Table 1: Study, participant and intervention characteristics

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **First author/ Year** | **Study Design**  | **Number of participants**  | **Age (years) mean (SD)**  | **Female (no./%)** | **Conditions** **(No./%)** | **Intervention description** | **Control description** | **Baseline physical activity levels: Mean (SD)**  | **Physical activity/****Sedentary behaviour outcomes** | **Longest follow-up**  |
| Baker 2020 | RCT | Total: 104Intervention: 52Control: 52 | Total:65.2Intervention:65.8 (6.6)Control:64.5 (8.3) | Total:85 (81.7%)Intervention:42 (80.8%)Control:43 (82.7%) | Knee OA Total:Knee OA N=94 (90.4%) Knee replacement N=10 (9.6%)Intervention:Knee OA N=48 (92.3%) Knee replacement N=4 (7.7%)Control:Knee OA N=46 (88.5%) Knee replacement N=6 (11.5%) | Duration: 24 months Type of PA:Non-self-selected Specific activities: Resistive strength training +Computer-based telephone counselling Method of delivery:Individual + group-basedSetting of PA: Supervised + unsupervisedDose: 54 sessions | Duration: 24 months Description:Resistive strength training + reminder text message  | N/A | PA: **Exercise adherence NRS** | 0 |
| Barone Gibbs 2017 | RCT | Total:27Intervention:13Control:14 | Total:51.5Intervention:52 (9)Control51 (13) | Total:21 (77.8%)Intervention:11 (85%)Control:10 (71%) | PLBP  | Duration: 6 months Type of PA:Non-self-selectedSpecific activities: Behavioural counselling, Sit-stand desk attachment, activity prompter + pain self-managementMethod of delivery:Individual Setting of PA: UnsupervisedDose: 7 sessions  | Duration: 6 months Description:No intervention | Overall: Min/week: 191Intervention:Min/week: 190 (163) Control:Min/week: 191 (175)  | PA: **Min/week doing MVPA (GPAQ)****SB: Hour/day sitting (GPAQ)**  | 0 |
| Basler 2007 | RCT | Total:170Intervention:86Control:84 | Total:70.3 (4.4)Intervention:70.09 (4.19)Control70.56 (4.55) | Total:109 (64%)Intervention:54 (62.8%Control:55 (65.5%) | PLBP | Duration: 5 weeksType of PA:Non-self-selectedSpecific activities: 10 mins counselling + physiotherapy (including exercise)Method of delivery:Individual Setting of PA: SupervisedDose: 20 sessions  | Duration: 5 weeks Description:Physiotherapy treatment + placebo ultrasound  | Overall:Min/day: 15 Intervention:Min/day: 15.98 Control:Min/day: 14.11  | PA: **Min/day (7-day activity diary)**  | 5 months |
| Bennell 2014 | RCT | Total:78Intervention:40Control:38 | Total:62.1 (6.9)Intervention:60.5 (6.6)Control63.7 (7) | Total:42 (53.8%)Intervention:24 (60%)Control:18 (47%) | Knee OA | Duration: 16 weeksType of PA:Non-self-selectedSpecific activities: Prescribed HEP + 2 physiotherapy booster sessionsMethod of delivery:Individual Setting of PA: SupervisedDose: 2 sessions | Duration: 0 weeks Description:Advice to do HEP | N/A | PA: **Exercise adherence NRS** | 8 weeks |
| Bennell 2017 | RCT | Total:168Intervention:84Control:84 | Total:62.25Intervention:61.1 (6.9)Control63.4 (7.8) | Total:106 (63%)Intervention:57 (68%)Control:49 (58%) | Knee OA | Duration: 6 monthsType of PA:Non-self-selectedSpecific activities: Physiotherapy exercise prescription + concurrent telephone coachingMethod of delivery:Individual Setting of PA: Supervised + unsupervised Dose: 11 sessions  | Duration: 6 months Description:Physiotherapy exercise prescription  | Overall:Step/day: 7998 Intervention:Step/day: 8116 Control:Step/day: 7879  | PA: **PASE**AAS**Step/day (7-day Accelerometry)** Exercise adherence NRS | PASE: 12 months Step/day (7-day Accelerometry): 0 |
