**Supplement 4: description of the interventions**

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| **First Author, year of publication** | **Intervention group** | | | | | | **Control group** | | **Outcome** | **Assessment** | **Duration of study (weeks)** |
| **n** | **Type of exercise** | **Delivery mode** | **Days/week** | **Duration (min)** | **intensity** | **n** | **Intervention** |
| **RA** | | | | | | | | | | | |
| Baillet, 200929 | 38 | Cycling/running + resistance training + hydrotherapy | supervised | 5 | 45+60 | 60-80% max HR | 76 | conventional joint rehabilitation | Max km in 5min | Bicycle ergometer | 4 |
| Baslund, 199328 | 9 | Cycling | Supervised group | 4-5 | 25 | Median max HR 169 ±6 beats/min | 9 | unclear | VO2max | Bicycle ergometer | 8 |
| Hansen, 199343 | 60 | Aerobic and strength exercise | Group A: home  Groups B/C/D: supervised | 3-7 | 45 | 70% max HR | 15 | none | Watt | Submax Aastrand test on Bicycle ergometer | 104 |
| Harkcom, 198543 | 11 | Cycling | Supervised group | 3 | 25-35 | 70%max HR | 6 | Cycling 15 min | VO2max | Bicycle ergometer | 8 |
| Hsieh, 200947 | 15 | Aerobic aqua and cycling | Supervised group | 3 | 60 | 50-80% VO2max | 15 | Home exercise | VO2max | Bicycle ergometer | 8 |
| Neuberger, 200767 | 167 | Aerobic and muscle strength | Supervised group/home exercise | 3 | 60 | 60-80% of max HR | 73 | none | VO2max | Aastrand-Rhyming protocol | 12 |
| Sanford-Smith, 199873 | 12 | Aquaerobic | supervised | 3 | 60 | 70% of max. heart rate | 12 | ROM and strength home exercises | Min | Modified Naughton protocol | 10 |
| Shapoorabadi, 201676 | 16 | cycling | Supervised  group | 3 | 35 | 60-70% of reserve heart rate | 17 | Usual care | Hematologic indices | unclear | 8 |
| van den Ende, 199683 | 25 | Cycling and muscle strength | Supervised group | 3 | 60 | 70-85% of age predicted max HR | 25 | ROM and isometric muscle strength exercise at home with written instructions | VO2max | Submax Astrand test on Bicycle ergometer | 12 |
| Westby, 200086 | 14 | aerobic dance and strength and stretching | At home | 3 | 45-60 | 220 – age x 60-75% | 23 | unclear | Kcal/day,  Fitness score | Caltrac accelerometer, questionnaire | 56 |
| **RA and OA** | | | | | | | | | | | |
| Minor, 198966 | 68 | aerobic aqua or walking | Supervised group | 3 | 60 | 60-80%max HR | 28 | ROM | VO2max | Treatmill ergometer | 12 |
| **SpA** | | | | | | | | | | | |
| Hsieh, 201448 | 9 | Aerobic (walking, cycling, swimming) and strength and ROM | Home exercise, phone calls by PT every 2weeks | 3 | 30 | 50-80% of VO2peak | 10 | ROM at home with written instructions | VO2max | Ergospirometry | 12 |
| Jennings, 201552 | 35 | Walking and stretching | unclear | 3 | 80 | For 40min at anaerobic treshold heartrate | 35 | stretching | VO2max | Ergospirometry | 12 |
| Karapolat, 200955 | 25 | Swimming or walking and stretching | unclear | 3 |  | 60-70% of pVO2/ 13-15 of BORG scale | 12 | stretching | VO2max | modified Bruce protocol on treatmill | 6 |
| Niedermann, 201368 | 53 | Nordic Walking and flexibility exercise | Supervised | 2 | 30 | 55–75% and 65–85% of the maximum HR | 53 | attention control and flexibility exercise | Watt | submaximal bicycle test on electrocardiogram | 12 |
| Sveaas, 201411 | 10 | High intensity intervall walking/running | Individually supervised | 3 | 40 | 90-95% of HRmax+active rest 70% HRmax | 14 | none | VO2max | treatmill | 12 |
