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RCTs of Physiotherapy
Interventions in
Parkinson's Disease
- A Systematic Review

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Background



- PD treatment: Pharmacological therapy and surgery
- Disease continues to progress, and increased disability
- PD impacts on person's mobility:
 - Gait impairments
 - Episodes of freezing
 - Increased risk of falls (and increased risk of fractures)
- Physiotherapy interventions used to:
 - Maximise functional ability
 - Minimise secondary complications

Through movement rehabilitation within context of education and support for whole person, with the overall aim to enhance QoL
- Physiotherapy covers a number of different treatment techniques centred on active exercises and re-education of mobility

Objective

Update Cochrane review published in 2001 comparing the efficacy of physiotherapy versus no physiotherapy in patients with PD

Deane K et al. Physiotherapy versus placebo or no intervention in Parkinson's disease. Cochrane Database of Systematic Reviews 2001, Issue 3

Systematic Review Methods

- Literature search (to end of 2010) for RCTs of physiotherapy versus no physiotherapy in patients with PD, using:
 - Electronic databases (e.g. MEDLINE, EMBASE)
 - Trials registers (e.g. Cochrane Controlled Trials Register, metaRegister of Controlled Trials, ClinicalTrials.gov)
 - Conference proceedings
 - Reference lists
- Search criteria:
 - RCTs of physiotherapy intervention vs. placebo or no intervention
 - Participants with a diagnosis of PD, any duration of PD, all ages, any duration of treatment
 - Physiotherapy intervention (e.g. physiotherapy, exercise, treadmill, cueing, multidisciplinary therapy (MDT) rehabilitation, dance and martial arts)

Data Analysis Methods

- Data extracted independently by two people, with any discrepancies resolved by consensus or discussion with a third person
- Standard meta-analysis methods for continuous data
 - Weighted mean difference
 - Forest plots of change from baseline to end of the treatment period
- Investigate overall effect of physiotherapy versus non-physiotherapy treated patients
- Pre-specified subgroup analysis to compare different types of physiotherapy interventions using tests of heterogeneity

Outcome Measures

□ Gait:

- 2 or 6 minute walk test (m)
- 10 or 20 metre walk test (s)
- Velocity (m/s)
- Cadence (steps/min)
- Stride length (m)
- Step length (m)
- Freezing of Gait Questionnaire

□ Functional Mobility & Balance:

- Timed Up and Go (s)
- Functional Reach (cm)
- Berg Balance Scale
- Activity Specific Balance Confidence

□ Fear of Falling

- Falls Efficacy Scale
- Falls Efficacy Scale- International

□ Clinician-rated UPDRS

- Total, mental, ADL, motor

□ Patient-rated QoL (PDQ-39)

- Mobility, Summary index

Results - Trials

- Review includes 44 trials and 2073 patients
 - 2001 Cochrane review included 11 trials

- Total number of patients in the trials ranged from 6 – 153 patients
 - Average trial size ~50 patients

Trial Participants

- Mean age - 67 years
- 63% were male
- Mean Hoehn & Yahr stage - 2.4
- Had had PD for ~6 years

Trial Classification

Comparison	No. of Trials
Physiotherapy	7
Exercise	17
Treadmill	7
Cueing	7
MDT Rehab	4
Dance	2
Martial Arts	4
TOTAL	44 trials for 48 comparisons*

