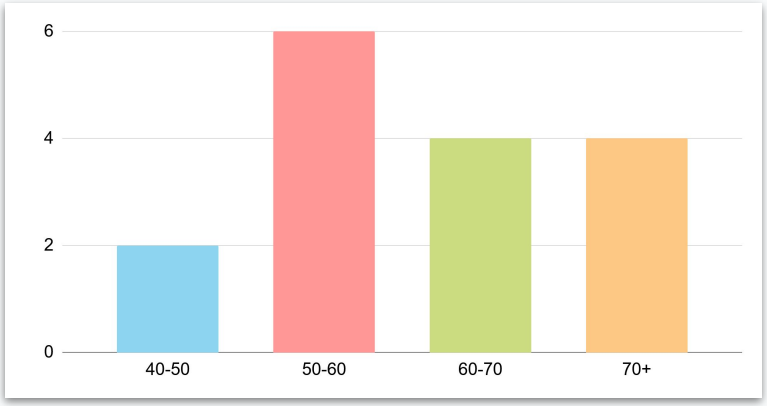
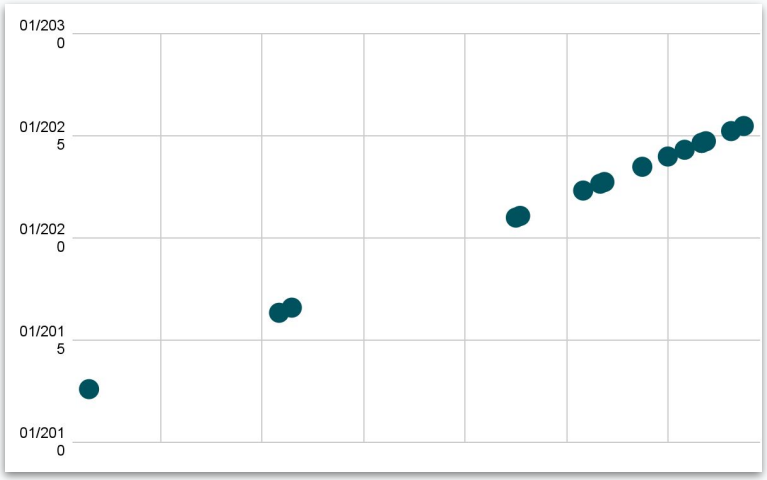


Chart 3
(Years Since Diagnosis)



04

Results — Mobility (Walking)

Restoring Fluidity

The Metric: The 3-Meter Return Walk Test measures gait speed, turning ability, and the presence of "freezing."

The Finding: Post-intervention data shows a consistent reduction in walking time. Participants moved with greater speed, fluidity, and confidence.

Case Highlight: Participant **E** demonstrated a remarkable **47% improvement**, reducing walking time from **25.38s to 13.56s**. This suggests that releasing axial rigidity may "unlock" the hips and legs, allowing for a more natural gait cycle.

Average Reduction in Walking Time:
25%

Chart 4 - **Walking - Before & After**

05

Results — Functional Strength (Sit-to-Stand)

