






# Comparison of the Effectiveness of Acceptance and Commitment Group Therapy and Pharmacotherapy on Reducing Non-Motor Symptoms in Parkinson's Disease Patients

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## ABSTRACT

**Objective:** The present study aimed to determine the difference in effectiveness between Acceptance and Commitment Group Therapy (ACT) and pharmacotherapy on reducing non-motor symptoms in Parkinson's disease patients who visited the Imam Reza Clinic in Shiraz, Neurology Department.

**Methods and Materials:** In this quasi-experimental study, 36 participants were purposefully selected for two groups (each group = 18 participants). The tools used for the assessment and diagnosis of disorders by a clinical specialist included the Non-Motor Symptoms Scale (NMSS) for Parkinson's Disease.

**Findings:** The findings confirmed the effectiveness of ACT and pharmacotherapy on non-motor symptoms, covering components such as cardiovascular, sleep/fatigue, mood/cognition, perceptual problems/hallucinations, attention/memory, gastrointestinal, urinary, sexual function, and miscellaneous issues ( $P < 0.05$ ). The results indicated that the effectiveness of ACT was greater than that of pharmacotherapy, and this difference was statistically significant ( $P < 0.05$ ).

**Conclusion:** Therefore, it is recommended that centers associated with Parkinson's patients use ACT to improve the mentioned components and thereby enhance the well-being of this group of patients.

**Keywords:** Parkinson's disease, pharmacotherapy, non-motor symptoms, Acceptance and Commitment Group Therapy (ACT).

## 1. Introduction

Parkinson's disease is the most common neurodegenerative disorder after Alzheimer's disease. It is a chronic and progressive disease that increases with age, with symptoms worsening over time and its prevalence increasing (Pinto, 2024). Over the past generation, the number of individuals with Parkinson's has more than doubled (Kenangil et al., 2020). From 1990 to 2019, the prevalence of Parkinson's disease increased by 159.73%, with the highest rate of increase observed in individuals over the age of 80 (Gupta & Shukla, 2021). Early diagnosis of Parkinson's is challenging as there are no laboratory tests, such as blood tests or brain scans, for diagnosis (Jankovic, 2008). Parkinson's disease is a common neurodegenerative disorder in the elderly population and occurs when the nerve cells in the basal ganglia, a region of the brain responsible for controlling body movements, become impaired or die (Carod-Artal et al., 2013). The main feature of Parkinson's is the impairment of both motor and non-motor symptoms with varying degrees of severity. Motor symptoms include bradykinesia, resting tremor, muscle rigidity, and postural reflex impairment (Chaudhuri et al., 2006; Chaudhuri et al., 2005; Jones et al., 2020).

In addition to these symptoms, non-motor symptoms, which may appear in individuals over 20 years old, typically include olfactory dysfunction (anosmia and hyposmia), cognitive deficits, depression, and REM sleep behavior disorder. Non-motor symptoms encompass neurobehavioral changes, autonomic dysfunction, sensory disturbances, and sleep disorders (Gupta & Shukla, 2021). Generally, neuropsychiatric changes such as depression, anxiety, social anxiety, cognitive disorders, dementia, and hallucinations; sensory changes such as olfactory and visual impairment, and pain; autonomic dysfunction such as blood pressure abnormalities, sexual dysfunction, gastrointestinal dysfunction, and urinary disorders are considered non-motor symptoms (Martínez-Martín et al., 2015; Nagatsu, 2020a, 2020b; Poewe et al., 2017).

Multiple studies have reported the effectiveness of various treatments on motor and non-motor symptoms of Parkinson's disease; although pharmacotherapy is the first-line treatment for Parkinson's, due to the psychological distress caused by non-motor symptoms, specialists have sought non-pharmacological treatments that improve patient functionality and quality of life while simultaneously reducing non-motor symptoms. Among the treatments whose effectiveness has been reported by researchers for

