

Appendix C – Supplementary results on secondary and exploratory analyses

Appendix to: *Hip strengthening exercise dosage is not associated with clinical improvements after total hip arthroplasty – a prospective cohort study (the PHETHAS-1 study)*

Secondary analysis

Figure C1. Box plots of the 3 (baseline) to 10-week (follow-up) median change in symptoms measured by HOOS, for quartile groups of performed number of repetitions per week (exercise dosages).

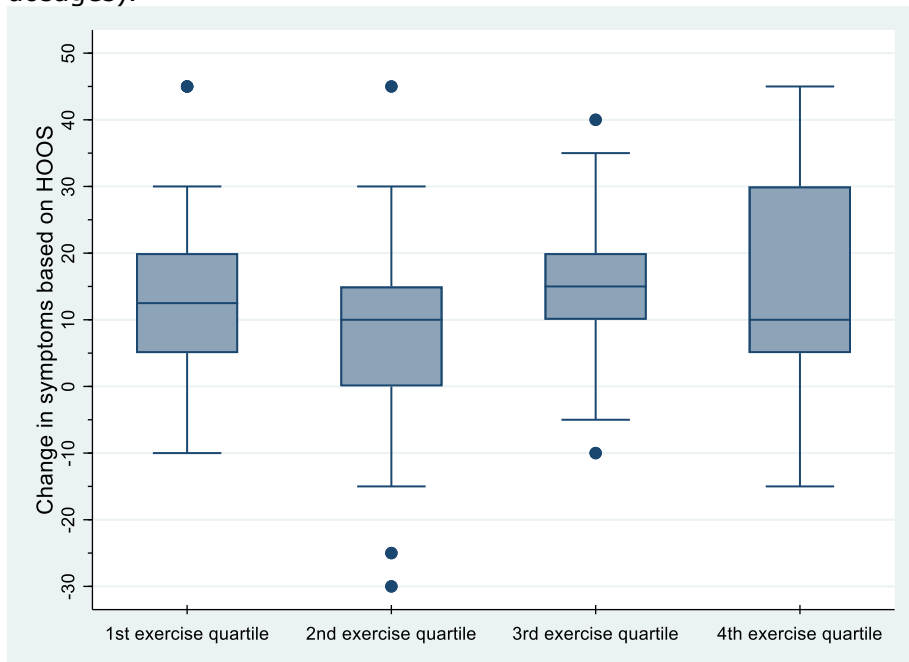
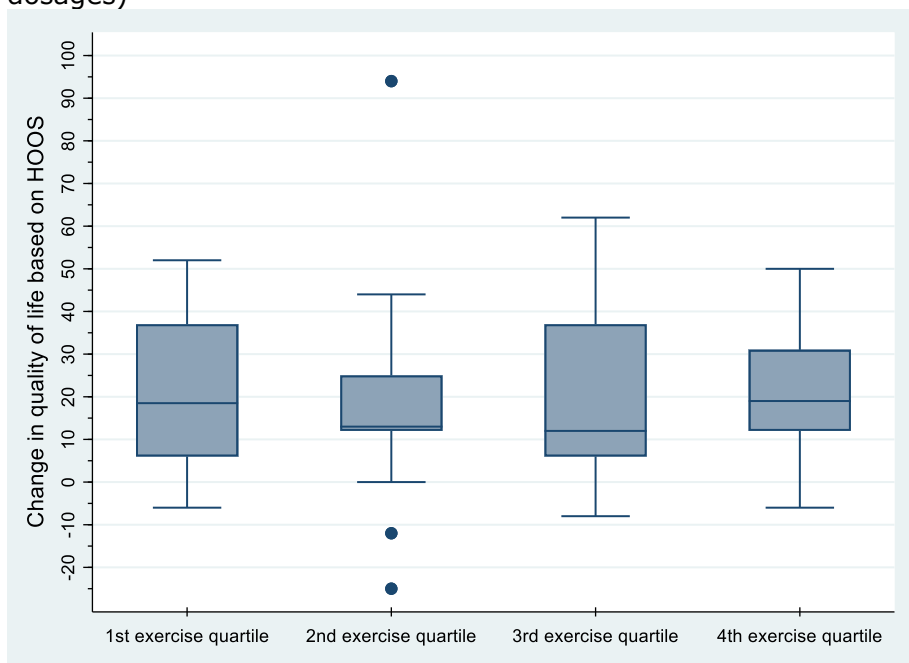