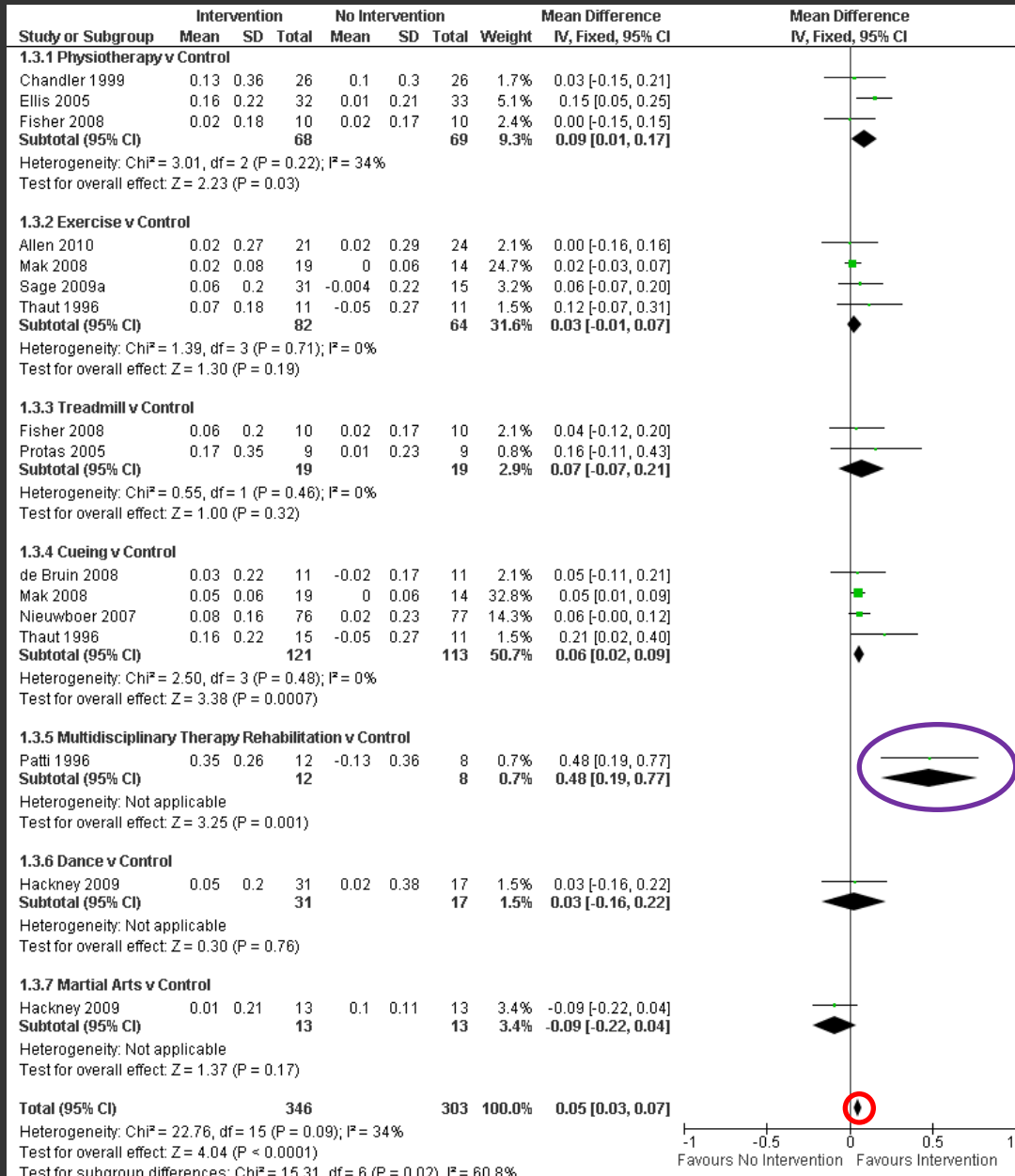
* 8 trials with multiple arms

Results – Gait



OUTCOME	MEAN DIFFERENCE (95% CI)	FAVOURS
2 or 6 minute walk test (m)	12.31 (0.98 to 23.64) p=0.03	INTERVENTION
10 or 20 metre walk test (s)	0.40 (0.00 to 0.80) p=0.05	NO INTERVENTION
Velocity (m/s)	0.05 (0.03 to 0.07) p<0.0001	INTERVENTION
Cadence (steps/min)	-1.73 (-4.03 to 0.56) p=0.1	INTERVENTION
Stride Length (m)	0.03 (-0.02 to 0.09) p=0.3	INTERVENTION
Step length (m)	0.03 (0.00 to 0.06) P=0.03	INTERVENTION
Freezing of Gait Questionnaire	-1.19 (-2.54 to 0.16) p=0.08	INTERVENTION

Results – Velocity (m/s)