| **OA** | | | | | | | | | | | |
| Ettinger, 199738 | 117 | walking | Supervised group | 3 | 60 | 50-70% HR | 127 | Health education | VO2max | Modified Naughton Protocol on treatmill | 12 |

Table 2: studies investigating the effect of aerobic exercise on cardiovascular fitness.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **First Author, year of publication** |  | | **Intervention group** | | | | | **Control group** | | **Outcome** | **Assessment** | **Duration of study (weeks)** |
| **n** | **Type of exercise** | **Delivery mode** | **Days/**  **week** | **sets** | **repetitions** | **load** | **n** | **Intervention** |
| **RA** | | | | | | | | | | | | |
| De Jong, 200937 | 60 | Exercise circuit, 10 exercises | Supervised group | 2 | ? | 8-15 | 90s exercise/  30s rest | 11 | none | Nm | Isokinetic extension (dynamometer), 60°/sec | 104 |
| Flint-Wagner 200940 | 25 | Progressive high intensity circle training | Partly supervised | 2 | 3 | 12 | 15-16 Borg | 26 | Self-administered | N | isokinetic (dynamometer), 60°/sec | 6 |
| Häkkinen 199487 | 16 | 8 strength exercises | supervised | 3 | 2 | 6-8 | 70-85% 1RM | 8 | none | N | isometric, 100°/sec | 16 |
| Häkkinen, 200342 | 31 | Progressive  Strength exercise | Instructed, at home | 2 | 2 | 8-12 | 50-70% 1RM | 31 | stretching | Kg | Concentric(dynamometer) | 104 |
| Hansen, 199343 | 21 | 9 progressive dynamic strength exercises | supervised | 2-4 | 2  3 | 15-30  6-12 | 40%/  50-60%/  70-80% of 1RM | 18 | none | Kp | Isometric, 75°/sec | 24 |
| Komatireddy, 199759 | 16 | 7 strength exercises | At home, videotape | 3 | 2-3 | 12-15 | 3-4BORG | 23 | none | unclear | Isokinetic knee extension,60°/sec | 12 |
| Lemmey, 200960 | 13 | 9 progressive strength exercises | Supervised | 2 | 3 | 8 | 80% 1RM | 15 | stretching | N | Isokinetic extension (dynamometer), 90°/sec | 24 |
| Lyngberg, 199464 | 25 | Progressive high intensity circle training | Partly supervised | 2 | 3 | 12RM | 15-16 Borg | 26 | Self administered | Nm | Isokinetic strength (dynamometer, 30°/sec | 6 |
| Seneca, 201575 | 60 | A: Self training (exercises and conditioning training),  B: A + training in phys. practice,  C: A + group training  D: C + pool | Group A: home  Groups B/C/D: supervised | A: min. 3  B: 1  C: 1 + 1  D: 1 + 1 | ? | ? | Pulse rate of 70% of max | 15 | No instruction | Kg | (Dynamometer) | 56 |
| Siqueria, 201777 | 51 | Progressive strength exercises | Supervised group | 3 | 3 | 11 reps of 30 sec | 4-8 on BORG | 32 | none | Nm | isokinetic dynamometer, 60°/sec | 16 |
| Strasser, 201180 | 15 | 8 progressive strength exercises | Supervised group | 2 | 2 | 10-15 | 70% 1RM | 20 | stretching | Kp | (Dynamometer) | 26 |
| Van den Ende, 199683 | 74 | A: cycling+strength  B:  ROM+strength  C:  ROM+strength | A, B:  Supervised group  C:  Individually supervised | 3 | ? | ? | A:fast pace  B:low pace | 25 | ROM and isometric home exercise (15min, 2d/week), written instructions | Nm | Isokinetic (dynamometer), 60°/sec | 12 |
| **OA** | | | | | | | | | | | | |
| Anwer, 201425 | 21 | 2 isometric strength exercises | supervised | 5 | 1-3 | 5-10 sec | max isometric strength | 21 | none | unclear | isometric | 5 |
| Baker, 200127 | 19 | Progressive  (2 functional + 5 isotonic) exercises | Visited Home-based | 3 | 2 | 12 | Borg and rep-number | 19 | Were informed, nutrition | Kg | unclear | 16 |