Figure C2. Box plots of the 3 (baseline) to 10-week (follow-up) median change in quality of life measured by HOOS, for quartile groups of performed number of repetitions per week (exercise dosages)



Appendix C – Supplementary results on secondary and exploratory analyses

Appendix to: *Hip strengthening exercise dosage is not associated with clinical improvements after total hip arthroplasty – a prospective cohort study (the PHETHAS-1 study)*

Figure C3. Box plots of the 3 (baseline) to 10-week (follow-up) median change in isometric hip abduction strength (Nm/kg), for quartile groups of performed number of repetitions per week (exercise dosages).

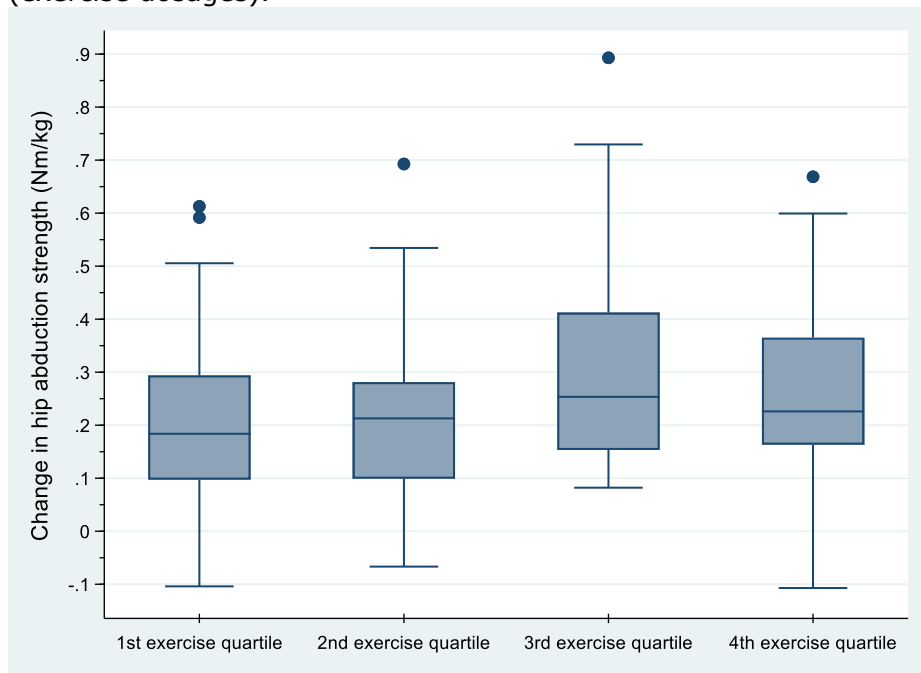
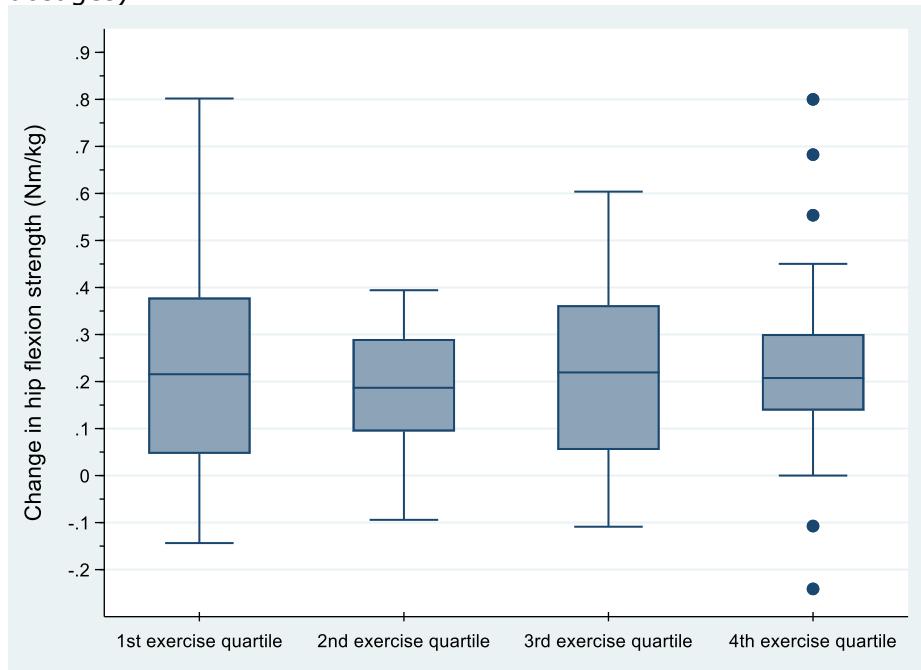


