# Cueing and Gait Improvement Among People With Parkinson's Disease - A Meta Analysis

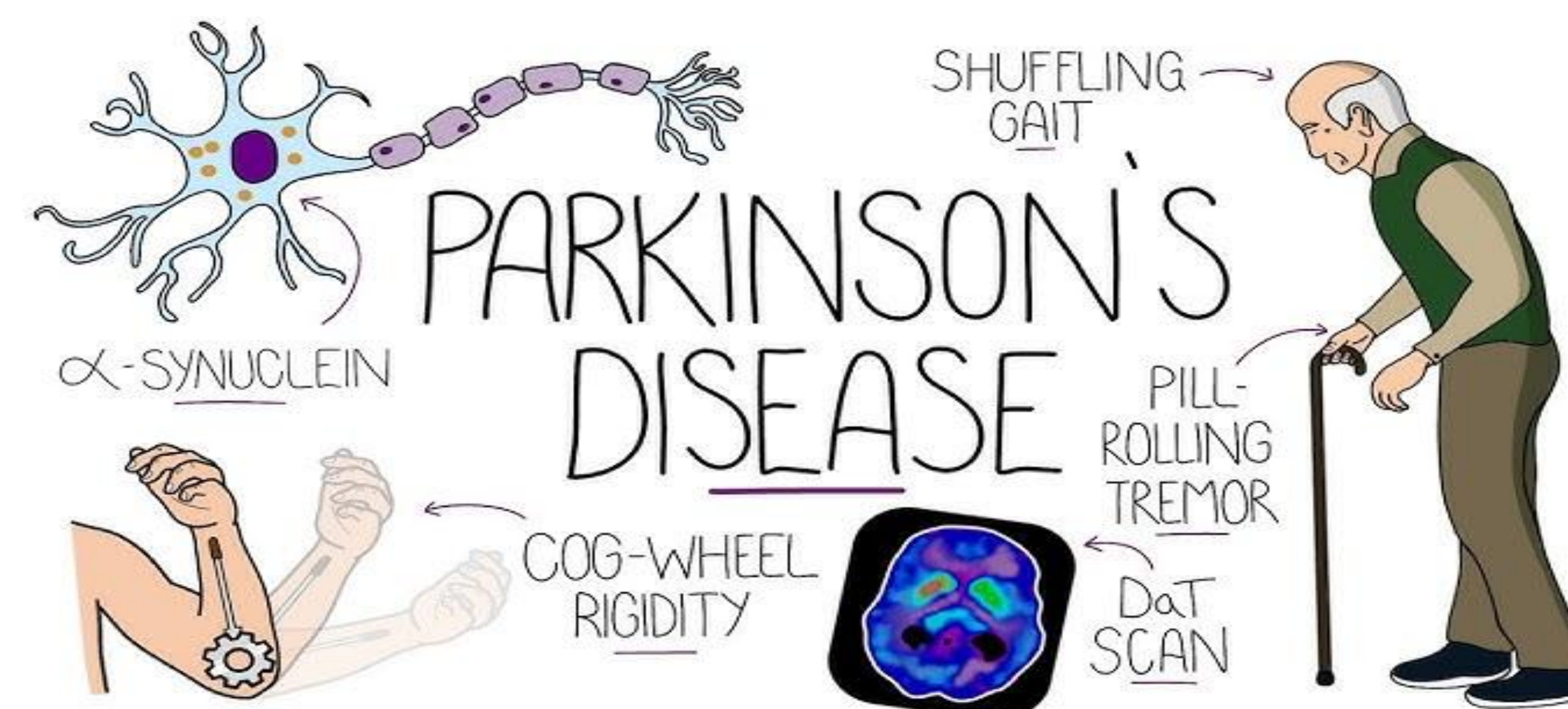Molly Turner, Summer Chapman, Gillian Gouveia, Dorota Kossowska-Kuhn

