



DANCE AND ITS EFFECTS ON COGNITION IN PEOPLE WITH PARKINSON'S DISEASE: INTEGRATIVE REVIEW

A DANÇA E SEUS EFEITOS SOBRE A COGNIÇÃO EM PESSOAS COM A DOENÇA DE PARKINSON: UMA REVISÃO INTEGRATIVA

LA DANZA Y SUS EFECTOS SOBRE LA COGNICIÓN EN PERSONAS CON LA ENFERMEDAD DE PARKINSON: UNA REVISIÓN INTEGRATIVA

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Abstract

Parkinson's Disease (PD) is the second most prevalent disease worldwide, characterized as chronic-degenerative and progressive, manifesting in motor and non-motor symptoms, including cognition. Dance has been associated with positive effects in PD treatment. Thus, the aim of this study was to conduct an integrative review on the effects of dance on cognitive symptoms of PD, selecting 13 studies accessed from various databases. The results indicate that dance, as a complementary therapy for people with PD, shows promising evidence of improvements in cognition, while also highlighting limitations in available studies, such as small samples and lack of randomization, as well as difficulties in conducting meta-analyses due to low methodological quality and a limited number of available studies. Future research should address these limitations, including larger and more diverse groups, and employing rigorous designs to improve result reliability.

Keywords: Parkinson's Disease; Cognition; Dance Therapy.

Resumo

A Doença de Parkinson (DP) é a segunda doença mais prevalente no mundo, caracterizada como crônico-degenerativa e progressiva, manifestando-se em sintomas motores e não motores, incluindo cognição. A dança tem sido associada a efeitos positivos no tratamento da DP. Dessa forma, o objetivo do trabalho foi realizar uma revisão integrativa sobre os efeitos da dança nos sintomas cognitivos da DP, os quais selecionamos 13 estudos, acessados entre diversos bancos de dados. Os resultados indicam que a dança, como terapia complementar para pessoas com DP, apresenta evidências promissoras de melhorias na cognição, ao mesmo tempo em que aponta as limitações nos estudos disponíveis, como amostras pequenas e falta de randomização, bem como as dificuldades em realizar metanálises devido à baixa qualidade metodológica e ao número limitado de estudos disponíveis. Futuras pesquisas devem abordar essas limitações, incluindo grupos maiores e mais diversos, e empregando designs rigorosos para melhorar a confiabilidade dos resultados.

Palavras-chave: Doença de Parkinson; Cognição; Terapia em Dança.

Resumen

La Enfermedad de Parkinson (EP) es la segunda enfermedad más prevalente en el mundo, caracterizada como crónico-degenerativa y progresiva, manifestándose en síntomas motores y no motores, incluida la cognición. La



danza genera efectos positivos en el tratamiento de la EP. Por lo tanto, el objetivo de este estudio fue realizar una revisión integrativa sobre los efectos de la danza en los síntomas cognitivos de la EP, seleccionando 13 estudios accedidos en diversas bases de datos. Los resultados indican que la danza, como terapia complementaria para personas con EP, evidencia mejoras en la cognición. Todavía, hay limitaciones en los estudios disponibles, como muestras pequeñas y la no aleatorización, así como dificultades para realizar metaanálisis debido a la baja calidad metodológica y un número limitado de estudios disponibles. Futuras investigaciones deben abordar estas limitaciones, incluyendo grupos más grandes y diversos, y empleando diseños rigurosos para mejorar la confiabilidad de los resultados.

Palabras clave: Enfermedad de Parkinson; Cognición; Danza Terapia.

INTRODUCTION

According to the World Health Organization (WHO) for every ten individuals in the world, one is over 60 years old, being considered elderly. It is estimated that this number will increase to 78 million in 2030 and 139 million in 2050. In this way, the WHO highlights the importance of aging in a healthy and active way, where care for the elderly should focus on maintaining the quality of life and their health status.

As we age, there is an increase in the prevalence of neurodegenerative diseases. Among these, Parkinson's disease (PD) stands as the second most common neurodegenerative disease worldwide, affecting 2% to 3% of the population over 65 years of age, which accounts for about six million people worldwide (Poewe *et al.*, 2017; Ou *et al.*, 2021). PD is becoming increasingly disabling and fatal globally. Its prevalence has doubled in the last 25 years, with more than 8.5 million people affected in 2019 (Aarsland; Kurz, 2010). The disease has also caused an 81% increase in years of life lost due to disability since 2000 and an increase of more than 100% in deaths caused by the disease since the same year (Parkinson's Foundation, 2022).

PD is a chronic and progressive neurodegenerative disease caused by the decomposition of dopaminergic neurons located in the substantia nigra of the basal ganglia of the brain, where dopamine is synthesized (Bloem; Okun; Klein, 2021). Dopamine is a neurotransmitter responsible for carrying information to various parts of the body and, when released, it causes a feeling of pleasure and increases motivation. It is characterized by muscle weakness, musculoskeletal fragility, imbalance, impaired and impaired gait, rigidity of movement and bradykinesia (abnormal slowness of movement), and resting tremor (Surmeier, 2018; Franzoni *et al.*, 2018).