+ve change = improvement

- Favours physio intervention

- 0.05 m/s
- P < 0.0001

Results – Gait

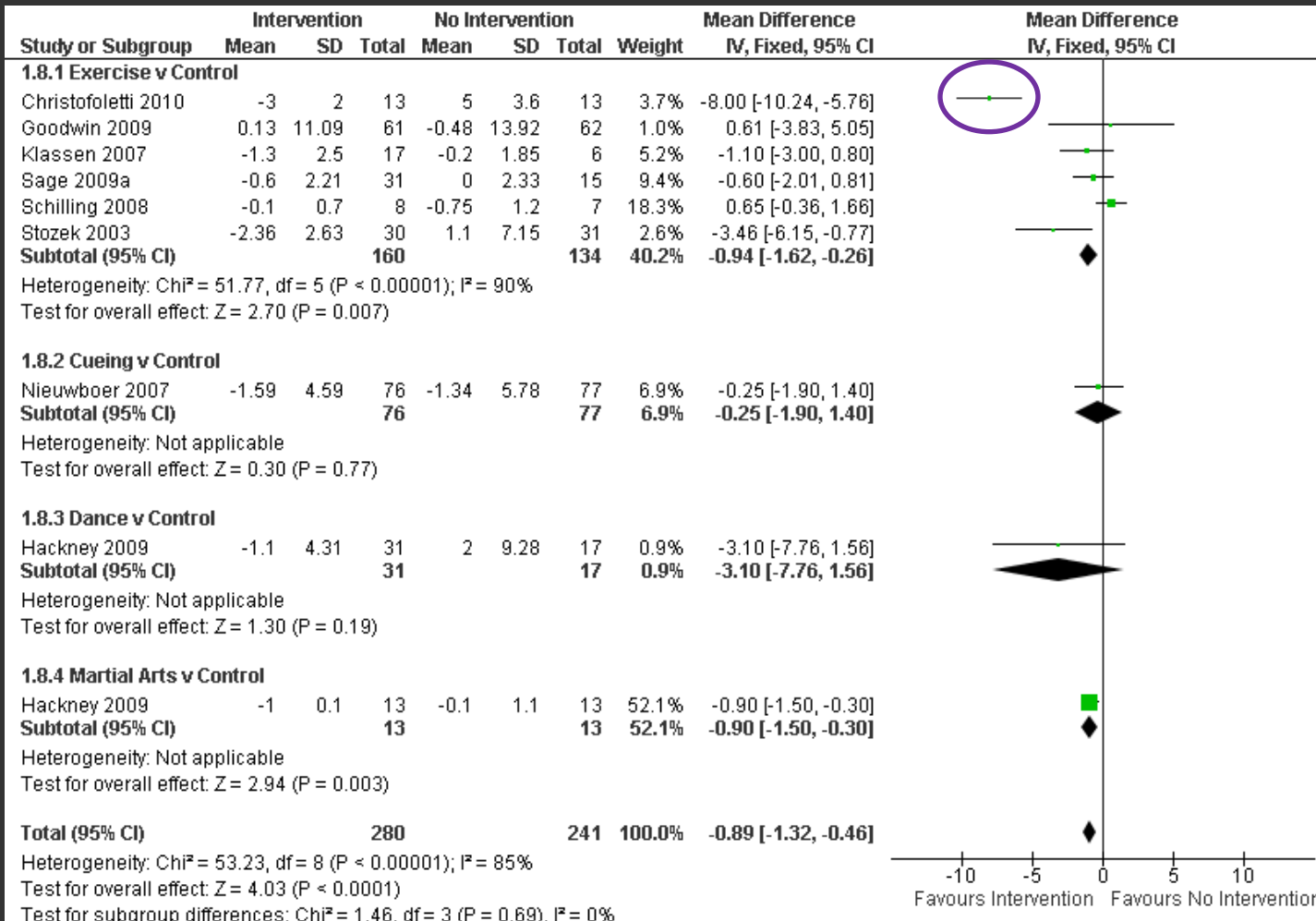
OUTCOME	MEAN DIFFERENCE (95% CI)	MCIC
2 or 6 minute walk test (m)	12.31 (0.98 to 23.64) p=0.03	No data
Velocity (m/s)	0.05 (0.03 to 0.07) p<0.0001	0.03 – 0.13 m/s (from stroke patients)
Step length (m)	0.03 (0.00 to 0.06) P=0.03	No data

MCIC = Minimally Clinically Important Change

Results – Functional Mobility & Balance

OUTCOME	MEAN DIFFERENCE (95% CI)	FAVOURS
Timed Up & Go (s)	-0.89 (-1.32 to -0.46) p<0.0001	INTERVENTION
Functional reach (cm)	2.16 (0.89 to 3.43) p=0.0008	INTERVENTION
Berg Balance Scale	4.10 (2.83 to 5.38) p<0.00001	INTERVENTION
Activity Specific Balance Confidence	2.40 (-2.78 to 7.57) p=0.4	INTERVENTION

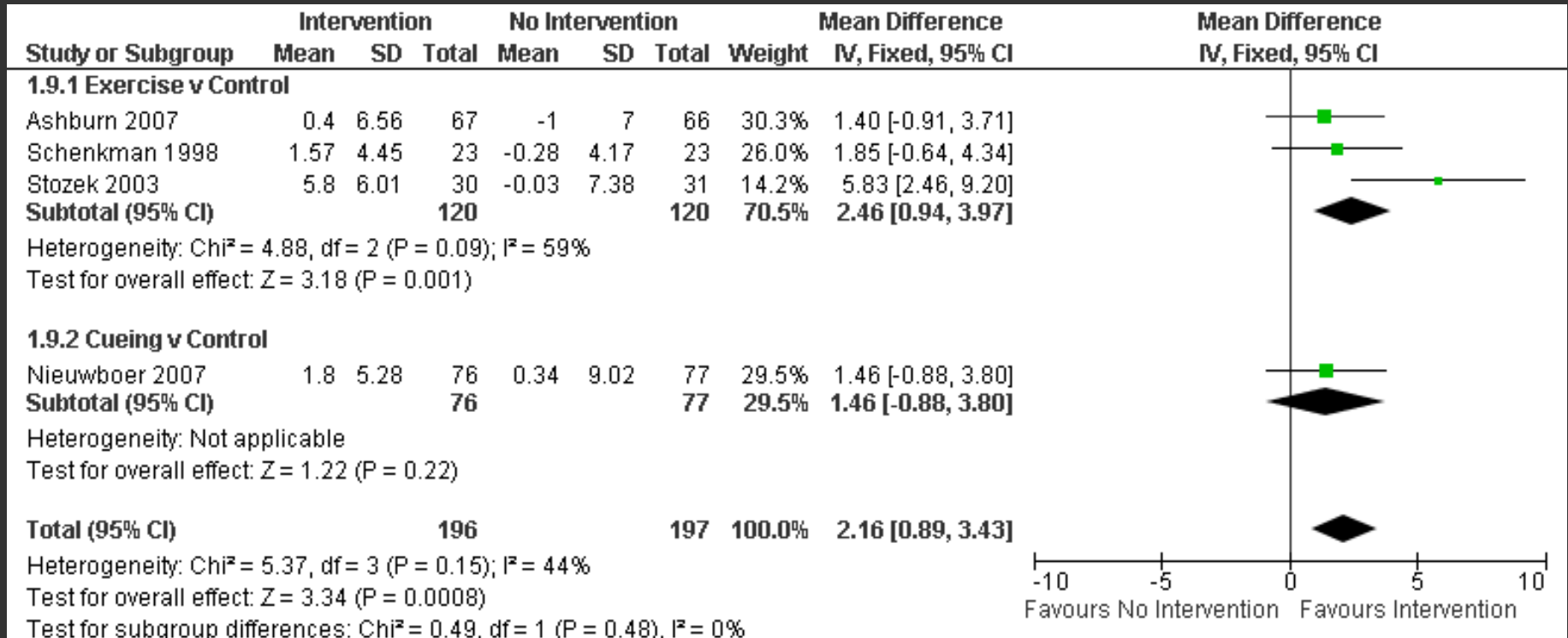
Results – Timed Up and Go (s)