| Bieler 2017 (Strength training) | RCT | Total: 152Intervention:50Control:52 | Total:69.6 Intervention:69.6 (5.4)Control69.3 (6.4) | Total:103 (67.8%)Intervention:34 (68%)Control:36 (69%) | Hip OA | Duration: 12 monthsType of PA:Non-self-selectedSpecific activities: Progressive strength training, PA/OA education + PA counsellingMethod of delivery:Individual + group-basedSetting of PA: Supervised + unsupervisedDose: 53 sessions | Duration: 0 months Description:1 session: Advised to do home exercises as per Danish Arthritis Association  | Overall:PASE: 122Intervention:PASE: 140 (64.7)Control:PASE: 119 (55.2) | PA: **PASE**VPA (0-5 Likert scale)CCHS | 0 |
| Bieler 2017 (Nordic walking) | RCT | Total: 152Intervention:50Control:52 | Total:69.6Intervention:70 (6.3)Control69.3 (6.4) | Total:103 (67.8%)Intervention:33 (66%)Control:36 (69%) | Hip OA | Duration: 12 months Type of PA:Non-self-selectedSpecific activities: Nordic walking, PA/OA education + PA counsellingMethod of delivery:Individual + group-basedSetting of PA: Supervised + unsupervisedDose: 53 sessions  | Duration: 0 months Description:1 session: Advised to do home exercises as per Danish Arthritis Association | Overall:PASE: 122Intervention:PASE: 107 (47.3)Control:PASE: 119 55.2) | PA: **PASE**VPA (0-5 Likert scale)CCHS | 0 |
| Bossen 2013 | RCT | Total:199Intervention:100Control:99 | Total:62 (5.7)Intervention:61 (5.9)Control63 (5.4) | Total:129 (64.8%)Intervention:60 (60%)Control:69 (69.7%) | Overall:Knee OA N=127 (63.8%)Hip OA N=41 (20.6%)Knee and hip OA N=31 (15.6%)Intervention: Knee OA N=67 (67%)Hip OA N=21 (21%)Knee and Hip OA N=12 (12%)Control:Knee OA N=60 (60.6%)Hip OA N=20 (20.2%)Knee and hip OA N=19 (19.2%) | Duration: 9 weeksType of PA:Self-selectedSpecific activities: ‘Join2move’: modular web-based focused on time-contingent gradual PA increaseMethod of delivery:IndividualSetting of PA: UnsupervisedDose: 9 modules | Duration: N/ASpecific Description:Waiting list  | Overall:Min/day: 382Intervention:Min/day: 369Control:Min/day: 395 | PA:PASE**Min/day (accelerometry)**SB:**Min/day (accelerometry)** | 10 months  |
| Cederbom 2019 | RCT | Total:105Intervention:52Control:53 | Total:85 (6.1)Intervention:85.2 (5.6)Control85.4 (6.7) | Total:91 (87.6%)Intervention:48 (92.3%)Control:49 (93%) | Chronic MSK pain (unspecified location) | Duration: 12 weeksType of PA:Self-selected and non-self-selectedSpecific activities: In-person physiotherapy + supportive telephone call Method of delivery:Individual Setting of PA: Supervise + unsupervisedDose: 10 sessions  | Duration: 10 weeksDescription:Standard care | Overall:Grimby-Frandin: 2.4Intervention:Grimby-Frandin: 2.4 (0.7)Control:Grimby-Frandin: 2.4 (0.8) | PA:**Grimby-Frandin Scale**  | 12 weeks  |
| Chen 2020 | Cluster-RCT | Total:161Intervention:89Control:72 | Total:68.9 (7.35)Intervention:67.09 (7.7)Control68.71 (6.69) | Total:149 (92.5)Intervention:81 (91%)Control:68 (94.4%) | OverallKnee OA: Unilateral N=80 (49.7%)Knee OA Bilateral N=81 (50.3%)Intervention:Knee OA:Unilateral N=47 (62.8%)Bilateral N=42 (47.2%)Control:Knee OAUnilateral N=33 (45.8%)Bilateral N=39 (54.2%) | Duration: 24 weeks Type of PA:Non-self-selectedSpecific activities: Balance, strengthening and range of movement exercises; group education, education handouts, TTM stage-based adviceMethod of delivery:Individual + group-basedSetting of PA: Supervised + unsupervised Dose: 9 sessions  | Duration: 12 weeks Description:HEP including intermittent review sessions  | N/A | PA:**Exercise adherence NRS** | 0 |