Furthermore, non-motor symptoms of PD are frequent and may precede motor symptoms by several years (Lintel, 2021). These symptoms range from psychiatric disorders such as depression, anxiety, agitation, hallucinations, and paranoia, to behavioral disorders (Zuzuárregui; During, 2020; Lintel, 2021). Other non-motor features, which include anosmia,





constipation, and Rapid Eye Movement (REM) sleep behavior disorder, may develop years before motor deficits and during later stages of the disease, additional non-motor features such as autonomic dysfunction and pain (Simon; Tanner; Brundin, 2020).

In advanced stages of the disease, non-motor symptoms can become more challenging because they can further affect the patient's quality of life and can be more difficult to treat (Prange *et al.*, 2022). Among the primary non-motor symptoms of PD are neuropsychiatric changes such as impaired cognition or dementia and memory problems (Goldman *et al.*, 2018; Prange *et al.*, 2022). Thus, a new subject implicated in PD came to light: the non-motor complications of PD, represented by impaired cognition or dementia (Zhang *et al.*, 2020).

PD has no cure, and its treatments aim to alleviate symptoms through pharmaceutical, surgical, physiotherapeutic, among other approaches (Church, 2021). However, there is evidence in the literature suggesting that dance is beneficial for people with PD with promising effects of different dance styles (Hackney; Mckee, 2014; Shanahan *et al.*, 2015; Delabary *et al.*, 2020; Fonseca *et al.*, 2021; Bek *et al.*, 2022). This type of non-pharmacological intervention can help alleviate both motor and non-motor symptoms of the disease (Wu; Lee; Huang, 2017). This raises a question in the study: How does dance practice influence cognitive aspects in people with Parkinson's disease, considering the different types of dance and their effects on both motor and non-motor symptoms of the disease?

In this context, this study aims to perform an integrative literature review to explore the effects of dance practice on the cognition of people with Parkinson's disease. The study seeks to holistically understand how dancing influences cognition, focusing on qualitative and multidimensional aspects, contributing to a more comprehensive view of the impact of dance on PwPD cognition.

METHODS

With the purpose of gathering and summarizing the scientific knowledge previously produced on the investigated topic, we performed an integrative literature review. The integrative literature review is a method that aims to gather and concentrate results of a research on a given topic, so that organized and systematized they can contribute to the knowledge of the investigated study (Gil, 2022). This type of review is a critical and broad analysis of the literature that is interested in results that can provide reflections on future





studies. The knowledge obtained was improved and expanded through previous studies arranged in reliable scientific databases in the academic environment.

A systematic approach was carried out to develop this review, comprising the following steps (Fink, 2005). Firstly, the theme was defined, and a guiding question was formulated. Then, electronic databases were selected to conduct a literature search. Inclusion and exclusion criteria were established to ensure the relevance of the studies. Specific descriptors were identified to refine the search process. After the initial screening, articles were pre-selected according to the research objectives. Next, a comprehensive evaluation of the pre-selected studies was conducted, leading to the final selection, meeting the review inclusion criteria. The gathered data was interpreted, and the results analyzed to draw meaningful insights. Finally, the integrative review was finalized, providing a cohesive and comprehensive overview of the subject matter. This methodological approach aimed to enhance the rigor and credibility of the review, contributing to a more thorough understanding of the topic under investigation (Fink, 2005).

A bibliographical survey was carried out with the support of the following databases: *Medical Literature Analysis and Retrieval System Online* (MEDLINE/PUBMED), *Virtual Health Library* (BVS), *SciVerse Scopus* (SCOPUS/ ELSEVIER), *Directory of Open Access Journals* (DOAJ). To streamline the search process, the study utilized the following descriptors: (*dance therapy*) AND (*cognition*) AND (*Parkinson's disease*). The careful selection of these descriptors helped filter the search results in scientific databases, enabling the inclusion of studies that would be most relevant to the research's focus and objectives.

Inclusion criteria was: articles published in the last 5 years; available in Portuguese, English and Spanish; experimental, quasi-experimental, randomized, non-randomized studies, and systematic reviews. The exclusion criteria was: observational studies; articles not available in a full version; duplicate articles in the databases; publications referring to thesis, dissertations, congress abstracts, annals, editorials, comments and opinions; studies that included people under the age of 60, elderly people without PD and/or people with PD caregivers.

The initial data was collected from September to December 2022, and a second collection was performed in April 2023, being subsequently evaluated for the title, and abstract reading. In the systematization process, the articles were read in full, finally, those that fit through the defined criteria were included, as shown in figure 1.