anxiety and depression disorders as well as for physical and neurological diseases such as Alzheimer's, cancer, diabetes, and multiple sclerosis is Acceptance and Commitment Therapy (ACT) (Hayes et al., 1999; Hayes et al., 2006; Hayes & Pierson, 2005). Additionally, various studies have indicated the effectiveness of ACT on depression, psychosis, substance-related disorders, eating disorders, occupational burnout, smoking, chronic pain, and even, albeit limitedly, on Parkinson's disease (Ghielen et al., 2017; Nagatsu, 2020a, 2020b; Zarotti et al., 2021). The goal of ACT is to improve psychological flexibility (consciously engaging with the moment and changing or maintaining behavioral patterns based on chosen values), helping individuals lead more meaningful lives (Nicolescu et al., 2024; Shahkaram et al., 2024). This therapy uses techniques such as acceptance, mindfulness, motivation, and behavior change to reduce ineffective efforts to control, change, or eliminate internal experiences (such as negative thoughts, feelings, and physical sensations) and increase participation in enriching life activities. These techniques help individuals face internal experiences instead of engaging in ineffective or futile struggles with them; become aware of their experiences rather than ruminating about the past or worrying about the future; and commit to actions based on what truly matters to them rather than experiences they want to avoid (Sharif Ara et al., 2023; Sofyan et al., 2023).

The group format of this therapy helps patients accept emotions and move towards a more valuable and quality life, facilitating the sharing of emotions with others, connecting with people who have similar problems, and exchanging effective ways to adapt to conditions, which seems to be a more useful and effective method considering the age of the patients. Analyzing the comparative effects of individual or group ACT therapy shows equivalent results (Harris, 2019); however, the unique therapeutic benefits of group therapies include reducing feelings of isolation, providing opportunities to learn from the experiences of other participants, and modeling new coping strategies and behaviors based on such shared learning (Rath et al., 2017). Given the above, the present study attempts to answer the question of how the effectiveness of ACT group therapy and pharmacotherapy on non-motor symptoms and quality of life differs.

## 2. Methods and Materials

## 2.1. Study Design and Participants

The research method was quasi-experimental with a pre-test, post-test, and follow-up design. The statistical population included patients with Parkinson's disease in Shiraz, and the research sample was selected from patients who visited the Imam Reza Clinic in Shiraz, Neurology Department. The sample size was determined based on Cohen's sample size table for experimental studies (Cohen, 1986; as cited in Sarhad et al., 1998), with 18 participants per group and a total of 36 participants for the two groups. According to Cohen's table, if two groups are studied at a 0.05 level with an effect size of 0.50, a minimum of 17 participants per group is required to achieve a test power of 0.89. To compensate for potential sample attrition, 24 participants were initially assigned to each group; however, during the treatment sessions, 2 participants from the pharmacotherapy group and 4 from the ACT group were excluded from the study based on specialist physician recommendations or withdrew from treatment. Ultimately, to maintain group homogeneity, the results of 18 participants in each group (36 in total) were studied and analyzed.

Inclusion criteria included patient consent to participate in the study based on signing a written consent form, physician approval, not taking medication for one month before the test, not having psychotic depression, not having dementia, and meeting the diagnostic criteria for Parkinson's disease determined by a specialist physician. Exclusion criteria included patient unwillingness to continue in the study, physician disapproval of medication discontinuation, and the emergence of psychotic symptoms.

After selecting the study samples as described in the sampling method, the Unified Parkinson's Disease Rating Scale was used to determine the severity of Parkinson's disease in patients for group matching. After matching, participants were randomly assigned to experimental and control groups. Initially, psychiatric medications used for non-motor symptoms were stopped for one month under the supervision of a specialist physician. Then, pre-tests were administered to each group using the Non-Motor Symptoms Scale, Beck Depression Inventory, Beck Anxiety Inventory, and the Parkinson's Disease Quality of Life Questionnaire. After the pre-test, the experimental study began. For the control group, appropriate pharmacotherapy for symptoms such as antidepressants, anxiolytics, and other psychiatric medications was selected and administered by the specialist physician. To follow the principles of group psychotherapy, the experimental group was divided into two groups of 12

and received ACT in 8 sessions of 90 minutes each by two therapists simultaneously.