Figure C4. Box plots of the 3 (baseline) to 10-week (follow-up) median change in isometric hip flexion strength, for quartile groups of performed number of repetitions per week (exercise dosages).



Appendix C – Supplementary results on secondary and exploratory analyses

Appendix to: *Hip strengthening exercise dosage is not associated with clinical improvements after total hip arthroplasty – a prospective cohort study (the PHETHAS-1 study)*

Table C1. Change in outcomes from baseline (3 weeks after surgery) to follow-up (10 weeks after surgery) distributed on quartiles of performed exercise dose.

	1st exercise quartile (28-208 reps/week) n=22	2nd exercise quartile (209-338 reps/week) n=23	3rd exercise quartile (339-548 reps/week) n=23	4th exercise quartile (549-1812 reps/week) n=23
Gait speed, m/sec <i>mean (95% CI)</i>	0.26 (0.18; 0.33)	0.32 (0.25; 0.39)	0.37 (0.28; 0.47)	0.37 (0.30; 0.45)
HOOS_adl <i>mean (95% CI)</i>	13 (8; 19)	10 (5; 15)	16 (11; 21)	16 (10; 22)
HOOS_pain <i>mean (95% CI)</i>	14 (8; 19)	10 (4; 15)*	16 (9; 22)	14 (8; 20)
HOOS_sym <i>mean (95% CI)</i>	14 (7; 20)	6 (-1; 14)*	15 (10; 20)	14 (8; 21)
HOOS_qol <i>mean (95% CI)</i>	19 (11; 27)	18 (8; 29)†	20 (12;28)	23 (17; 29)
30s chair-stand <i>mean (95% CI)</i>	3.9 (2.0; 5.8) §	4.6 (2.6; 6.5) §	6.0 (4.4; 7.5)	5.0 (3.8; 6.1)‡
Hip abduction strength, Nm/kg <i>mean (95% CI)</i>	0.22 (0.13; 0.30)	0.22 (0.13; 0.30)‡	0.32 (0.23; 0.41)	0.26 (0.18; 0.33)
Hip flexion strength, Nm/kg <i>mean (95% CI)</i>	0.24 (0.14; 0.34)	0.18 (0.12; 0.24)*	0.22 (0.14; 0.31)*	0.24 (0.14; 0.34)

* n=22, † n=21, ‡ n=20, § n=18

Table C2. Association between gait speed at 10 weeks follow up and the independent variables: performed exercise dose (mean number of repetitions/week), self-efficacy at baseline, 24-hour physical activity (Mean upright time/day and mean number of steps/day), and gait speed at baseline. The association is presented as relative increase.

Independent variables	Coefficient (95% CI)
Mean number of repetitions/week (in hundreds)	1.007 (0.998; 1.017)
Self-efficacy at baseline	1.048 (0.995; 1.104)
Mean upright time/day	0.981 (0.964; 0.998)
Mean number of steps/day	1.000 (1.000; 1.000)
Gait speed at baseline	1.005 (1.004; 1.005)

Appendix C – Supplementary results on secondary and exploratory analyses

Appendix to: *Hip strengthening exercise dosage is not associated with clinical improvements after total hip arthroplasty – a prospective cohort study (the PHETHAS-1 study)*

Exploratory analyses

Factors associated with exercise dose

Based on the statistical approach thoroughly described in Appendix A, the association is tested differently among the independent variables.

For HOOS_pain at 3 weeks and Self-efficacy at 3 weeks, the association could be presented as a polynomial equation along with presentation of a graphical prediction line. To show further details on distribution of data, analyses based on quartiles – along with Kruskal-Wallis test – is also presented.