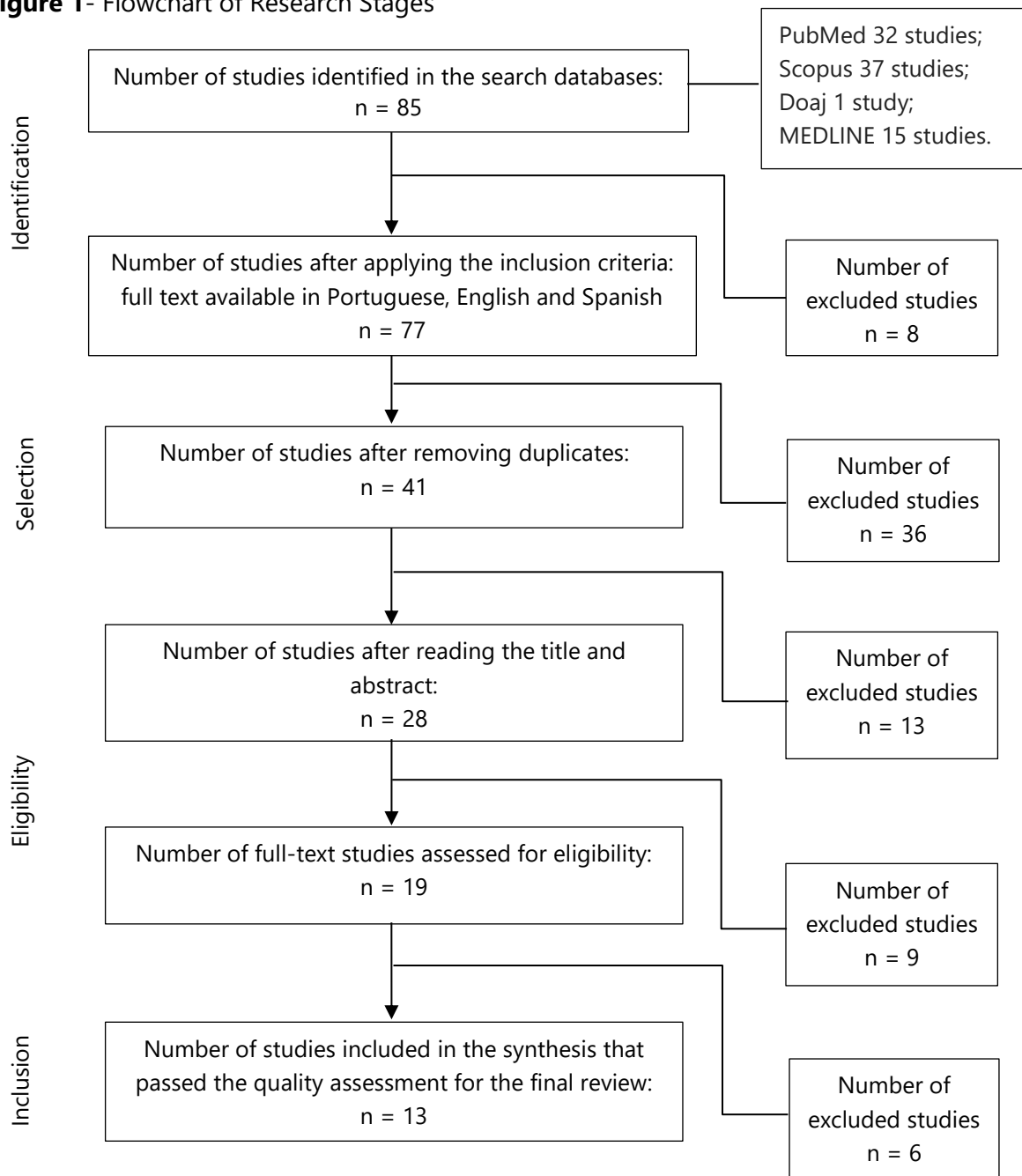
RESULTS

A total of 85 articles was found. After applying the inclusion criteria, 8 articles were excluded. Subsequently, 36 duplicates were removed, resulting in 41 articles. After analyzing the titles and abstracts, 13 articles were excluded, due to their focus on different interventions or evaluation of other populations, such as, people with stroke or elderly people without neurological diseases, resulting in 28 articles. After a thorough full-text review, 9 studies were excluded, resulting in a total of 19 articles for consideration. These 19 articles underwent rigorous evaluation as some relied on obvious statements, common sense, stereotypes, and conjectures, which could not be considered scientific, culminating in the final selection of 13 articles for synthesis. These 13 carefully chosen articles form the basis of a robust and informative review, ensuring a strong foundation of relevant and high-quality research for the synthesis phase. The Figure 1 illustrates the flowchart of research stages.





Figure 1- Flowchart of Research Stages



Source: authors' construction.

Table 01 shows a detailed synthesis of the included articles authors, title, year of publication, intervention, sample, country where they were published and type of study.



