

Running head: Stratifying QoL outcomes in STN-DBS for PD

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Supplementary Table 1: Baseline clinical parameters in non-motor, motor progression, and levodopa response strata

	Non-motor Symptom Scale									p
	'mild to moderate' (≤ 40)			'severe' (41 – 70)			'very severe' (≥ 71)			
	n	mean	SD	n	mean	SD	n	mean	SD	
PDQ-8 SI	56	26.2	12.3	50	33.7	13.3	60	41.4	15.5	<0.001***
NMSS total	56	27.3	10.1	50	53.8	8.0	60	102.4	28.5	<0.001***
Hoehn & Yahr	56	2.4	0.8	47	2.4	0.8	60	2.8	0.8	0.041*
Levodopa challenge test response (%)	54	46.0	20.0	49	48.5	19.0	60	47.1	18.0	0.809
UPDRS-III	56	24.4	12.6	50	21.3	9.0	60	31.7	14.1	<0.001***
SCOPA-M ADL	53	6.0	2.9	49	7.0	2.9	58	8.7	3.2	<0.001***
Motor complications	53	4.2	3.0	49	4.7	2.6	58	6.1	2.7	<0.001***
LEDD	56	1082.2	426.3	49	1125.7	510.9	60	1128.3	591.8	0.983
	Hoehn and Yahr Scale									p
	'minimal to mild' (≤ 2.5)			'moderate' (3)			'severe' (≥ 4)			
	n	mean	SD	n	mean	SD	n	mean	SD	
PDQ-8 SI	96	31.3	14.5	48	37.2	14.7	19	37.3	16.7	0.112
NMSS total	96	55.9	34.5	48	69.6	37.4	19	78.9	43.4	0.020*
Hoehn & Yahr	96	2.0	0.5	48	3.0	0.0	19	4.1	0.2	<0.001***
Levodopa challenge test response (%)	94	44.3	18.0	48	48.2	18.5	18	58.7	21.0	0.030*
UPDRS-III	96	21.4	9.6	48	31.6	13.6	19	36.5	15.7	<0.001***
SCOPA-M ADL	93	6.8	3.2	46	7.3	3.2	18	9.6	2.0	<0.001***
Motor complications	93	4.4	2.7	46	5.2	2.8	18	8.0	1.6	<0.001***
LEDD	96	1120.6	505.4	48	1085.1	522.0	18	1207.5	555.3	0.809
	Levodopa challenge test response									p
	'low' (< 33%)			'partial' (33 – 50%)			'full' (> 50%)			
	n	mean	SD	n	mean	SD	n	mean	SD	
PDQ-8 SI	43	34.2	14.1	55	34.1	15.5	66	33.7	15.8	0.983
NMSS total	42	62.5	32.2	55	62.6	45.2	66	63.0	32.9	0.809
Hoehn & Yahr	41	2.5	0.6	55	2.5	0.7	64	2.6	0.9	0.484
Levodopa challenge test response (%)	43	24.0	5.5	55	42.3	5.0	66	65.9	11.2	<0.001***
UPDRS-III	43	26.9	11.8	55	25.6	12.8	66	26.1	13.9	0.917
SCOPA-M ADL	40	7.5	2.6	54	6.9	3.1	64	7.4	3.6	0.640
Motor complications	40	4.8	3.1	54	4.2	2.4	64	5.9	2.9	0.004**
LEDD	43	957.5	501.2	54	1183.8	482.6	66	1151.2	546.1	0.135

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Abbreviations: **ADL** = activities of daily living, **SD** = standard deviation, **LEDD** = levodopa-equivalent daily dose, **NMSS** = Non-motor Symptom Scale, **PDQ-8** = Parkinson's Disease Questionnaire-8, **SCOPA** = Scales for Outcomes in Parkinson's Disease, **UPDRS-III** = Unified Parkinson's Disease Rating Scale-motor examination.

Legend: Kruskal-Wallis tests were performed for independent samples for between-strata analyses of baseline parameters. Multiple comparisons (multiple scales and three stratifications) were corrected with the Benjamini-Hochberg method.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Bold font highlights significant results.

