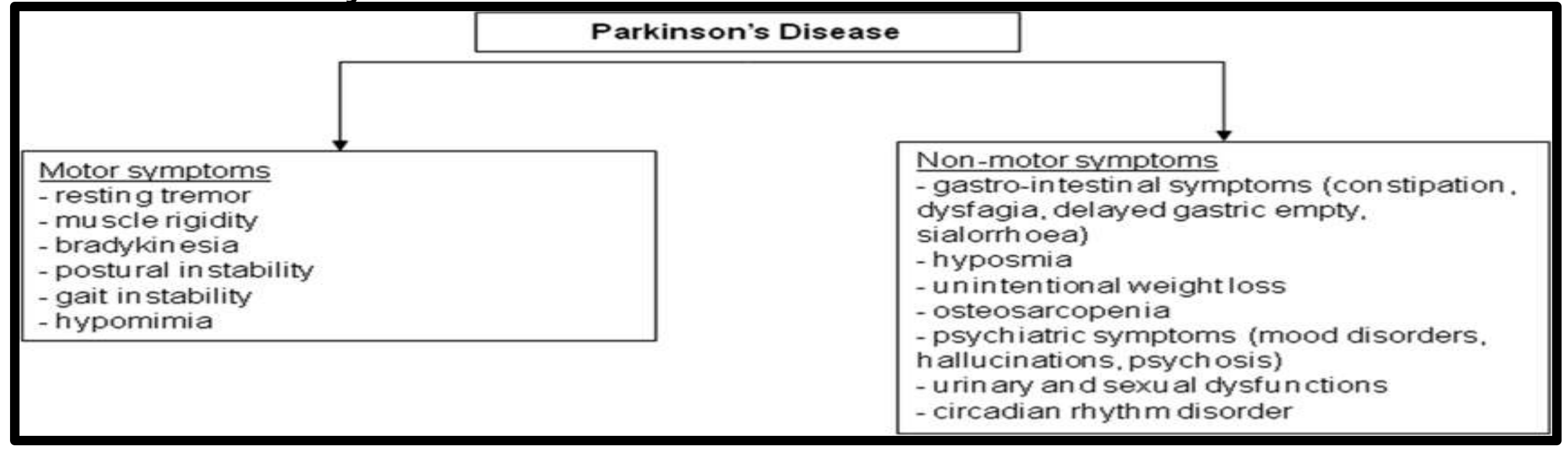


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INTRODUCTION

Parkinson's Disease (PD) is a neurodegenerative disorder characterized by **motor** symptoms (tremors, falls, rigidity, etc.) and **nonmotor** symptoms such as depression and anxiety.³



Parkinson's disease and the non-motor symptoms: hyposmia, weight loss, osteosarcopenia - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Motor-and-non-motor-symptoms-in-Parkinsons-disease_fig1_338863337 [accessed 18 Oct, 2023]

Depression and **Anxiety** are prevalent nonmotor symptoms of PD, due to neurobiological mechanisms associated with the neurodegenerative disorder. **Depression** is known as the most commonly reported neuropsychiatric disturbances in PD as over **50%** of participants in a sample study of 1000 PD patients reported having mild to severe depressive symptoms. Anxiety is also known as a globally recognized NMS of PD in **31%** of PwPD.³

Bearss & Desouza (2021) found that weekly **dance** interventions are able to mitigate some MS and NMS of PD through measures (i.e. **PANAS-X**)⁴

To **operationally define** symptoms of depression and anxiety, the PANAS-X scale moodlets were used to categorize the mood disorders into 4 separate scales in reference to the **DSM-V**.¹

Current Aims:

- 1) To observe how NMS of depression and anxiety will be mitigated through dance interventions using PANAS-X Derived Scales
- 2) To observe the after effects of the mood disorders to the dance class (if any).



Suzuki, K. (Director), & Choueiri, S. (Producer). (2016). SYNAPSE DANCE

RESULTS

The study design that has been performed is a repeated-measures (RM) ANOVA in order to investigate the research objectives.

D-Neg Scale RM-A analysis

Sum of Squares	df	Mean Square	F	p	η^2
304.2	1	304.2	17.410	<.001	0.247
14.2	1	14.2	0.814	0.380	0.012
279.6	16	17.5			

D-Pos Scale RM-A analysis

Sum of Squares	df	Mean Square	F	p	η^2
125.3472	1	125.3472	8.20	0.011	0.045
0.0139	1	0.0139	9.09e-4	0.976	0.000
244.4583	16	15.2786			

The within subjects (WS) effects for the D-Neg includes df = 1, η^2 = 0.247, p = 0.001, and F = 17.410. The between subjects (BS) effects for the D-Neg Scale includes df=1, η^2 = 0.028, p = 0.349, F = 0.930).