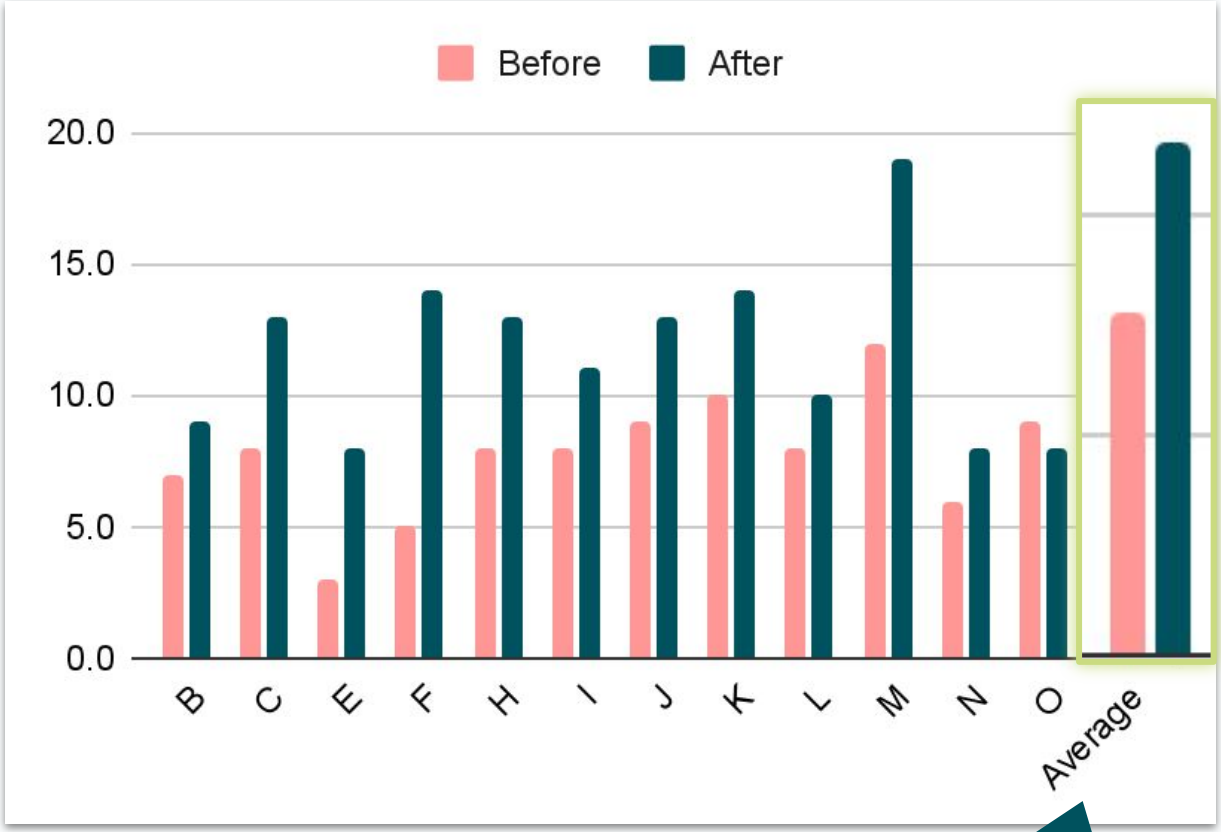
Regaining Independence

The Metric: The 30-Second Sit-to-Stand test is a key indicator of lower body strength, balance and fall risk.

The Finding: Participants demonstrated a significant increase in the number of stands completed. This indicates not just "strength," but a reduction in the spinal stiffness that typically makes the initial movement required to stand up from a seated position so difficult for PD participants .

Case Highlight: Participant **F** nearly tripled his performance, improving from **5 to 14 repetitions**. This functional gain directly translates to daily independence—getting out of a chair or car without assistance.

Chart 5 - **Sit-to-Stand Before & After**



Average improvement of Sit-to-Stand repetitions:
50.54%

06

Results — Pain Reduction

Breaking the Pain Cycle

The Metric: Visual Analog Scale (VAS) for Pain (0-10).

The Finding: This was the most consistent and dramatic result of the study. High levels of chronic back pain were frequently reduced to near-zero.

Case Highlight: Participants **G** and **M** began the study with significant pain scores (6/10 and 7.5/10). By the final session, both reported **0/10 pain**.

This confirms that much of the "PD Pain" is mechanical in origin—driven by muscle spasms and joint stiffness—and is highly responsive to robotic mobilization.

100%
of participants reported a reduction in pain.

Chart 6 - **Pain Before & After**

07

Results — Sleep Quality

The Restoration of Sleep

The Finding: Sleep disruption in Parkinson's is often mechanical—caused by the inability to turn over in bed due to spinal rigidity and pain..

Our data reveals a distinct **"Sleep Shift."** Before the study, the majority of the cohort reported "Poor" or "Very Poor" sleep.

Following the robotic intervention, **38% of the entire group (6 participants)** experienced a breakthrough, shifting their classification from "Poor" to "Good."

Why It Matters: Reducing evening rigidity allows for easier movement in bed, leading to fewer wake-ups and deeper restorative sleep—a critical factor for dopamine regulation.