To assess the effectiveness of the treatments, post-tests were administered after completing the therapy sessions. The post-test was also conducted using the Non-Motor Symptoms Scale, and three months later, participants were re-evaluated using the same scales for follow-up. In this study, pre-tests, post-tests, and follow-up tests were administered by the study therapists, but the assessment and diagnosis of Parkinson's disease severity were conducted by a neurologist, and the assessment, diagnosis, and severity of psychological disorders and the standardized Mini-Mental State Examination for dementia diagnosis were conducted by a clinical specialist. Group ACT was administered in both experimental groups by the therapists (researcher and research assistant).

## 2.2. Measures

### 2.2.1. Non-Motor Symptoms

The Non-Motor Symptoms Scale (NMSS) for Parkinson's Disease, developed by Chaudhuri et al. in 2005, is the first tool for assessing non-motor symptoms in Parkinson's patients (Jiwan & Emre, 2020). This scale comprises 30 questions categorized into 9 dimensions: cardiovascular, sleep/fatigue, mood/cognition, perceptual problems/hallucinations, attention/memory, gastrointestinal, urinary, sexual function, and miscellaneous (Chaudhuri et al., 2007). The symptoms experienced by patients over the past month are calculated for each item by multiplying severity (0 = none, 1 = mild, 2 = moderate, 3 = severe) by frequency (1 = rarely (less than once a week), 2 = often (once a week), 3 = frequently (several times a week), 4 = very frequently (daily or all the time)). Each question scores between 0 to 12, and the total scale score ranges from 0 to 360 (Chaudhuri et al., 2006; Chaudhuri et al., 2005). In this study, the overall Cronbach's alpha for the Persian version was reported to be 0.84. Additionally, three dimensions—mood/cognition, attention/memory, and urinary—had internal consistency above 0.7; two dimensions—perceptual problems/hallucinations and sleep/fatigue—had internal consistency above 0.6; the remaining dimensions had values below 0.6, with the miscellaneous dimension having the lowest Cronbach's alpha of 0.35. The test-retest reliability for the overall scale was 0.93, and for the domains, it ranged from 0.81 to 0.93.

### 2.3. *Intervention*

#### 2.3.1. *Group Acceptance and Commitment Therapy*

The treatment method followed the ACT protocol (Ghielen et al., 2017; Nagatsu, 2020a, 2020b; Zarotti et al., 2021), adapted for Parkinson's disease. The protocol included eight 90-minute sessions as outlined in the appendix.

The first session involved discussing the details of Parkinson's disease in patients, introducing the treatment method (using the metaphor of two mountains), and creating a verbal agreement for attending the 8 therapy sessions. Patients were then asked how they discovered their disease and what actions they had taken so far, identifying which were effective and which were not. The goal of this phase, "creative hopelessness" in therapy, was to remind patients that their strategies seemed only temporarily effective, leading to more symptoms.

The second session used the "person in a hole" metaphor and the "tug-of-war with a monster" metaphor to illustrate how efforts to regulate internal experiences like symptoms are ineffective. The first metaphor described a person who fell into a hole (indicative of being preoccupied with Parkinson's symptoms) and had only a shovel (a tool to reduce Parkinson's symptoms) to get out. As the person tried to dig their way out (indicating efforts to reduce or control symptoms), the hole deepened (showing the paradox of how struggling with symptoms makes controlling them harder). The primary goal of this metaphor was to reduce the individual's focus on controlling or reducing symptoms. In the second metaphor, the patient imagines having a tug-of-war with a giant (representing the struggle with symptoms), trying to throw the giant into a hole between them to escape. However, this effort drains the patient's energy and disrupts their functioning. The goal of this session was to continue creative hopelessness.

The third and fourth sessions focused on showing that trying to control Parkinson's disease only exacerbates the problem and is not a solution. These sessions included exercises to demonstrate the limitations of controlling personal events like depression, anxiety, and other symptoms. For example, not thinking about something like a chocolate cake. These exercises were designed to help the individual understand the difference between uncontrollable personal events and controllable ones, shifting focus from symptom reduction to moving towards values and quality of life. The "two scales" and "polygraph machine" metaphors illustrated the potential benefits of accepting symptoms

rather than trying to control or reduce them. The goal of these metaphors was to shift attention from reducing unpleasant personal events like anxiety and other symptoms to increasing the willingness to experience them. Willingness to experience symptoms allows feelings resulting from symptoms to subside, while symptom control has paradoxical effects, increasing their frequency and severity and enhancing their ability to control the individual's behavior.