**Table 1** – Articles, author, title, year of publication, intervention, sample, country of origin and research design

Author	Title	Year	Intervention	Sample	Country of origin	Type of study
Michels, K.; Dubaz, O.; Hornthal, E.; Bega, D.	"Dance Therapy" as a psychotherapeutic movement intervention in Parkinson's disease.	2018	Holistic approach to dance, exploring diverse rhythms and movements. Tango 60 minutes; 1 x week; 10 weeks	9 participants in the dance	Unites States	randomized pilot study
Kalyani, HHN.; Sullivan, KA.; Moyle, G.; Brauer, S.; et al	Impacts of dance on cognition, psychological symptoms and quality of life in Parkinson's disease.	2019	DfPD-based classes including aspects of ballet, modern dance, choreographic repertoire, jazz, tap, flamenco and Scottish dance. 60 minutes; 2 x week; 12 weeks	17 participants in the dance	Australia	Quasi-experimental study
Kalyani, HHN.; Sullivan, KA.; Moyle, G.; Brauer, S.; et al	Effects of Dance on Gait, Cognition, and Dual-Tasking in Parkinson's Disease: A Systematic Review and Meta-Analysis.	2019	NA	27 studies included	Australia	Systematic review with meta-analysis
Solla et al	Sardinian Folk Dance for Individuals with Parkinson's Disease: A Randomized Controlled Pilot Trial.	2019	Sardinian Folk Dance 90 minutes; 2 x week; 12 weeks	10 participants in the dance	Italy	Controlled randomized pilot trial
Zhang, Q.; Hu, J.; Wei, L.; Jia, Y.; Jin, Y.	Effects of dance therapy on cognitive and mood symptoms in people with Parkinson's disease: A systematic review and meta-analysis.	2019	NA	7 studies included	China	Systematic review with meta-analysis
Lihala, S.; Mitra, S.; Neogy, S.; Datta, N.; et al	Dance movement therapy in rehabilitation of Parkinson's disease - A feasibility study.	2020	Dance 60 minutes 1x week; 12 weeks	9 participants in the dance	India	Quasi-experimental study
Fisher, M.; Kuhlmann, N.; Moulin, H.; Sack, J.; Lazuk, T.; Gold, I.	Effects of Improvisational Dance Movement Therapy on Balance and Cognition in Parkinson's Disease.	2020	Dance based on movement improvisation 90 minutes 1x week; 10 weeks	16 participants in the dance	Canada	Non-Randomized Clinical Trial
Ismail, SR.; Lee, SWH.; Merom, D. et al.	Evidence of disease severity, cognitive and physical outcomes of dance interventions for persons with	2021	NA	20 studies included	Malaysia	Systematic review with meta-analysis





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Moratelli, J.; Alexandre, KH.; Boing, L.; Swarowsky, A.; et al	Binary dance rhythm or Quaternary dance rhythm which has the greatest effect on non-motor symptoms of individuals with Parkinson's disease?	2021	Binary dance rhythm or Quaternary dance rhythm 45 minutes; 2 x week; 12 weeks	31 participants in the dance	Brazil	Randomized Clinical Trial
Wang, L-L.; Sun, C-J.; Wang, Y. et al.	Effects of dance therapy on non-motor symptoms in patients with Parkinson's disease: a systematic review and meta-analysis.	2021	NA	9 studies included	China	Systematic review with meta-analysis
Elpidoforou, M.; Bakalidou, D.; Drakopoulou, M.; Kavga, A.; et al.	Effects of a structured dance program in Parkinson's disease. A Greek pilot study	2021	Greek Dances 60 minutes; 2 x week; 8 weeks	16 participants in the dance	Greece	Non-randomized pilot study
Duarte, MVA.; Delabary, MDS.; Wolffenbuttel, M.; Haas, AN.	Una propuesta de Danza Brasileña: Efectos en los niveles de cognición global de personas con la Enfermedad de Parkinson	2022	Brazilian Dances 60 minutes; 2 x week; 11 weeks	30 participants in the dance	Brazil	Quasi-experimental study
Duarte, JDS.; Alcantara, WA.; Brito, JS.; et al.	Physical activity based on dance movements as complementary therapy for Parkinson's disease: Effects on movement, executive functions, depressive symptoms, and quality of life	2023	Dance styles included: tango, ballroom dancing, urban dances, samba, ballet, contemporary dance and Brazilian regional dances. 50 minutes; 2 x week; 24 weeks	13 participants in the dance	Brazil	Quase-experimental Study

Note: "NA" means "not applicable".

Source: authors' construction.

DISCUSSION

This study aimed to perform an integrative literature review about the effects of dance on cognition in people with PD, including experimental, quasi-experimental, non-randomized, randomized studies and systematic reviews. The 4 systematics reviews included (Kalyani *et al.*, 2019; Zhang *et al.*, 2019; Ismail *et al.*, 2021; Wang *et al.*, 2022) in this study reinforce the positive effects of dance on cognition, encompassing executive function and





memory. They suggest that dance is a beneficial intervention to address both motor and cognitive aspects of PD. However, they highlight the importance of further research to identify the specific types of dance and intervention durations that yield the most significant benefits.