-ve change = improvement

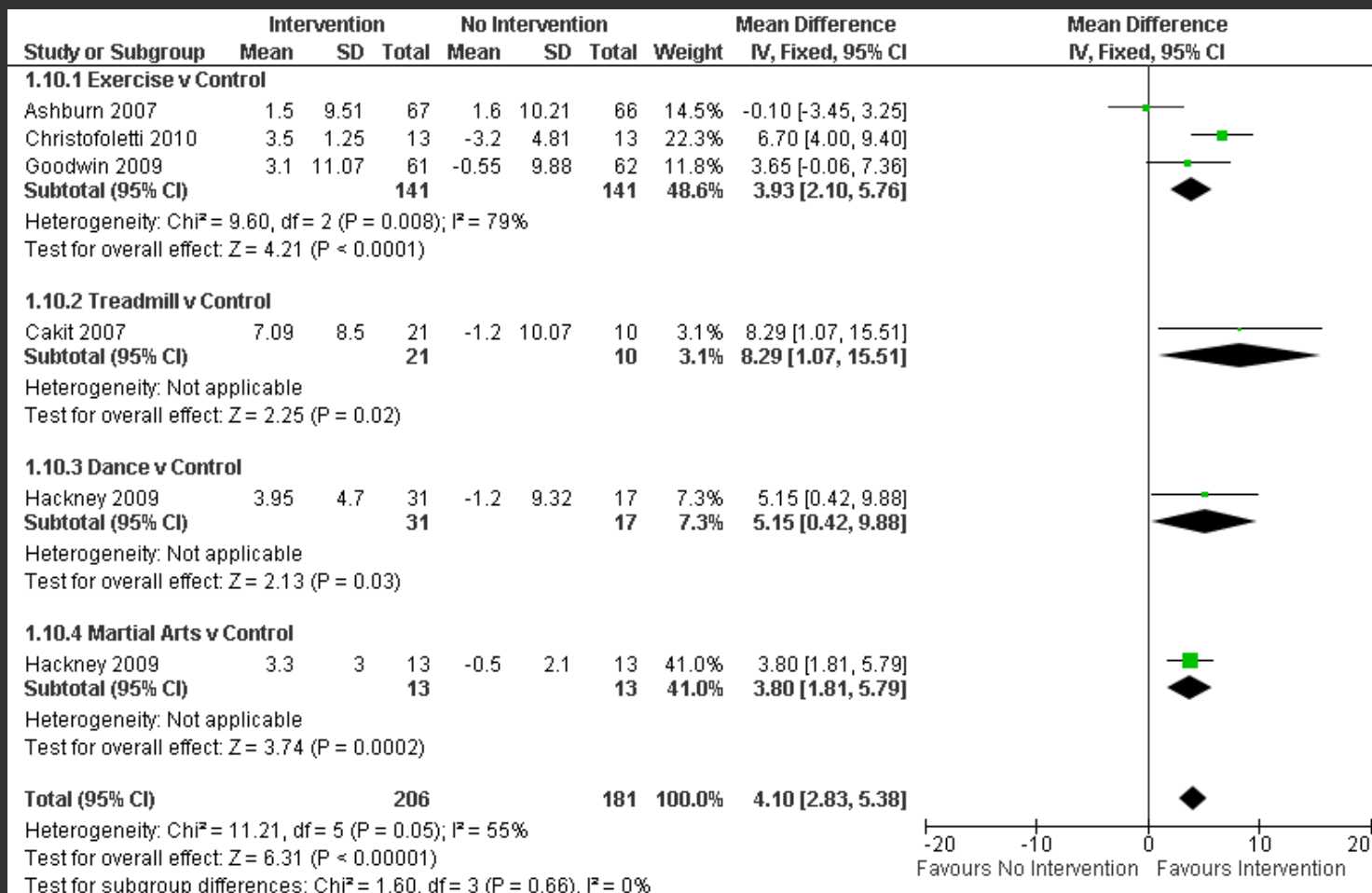
- Favours physio intervention
- 0.89s, P<0.0001