The fifth and sixth sessions focused on changing the psychological function of Parkinson's symptoms from threatening to a mere verbal event, including defusion exercises, contact with the present moment, and self-as-context. An example of a defusion exercise is quickly repeating "Parkinson's" until it loses its meaning (milk-milk exercise). Contact with the present moment helps patients observe the world more directly and flexibly rather than through their verbally evaluated rules. Contact with the present moment is encouraged through experiential exercises like "leaves on a stream," where thoughts and other experiences can be seen as events floating on a stream. The goal of such exercises is to attend to present moment experiences without struggling or evaluating thoughts or feelings, just observing them. Self-as-context helps patients see their thoughts as events that sometimes occur and sometimes do not, representing experiences rather than defining characteristics. Using the "chessboard" metaphor, where the individual is the chessboard, and the chess pieces are Parkinson's symptoms, helps patients understand that the disease can exist without harming them, just as the presence of chess pieces does not harm the chessboard. Self-as-context helps patients experience themselves beyond their inner experiences, as an observing individual.

The seventh and eighth sessions included explaining the patient's values and increasing behavioral commitments for a more sustainable life ("squatter at the door" metaphor). Finally, patients were helped to apply learned exercises such as acceptance, contact with the present moment, cognitive defusion, self-as-context, and participation in valued activities to prevent the recurrence of Parkinson's symptoms (session-by-session protocol headings for ACT for Parkinson's disease are in the appendix).

#### 2.3.2. *Pharmacotherapy*

Pharmacotherapy was prescribed and used by patients based on the symptoms by the specialist physician in the study.



## 2.4. Data analysis

Data analysis included descriptive and inferential sections. Descriptive statistics methods such as frequency, mean, and standard deviation were used to describe the obtained information. Repeated measures analysis was used to determine the existence or absence of differences between variables. The SPSS-27 statistical software was used for data analysis.

**Table 1**

*Mean and Standard Deviation of Non-Motor Symptom Components by Assessment Stage in Groups*

Variable	Index	Pre-test ACT	Post- test ACT	Follow-up ACT	Pre-test Pharmacotherapy	Post-test Pharmacotherapy	Follow-up Pharmacotherapy
Cardiovascular	Mean	5.89	3.19	3.57	6.17	3.52	4.09
	Standard Deviation	1.94	1.63	1.58	2.18	1.19	2.21
Sleep/Fatigue	Mean	21.67	14.04	13.97	23.17	16.24	16.98
	Standard Deviation	6.70	5.29	5.23	5.35	5.59	5.45
Mood/Cognition	Mean	28.33	18.21	18.05	29.07	21.03	20.15
	Standard Deviation	9.45	7.24	7.00	11.13	8.02	8.61
Perceptual Problems/Hallucinations	Mean	9.06	5.36	4.96	9.17	5.97	6.14
	Standard Deviation	2.97	2.71	2.33	4.05	3.24	3.36
Attention/Memory	Mean	14.05	7.23	8.01	13.84	9.06	8.89
	Standard Deviation	5.84	3.75	4.11	6.05	5.42	5.37
Gastrointestinal	Mean	17.67	10.05	11.14	17.22	11.26	12.02
	Standard Deviation	5.96	4.32	4.63	6.95	4.87	5.24
Urinary	Mean	12.56	10.59	10.47	13.05	10.43	11.19
	Standard Deviation	3.97	4.17	4.52	4.93	5.97	5.32
Sexual Function	Mean	16.44	9.72	10.28	15.97	10.33	9.85
	Standard Deviation	5.67	3.97	4.02	5.02	4.64	4.32
Miscellaneous	Mean	25.56	18.25	17.99	23.99	18.19	17.83
	Standard Deviation	9.72	8.02	8.23	9.65	9.59	8.97
Total	Mean	149.77	97.09	95.79	147.97	128.23	125.35
	Standard Deviation	41.95	32.41	35.16	37.84	34.18	34.64

As observed, the mean scores in the ACT and pharmacotherapy groups in the post-test stage decreased compared to the pre-test stage in all subscales. Based on the results in the table, it can be inferred that ACT has caused changes in the components of non-motor symptoms.