Table C3.

Factors associated with exercise dose in terms of repetitions per week and exercise days per week.

Dependent variable	Repetitions per week		Exercise days per week	
Independent variable	Median (1st-3rd quartile) p-values (Kruskall-Wallis test) *		Median (1st-3rd quartile) p-values (Kruskall-Wallis test) *	
Number of pain flares (week 0-2), n=91				
- No pain flares, n=73†	339 (208-561)	p=0.82	2.7 (2-3.2)	p=0.97
- One pain flare, n=11	462 (246-521)		3 (2.0-3.2)	
- Two or more pain flares, n=7	257 (144-500)		2.6 (1.4-3.3)	
- No pain flares, n=73†	339 (208-561)	p=0.76	2.7 (2-3.2)	p=0.83
- At least one pain flare, n=18	383.5 (246-500)		2.8 (2.0-3.2)	
Number of pain flares (entire period), n=91				
- No pain flares, n=71†	370 (182-572)	p=0.66	2.7 (2-3.2)	p=0.85
- One pain flare, n=10	391 (302-521)		3.0 (2.0-3.2)	
- Two or more pain flares, n=10	254.5 (209-470)		2.6 (2.4-3.2)	
- No pain flares, n=71†	370 (182-572)	p=0.59	2.7 (2-3.2)	p=0.78
- At least one pain flare, n=20	312.5 (234-485)		2.9 (2.2-3.2)	
HOOS_pain at 3 week, n=90†	Association is visualized in Figure 12	p=0.11‡		
- 1st quartile (40-65), n=26†			2.6 (2.0-3.1)	
- 2nd quartile (68-75), n=21			3.1 (2.4-3.3)	
- 3rd quartile (78-88), n=21			2.8 (2.2-3.4)	p=0.43
- 4th quartile (90-100), n=22			2.7 (1.6-3.1)	
Self-efficacy at 3 week, n=75	Association is visualized in Figure 13	p= 0.38§		
- 1st quartile (1-2.9), n=18			3.1 (2-3.3)	
- 2nd quartile (3-3.4), n=24			2.8 (2.2-3.4)	
- 3rd quartile (3.5-3.8), n=24†			2.6 (2.0-3.1)	p=0.28
- 4th quartile (3.9-4), n=19			2.6 (1.7-3)	
Motivation to perform exercises				
- Very much, n=78†	373 (212-550)		2.8 (2.1-3.2)	
- To some degree, n=11	305 (144-492)	p=0.31	2.7 (1.4-3.3)	
- A little, n=1	99 (99-99)		0.3 (0.3-0.3)	p=0.23

Appendix C – Supplementary results on secondary and exploratory analyses

Appendix to: *Hip strengthening exercise dosage is not associated with clinical improvements after total hip arthroplasty – a prospective cohort study (the PHETHAS-1 study)*