Results – Functional Reach (cm)



- +ve change = improvement
- Favours physio intervention
- 2cm, P=0.0008

Results – Berg Balance Scale



- +ve change = improvement
- Favours physio intervention
- 4 points, P<0.00001

Results – Functional Mobility & Balance

OUTCOME	MEAN DIFFERENCE (95% CI)	MCIC
Timed Up & Go (s)	-0.89 (-1.32 to -0.46) p<0.0001	11 seconds
Functional reach (cm)	2.16 (0.89 to 3.43) p=0.0008	9 cm (forward) 7cm (backward)
Berg Balance Scale	4.10 (2.83 to 5.38) p<0.00001	5 points

MCIC = Minimally Clinically Important Change

Results – Fear of Falling

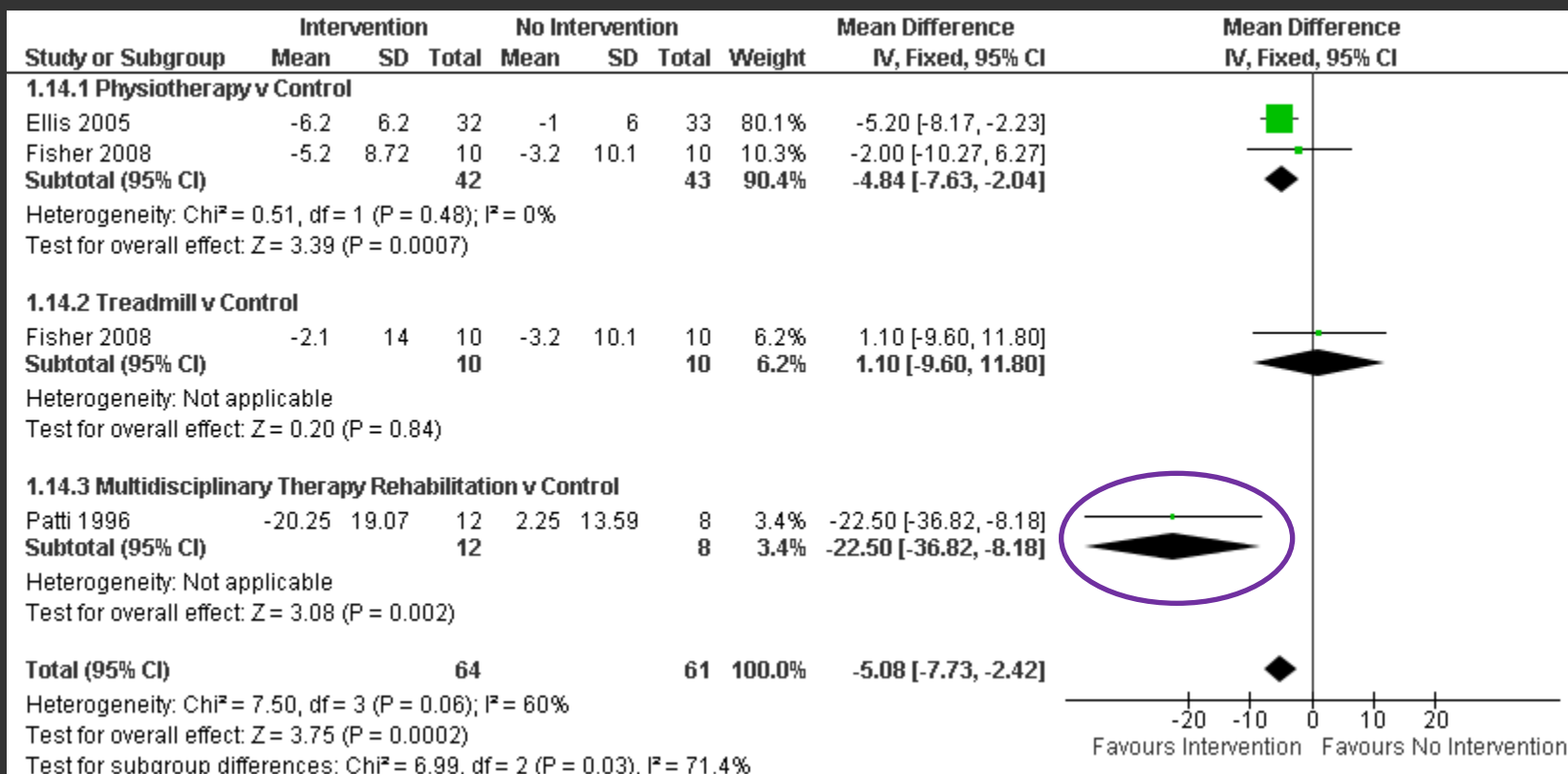
OUTCOME	MEAN DIFFERENCE (95% CI)	FAVOURS
Falls Efficacy Scale (FES)	1.29 (-6.91 to 9.49) p=0.7	NO INTERVENTION
Falls Efficacy Scale – International (FES-I)	-2.35 (-5.38 to 0.69) p=0.1	INTERVENTION