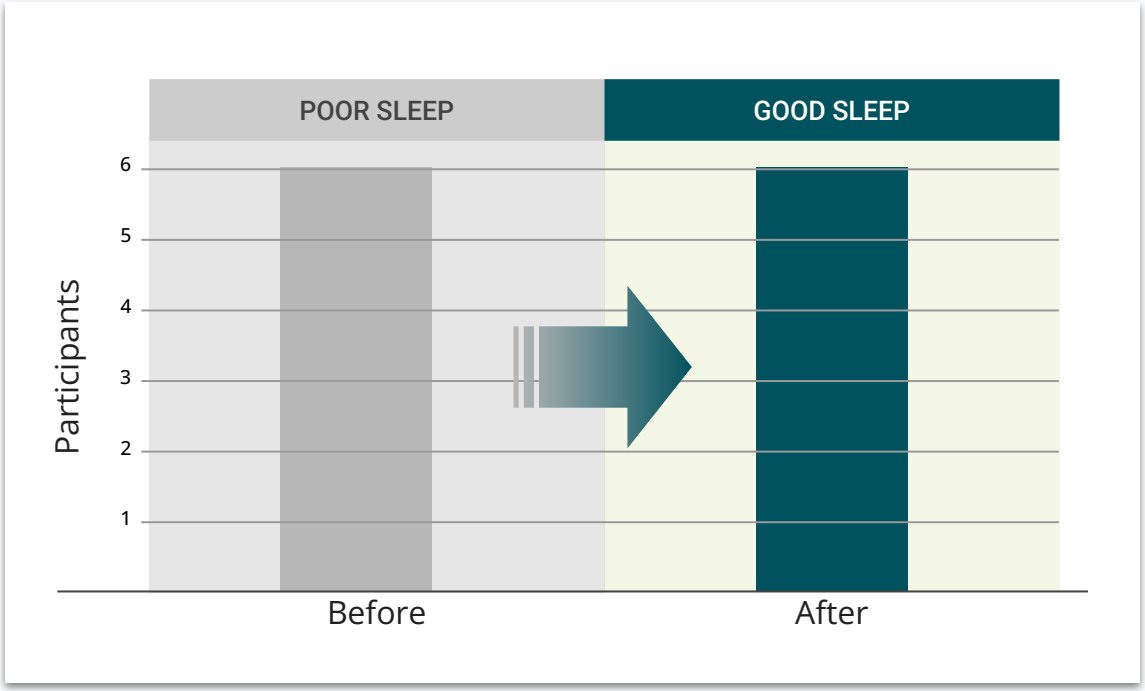


Chart 7 - **Shift in Sleep Quality (N=16)**

"I finally slept through the night without waking up in pain."

08

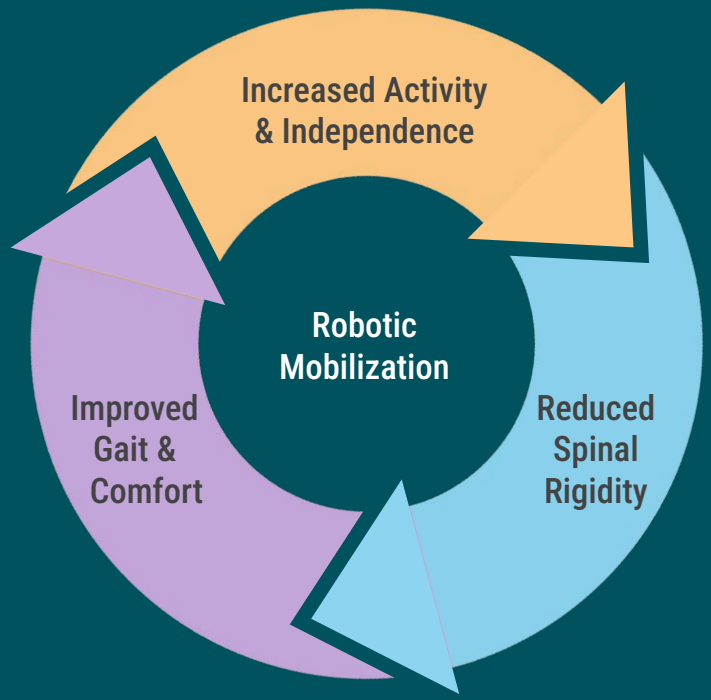
Discussion & Conclusion

The Physio-Engineer's Conclusion

The data from this preliminary study supports our core hypothesis: **When the spine moves, the body follows.**

While BackHug does not treat the neurological root of Parkinson's Disease, it effectively addresses the **mechanical root of one of Parkinson's Disease key symptoms**: Axial Rigidity.

By automating the mobilization process, BackHug provides sufferers with a consistent, accessible tool to manage and even escape from their "Concrete Body," resulting in measurable gains in mobility, strength, and comfort.



The "Road Ahead" Timeline

Step 1: Validate
Expand Clinical Evidence (30+ Participants)

Step 2: Certify
Secure Class 2 Medical Device Approval (Safety & Efficacy)

Step 3: Empower
"Making robotic mobility management accessible."

09

Appendix & Testimonials

The Human Impact

“Beyond the metrics, the true measure of success is the restoration of daily life."

Data tells the scientific story. The participants tell the human story.

These testimonials reflect the lived experience of the "Concrete Body" lifting, restoring a sense of agency and freedom.

Selected References

- *Emmerik et al. (1999)*. Identification of axial rigidity during locomotion in parkinson disease
- *Yang et al. (2016)*. Motion analysis of axial rotation and gait stability during turning in people with Parkinson's disease
- *Seçkinoğullari et al. (2023)*. Acute effects of lumbosacral mobilization on balance and functional activities in idiopathic Parkinson’s disease:A randomised controlled trial

"The Parkinson's community needs to know this help exists."

"My hands are steadier. I’m typing better at the keyboard."

"I’m using my walking poles less and am standing taller."

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