Introduction

- Parkinson's Disease is a neurodegenerative disease that is characterized by a loss of movement and coordination due to an impairment of the dopaminergic nerve cells in the substantia nigra of the basal ganglia, causing a failure to produce dopamine.
- Though there is no current cure for Parkinson's Disease, treatments using cueing to improve gait are being studied for possible improvement of symptoms.
- Some specific treatments used for gait in Parkinson's Disease are the use of visual, auditory, and audiovisual cueing.
- Gait is defined as a patient's walking patterns. Cueing is the use of a stimulus to regulate a patient's movement.
- Visual cueing, such as lights or lines on the floor, is any type of stimulus meant to initiate or maintain motor activity that is seen by the patient visually. Auditory cueing, such as a metronome or music, is any type of stimulus that initiates or maintains motor activity that is heard by the patient. Audiovisual cueing is a combination of the types in order to appeal to multiple methods of treatments.
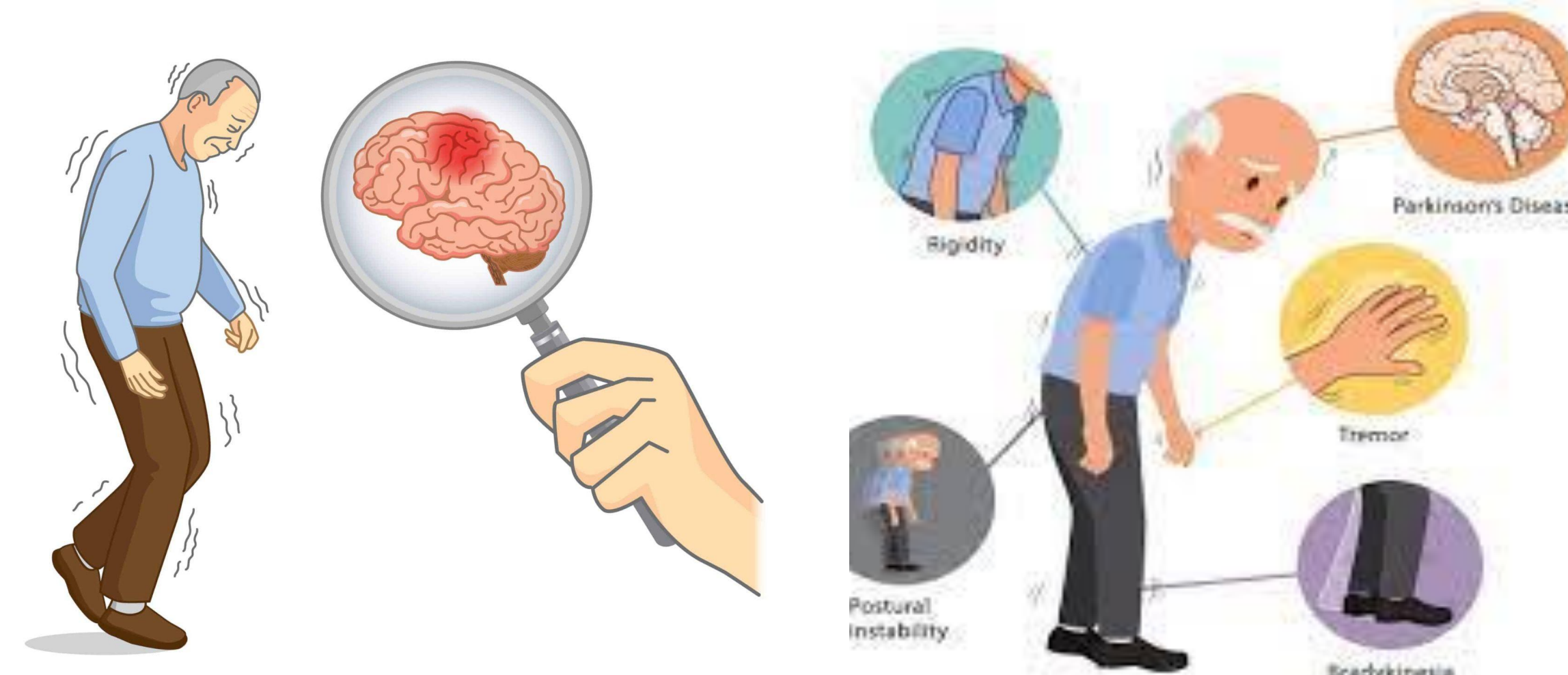
Methods

- A literature search conducted using Embase, Web of Science, Medline, CINAHL, and PubMed
- Search string used: "(Parkinson* OR PD) AND ((gait OR cadence OR "stride length" OR step OR pace OR walk*) AND (cue* OR prompt)"
- Gait was defined as patterns of cadence, stride length, and velocity
- Inclusion criteria: visual, auditory, or audiovisual intervention treatment on those with Parkinson's, any medication status, includes pre and post-intervention scores, and biometric data for stride length, velocity, and cadence, english language
- Exclusion criteria: Insufficient biometric data, only test cognitive cueing, unpublished research, qualitative articles, combination cueing with other intervention (i.e., auditory and exercise)
- Each article was blindly screened by 2 reviewers, firstly the abstract, then full-text for inclusion criteria; extraction was done by 2 blind reviewers and then compared by a 3rd for consistency
- Obtained additional demographic information such as age, sex, MMSE, PD duration, H&Y, UPDRS, amd medication status included
- Statistics tests ran was Hedges G for biometric values of stride length, cadence, and velocity

Expected Results

- We are still in the process of extracting our quantitative data into quantifiable information. Once we have all of our data in place, we will be able to find effects of visual, auditory, and audiovisual cueing on cadence, stride length, and velocity.
- The present dataset comprises 28 effect sizes from 12 studies, involving a total of 236 participants with Parkinson's Disease. The overall findings indicate a statistically significant difference ($p = 0.05$) across various aspects. As indicated by Hedge's G, cadence (0.26), velocity (0.26), and stride length (0.43), a small to medium effect size is observed.
- Once all of our data is fully extracted, we expect to see similar results in the rest of our studies that demonstrate a small to medium effect size in cadence, velocity, and stride length of Parkinson's patients.

Discussion

Importance of the Project:

- Understanding the effects of visual, auditory, and audiovisual cueing on gait in Parkinson's disease
- Gather further insight on how different cueing techniques interact with the different aspect of gait- specifically stride length, cadence, and velocity
- May help provide insight into usefulness of using cue techniques to improve gait in those with Parkinson's disease

Limitations:

- Unable to obtain every article possible due to being unable to contact certain authors or locate full-text
- Unable to extract non-english studies

Suggestions for Future Research:

- Research cue techniques with more carryover effects post treatment
- Investigate easy to use and less noticeable cueing techniques for Parkinson's patients
- Validate results through a directed study looking at stride length, cadence, and velocity with visual and auditory cueing alone

References

Bhatia, M. (2021, December 22). What is parkinson's disease: Parkinson's disease treatment. Neurology and Sleep Centre. https://neurologysleepcentre.com/blog/what-is-parkinsons-disease/

Das, A. (2022, April 4). Parkinson's disease. DSS Imagetech - Biotechnology Products. https://www.dssimage.com/blog/parkinsons-disease/

Sheikh, N. (2022, September 20). Patients ask: What can mimic parkinson's disease? Altoida. https://altoida.com/blog/patients-ask-what-can-mimic-parkinsons-disease/

YouTube. (2019, December 6). What is parkinson's disease? what are the symptoms and treatment options? YouTube. https://www.youtube.com/watch?v=1FobdhZXqJw