| Bennell, 201029 | 39 | 6 standardized exercises  + 7 individual exercises with PT | Supervised home program | 5 | 3 | 10 | determined by the participant's ability | 37 | none | Nm/kg | Isometric 60°/sec(dynamometer) | 12 |
| Börjesson, 199632 | 29 | 7 strength exercises | supervised | 3 | 2 | 10 + 10sec holding | 10RM | 32 | none | Nm | Isokinetic, 30°/sec (dynamometer) | 5 |
| Bruce-Brand, 201235 | 10 | 6 strength exercises | home-based/ 2w supervised | 3 | 3 | 10 | Borg <14,  VAS <3,  Longer time/higher resistance bands | 6 | Standard care | Nm | Isometric and isokinetic,60°/sec (dynamometer) | 6 |
| Foroughi, 201141 | 20 | 6 high intensity progressive  strength exercises | supervised | 3 | 3 | 10-15 s | 80% of peak muscle strength | 25 | Like intervention except omitted hip ab- and adduction, 2x8 rep | Nm | unclear | 24 |
| Hermann, 201645 | 38 | 4 progressive strength exercises | supervised | 2 | 3 | 8-12 | concentric as fast as possible | 39 | none | Watt/kg | concentric, (leg extension power rig) | 10 |
| Jan, 200851 | 34  +  34 | High- and  Low-resistance | supervised | 3 | 3  10 | 8  15 | 60% 1RM  10% 1RM | 30 | none | Nm | Isokinetic (dynamometer), 60°/sec, 120°/sec and 180°/sec | 8 |
| Jorge, 201553 | 29 | 4 progressive  Strength exercises | supervised | 2 | 2 | 8 | 50-70% 1RM | 31 | none | Kg | Unclear (machine-based) | 12 |
| Juhakoski, 201154 | 58 | ? | supervised | ? | ? | ? | max effort and highest velocity | 58 | Standard care | W/kg | unclear | 12 |
| Lim, 201062 | 46 | 1. Aquatic 2. landbased | supervised | 3 | - | 30min  40min | 40-60% 1RM | 20 | Home-based exercise | Nm | Isokinetic (dynamometer), 60°/sec | 8 |
| Lin, 200963 | 36 | Progressive strength exercises | supervised | 3 | 4 | 6 | 50% 1RM +5% every 2w | 36 | 1. None 2. Proprioceptive training | Nm | isokinetic (dynamometer)  60°/sec, 120°/sec, and 180°/sec | 8 |
| Mikesky, 200665 | 113 | 4 strength exercises | 2x fitness, 1x at home | 3 | 3 | 8-10 | Max resistance | 108 | Simple movement exercises | Nm | Concentric isokinetic (dynamometer) 60°/sec, 120°/sec | 12 |
| Salli, 201072 | 47 | 5 Isokinetic & 5 isometric  strength exercises | supervised | 3 | ? | 10 | 70% max voluntary contraction | 24 | none | (Nm) | Isokinetic (dynamometer), 60°/sec, 120°/sec, 180°/sec | 8 |
| Sayers, 201274 | 22 | High und  low speed strength exercises | supervised | 3 | 3  3 | 12-14  8-10 | 40% 1RM  80% 1RM | 11 | none | N | concentric, unclear | 12 |
| Steinhilber 201679 | 70 | 4 progressive exercises | group session & home exercise | 1&2 | 2-4 | 10-25 | Borg 6-20,  30-70% MVC | 68 | none | Nm/kg | Isokinetic (dynamometer) | 12 |
| Svege, 201681 | 54 | Hip strength exercises | Partly supervised | 2-3 | 3 | 8 | 70-80% of 1RM | 50 | Patient education program | Nm | Isokinetic, concentric (dynamometer), 60°/sec | 12 |
| Wang, 200784 | 20 | Aquatic programme  (lower & upper body) | supervised | 3 | 17 | 10-15 | Borg CR10 scale | 18 | none | Kg | Isometric  (dynamometer) | 12 |
| Weng, 200985 | 124 | Isokinetic muscular strength | supervised | 3 | 1-6 | 10 (5 con-ecc und 5 ecc-con) | 60% of the average torque | 132 | none | (Nm) | isokinetic (dynamometer), 60°/sec, 180°/sec | 8 |

Table 3: studies investigating the effect of strength exercise on M.quadriceps femoris.   