In most of the included studies, changes on different cognitive domains in people in the early stages of PD were described, namely in executive and psychomotor functions, language, memory, and visual-spatial skills (Michels *et al.*, 2018; Solla *et al.*, 2019; Kalyani *et al.*, 2019a; Kalyani *et al.*, 2019b; Zhang *et al.*, 2019; Fisher *et al.*, 2020; Ismail *et al.*, 2021; Lihala *et al.*, 2021; Moratelli *et al.*, 2021; Andreatza *et al.*, 2022; Elpidoforou *et al.*, 2022; Wang *et al.*, 2022; Duarte *et al.*, 2023). Changes in the executive function are the most common finding (Michels *et al.*, 2018; Kalyani *et al.*, 2019; Zhang *et al.*, 2019; Elpidoforou *et al.*, 2022; Duarte *et al.*, 2023). Memory appears (Solla *et al.*, 2019; Kalyani *et al.*, 2019a; Kalyani *et al.*, 2019b) to be the second cognitive domain most frequently affected, followed by attention and visuo-spatial functions, which seem to be less impaired in PD and less investigated.

A substantial number of studies (Michels *et al.*, 2018; Kalyani *et al.*, 2019a; Kalyani *et al.*, 2019b; Zhang *et al.*, 2019; Duarte *et al.*, 2023) showed global cognition reduction after dance intervention. However, the vast majority (Michels *et al.*, 2018; Solla *et al.*, 2019; Kalyani *et al.*, 2019a; Fisher *et al.*, 2020; Lihala *et al.*, 2021; Moratelli *et al.*, 2021; Andreatza *et al.*, 2022; Elpidoforou *et al.*, 2022; Duarte *et al.*, 2023) do not show statistical difference, which may be related to the complex pathophysiology of this symptom. Cognitive decline in PD is multifactorial and influenced by a combination of neurodegenerative processes, neurotransmitter imbalances, and structural brain changes (Aarsland *et al.*, 2021). Given this multifaceted nature, cognitive changes might not manifest uniformly across all individuals or respond consistently to interventions like dance.

There is evidence about changes in executive function (Kalyani *et al.*, 2019a; Kalyani *et al.*, 2019b; Zhang *et al.*, 2019; Elpidoforou *et al.*, 2022; Duarte *et al.*, 2023), memory (Michels *et al.*, 2018; Solla *et al.*, 2019; Kalyani *et al.*, 2019b) and global cognition (Michels *et al.*, 2018; Kalyani *et al.*, 2019a; Kalyani *et al.*, 2019b; Zhang *et al.*, 2019; Duarte *et al.*, 2023) in people with PD after dance intervention. These results have positive implications in this population, helping to prevent progression to mild-cognitive impairment and dementia in PD (Michels *et al.*, 2018; Solla *et al.*, 2019; Kalyani *et al.*, 2019a; Kalyani *et al.*, 2019b; Zhang *et al.*, 2019; Fisher *et al.*, 2020; Ismail *et al.*, 2021; Lihala *et al.*, 2021; Moratelli *et al.*, 2021; Andreatza *et al.*, 2022; Elpidoforou *et al.*, 2022; Wang *et al.*, 2022; Duarte *et al.*, 2023).





The prevalence of cognitive impairment in PD, in its various forms, ranges from 20% to 50% of cases (Caballo; Martí; Tolosa, 2007; Goldman *et al.*, 2018). A more significant concern is that this impairment often progresses to dementia in up to 80% of cases (Fengler *et al.*, 2017; Goldman *et al.*, 2018). Studies suggest that 10% to 20% of people with PD show signs of cognitive impairment already at the time of diagnosis.

This review results showed that dance can be an accessible and enjoyable complementary therapy for people with PD, helping to improve cognitive domains and executive function (KALYANI *et al.*, 2019b; ZHANG *et al.*, 2019; DUARTE *et al.*, 2023). These improvements can be associated with rhythm synchronization, step and cadence affecting higher cortical functions (Kalyani *et al.*, 2019b). Dance requires movement memory, spatial and temporal cognition and stimulates the sensory-motor system, helping people with PD overcome cognitive challenges (Meulenberg *et al.*, 2023).

It is important to highlight that the absence of statistically differences in cognitive outcomes after dance interventions could stem from several sources. Variability in the severity of cognitive impairment among participants, differences in the stage of PD progression, and variations in the types and durations of dance interventions all contribute to the complexity of the outcomes. Additionally, small sample sizes and insufficient statistical power can hinder the ability to detect significant changes. Addressing cognitive decline in PD through dance interventions requires a nuanced approach. Rather than viewing global cognitive changes in isolation, it's essential to identify specific cognitive domains that may respond differently to dance (Fengler *et al.*, 2017). This tailored approach could help pinpoint areas of improvement and guide future research towards more precise interventions. Considering these complexities, the field of dance interventions for people with PD faces several critical questions. How can dance interventions be tailored to address specific cognitive domains affected by PD? What role individual characteristics do, and the disease stage play in shaping cognitive responses to dance? Addressing these questions will not only deepen our understanding about the relationship between dance and cognition in PD but also inform the development of more effective interventions.