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Supplementary Table 2: Relative and change and effect size of Parkinson's Disease Questionnaire-8 domains at follow-up

	Non-motor Symptom Scale					
	'mild to moderate' (≤ 40)		'severe' (41 – 70)		'very severe' (≥ 71)	
	Relative change [%]	Effect size	Relative change [%]	Effect size	Relative change [%]	Effect size
Mobility	-23.0	0.31	-19.8	0.36	-25.2	0.42
ADL	-27.5	0.30	-26.9	0.40	-36.6	0.54
Emotional well-being	-30.3	0.30	9.3	0.10	-25.6	0.37
Social support	-18.7	0.16	17.9	0.18	-21.7	0.25
Cognition	-41.5	0.58	5.0	0.07	-35.0	0.54
Communication	-19.5	0.17	10.5	0.12	-26.7	0.40
Bodily discomfort	-15.2	0.15	-16.5	0.25	-37.9	0.70
Stigma	-28.2	0.22	-17.9	0.16	-37.1	0.45
	Hoehn and Yahr Scale					
	'minimal to mild' (≤ 2.5)		'moderate' -3		'severe' (≥ 4)	
	Relative change [%]	Effect size	Relative change [%]	Effect size	Relative change [%]	Effect size
Mobility	-22.7	0.34	-28.1	0.49	-6.2	0.10
ADL	-35.9	0.43	-24.9	0.38	-30.6	0.47
Emotional well-being	-22.9	0.27	-8.3	0.10	-15.6	0.18
Social support	3.4	0.03	-12.2	0.13	-47.2	0.45
Cognition	-25.1	0.37	-23.0	0.31	-29.6	0.37
Communication	-9.1	0.10	-16.4	0.21	-22.0	0.23
Bodily discomfort	-24.3	0.32	-22.0	0.33	-37.2	0.66
Stigma	-34.2	0.31	-19.3	0.20	-35.9	0.41
	Levodopa challenge test response					
	'low' (< 33%)		'partial' (33 – 50%)		'full' (> 50%)	
	Relative change [%]	Effect size	Relative change [%]	Effect size	Relative change [%]	Effect size
Mobility	-6.2	0.10	-25.3	0.39	-17.8	0.29
ADL	-30.6	0.47	-40.3	0.58	-28.4	0.37

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Emotional well-being	-15.6	0.18	-9.7	0.12	-23.5	0.26
Social support	-47.2	0.45	-13.9	0.15	-7.7	0.06
Cognition	-29.6	0.37	-23.2	0.36	-34.9	0.45
Communication	-22.0	0.23	-25.9	0.36	-11.7	0.12
Bodily discomfort	-37.2	0.66	-18.4	0.25	-32.8	0.53
Stigma	-35.9	0.41	-17.1	0.15	-29.1	0.31

Abbreviations: ADL = activities of daily living

Legend: We calculate relative change from baseline to follow-up $[(\text{mean Test}_{\text{baseline}} - \text{mean Test}_{\text{follow-up}}) / \text{mean Test}_{\text{baseline}} \times 100]$ and quantified effect size with Cohen's *d*.

Supplementary Table 3: Changes of clinical parameters at 6-month follow-up in non-motor, motor progression, and levodopa response strata