| Farr 2010 | RCT | Total:171Intervention:114Control:57 | Total:55.1 (7.1)Intervention:54.7 (7.3)Control55.8 (6.1) | Total:128 (74%)Intervention:87 (76%)Control:41 (72%) | Knee OA  | Duration: 9 months Type of PA:Non-self-selectedSpecific activities: Resistance training, classroom-based self-management advice + telephone programme to reinforce skills Method of delivery:Individual and group-based Setting of PA: SupervisedDose: 36 sessions  | Duration: 9 months Description:Classroom-based self-management advice + telephone programme to reinforce skills | Overall:Min/day: 25.8Intervention:Min/day: 27.4 (19.4)Control:24.2 (19.3) | PA: **Min/day (≥ 3 METs) (accelerometry)** | 0 |
| Hinman 2007 | RCT | Total:71Intervention:36Control:35 | Total:62.4 Intervention:63.3 (9.5)Control61.5 (7.8) | Total:48 (67.6%)Intervention:24 (67%)Control:24 (69%) | Overall: Knee OA N=55 (77%)Hip OA N=16 (23%Intervention:Knee OA N=31 (86%)Hip OAN=5 (14%)Control:Knee OA N=24 (69%)Hip OAN=11 (31%) | Duration: 6 weeks Type of PA:Non-self-selected Specific activities: Aquatic physiotherapy, written handouts + information on local pools Method of delivery:Group-basedSetting of PA: Supervised + unsupervisedDose: 12 sessions  | Duration: 0 weeks Description:Advice to continue with normal activities  | Overall:PASE: 159Intervention:PASE: 165 (80)Control:PASE: 153 (79) | PA:**PASE** | 0 |
| Hinman 2020 | RCT | Total:175Intervention:88Control:87 | Total:62.5Intervention:62.4 (9.1)Control:62.5 (8.1) | Total:110 (63%)Intervention:55 (63%Control:55 (63%) | Knee OA | Duration: 6 months Type of PA:Self-selected and non-self-selectedSpecific activities: Strengthening exercises, general PA (unspecified) and support with developing an action plan delivered via phone consultations with physical therapists. Also received existing care from the Musculoskeletal Help Line in Victoria, Australia, and website with exercise videos.Method of delivery:Individual Setting of PA: Unsupervised Dose: 7 sessions | Duration: 1 sessionDescription:Existing care from the Musculoskeletal Help Line in Victoria, Australia. Provides information on OA, treatments, self-management strategies, navigation of care pathways and linkages to community services | Overall:PASE: 167Intervention:PASE: 170 (91)Control:PASE: 163 (81) | PA:**PASE** | 6 months  |
| Hughes 2006 | RCT | Total:215Intervention:115Control:100 | Total:73.4Intervention:73.3 Control73.4 | Total:179 (83.3%)Intervention:93 (80.6%)Control:86 (85.9%) | Knee or hip OA (participant numbers unspecified) | Duration: 8 weeks Type of PA:Non-self-selectedSpecific activities: Walking, strengthening exercises + education Method of delivery:Individual + group-basedSetting of PA: Supervised + unsupervisedDose: 24 sessions  | Duration: 0 weeks Description:Given Arthritis Helpbook, list of exercise programmes in the community + self-care materials/ handouts | Overall:Min/week: 128.91Intervention:Min/week: 135.27 (145.11)Control:Min/week: 122.55 (128.05) | PA:**Min/week exercising (self-report)** | 10 months  |