In relation to the instruments using to evaluate global cognition, most of the studies used the MoCA (Michels *et al.*, 2018; Solla *et al.*, 2019; Kalyani *et al.*, 2019a; Fisher *et al.*, 2020; Ismail *et al.*, 2021; Lihala *et al.*, 2021; Moratelli *et al.*, 2021; Elpidoforou *et al.*, 2022; Andrezza *et al.*, 2022; Wang *et al.*, 2022) as a primary tool for assessing participants' overall





cognition. It's important to note that the MoCA was originally developed as a screening tool to detect mild cognitive impairment (Larner, 2018). The MoCA can yield variable results, and its sensitivity and specificity can be influenced by various factors such as participants' level of education, the presence of medical comorbidities, and the examiner's experience. This variability in the MoCA results underscores the importance of considering other complementary and in-depth measures to assess cognition in future studies. Therefore, while the MoCA is a valuable tool, its results should be interpreted with caution (Larner, 2018).

Other instruments, such as SCOPA-Cog (Kalyani *et al.*, 2019b; Wang *et al.*, 2022), ACE (Kalyani *et al.*, 2019a) and FAB (Kalyani *et al.*, 2019b; Duarte *et al.*, 2023), were also employed to assess cognition. These instruments have demonstrated high discriminative validity and have been proposed as valuable screening measures for people with PD due to their precision in classification. Also, most of the studies (Michels *et al.*, 2018; Solla *et al.*, 2019; Kalyani *et al.*, 2019a; Kalyani *et al.*, 2019b; Zhang *et al.*, 2019; Fisher *et al.*, 2020; Ismail *et al.*, 2021; Lihala *et al.*, 2021; Moratelli *et al.*, 2021; Andreatza *et al.*, 2022; Elpidoforou *et al.*, 2022; Wang *et al.*, 2022; Duarte *et al.*, 2023) used a single cognitive test, self-reported questionnaires, or general cognitive measures to measure cognition. This makes it challenging to compare the results across studies. Therefore, future studies adopting a standardized outcomes measurements are recommended, providing a broader perspective to better reflect clinically significant improvements on cognition in people with Parkinson's who participated in a dance intervention. The combination of different cognitive assessment instruments can provide a more comprehensive and accurate understanding of participants' cognitive status, thus reducing the potential impact of limitations inherent in a single test (Larner, 2018).

One of the challenges encountered in studies about the effects of dance in people with PD is the lack of randomized controlled trials (RCTs). This type of study is considered the gold standard in medical research, as they allow researchers to control important variables and minimize bias (Krause, 2018). However, many of the available studies are not a RCT, which can impact the generalizability of the results. It is essential for future research to incorporate well-designed RCTs to provide more robust evidence and further validate the potential benefits of dance therapy for people with PD.

It is important to highlight the lack of consensus on the ideal type of dance for people with PD (Zhang *et al.*, 2019; Ismail *et al.*, 2021; Wang *et al.*, 2022). It is still unclear whether a specific dance genre is more effective than others to improve cognition in people





with PD. Some dance genres may be more challenging for this population than others, depending on individual disease symptoms and characteristics (Navarta-Sánchez *et al.*, 2023). KALYANI *et al.*, 2019a also bring attention to the absence of detailed dance protocols in some studies. The detailed information about and clarity on these protocols is essential because they define the structure, frequency, duration, intensity, and components of the dance interventions. With a comprehensive information about these protocols, it would be possible to design effective interventions, and replicate the studies.

In relation to the dance protocols dose, there was a standardization, consisting of 60-minute session, once to twice a week, lasting 12 weeks. However, these sessions encompassed a variety of dance styles and genres without providing a detailed step-by-step explanation, progression information for seated or standing exercises, or specifics on the exercises used.

Another aspect to highlight is the heterogeneity of the participants included in the studies. PD is a complex condition, and symptoms vary widely among individuals (Krause, 2018). This can make it difficult to compare results between different studies and determine which individuals may benefit the most from dance interventions. Furthermore, many of the available studies have methodological limitations, such as, small sample sizes, lack of appropriate control groups, and lack of blinding of participants and researchers (Wang *et al.*, 2021). These limitations can impact the validity of the results and make it challenging to determine the effectiveness of dance for people with PD. It also shed light on areas where future studies could be enhanced and provide a critical perspective on the scope and findings of the research. Future research should strive to include larger and more diverse participant groups, use rigorous study designs, and implement appropriate control measures to enhance the reliability and validity of the findings.

CONCLUSION

Dance was effective to improve executive function and memory in people with PD, suggesting tailored benefits to critical cognitive domains. The dance interventions, encompassing various genres, showing their versatility as an alternative and effective non-pharmacological intervention with potential benefits on cognition in people with PD.