- Limited data
- Only 2 trials reported data on FES and FES-I

Results – UPDRS & PDQ-39

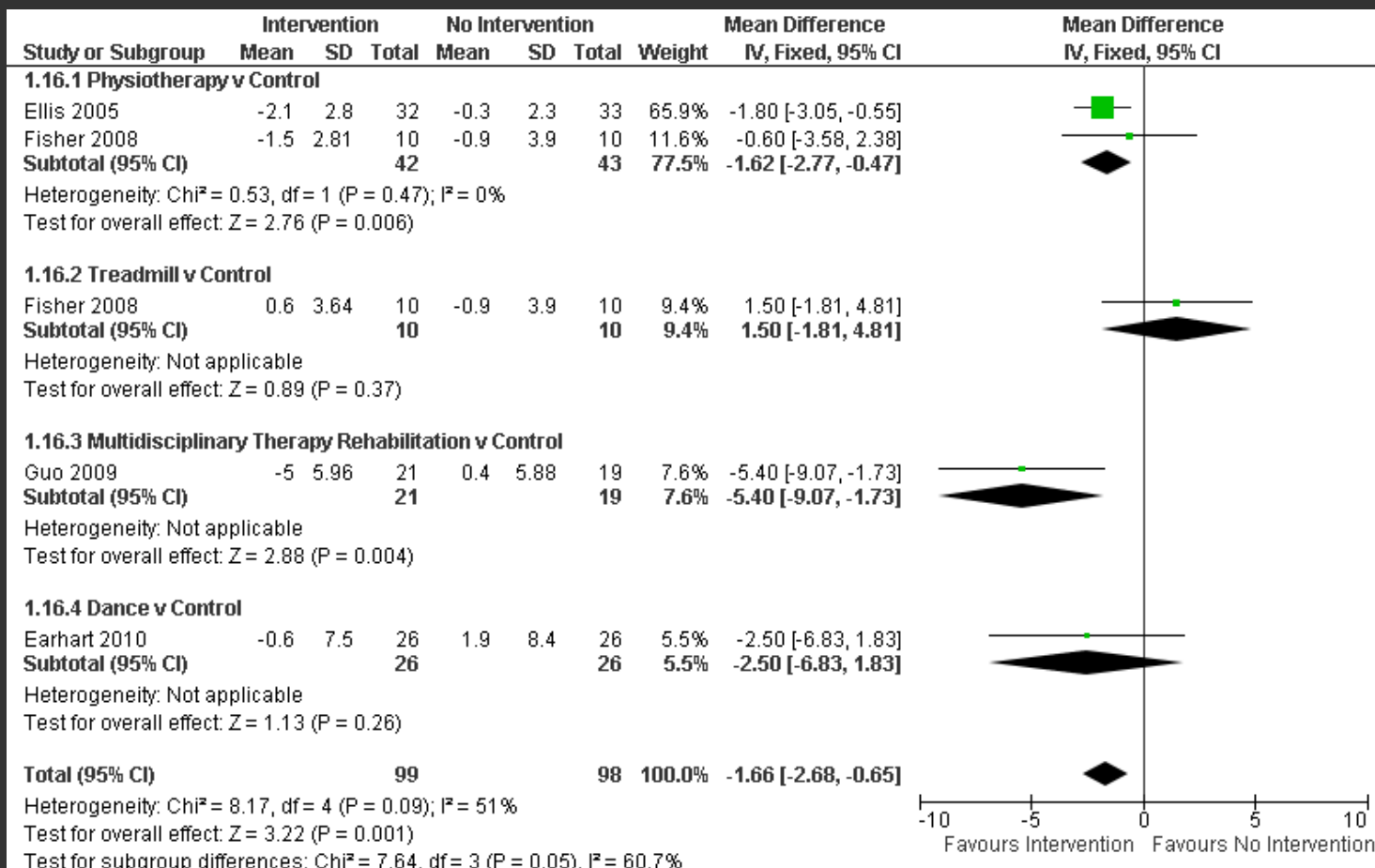
OUTCOME	MEAN DIFFERENCE (95% CI)	FAVOURS
UPDRS – Total	-5.08 (-7.73 to -2.42) p=0.0002	INTERVENTION
UPDRS - Mental	-0.44 (-0.98 to 0.09) p=0.1	INTERVENTION
UPDRS – ADL	-1.66 (-2.68 to -0.65) p=0.001	INTERVENTION
UPDRS – Motor	-4.45 (-5.86 to -3.04) p<0.00001	INTERVENTION
PDQ-39 – Summary Index	-1.83 (-3.65 to -0.01) P=0.05	INTERVENTION
PDQ-39 – Mobility	-2.19 (-6.86 to 2.48) p=0.4	INTERVENTION