- Not at all, n=0 - Don't know, n=0	NA NA		NA NA	
- Very much, n=78 [†] - Less than very much, n=12	373 (212-550) 275.5 (121.5-477.5)	p=0.28	2.8 (2.1-3.2) 2.7 (1.3-3.2)	p=0.64
Belief in effect of exercises - Very much, n=85 [†] - To some degree, n=5 - A little, n=0 - Not at all, n=0 - Don't know, n=0	376 (209-549) 257 (222-305) NA NA NA	p=0.40	2.8 (2.0-3.2) 2.7 (2.6-3.1) NA NA NA	p=0.98
Self-belief in compliance to exercise - Very certain, n=49 - Almost certain, n=40 [†] - A little uncertain, n=1 - Very uncertain, n=0 - Don't know, n=0	418 (175-550) 323 (222-510.5) 222 (222-222) NA NA	p=0.72	2.9 (2.1-3.2) 2.6 (2-3.2) 2.7 (2.7-2.7) NA NA	p=0.71
- Very certain, n=49 - Less than very certain, n=41 [†]	418 (175-550) 308 (222-500)	p=0.69	2.9 (2.1-3.2) 2.6 (2-3.2)	p=0.41
Satisfaction with rehabilitation exercises - Very satisfied, n=63 - Satisfied, n=21 - Unsatisfied, n=3 [‡] - Very unsatisfied, n=1 - Don't know, n=1	418 (208-589) 320 (222-539) 214 (52-252) 246 (246-246) 68 (68-68)	p=0.19	2.8 (2.1-3.2) 3 (2.1-3.4) 1.9 (0.9-2.3) 2.0 (2.0-2.0) 0.6 (0.6-0.6)	p=0.11
- Satisfied or very satisfied, n=84 - Unsatisfied or very unsatisfied, n=4 [‡]	230 (133-249) 379.5 (210.5-555.5)	p=0.07	2.8 (2.1-3.2) 2.0 (1.5-2.3)	p=0.03
Upright time per day (hours), n=78	44 (3; 84), p=0.04			
- 1st quartile (2.58-4.39), n=20 - 2nd quartile (4.41-5.6), n=20 - 3rd quartile (5.69-6.56), n=20 - 4th quartile (6.58-9.34), n=19			2.8 (2.0-3.2) 2.6 (2.1-3.1) 2.5 (1.6-3.3) 2.9 (2.3-3.2)	p=0.78
Steps per day (in 1000), n=78	36 (13; 58), p=0.003			
- 1st quartile (1748-4744), n=20 - 2nd quartile (4887-6019), n=20 - 3rd quartile (6346-8239), n=20 - 4th quartile (8907-14188), n=19			2.7 (2.3-3.1) 2.3 (1.8-3) 2.8 (1.9-3.1) 3.1 (2.3-3.4)	p=0.28

* unless otherwise stated

† plus one extra observation in analysis of association between exercise days and independent variable

‡ a non-linear regression model (third-grade polynomial) was used.

§ a non-linear regression model (fourth-grade polynomial) was used.

|| A linear regression model was used

Appendix C – Supplementary results on secondary and exploratory analyses

Appendix to: *Hip strengthening exercise dosage is not associated with clinical improvements after total hip arthroplasty – a prospective cohort study (the PHETHAS-1 study)*

Figure C5. Association between HOOS_pain at baseline and performed number of repetitions per week.