| Kloek 2018 | Cluster-RCT | Total:208Intervention:109Control:99 | Total:63.1Intervention:63.8 (8.5)Control62.3 (8.9) | Total:141 (67.8%)Intervention:74 (67.9%)Control:67 (67.7%) | Overall:Knee OA N=138 (66.3%)Hip OA N=38 (18.3%)Knee and hip OA N=32 (15.4%)Intervention: Knee OA N=71 (65.1%)Hip OA N=21 (19.3%)Knee and Hip OA N=17 (15.6)Control:Knee OA N=67 (67.6%) Hip OA N=17 (17.2%)Knee and hip OA N=15 (15.2%) | Duration: 12 weeks Type of PA:Self-selected + non-self-selectedSpecific activities: Physiotherapy prescribed exercise, self-selected PA + online E-exercise graded activity modules Method of delivery:Individual Setting of PA: Supervised + unsupervisedDose: 5 in-person11 online modules | Duration: Not reportedDescription:Usual care | Overall:Min/day MVPA (accelerometry): 23.9 Intervention:Min/day MVPA (accelerometry): 25.2 (23.1)Control:Min/day MVPA (accelerometry): 22.5 (21.8) | PA:Min/day doing MVPA (SQUASH)**Min/day doing MVPA (accelerometry)**SB: **Min/day (accelerometry)** | 9 months  |
| Krein 2013 | RCT | Total:229Intervention:111Control:118 | Total:51.6 Intervention:51.2 (12.5)Control51.9 (12.8) | Total:28 (12.2%)Intervention:12 (11%)Control:16 (14%) | PLBP | Duration: 12 months Type of PA:Non-self-selectedSpecific activities: Walking-based, internet-based providing goal setting and feedback on pedometer data + e-community with fellow participants Method of delivery:Individual Setting of PA: UnsupervisedDose: N/A | Duration: N/ADescription:Enhanced usual care – usual care + use of pedometer  | Overall:Step/day: 4407.4Intervention:Step/day: 4492.9 (2749.9)Control:Step/day: 4321.9 (2285.4) | PA:**Step/day (pedometer)**  | 0 |
| Lang 2021 | RCT | Total: 174Intervention:117Control:57 | Total:46 (16.5)Intervention: 47.1 (16.1)Control:43.7 (17.2) | Total:104 (60.1%)Intervention:67 (57.8%)Control:37 (64.9%) | PLBP | Duration: 12 weeks Type of PA:Non-self-selectedSpecific activities:Personalised pedometer driven walking programme and a standard package of education about PA.Method of delivery:Individual Setting of PA:Unsupervised Dose:13 sessions | Duration: 1 weekDescriptionStandard package of education about PA. | OverallMET-min/week: 3046 (3910.9)InterventionMET-min/week: 2836.3 (3501.5)ControlMET-min/week 3461 (4623.1) | PA:**MET-min/week (IPAQ)** | 9 months  |
| Meng 2011 | RCT | Total:360Intervention:187Control:173 | Total:49.9 (7.6)Intervention:50.2 (7.6)Control49.5 (7.7) | Total:231 (64.2%)Intervention:122 (65.2%)Control:109 (63%) | PLBP | Duration: Not reportedType of PA:Non-self-selectedSpecific activities: New back school with education and exercise practiceMethod of delivery:Group-basedSetting of PA: SupervisedDose: 7 sessions  | Duration: Not reportedDescription:Traditional back school (usual care) – 1 less session than intervention group | Overall:Hour/week: 7.05Intervention:Hour/week: 7.33 (4.85)Control:Hour/week: 6.76 (4.27) | PA: **Hour/week (Freiburg Questionnaire on Physical Activity)** | 12 months (from baseline) |
| Nelligan 2021 | RCT | Total:206Intervention:103Control:103 | Total: 60 (8.4)Intervention:60.3 (8.2)Control:59 (8.5) | Total:126 (61%)Intervention:60 (58%)Control:66 (64%) | Knee OA | Duration: 24 weeksType of PA:Non-self-selectedSpecific activities:Home-based lower limb strengthening exercise programme, general PA (unspecified) and education accessed on a website, and automated text message supportMethod of delivery:IndividualSetting of PA:UnsupervisedDose:17 sessions  | Duration:Description:Education via a website about PA for people with OA  | Overall:PASE: 141.45Intervention:PASE: 146.9 (71.7)Control:PASE: 136 (68.2) | PA:**PASE** | 0 |