The WS effects for the D-Pos includes df = 1, η^2 = 0.045, p = 0.011, and F = 8.20. The BS effects for the D-Pos Scale includes df = 1, η^2 = 0.029, p = 0.466, F = 0.558.

A-Neg Scale RM-A analysis

Sum of Squares	df	Mean Square	F	p	η^2
64.2	1	64.2	5.55	0.032	0.062
18.0	1	18.0	1.56	0.230	0.017
185.0	16	11.6			

A-Pos Scale RM-A analysis

Sum of Squares	df	Mean Square	F	p	η^2
86.7	1	86.68	10.31	0.005	0.050
19.0	1	19.03	2.26	0.152	0.013
134.5	16	8.41			

The WS effects for A-Neg includes df = 1, η^2 = 0.062, p = 0.032, and F = 5.55. The BS effects include df = 1, η^2 = 0.036, p = 0.378, F = 0.821.

The WS effects of A-Pos includes df = 1, η^2 = 0.050, p = 0.005, and F = 10.31. The BS effects include df = 1, η^2 = 0.005, p = 0.762, F = 0.0946.

A-Pos/ D-Pos Scale RM-A analysis

Sum of Squares	df	Mean Square	F	p	η^2
37.556	1	37.556	4.244	0.056	0.017
0.889	1	0.889	0.100	0.753	0.000
143.563	16	8.949			

A-Neg/D-Neg Scale RM-A analysis

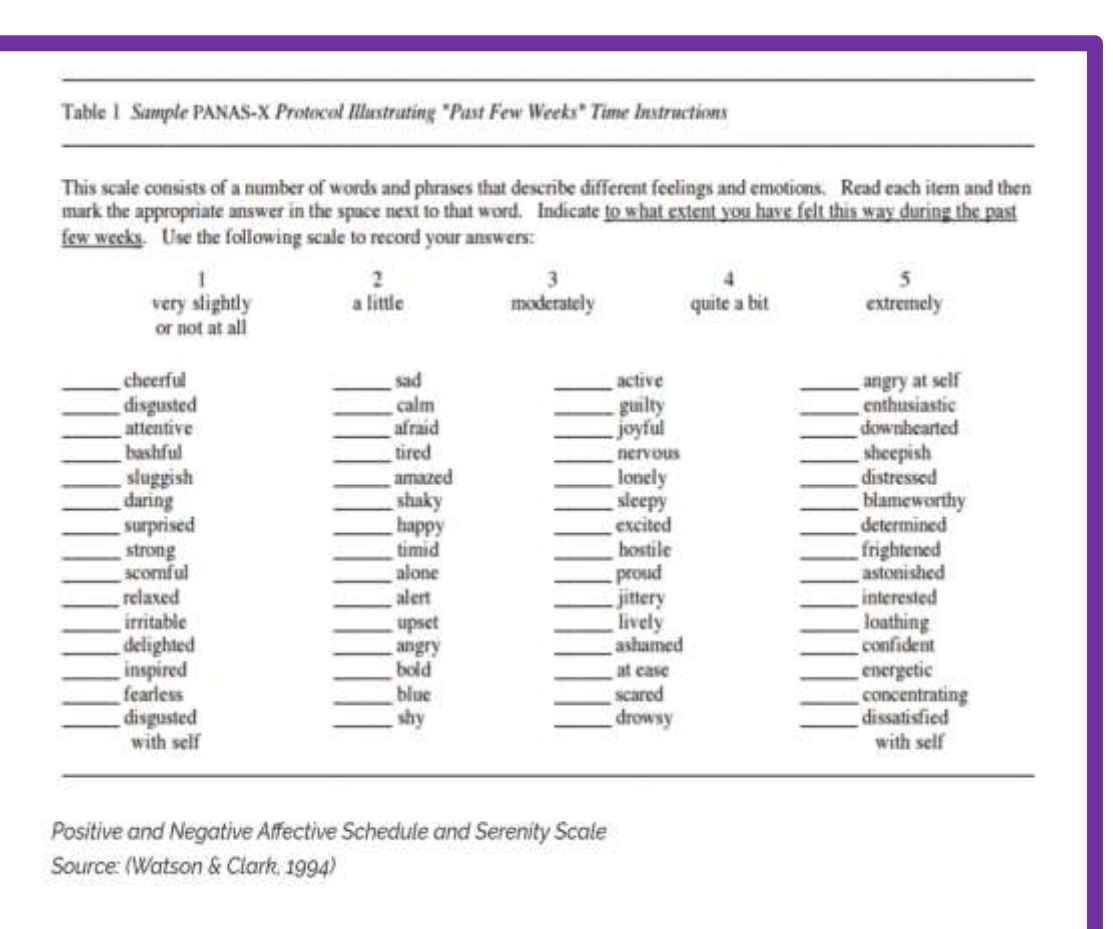
Sum of Squares	df	Mean Square	F	p	η^2
36.1	1	36.13	9.65	0.007	
15.1	1	15.12	4.04	0.062	
99.9	16	6.24			

The WS effects for A-Neg/ D-Neg (after effects) includes df = 1, η^2 = 0.055, p = 0.007, and F = 9.65. The BS effects includes df = 1, η^2 = 0.051, p = 0.323, F = 1.04.