Considering the results of the Shapiro-Wilk test and the obtained significance levels for each research variable greater than 0.05, the null hypothesis was confirmed, and the data for the variables in the three groups are normal,

## 3. Findings and Results

Descriptive indices (mean and standard deviation) of non-motor symptom scores in the Acceptance and Commitment Therapy (ACT) and pharmacotherapy groups at pre-test, post-test, and follow-up stages are presented in Table 1.

allowing the use of parametric tests. To examine the effect of ACT and pharmacotherapy on non-motor symptoms, repeated measures ANOVA (one within-subject factor and one between-subject factor) was used. The scores of non-motor symptom components in the ACT and pharmacotherapy groups at pre-test, post-test, and follow-up stages were included in the analysis. To examine significant differences between the mean scores of non-motor symptom components in the three groups at the three treatment stages,

the assumptions of homogeneity of variances and sphericity were checked. Levene's test results for homogeneity of variances in groups for non-motor symptom components showed that the homogeneity assumption of variances was maintained in both groups. Mauchly's sphericity test was

used to examine this assumption, and the results indicated the homogeneity of covariances for non-motor symptom components. The results of the repeated measures ANOVA for within-group and between-group factors are presented in [Table 2](#).

**Table 2**

*Mixed ANOVA of Non-Motor Symptom Component Scores with Greenhouse-Geisser Criterion*

Variable	Factors/Statistical Index	SS	df	MS	F	Sig	Eta squared
Cardiovascular	Within-group	185.05	1.72	107.72	144.86	0.001	0.74
	Interaction (Test*Group)	2.47	3.44	0.62	1.06	0.047	0.37
	Between-group	1.86	2	0.93	1.83	0.021	0.16
Sleep/Fatigue	Within-group	1165.78	1.92	608.19	80.76	0.001	0.61
	Interaction (Test*Group)	39.41	3.83	10.28	1.36	0.025	0.51
	Between-group	136.93	2	68.46	1.92	0.040	0.35
Mood/Cognition	Within-group	2164.68	1.30	1668.78	78.21	0.001	0.60
	Interaction (Test*Group)	13.06	2.59	5.03	0.24	0.044	0.27
	Between-group	418.90	2	209.45	1.01	0.037	0.15
Perceptual Problems/Hallucinations	Within-group	330.04	1.25	263.80	31.31	0.001	0.38
	Interaction (Test*Group)	9.04	2.50	3.61	1.43	0.048	0.17
	Between-group	0.48	2	0.24	1.10	0.045	0.10
Attention/Memory	Within-group	788.90	1.36	578.56	142.69	0.001	0.74
	Interaction (Test*Group)	36.47	2.73	13.37	3.30	0.029	0.12
	Between-group	60.75	2	30.38	0.43	0.044	0.02
Gastrointestinal	Within-group	1216.75	1.31	925.51	165.81	0.001	0.76
	Interaction (Test*Group)	17.65	2.63	6.71	1.20	0.031	0.45
	Between-group	14.61	2	7.30	1.79	0.047	0.33
Urinary	Within-group	63.49	1.66	38.17	9.15	0.001	0.24
	Interaction (Test*Group)	15.76	3.33	4.74	1.13	0.034	0.19
	Between-group	37.68	2	18.84	1.29	0.028	0.11
Sexual Function	Within-group	711.31	1.55	458.31	89.66	0.001	0.64
	Interaction (Test*Group)	85.43	3.10	27.52	5.38	0.002	0.47
	Between-group	125.97	2	62.98	1.03	0.036	0.39
Miscellaneous	Within-group	981.64	1.49	659.66	79.43	0.001	0.61
	Interaction (Test*Group)	42.06	2.98	14.13	1.70	0.07	0.29
	Between-group	15.79	2	7.89	1.37	0.001	0.14