| Pisters 2010 | Cluster-RCT | Total:200Intervention:97Control:103 | Total:65Intervention:65 (7)Control65 (8) | Total:154 (77%)Intervention:73 (75%)Control:81 (79%) | Overall:Knee OA N=130 (65%)Hip OA N=50 (25%)Knee and hip OA N=20 (10%)Intervention: Knee OA N=67 (69%)Hip OA N=22 (23%)Knee and Hip OA N=8 (8%)Control:Knee OA N=63 (61%) Hip OA N=28 (27%)Knee and hip OA N=12 (12%) | Duration: 55 weeksType of PA:Non-self-selectedSpecific activities: Exercise and functional activities, behavioural graded activity programme – time + booster sessions to foster integration into daily livesMethod of delivery:Individual Setting of PA: Supervised + unsupervisedDose: 25 sessions  | Duration: 12 weeks Description:Usual care | Overall:Day/week ≥30 mins MVPA: 4.3Intervention:Day/week ≥30 mins MVPA: 4.6 (2.7)Control:Day/week ≥30 mins MVPA: 3.9 (2.9) | PA:**Day/week performing ≥30 mins MVPA (SQUASH)** | 10 weeks  |
| Schaller 2017 | RCT | Total:412Intervention:201Control:211 | Total:50.4Intervention:49.7 (8.3)Control51.1 (7.8) | Total:126 (30.6%)Intervention:58 (28.9%)Control:68 (32.2%) | PLBP | Duration: 12 months Type of PA:Self-selected Specific activities: ‘Movement coaching’: Multi-level including In-person group sessions, telephone aftercare + online resources platformMethod of delivery:Individual + group-basedSetting of PA: UnsupervisedDose: 5 sessions  | Duration: 3 weeks Description:Two PA education lectures  | Overall:MET-min/week: 7260Intervention:MET-min/week: 7654 (8527)Control:MET-min/week: 6865 (8779) | PA:**MET-min/week (GPAQ)** | 0 |
| Semrau 2021 | RCT | Total: 361Intervention: 176Control:175 | Total: 51 (7.4)Intervention:51.24 (7.4)Control:51 (7.4) | Total: 257 (79%)Intervention:124 (75.8%)Control:133 (81.7%) | PLBP | Duration: 4 weeksType of PA:Non-self-selected Specific activities:Biopsychosocial rehabilitation programme for PLBP and Behaviour Exercise Therapy for promotion of PA behaviour. Included a range of exercise types (e.g. mobility, strengthening, walking)Method of delivery:Group-basedSetting of PA:CombinationDose:32 sessions | Duration: 4 weeksDescription:Biopsychosocial rehabilitation programme for PLBP and Standard Exercise Therapy  | Overall: Hour/week: 7.28Intervention:Hour/week: 6.73 (7.47)Control:7.82 (10.63) | PA:**Hour/week (Freiburg Questionnaire on Physical Activity)**  | 11 months  |
| Wallis 2017 | RCT | Total:46Intervention:23Control:23 | Total:67.5Intervention:68 (8)Control67 (7) | Total:20 (43.5%)Intervention:9 (39%)Control:11 (48%) | OverallKnee OA: Unilateral N=20 (43.5%)Bilateral N=26 (56.5%)Intervention:Knee OA:Unilateral N=9 (39%)Bilateral N=14 (61%)Control:Knee OAUnilateral N=11 (48%)Bilateral N=12 (52%) | Duration: 12 weeks Type of PA:Non-self-selectedSpecific activities: Community-based walking programme, physiotherapy + usual careMethod of delivery:Individual + group-basedSetting of PA: Supervised + unsupervisedDose: Not reported | Duration: N/ADescription:Usual care | Overall:Min/day walking: 76Intervention:Min/day walking: 85 (40)Control:Min/day walking: 67 (28) | PA:Step/day (accelerometry)**Min/day walking (accelerometry)**SB: **Hour/day sitting or lying (accelerometr**y) | 0 |
| Zacharia 2018 | RCT | Total:20Intervention:10Control:10 | Total: 57 (4.1)Intervention:Not reportedControlNot reported | Not reported | Lower limb OA (hip, knee, ankle or feet) (participant numbers unspecified) | Duration: 12 weeksType of PA:Non-self-selectedSpecific activities: Yoga programme + relapse prevent programme – emails and phone callsMethod of delivery:Individual + group-basedSetting of PA: Supervised + unsupervisedDose: 20 sessions  | Duration: 8 weeks Description:Yoga programme  | Overall:MET-min/week: 3295.1 Intervention:MET-min/week: 3094.3 (1696.9)Control:MET-min/week: 3495.9 (2023.7) | PA: **MET-min/week (IPAQ)** | 0 |