The comprehensive analysis of the impact of dance on cognition in people with PD offers a glimpse of its promising potential. In the realm of PD management, dance emerges as





an encouraging avenue for cognitive enhancement and overall well-being. By bridging the domains of cognition and movement, dance demonstrates its potential to enrich the lives of people living with Parkinson's, offering hope for a brighter future in their journey towards cognitive empowerment.

However, cautious interpretation is needed due to the heterogeneity of study results and methodological limitations. Further well-designed studies, with larger and more diverse sample sizes, are warranted to establish conclusive evidence regarding the specific dance interventions effectiveness and their lasting benefits on cognitive in PD.

REFERENCES

AARSLAND, Dag; KURZ, Martin Wilhelm. The epidemiology of dementia associated with parkinson's disease. **Brain Pathology**, v. 20, n. 3, p. 633-639, 2010.

AARSLAND, Dag *et al.* Parkinson disease-associated cognitive impairment. **Nature review. Disease primers**, v. 7, n. 47, p. 1-21, 2021.

ANDREAZZA DUARTE, Maria Vitoria *et al.* Una propuesta de danza brasileña: efectos en los niveles de cognición global de personas con la enfermedad de parkinson. **Retos**, n. 45, p. 591-597, 2022.

BEK, Judith *et al.* Moving online: experiences and potential benefits of digital dance for older adults and people with Parkinson's disease. **PLoS one**. v. 17, n. 11, p. 1-17, 2022.

BLOEM, Bastiaan; OKUN, Michael; KLEIN, Christine. Parkinson's disease. **Lancet**. v. 397, n. 10291, p. 2284-2303, 2021.

CABALLOL, Nuria; MARTÍ, Maria J.; TOLOSA, Eduardo. Cognitive dysfunction and dementia in parkinson disease. **Movement disorders**, suppl. 17, n. 22, p. 358-366, 2007.

CHURCH, Frank C. Treatment options for motor and non-motor symptoms of parkinson's disease. **Biomolecules**, n. 11, p. 1-17, 2021.

DELABARY, Marcela dos Santos *et al.* Can samba and forró brazilian rhythmic dance be more effective than walking in improving functional mobility and spatiotemporal gait parameters in patients with parkinson's disease? **BMC Neurology**, v. 20, n. 1, p. 1-10, 2020.

DUARTE, Juliana dos Santos *et al.* Physical activity based on dance movements as complementary therapy for parkinson's disease: effects on movement, executive functions, depressive symptoms, and quality of life. **PLoS one**, v. 18, n. 2, p. 1-16, 2023.





ELPIDOFOROU, Michail *et al.* Effects of a structured dance program in parkinson's disease. A greek pilot study. **Complementary therapies in clinical practice**, v. 46, 2022.

FENGLER, Sophie *et al.* Cognitive changes in prodromal parkinson's disease: a review. **Movement disorders**, v. 32, n. 12, p. 1655-1666, 2017.

FINK, Arlene. **Conducting research literature reviews: from the internet to paper**. 2. ed. Thousand Oaks, California: Sage, 2005.

FISHER, Maura *et al.* Effects of improvisational dance movement therapy on balance and cognition in parkinson's disease. **Physical & occupational therapy in geriatrics**, suppl 4, n. 30, p. 385-399, 2020.

FONSECA, Líria Cruz *et al.* The impact of brazilian samba on balance and quality of life of individuals with parkinson's disease. **Revista brasileira de atividade física e saúde**, n. 26, p. 1-7, 2021.

FRANZONI, Leandro Tolfo *et al.* A 9-week nordic and free walking improve postural balance in parkinson's disease. **Sports medicine international open**, v. 2, n. 2, p. E28-E34, 2018.

GIL, Antonio Carlos. **Como elaborar projetos de pesquisa**. 7. ed. São Paulo: Atlas, 2022.

GOLDMAN, Jennifer G. *et al.* Cognitive impairment in parkinson's disease: a report from a multidisciplinary symposium on unmet needs and future directions to maintain cognitive health. **NPJ parkinsons disease**, v. 26, n. 4, p. 1-11, 2018.

HACKNEY, Madeleine E; MCKEE, Kathleen. Community-based adapted tango dancing for individuals with parkinson's disease and older adults. **Journal of visualized experiments**, v. 9, n. 94, p. 1-12, 2014

KALYANI, Hewa Haputhanthirige Nadeesha *et al.* Impacts of dance on cognition, psychological symptoms and quality of life in parkinson's disease. **NeuroRehabilitation**, v. 45, n. 2, p. 273-283, 2019a.

KALYANI, Hewa Haputhanthirige Nadeesha *et al.* Effects of dance on gait, cognition, and dual-tasking in parkinson's disease: a systematic review and meta-analysis. **Journal of parkinsons disease**, v. 9, n. 2, p. 335-349, 2019b.