The results in [Table 2](#) indicate that for the within-group factor, the calculated F-value for the stages (pre-test, post-test, and follow-up) is significant at the 0.05 level for non-motor symptom components ( $P < 0.05$ ). It can be concluded that both ACT and pharmacotherapy had an impact on non-motor symptom components. Additionally, considering that the decrease in component scores at the follow-up stage compared to the pre-test stage was also significant, the decreasing trend of component scores continued significantly in the follow-up stage, indicating the stability of the training (ACT and pharmacotherapy) on non-motor symptom component scores.

#### 4. Discussion and Conclusion

The present study's results indicate a significant difference in the effectiveness of ACT and pharmacotherapy on non-motor symptoms, with ACT showing greater effectiveness than pharmacotherapy.

No previous studies were found on the effectiveness of ACT on non-motor symptoms, highlighting the uniqueness of this research. ACT, a transdiagnostic therapy defined by psychological flexibility, particularly through cognitive defusion, experiential acceptance, and values ([Ghielen et al., 2017](#); [Nagatsu, 2020a, 2020b](#); [Zarotti et al., 2021](#)), introduces patients to a new style of treatment and living. It provides meaning to avoidance behaviors and symptom control efforts in patients. The aim is not to avoid or eliminate negative experiences but to reduce attention to symptoms and create space for accepting unwanted emotions while moving towards valued life directions

despite these experiences. ACT helps patients focus on achieving their life values in any condition rather than changing their circumstances. This therapy allows patients to view Parkinson's and its symptoms from a new perspective, facilitating new therapeutic experiences and potentially forming new neuronal pathways in the brain through neuroplasticity, leading to a richer and more meaningful lifestyle.

While pharmacotherapy is the foundational treatment for Parkinson's, improper and inappropriate use of medications, failure to adjust proper dosages, and drug interactions present challenges. Additionally, medication side effects such as drowsiness, motor disorders, sexual dysfunction, gastrointestinal issues, cardiovascular problems, and weight changes (Poewe et al., 2017; Schapira, 2009) often resemble non-motor symptoms in Parkinson's patients. The experience of exacerbated or new non-motor symptoms during treatment increases their reliance on medication, trapping them in a vicious cycle of dependence and feeling powerless over their disease and daily life.

Parkinson's patients typically seek medical attention for motor symptoms, gradually becoming aware of non-motor symptoms, for which medications like antidepressants, anxiolytics, and sleep disorder treatments are prescribed. However, the increasing number of medications contributes to a sense of dependence on drugs for functioning and living, further diminishing their self-efficacy and quality of life. Self-efficacy, an influential factor in treatment effectiveness (Nasiri et al., 2020), declines, leading to hopelessness regarding treatment and recovery, possibly resulting in treatment discontinuation or indifference. In ACT, particularly in group settings, patients discuss their problems, hear others, and are introduced to a different lifestyle method.

In this therapeutic approach, patients consciously attend to their symptoms instead of ignoring, denying, or clinging to them, enhancing their psychological capacity to endure problems. Parkinson's is no longer perceived as debilitating but as a manageable part of life, fostering a sense of ability and self-efficacy. Patients learn to focus on valued aspects of life, moving towards these values despite motor and non-motor challenges, feeling capable of pursuing interests and gaining more control over life, thereby improving self-efficacy and quality of life. ACT's neuroplasticity attributes suggest it could be an effective standalone treatment for non-motor symptoms, depression, anxiety, and quality of life in Parkinson's patients, without the side effects of pharmacotherapy and with greater effectiveness.

## 5. Limitations & Suggestions

This research was conducted in a treatment center in Shiraz, so generalizing the findings requires caution. Conducting similar studies in other regions and countries could mitigate this limitation. The short three-month evaluation period is another limitation; longer assessments could yield more accurate results. Although the limited sample size enhances internal validity, it reduces external validity. Larger sample studies could address this shortcoming.