| Key: AAS = Active Australia Survey; CCHS = Copenhagen City Heart Study; CV = cardiovascular; GPAQ = Global Physical Activity Questionnaire; HEP = Home exercise programme; IPAQ = International Physical Activity Questionnaire; MET = Metabolic Equivalents; MVPA = moderate-vigorous physical activity; NRS = Numerical Rating Scale; OA = osteoarthritis; PA = physical activity; PASE = Physical Activity Scale for the Elderly; PLBP = persistent low back pain; RCT = randomised controlled trial; SB = sedentary behaviour; SD = standard deviation; SQUASH = Short Questionnaire to Assess Health-Enhancing Physical Activity; TTM = Transtheoretical model; VPA = Vigorous physical activity**Bold outcomes = used in meta-analyses** Longest follow-up time = time since end of intervention, 0 = no other follow-up except immediate post-intervention |

Table 2: Main meta-analysis and subgroup meta-analysis

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Analysis  | Number of trials/ outcomes  | Meta-analysis | HeterogeneityI2 | Trim and fill effect size (95% CI) [adjusted studies] | Classic fail-safe N |
|  | **Hedge’s g** | **95% CI** | **p-value**  |  |  |  |
| Meta-analysis |  |  |  |  |  |  |  |
| Intervention vs controlPA outcomes post-intervention | 21 | 0.321 | 0.136 – 0.507 | 0.001 | 82.947 | 0.456 (0.274 – 0.637) [6] | 302 |
| Intervention vs controlPA outcomes longer-term follow-up | 12 | 0.197 | 0.061 – 0.332 | 0.005 | 59.039 | 0.242 (0.110 – 0.373) [2] | 49 |
| Intervention vs control SB outcomes post-intervention | 3 | -0.203 | -0.702 – 0.295 | 0.424 | 63.965 | Unchanged  | 0 |
| Intervention vs controlSB outcomes longer-term follow-up | 2 | 0.011 | -0.183 – 0.204 | 0.914 | 0 | NA | NA |
| Subgroup analysis – PA outcomes  |  |  |  |  |  |  |
| Low risk of bias  |  |  |  |  |  |  |  |
| Post-intervention  | 16 | 0.257 | 0.115 – 0.399 | 0.000 | 64.543 | 0.363 (0.208 – 0.518) [4] | 124 |
| Longer-term follow-up  | 10 | 0.202 | 0.045 – 0.360 | 0.012 | 66.312 | 0.227 (0.073 – 0.381) [1] | 38 |
| Outcome measure type (post-intervention) |  |  |  |  |  |
| Self-report | 16 | 0.350 | 0.113 – 0.586 | 0.004 | 85.344 | 0.490 (0.271 – 0.708) [5] | 208 |
| Objective  | 5 | 0.191 | -0.039 – 0.420 | 0.103 | 60.362 | Unchanged  | 4 |
| Nature of the intervention (post-intervention) |
| PA + counselling/coaching | 9 | 0.121 | -0.007 – 0.249 | 0.064 | 28.274 | -0.020 (-0.172 – 0.132) [4] | 4 |
| PA + education | 4 | 0.749 | 0.003 – 1.495 | 0.049 | 95.535 | Unchanged | 77 |
| PA + education + counselling | 6 | 0.216 | 0.064 – 0.369 | 0.006 | 0 | Unchanged  | 6 |
| PA only  | 2 | 0.586 | -0.016 – 1.188 | 0.056 | 60.369 | NA | NA |
| Type of PA (post-intervention) |  |  |  |  |  |  |
| Self-selected  | 1 | -0.057 | -0.250 – 0.135 | 0.560 | NA | NA | NA |
| Non-self-selected  | 17 | 0.384 | 0.158 – 0.610 | 0.001 | 83.452 | 0.495 (0.284 – 0.706) [4] | 273 |
| Self-selected and non-self-selected  | 3 | 0.118 | -0.061 – 0.298 | 0.196 | 0 | -0.002 (-0.183 – 0.180) [2] | 0 |
| Setting of PA (post-intervention) |  |  |  |  |  |  |
| Supervised | 3 | 0.262 | 0.061 – 0.464 | 0.011 | 0 | Unchanged  | 2 |
| Unsupervised | 6 | 0.069 | -0.051 – 0.188 | 0.261 | 3.216 | 0.007 (-0.121 – 0.125) [3] | 0 |
| Supervised and unsupervised | 12 | 0.447 | 0.130 – 0.764 | 0.006 | 87.809 | 0.600 (0.310 – 0.901) [3] | 180 |
| Method of delivery (post-intervention) |  |  |  |  |  |