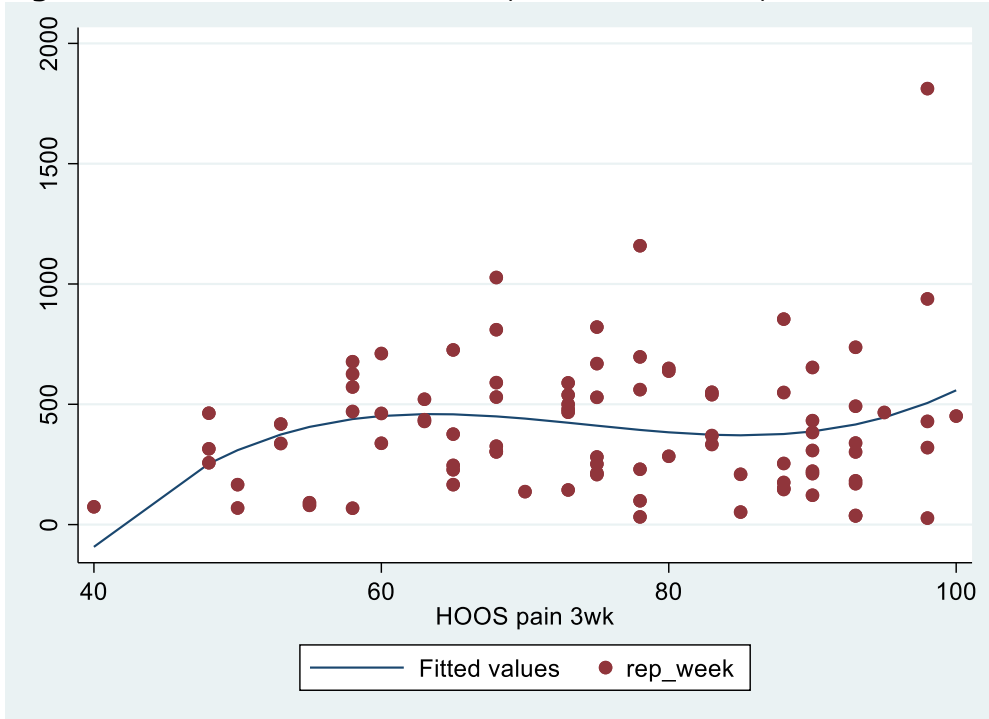
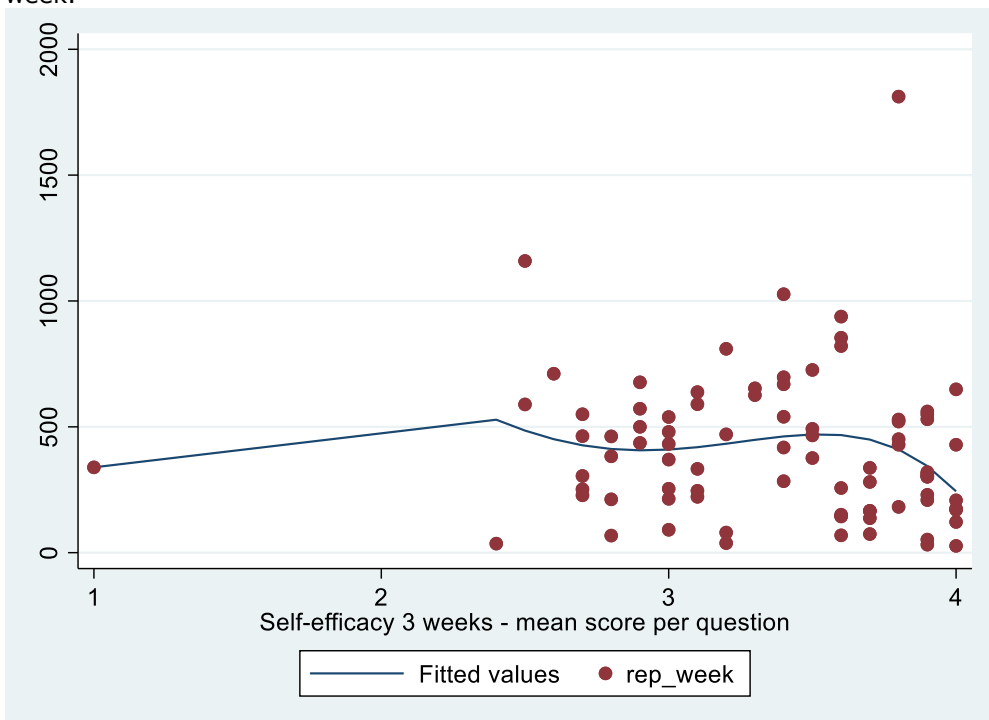


Figure C6. Association between mean self-efficacy at baseline and performed number of repetitions per week.



Appendix C – Supplementary results on secondary and exploratory analyses

Appendix to: *Hip strengthening exercise dosage is not associated with clinical improvements after total hip arthroplasty – a prospective cohort study (the PHETHAS-1 study)*

Factors associated with physical activity

Table C4. Factors associated with physical activity in terms of upright time per day and steps per day. Association is determined by univariate linear regression models

Independent variable \ Dependent variable	Upright time/day (hours)	Step/day (numbers)
Number of pain flares (week 0-2), n=81	-0.14 (-0.55; 0.26)	-118 (-828; 592)
HOOS_pain at 3 week, n=80	-0.01 (-0.03; 0.01)	-41 (-80; -2)*
Self-efficacy at 3 week, n=75	-0.30 (-0.98; 0.38)	617 (-595; 1829)
Motivation to perform exercises	<i>Reference</i>	<i>Reference</i>
- Very much, n=70	-0.55 (-1.64; 0.53)	-763 (-2695; 1169)
- To some degree, n=9	-2.37 (-5.45; 0.71)	164 (-5330; 5658)
- A little, n=1	NA	NA
- Not at all, n=0	NA	NA
- Don't know, n=0	-0.73 (-1.77; 0.30)	-670 (-2503; 1163)
Very much versus lesser degree of motivation (very much is reference value)		
Self-belief in compliance to exercising	<i>Reference</i>	<i>Reference</i>
- Very certain, n=43	0.37 (-0.32; 1.06)	-525 (-1739; 690)
- Almost certain, n=37	NA	NA
- A little uncertain, n=0	NA	NA
- Very uncertain, n=0	NA	NA
- Don't know, n=0	NA	NA