This innovative research provided novel interventions, showing that ACT alone or alongside pharmacotherapy significantly affects non-motor symptoms and quality of life in Parkinson's patients. Additionally, it is the only study examining the overall impact of a psychological treatment on motor symptoms rather than individual symptoms. More studies are needed to generalize these results. Exploring non-motor symptom progression, caregiver issues, and caregiver treatment are other neglected aspects in Parkinson's research. Longitudinal studies could further understanding and assist patients. The researcher suggests examining the combined effectiveness of ACT and pharmacotherapy on individual non-motor symptoms for future research.

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## Declaration of Interest

The authors of this article declared no conflict of interest.

## Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

## Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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## Authors' Contributions

All authors equally contributed in this article.

## References

- Carod-Artal, F. J., Mesquita, H. M., Ziolkowski, S., & Martinez-Martin, P. (2013). Burden and health-related quality of life among caregivers of Brazilian Parkinson's disease patients. *Parkinsonism & Related Disorders*, 19(11), 943-948. <https://doi.org/10.1016/j.parkreldis.2013.06.005>
- Chaudhuri, K. R., Healy, D. G., & Schapira, A. H. V. (2006). Non-motor symptoms of Parkinson's disease: diagnosis and management. *The Lancet Neurology*, 5(3), 235-245. [https://doi.org/10.1016/S1474-4422\(06\)70373-8](https://doi.org/10.1016/S1474-4422(06)70373-8)
- Chaudhuri, K. R., Yates, L., & Martinez-Martin, P. (2005). The non-motor symptom complex of Parkinson's disease: A comprehensive assessment is essential. *Current Neurology and Neuroscience Reports*, 5(4), 275-283. <https://doi.org/10.1007/s11910-005-0072-6>
- Ghielen, I., van Wegen, E. E. H., Rutten, S., de Goede, C. J. T., Houniet-de Gier, M., Collette, E. H., Burgers-Bots, I. A. L., Twisk, J. W. R., Kwakkel, G., Vermunt, K., van Vliet, B., Berendse, H. W., & van den Heuvel, O. A. (2017). Body awareness training in the treatment of wearing-off related anxiety in patients with Parkinson's disease: Results from a pilot randomized controlled trial. *Journal of psychosomatic research*, 103, 1-8. <https://doi.org/10.1016/j.jpsychores.2017.09.008>
- Gupta, S., & Shukla, S. (2021). Non-motor symptoms in Parkinson's disease: Opening new avenues in treatment. *Current Research in Behavioral Sciences*, 2, 100049. <https://doi.org/10.1016/j.crbeha.2021.100049>
- Harris, R. (2019). *ACT made simple: An easy-to-read primer on acceptance and commitment therapy*. New Harbinger Publications. <https://psycnet.apa.org/record/2012-17248-000>
- Hayes, S., Strosahl, K., & Wilson, K. (1999). Acceptance and commitment therapy: An experiential approach to behavior change (p. 304). In: New York, NY: The Guilford Press.
- Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and Commitment Therapy: Model, processes and outcomes. *Behaviour Research and Therapy*, 44(1), 1-25. <https://doi.org/10.1016/j.brat.2005.06.006>
- Hayes, S. C., & Pierson, H. (2005). *Acceptance and commitment therapy*. Springer. [https://link.springer.com/chapter/10.1007/0-306-48581-8\\_1](https://link.springer.com/chapter/10.1007/0-306-48581-8_1)
- Jankovic, J. (2008). Parkinson's disease: clinical features and diagnosis. *Journal of neurology, neurosurgery & psychiatry*, 79(4), 368-376. <https://jnnnp.bmj.com/content/79/4/368.short>