RA= rheumatoid arthritis, OA= osteoarthritis, n=numbers, RM= repetition movement, ?=unclear/not reported

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **First Author, year of publication** | **Intervention group** | | | | | | **Control group** | | **Outcome** | **Assessment** | **Duration of study (weeks)** |
| **n** | **Type of exercise** | **Delivery mode** | **Days/week** | **Duration (min)** | **intensity** | **n** | **Intervention** |
| **SpA** | | | | | | | | | | | |
| Altan, 201224 | 29 | Pilates exercise program | supervised | 3 | 60 | unclear | 24 | Standard care | score | BASMI | 12 |
| Fang, 201639 | 21 | Flexibility exercises | Home-based and supervised | 3 | 60 | 5x10 sec. | 13 | Unclear home exercise (conventional) | score | BASMI | 24 |
| Ince, 200650 | 15 | Multimodal (aerobic, stretching and pulmonary exercises) | supervised | 3 | 50 | unclear | 15 | None | cm | chest expansion 4th intercostal level | 12 |
| Kjeken, 201357 | 29 | In-patient reha Nordic walking, strength, mobility | supervised | 3 | 60 | unclear | 34 | Standard care | score | BASMI | 53 |
| **OA** | | | | | | | | | | | |
| Juhakoski, 201154 | 60 | Strength, flexibility | supervised | 1 | 45 | mild tension | 58 | Standard care | Degree (°) | passive ROM hip flex | 12 |
| Rogind, 199871 | 12 | balance, coordination, stretching, muscle strength | supervised | 2  (+4 home program) | unclear | unclear | 13 | none | Degree (°) | ROM knee flexion | 12 |
| Svege, 201681 | 54 | strengthening, and stretching exercises,  patient education | supervised | 2-3 | unclear | unclear | 50 | Patient education | Degree (°) | passive ROM hip ex | 16 |
| Wang, 200784 | 20 | Aquatic programme | supervised | 3 | 50 | 10-15 reps, unclear | 18 | none | Degree (°) | active ROM knee extension | 12 |

Table 4: studies investigating the effect of flexibility exercises on ROM, BASMI, chest expansion.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **First Author, year of publication** | **Intervention group** | | **Control group** | | **Outcome** | **Assessment** | **Duration of study (weeks)** |
| **n** | **Intervention** | **n** | **Intervention** |
| **OA** | | | | | | | |
| Bennell, 201730 | 72 | 5 PT sessions + 6 PA counselling phone calls (with option of 6 additional calls) | 70 | 5 PT sessions over 6 months | N of steps per day, step time h/day | accelerometer, questionnaires PASE, AAS | 24 |
| Bieler, 201631 | 100 | Strength exercises in fitness OR Nordic Walking in park (both supervised) + PA counselling (education session, 2 face-to-face sessions, 2 phone calls) (pooled) | 52 | Home exercise | score | PASE | 16 |
| Brosseau, 201234 | 37 | Supervised Walking + PA counselling (monthly face-to-face sessions + phone calls, pedometer, logbook) | 38 | Education booklet | score | 7-days PAR | 52 |
| Hiyama, 201246 | 20 | Walking, with the task to increase of 3000 steps per day within 4 weeks, weekly PT sessions | 20 | Weekly PT sessions | Steps per day | pedometer | 4 |
| Li, 201761 | 17 | PA counselling (education session, weekly phone calls, Fitbit) | 17 | Waiting list | MET | accelerometer | 4 |
| **RA** | | | | | | | |
| Brodin, 200833/Sjöquist 201178 | 94 | PA counselling (face-to-face-sessions, phone calls) | 134 | none | % of active people | 3-questions | 52 |
| Katz, 201756 | 68 | Pedometer only OR pedometer and step targets (jawbone activity monitor) | 28 | PA education | Steps per day | accelerometer | 21 |
| Knittle, 201558 | 38 | PA counselling (MI, SR, phone calls) | 40 | PA education | score | SQUASH | 5 |
| Van den Berg 200782/Hurkmans 201049 | 56 | Individual training (guided via website, mail), ergometer, social group contact | 54 | General training(PA information provided by website) | % of active people | 3-questions | 52 |
| **SpA** | | | | | | | |
| O’Dwyer, 201769 | 20 | Counselling (MI)m weekly goal reminder | 20 | none | Sedentary time, active min per week | Accelerometer | 12 |
| Rodriguez-Lozano, 201370 | 381 | Education session, exercise instruction session, advice to do at least 50% of the exercises per day, monthly phone calls (exercise reminder) | 375 | Monthly phone calls (drug diary) | rating of percentage of recommended exercise program that they actually carried out each week | Questionnaire | 24 |

Table 5: studies investigating the effect of PA promotion intervention on daily PA level. N=number, PT= physiotherapist, PA= physical activity, PASE= Physical Activity Scale for the Elderly, AAS= Australian Activity Survey, PAR= Physical activity recall, SQUASH= Short Questionnaire to Assess Health-enhancing Physical activity, MI= motivational interviewing, SR= self-regulation