*p=0.04

Patient-perceived change in hip symptoms and MCII

Table C5. Change from baseline(3 weeks) to 10-week follow-up in gait speed, HOOS_adl, HOOS_symp, HOOS_pain and HOOS_qol, distributed on level of patient-perceived change in hip symptoms

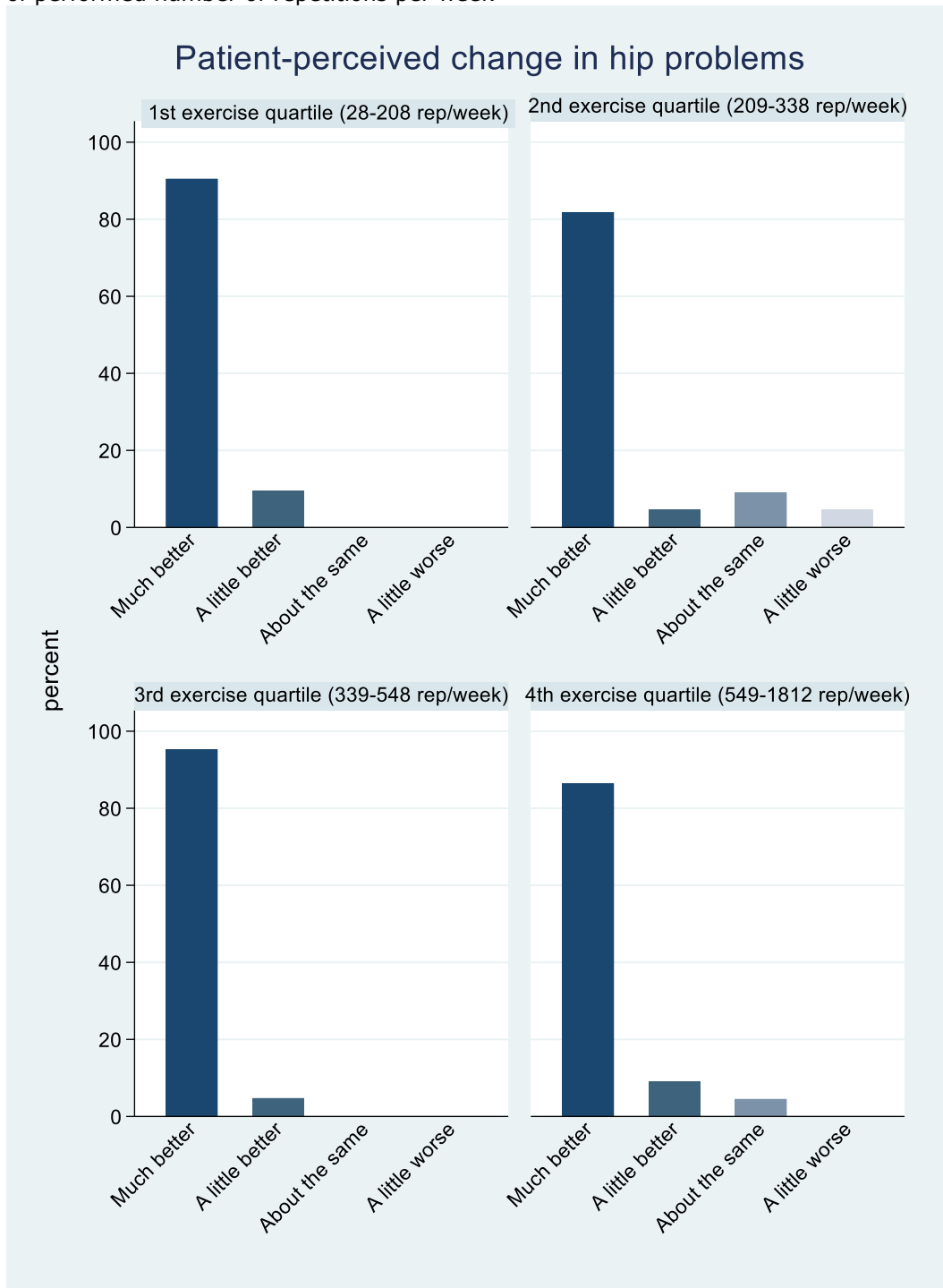
	Change in HOOS_adl mean (95% CI)	Change in HOOS_pain mean (95% CI)	Change in HOOS_symp mean (95% CI)	Change in HOOS_qol mean (95% CI)	Change in gait speed (m/sec) median [1st-3rd quartile]
Much better, n=77	14 (11; 17)*	14 (11; 17)	14 (11; 16)	22 (19; 27)*	0.32 [0.21-0.42]†
A little better, n=6	15 (-5; 36)	13 (-5; 30)	18 (-6; 41)	10 (-4; 24)	0.36 [0.30-0.41]
About the same, n=4	9 (-12; 30)	-4 (-23; 15)	-4 (-32; 25)	3 (-31; 37)	0.20 [0.18-0.23]
A little worse, n=1	6 (NA)	12 (NA)	-25 (NA)	0 (NA)	0.36 [NA]
Much worse, n=0	NA	NA	NA	NA	NA