Results - UPDRS Total



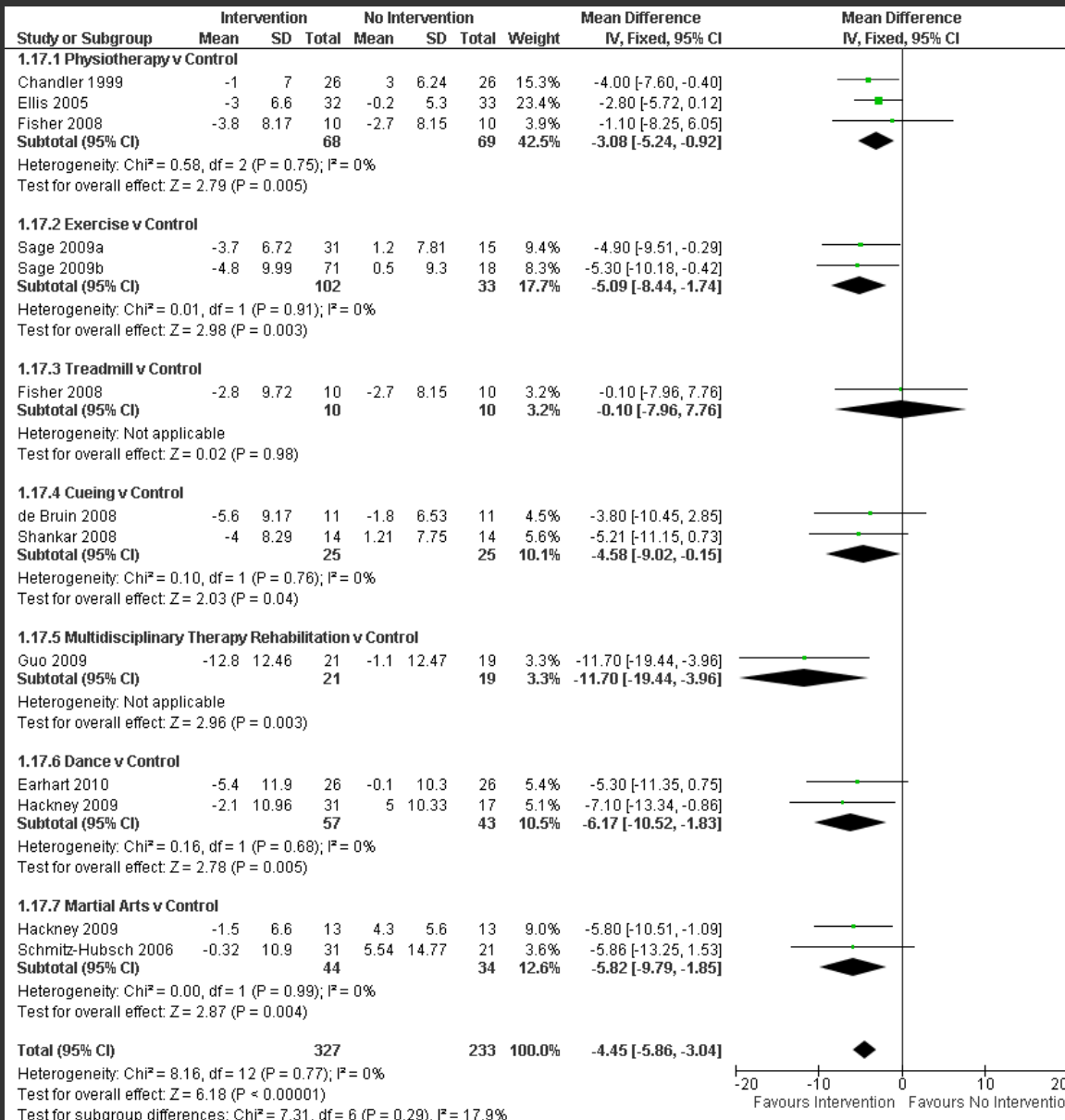
- -ve change = improvement
- Favours physio intervention
- 5 points, P=0.0002