	Non-motor Symptom Scale												p ^b
	'mild to moderate' (≤ 40)				'severe' (41 – 70)				'very severe' (≥ 71)				
	n	mean	SD	p ^a	n	mean	SD	p ^a	n	mean	SD	p ^a	
PDQ-8 Summary Index	52	7.9	12.5	<0.001***	49	2.7	16.7	0.173	60	13.0	16.3	<0.001***	0.003**
NMSS total	53	3.0	17.1	0.063	48	12.4	24.4	0.001**	60	44.3	39.4	<0.001***	<0.001***
Hoehn & Yahr	52	0.3	0.8	0.030*	45	0.2	0.8	0.087	59	0.3	0.9	0.012*	0.841
UPDRS-III	42	-17.4	10.6	<0.001***	37	-19.4	8.8	0.054	35	-18.5	8.8	<0.001***	0.26
SCOPA-M ADL	49	1.7	2.9	<0.001***	47	1.6	3.1	0.001**	57	2.3	3.7	<0.001***	0.247
Motor complications	49	1.8	3.0	<0.001***	47	2.4	2.5	<0.001***	56	2.9	2.6	<0.001***	0.032*
LEDD	51	515.4	451.3	<0.001***	49	569.4	525.3	<0.001***	60	521.7	598.8	<0.001***	0.727
	Hoehn and Yahr Scale												p ^b
	'minimal to mild' (≤ 2.5)				'moderate' (3)				'severe' (≥ 4)				
	n	mean	SD	p ^a	n	mean	SD	p ^a	n	mean	SD	p ^a	
PDQ-8 Summary Index	93	7.9	13.3	<0.001***	47	7.6	19.9	0.010*	18	10.9	16.3	0.006**	0.961
NMSS total	92	19.6	35.6	<0.001***	47	24.8	28.6	<0.001***	19	21.7	43.6	0.068	0.377
Hoehn & Yahr	91	-0.1	0.7	<0.001***	46	0.6	0.7	<0.001***	19	1.3	0.8	0.003**	<0.001***
UPDRS-III	77	-17.2	8.9	<0.001***	28	-20.7	9.7	<0.001***	6	-20.0	11.9	<0.001***	0.157
SCOPA-M ADL	88	2.0	2.8	<0.001***	44	1.1	3.9	<0.001***	18	3.2	3.2	0.001**	0.083
Motor complications	87	2.3	2.9	<0.001***	44	2.3	2.6	<0.001***	18	3.0	2.4	0.012*	0.466
LEDD	92	605.8	542.3	0.151	47	436.8	414.1	<0.001***	18	473.2	689.3	<0.001***	0.251
	Levodopa challenge test response												p ^b
	'low' (< 33%)				'partial' (33 – 50%)				'full' (> 50%)				
	n	mean	SD	p ^a	n	mean	SD	p ^a	n	mean	SD	p ^a	
PDQ-8 Summary Index	42	8.2	16.0	0.007**	51	8.0	16.7	0.001**	66	8.9	15.2	<0.001***	0.993
NMSS total	42	18.4	29.0	0.001**	52	23.9	42.6	<0.001***	64	21.6	30.7	<0.001***	0.841
Hoehn & Yahr	41	0.2	0.6	0.122	50	0.2	0.8	0.057	62	0.4	1.0	0.004**	0.294
UPDRS-III	36	-19.2	9.4	<0.001***	45	-19.0	9.0	<0.001***	30	-17.0	10.5	<0.001***	0.468
SCOPA-M ADL	40	2.3	3.2	<0.001***	51	1.6	3.2	0.001**	60	1.9	3.4	<0.001***	0.564
Motor complications	39	2.8	3.0	<0.001***	51	1.9	2.8	<0.001***	60	2.6	2.5	<0.001***	0.346
LEDD	43	529.1	506.7	<0.001***	51	542.5	490.3	<0.001***	64	525.1	585.2	<0.001***	0.993

Abbreviations: ADL = activities of daily living, SD = standard deviation, LEDD = levodopa-equivalent daily dose, NMSS = Non-motor Symptom Scale, PDQ-8 =

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Parkinson's Disease Questionnaire-8, **SCOPA** = Scales for Outcomes in Parkinson's Disease, **UPDRS-III** = Unified Parkinson's Disease Rating Scale-motor examination.