* n=76, † n=78

Appendix C – Supplementary results on secondary and exploratory analyses

Appendix to: *Hip strengthening exercise dosage is not associated with clinical improvements after total hip arthroplasty – a prospective cohort study (the PHETHAS-1 study)*

Figure C7. Distribution of level of patient-perceived change in hip symptoms presented for each quartile of performed number of repetitions per week



MCII

Due to only 6 observations reporting change in hip symptoms to be "a little better", the estimate of MCII was very imprecise. Results can be seen in tableC4.

Appendix C – Supplementary results on secondary and exploratory analyses

Appendix to: *Hip strengthening exercise dosage is not associated with clinical improvements after total hip arthroplasty – a prospective cohort study (the PHETHAS-1 study)*

Patient-perceived result of surgery

Table C6. Change from baseline to 10-week follow-up in gait speed, HOOS_adl, HOOS_symp, HOOS_pain and HOOS_qol, distributed on level of patient-perceived result of surgery

	Change in HOOS_adl mean (95% CI)	Change in HOOS_pain mean (95% CI)	Change in HOOS_symp mean (95% CI)	Change in HOOS_qol mean (95% CI)	Change in gait speed (m/sec) median [1st-3rd quartile]
Excellent	n=56 14 (11; 18)	n=57 14 (11; 18)	n=57 13 (10; 16)	n=57 22 (17; 27)	n=58 0.32 [0.20-0.43]
Very good	n=23 13 (8; 17)	n=23 13 (8; 18)	n=23 15 (10; 20)	n=23 20 (11; 30)	n=23 0.34 [0.27-0.40]
Good	n=4 22 (7; 37)	n=4 17 (-7; 41)	n=4 15 (-13; 43)	n=4 22 (9; 35)	n=4 0.34 [0.25-0.40]
Fair	n=2 [6-10]*	n=2 [-10-12]*	n=2 [-25-10]*	n=2 [0-12]*	n=2 [0.25-0.36]*
Poor	n=2 [-10-18]*	n=2 [-17-10]*	n=2 [-30-5]*	n=2 [-25-0]*	n=2 [0.16-0.21]*
Acceptable†	n=83 14 (11; 17)	n=84 14 (11;17)	n=84 14 (11;16)	n=83 21 (17; 25)	85 0.33 [0.21-0.42]
Not acceptable‡	n=4 6 (-13; 25)	n=4 -1 (-24; 22)	n=4 -10 (-42; 22)	n=4 -3 (-28; 22)	4 0.23 [0.18-0.31]

* Range

† Comprises participants reporting an excellent, very good or good result of the operation

‡ Comprises participants reporting a fair or poor result of the operation

PASS

Table C7. Mean and median scores for HOOS subscales at 10 week follow-up for participants reporting a good, very good or excellent result of the operation.

	Mean (95% CI)	Median [1st-3rd quartile]
HOOS_adl , n=84	89 (87; 91)	91 [87.5-95.5]
HOOS_symptoms , n=85	84 (81; 86)	85 [75-90]
HOOS_pain , n=85	90 (88; 93)	93 [85-98]
HOOS_qol , n=84	78 (74; 81)	75 [69-100]