Results - UPDRS ADL



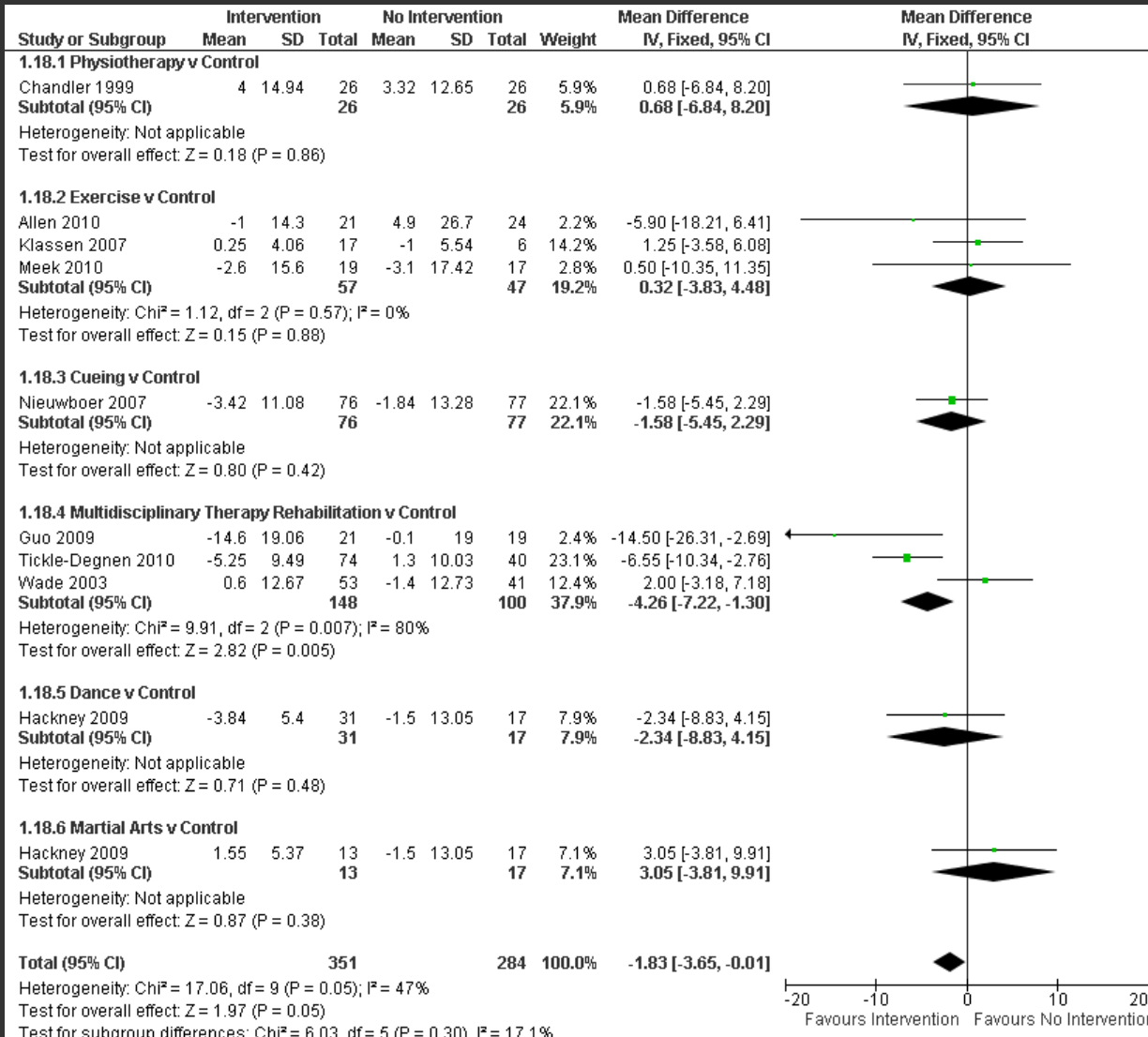
- -ve change = improvement
- Favours physio intervention
- 1.7 points, P=0.001

Results – UPDRS Motor



- -ve change = improvement
- Favours physio intervention
- 4.5 points
- P < 0.00001

Results – PDQ-39 Summary Index



- ve change = improvement

- Favours physio intervention

- 1.8 points
- P=0.05

Results – UPDRS & PDQ-39

OUTCOME	MEAN DIFFERENCE (95% CI)	MCIC
UPDRS – Total	-5.08 (-7.73 to -2.42) p=0.0002	8 points 4.1 – 4.5 points
UPDRS – ADL	-1.66 (-2.68 to -0.65) p=0.001	2 – 3 points
UPDRS – Motor	-4.45 (-5.86 to -3.04) p<0.00001	5 points 2.3 – 2.7 points
PDQ-39 – Summary Index	-1.83 (-3.65 to -0.01) P=0.05	1.6 points

MCIC = Minimally Clinically Important Change

Comparison of Different Types of Physiotherapy Intervention

- Gait, functional mobility and balance outcomes, no evidence of difference in treatment effect across the different physiotherapy interventions
 - Velocity (test for heterogeneity, $p=0.02$)
 - One highly significant MDT trial which if omit from analysis ($p=0.2$)

- Clinician-rated UPDRS and patient-rated QoL, no evidence of heterogeneity between the different physiotherapy interventions
 - UPDRS total (test for heterogeneity, $p=0.03$)
 - One highly significant MDT trial which if omit from analysis ($p=0.3$)

Conclusion

- Review provides evidence on the short term benefits of physiotherapy in the treatment of PD
- Improvements seen for velocity, 2 or 6 minute walk test, step length, Berg balance, UPDRS scores and PDQ-39 Summary Index
- Most of the observed differences were small
- Differences observed for velocity, Berg balance, UPDRS scores and PDQ-39 Summary Index were at or approaching what are considered minimally clinical important changes

Conclusion

- No clear or robust evidence to suggest one type of physiotherapy better than another

- Studies included in this review are relatively small with short-term follow up, so larger RCTs needed looking at the long-term benefit of physiotherapy are needed
 - PD REHAB (n=750)
 - This month recruited its 400th patient!

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PARKINSON'S^{UK}
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