- Jones, S., Torsney, K. M., Scourfield, L., Berryman, K., & Henderson, E. J. (2020). Neuropsychiatric symptoms in Parkinson's disease: aetiology, diagnosis and treatment. *Bjpsych Advances*, 26(6), 333-342. <https://doi.org/10.1192/bja.2019.79>
- Kenangil, G., Demir, M., Tur, E. K., & Domac, F. M. (2020). Alexithymia, depression, and cognition in patients with Parkinson's disease. *Parkinsonism & Related Disorders*, 79, e17-e18. <https://doi.org/10.1016/j.parkreldis.2020.06.089>
- Martínez-Martín, P., Rodríguez-Blázquez, C., Alvarez, M., Arakaki, T., Arillo, V. C., Chaná, P., Fernández, W., Garretto, N., Martínez-Castrillo, J. C., & Rodríguez-Violante, M. (2015). Parkinson's disease severity levels and MDS-Unified Parkinson's Disease Rating Scale. *Parkinsonism & Related Disorders*, 21(1), 50-54. <https://www.sciencedirect.com/science/article/pii/S1353802014004118>
- Nagatsu, T. (2020a). Correction to: Hypothesis: neural mechanism of psychotherapy for the treatment of Parkinson's disease: cognitive behavioral therapy (CBT), acceptance and commitment therapy (ACT), and Morita therapy? *Journal of Neural Transmission*, 127(2), 277-277. <https://doi.org/10.1007/s00702-020-02147-5>
- Nagatsu, T. (2020b). Hypothesis: neural mechanism of psychotherapy for the treatment of Parkinson's disease: cognitive behavioral therapy (CBT), acceptance and commitment therapy (ACT), and Morita therapy? *Journal of Neural Transmission*, 127(2), 273-276. <https://doi.org/10.1007/s00702-019-02111-y>
- Niculescu, S., Secară, E.-C., Jiboc, N. M., & Băban, A. (2024). Oncovox: A randomised controlled trial of a web-based acceptance and commitment therapy for breast cancer patients. *Journal of Contextual Behavioral Science*, 32, 100729. <https://doi.org/10.1016/j.jcbs.2024.100729>
- Pinto, C. (2024). Acceptability and Feasibility Randomized Controlled Trial of a Digital Psychological Support Intervention for People With Parkinson's Disease: Trial Protocol. <https://doi.org/10.21203/rs.3.rs-3773762/v1>
- Poewe, W., Seppi, K., Tanner, C. M., Halliday, G. M., Brundin, P., Volkman, J., Schrag, A.-E., & Lang, A. E. (2017). Parkinson disease. *Nature Reviews Disease Primers*, 3(1), 17013. <https://doi.org/10.1038/nrdp.2017.13>
- Schapira, A. H. V. (2009). Neurobiology and treatment of Parkinson's disease. *Trends in Pharmacological Sciences*, 30(1), 41-47. <https://doi.org/10.1016/j.tips.2008.10.005>
- Shahkaram, H., Yaztappeh, J. S., Sadeghi, A., Kianimoghadam, A. S., Soltanabadi, S., Bakhtiari, M., & Arani, A. M. (2024). Comparing the effectiveness of transdiagnostic treatment with acceptance and commitment therapy on emotional disorders, rumination, and life satisfaction in patients with irritable bowel syndrome: a randomized clinical trial. *BMC Gastroenterology*, 24(1), 1-12. <https://doi.org/10.1186/s12876-024-03142-w>
- Sharif Ara, B., Khosropour, F., & Molayi Zarandi, H. (2023). Effectiveness of Acceptance and Commitment Therapy (ACT) on Emotional Processing, Irrational Beliefs and Rumination in Patients with Generalized Anxiety Disorder. *Journal of Adolescent and Youth Psychological Studies (JAYPS)*, 4(4), 34-44. <https://doi.org/10.61838/kman.jayps.4.4.5>
- Sofyan, A., Ramli, M., Sugiyono, S., & Kurniawan, K. (2023). Development of Acceptance and Commitment Therapy Group Counseling Models and Mindfulness-Based Stress Reduction to Reduce Academic Burnout in High School Students. *COUNS-EDU: The International Journal of Counseling and Education*, 7(3). <https://doi.org/10.23916/0020220736730>
- Zarotti, N., Eccles, F. J. R., Foley, J. A., Paget, A., Gunn, S., Leroi, I., & Simpson, J. (2021). Psychological interventions for people with Parkinson's disease in the early 2020s: Where do we stand? *Psychology and Psychotherapy: Theory, Research and Practice*, 94(3), 760-797. <https://doi.org/10.1111/papt.12321>