The WS effects of A-Pos/ D-Pos (after effects) includes df = 1, η^2 = 0.017, p = 0.056, and F = 4.244. The BS effects include df = 1, η^2 = 0.031, p = 0.465, F = 0.561.

METHODS

PANAS-X DERIVED SCALES (PRETEST-POSTTEST)



Depression -	D.C. (B)	D.C. (A)	Anxiety -	D.C. (B)	D.C. (A)
Sluggish	2	3	Afraid	2	3
Guilt	1	3	Shaky	4	2
Disgusted w/ self	1	2	Timid	2	3
Sad	3	3	Irritability	3	3
Tired	3	2	Nervous	3	4
Upset	4	3	Jittery	3	4
Alone	3	1	Distressed	2	3
Loathing	1	3	Alert	3	3
Dissatisfied w/ self	3	3	Frightened	3	2
Downhearted	1	2	Blameworthy	2	3
TOTAL	22	25	TOTAL	27	30

Depression +	D.C. (B)	D.C. (A)	Anxiety +	D.C. (B)	D.C. (A)
Happy	4	3	Fearless	3	3
Enthusiastic	3	3	Calm	3	2
Delighted	3	3	At ease	4	3
Proud	4	3	Concentrating	3	3
Active	4	3	Determined	3	2
Excited	3	2	Relaxed	4	2
Lively	3	4	Confident	3	3
Energetic	4	2	Daring	3	4
Joyful	4	3	Strong	3	3
Inspired	3	3	Bold	3	3
TOTAL	35	29	TOTAL	32	28

Measures. The JOElab (2017) research was conducted as a pretest-posttest design where participants in the people with Parkinson's Disease (PwPD) experimental (N = 12) and healthy, age-matched control groups (N= 6) completed the PANAS-X scale before and after the 60 minute dance session.²

1-hr Dance Class



Manaf, H., Justine, M., & Omar, M. (2014).

Each moodlet for the scales referenced by common negative and positive/counteracting characteristics of major depressive disorder, generalized anxiety disorder, and social anxiety according to **DSM-V**.¹

FOUR SEPARATE PANAS-X SCALES:

- Anxiety-Negative (A-Neg)** → afraid, shaky, jittery, nervous, distressed, timid, alert, frightened, blameworthy
- Depression-Negative (D-Neg)** → guilty, sluggish, sad, upset, loathing, dissatisfied and disgusted with self, downhearted, alone, and tired
- Anxiety-Positive (A-Pos)** → fearless, calm, at ease, concentrating, determined, relaxed, confident, daring, strong, bold
- Depression-Positive (D-Pos)** → happy, enthusiastic, delighted, proud, active, excited, lively, energetic, joyful, inspired,

DISCUSSION

This study provided an insightful method of determining the effects of PwPD and how dance interventions may mitigate symptoms through the novel use of the PANAS-X. PwPD reported **NMS highly associating with negative symptoms of D-Neg scale**, and the **A-Pos scale had the largest decreasing effect after the dance intervention**. Future direction for the **NMS** research is promising as the limitations of this research included usage of pharmacotherapy and the lack of a multiple session dance program to further explore the results of dance interventions on NMS of PD relating to depressive and anxiety disorders.

REFERENCES

1. American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). <https://doi.org.ezproxy.yorku.ca/10.1176/appi.books.9780890425596>
 2. Bearss, K. A., McDonald, K. C., Bar, R. J., & DeSouza, J. F. (2017). Improvements in balance and gait speed after a 12 week dance intervention for Parkinson's disease. *Advances in integrative medicine*, 4(1), 10-13.,
 3. Dissanayaka, N. N., Forbes, E. J., Perepezko, K., Leentjens, A. F. G., Dobkin, R. D., Dujardin, K., & Pontone, G. M. (2022). Phenomenology of atypical anxiety disorders in parkinson's disease: A systematic review. *The American Journal of Geriatric Psychiatry*, 30(9), 1026-1050. <https://doi.org/10.1016/j.jagp.2022.02.004>
 4. Bearss, K. A., & DeSouza, J. F. (2021). Parkinson's disease motor symptom progression slowed with multisensory dance learning over 3-years: A preliminary longitudinal investigation. *Brain Sciences*, 11(7), 895. <https://doi.org/10.3390/brainsci11070895>