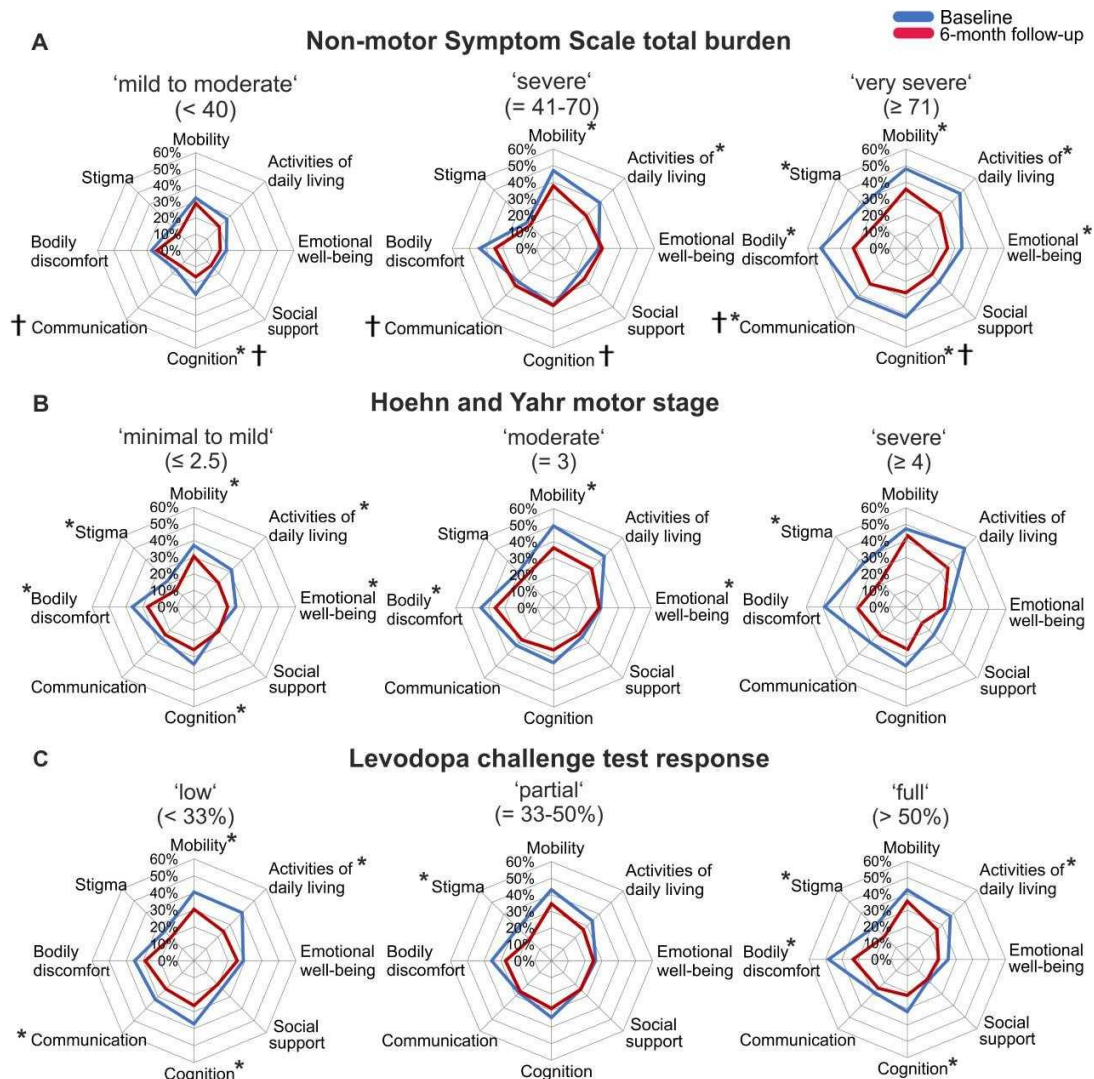
^a Wilcoxon signed-rank tests were used for within-group analyses of change scores between baseline and 6-month follow-up. Multiple comparisons (three strata and seven scales) were corrected with the Benjamini-Hochberg method.

^b Kruskal-Wallis tests were performed for independent samples for between-group analyses of change scores between baseline and 6-month follow-up.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Bold font highlights significant results.

Supplementary Figure 1: Domains of quality of life at baseline and 6-month follow-up stratified by Non-motor Symptom Scale total burden, Hoehn and Yahr motor stage, and levodopa challenge test response



Legend: Radar charts illustrate PDQ-8 domains at baseline (blue) and 6-month follow-up (red) stratified by (A) Non-motor Symptom Scale total burden, (B) Hoehn and Yahr motor stage, and (C) levodopa challenge test response. Domain scores are illustrated as the percentage of maximum scores and more extensive areas represent more severe impairment.

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* significant within-group differences of PDQ-8 domain outcomes from baseline to follow-up ($p < 0.05$)

† significant between-group outcome differences between strata ($p < 0.05$)