KRAUSE, Josianne da Costa Rodrigues. **A dança como estratégia de promoção da saúde cardiometabólica e independência funcional no envelhecimento**. 2018. 86f. Tese (Doutorado em Educação Física). Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, 2018.

ISMAIL, Sophia Rasheeqa *et al.* Evidence of disease severity, cognitive and physical outcomes of dance interventions for persons with parkinson's disease: a systematic review and meta-analysis. **BMC geriatrics**, n. 21, p. 1-11, 2021.





LARNER, Andrew J. **Cognitive screening instruments: a practical approach**. 2. ed. Liverpool, United Kingdom: Springer. 2017.

LIHALA, Shubha *et al.* Dance movement therapy in rehabilitation of parkinson's disease - A feasibility study. **Journal of bodywork and movement therapies**, n. 26, p. 12-17, 2021.

LINTEL, Hendrik *et al.* Mood disorders and anxiety in parkinson's disease: current concepts. **Journal of geriatric psychiatry and neurology**, v. 34, n. 4, p. 280-288, 2021.

MEULENBERG, Cécil *et al.* Unleashing the potential of dance: a neuroplasticity-based approach bridging from older adults to parkinson's disease patients. **Frontiers aging neuroscience**, n. 15, p. 1-9, 2023.

MICHELS, Kristi *et al.* "Dance therapy" as a psychotherapeutic movement intervention in Parkinson's disease. **Complementary therapies in medicine**, n. 40, p. 248-252, 2018.

MORATELLI, Jéssica *et al.* Binary dance rhythm or quaternary dance rhythm which has the greatest effect on non-motor symptoms of individuals with Parkinson's disease? **Complementary therapies in clinical practice**, v. 43, 2021.

NAVARTA-SÁNCHEZ, María Victoria *et al.* Perspectives of people with parkinson's disease and family carers about disease management in community settings: a cross-country qualitative study. **Journal of clinical nursing**, v. 32, n. 15-16, p. 5201-5218, 2023.

OU, Zejin *et al.* Global trends in the incidence, prevalence, and years lived with disability of parkinson's disease in 204 countries/territories from 1990 to 2019. **Frontiers in public health**, v. 9, p. 1-16, 2021.

PARKINSON'S FOUNDATION. 2022. **Ebook**. Available in: <<https://www.parkinson.org/annual-report-2022/>>. Access in: november 29, 2023.

POEWE, Werner *et al.* Parkinson disease. **Nature review. Disease primers**, v. 3, p. 1-21, 2017.

PRANGE, Stéphane *et al.* Depression in patients with parkinson's disease: current understanding of its neurobiology and implications for treatment. **Drugs & aging**, n. 39, p. 417-439, 2022.

SHANAHAN, Joanne *et al.* Is Irish set dancing feasible for people with parkinson's disease in Ireland? **Complementary therapies in clinical practice**, v. 21, n. 1, p. 47-51, 2015.

SIMON, David; TANNER, Caroline; BRUNDIN, Patrick. Parkinson disease epidemiology, pathology, genetics, and pathophysiology. **Clinics in geriatric medicine**, v. 36, n. 1, p. 1-12, 2020.

SOLLA, Paolo *et al.* Sardinian folk dance for individuals with parkinson's disease: a randomized controlled pilot trial. **Journal of alternative and complementary medicine**, v. 25, n. 3, p. 305-316, 2019.





SURMEIER, Dalton James. Determinants of dopaminergic neuron loss in parkinson's disease. **The FEBS journal**, v. 285, n. 19, p. 3657-3669, 2018.

WANG, Li-Li *et al.* Effects of dance therapy on non-motor symptoms in patients with parkinson's disease: a systematic review and meta-analysis. **Aging clinical and experimental research**, v. 34, n. 6, p. 1201-1208, 2022.

WORLD HEALTH ORGANIZATION. WHO guidelines on physical activity and sedentary behaviour: at a glance. **World Health Organization**. 2021. Available in: <<https://apps.who.int/iris/handle/10665/337001>>. Access in: november 29, 2023.

WU, Pei-Ling; LEE, Megan; HUANG, Tzu-Ting. Effectiveness of physical activity on patients with depression and parkinson's disease: a systematic review. **PLoS one**, v. 12, n. 7, p. 1-14, 2017.

ZHANG, Qi *et al.* Effects of dance therapy on cognitive and mood symptoms in people with parkinson's disease: a systematic review and meta-analysis. **Complementary therapies in clinical practice**, n. 36, p. 12-17, 2019.

ZHANG, Qi *et al.* Approach to cognitive impairment in parkinson's disease. **Neurotherapeutics**, v. 17, n. 4, p. 1495-1510, 2020.

ZUZUÁRREGUI, José Rafael; DURING, Emmanuel. Sleep issues in parkinson's disease and their management. **Neurotherapeutics**, v. 17, n. 4, p. 1480-1494, 2020.

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