| Individual  | 11 | 0.177 | 0.079 – 0.276 | 0.000 | 0 | 0.104 (0.008 – 0.199) [4] | 9 |
| Group-based | 1 | 0.309 | -0.154 – 0.772 | 0.190 | NA | NA | NA |
| Individual and group-based | 9 | 0.491 | 0.054 – 0.927 | 0.028 | 92.159 | 0.668 (0.223 – 1.113) [2] | 115 |
| Key: CI = confidence interval; NA = not applicable;  |

Table 3: Summary of findings and quality of evidence (GRADE)

|  |  |  |  |
| --- | --- | --- | --- |
| Outcome | No. of participants(studies) | Hedge’s g effect size (95% CI) | Quality of the evidence (GRADE)  |
| Physical activity post-intervention | 3,008 (21) | 0.321 (0.136 to 0.507) |  **VERY LOW1 2** Due to inconsistency and imprecision  |
| Physical activity longer-term follow-up | 2,152(12) | 0.197 (0.061 to 0.332) |   **LOW 1 3**Due to inconsistency and imprecision |
| Sedentary behaviour post-intervention | 280(3) | -0.203 (-0.702 to 0.295) |  **VERY LOW1 4 5** Due to indirectness, inconsistency and imprecision |
| Sedentary behaviour longest follow-up | 407(2) | 0.011 (-0.183 to 0.204) |  **VERY LOW 4 5**Due to indirectness and imprecision |
| Key: CI = confidence interval; ES = effect size; PA = physical activity; ROB = Risk-of-bias; SB = sedentary behaviour |
| GRADE Working Group grades of evidence High quality: Further research is very unlikely to change our confidence in the estimate of effectModerate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimateLow quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.Very low quality: We are very uncertain about the estimate.  |
| Footnotes/reasons for downgrading 1 Downgraded by one level for inconsistency due to high (≥50% I2) heterogeneity 2 Downgraded by two levels for imprecision due to the lower CI including no effect, presence of small studies and the ES was derived from four studies of which one had concerns over ROB, and one was a small study3 Downgraded by one for imprecision as lower CI includes no effect and the ES derived from three studies 4 Downgraded by one for indirectness as >50% studies are not aimed at reducing SB 5 Downgraded by two for imprecision as CI included no effect |

Table 4: Meta-regression of moderators of physical activity outcomes

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Moderator**  | **Number of trials**  | **β** | **95% CI** | **p-value** | **R2**  |
| **Number of BCTs** |  |  |  |  |  |
| Post-intervention | 21 | 0.0216 | -0.0520 – 0.0952 | 0.5650 | 0.00 |
| Longer-term follow-up | 12 | 0.0267 | -0.0126 – 0.0659 | 0.1828 | 0.12 |
| **Number of sessions** |  |  |  |  |  |
| Post-intervention | 19 | -0.0031 | -0.0155 – 0.0092 | 0.6178 | 0.00 |
| Longer-term follow-up | 11 | 0.0095 | -0.0060 – 0.0249 | 0.2304 | 0.07 |
| Key: β = beta coefficient**;** BCT = behaviour change technique; CI = confidence interval |

Table 5: Frequency and effectiveness percentages for behaviour change techniques used in physical activity interventions

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **BCT number**  | **BCT label**  | **Number of interventions present in**  | **Effective interventions present in** | **Effectiveness percentages (physical activity)** | **Number of controls present in** |
| 1.1 | Goal setting (behaviour) | 9 | 3 | 33% | 1 |
| 1.2  | Problem solving  | 9 | 3 | 33% | 2 |
| 1.3 | Goal setting (outcome) | 4 | 2 | 50% | 1 |
| 1.4 | Action planning  | 8 | 4 | 50% | 0 |
| 1.5 | Review behaviour goal(s) | 2 | 1 | NA | 0 |
| 1.8  | Behavioural contract | 1 | 1 | NA | 0 |
| 2.1 | Monitoring of behaviour by others without feedback | 2 | 0 | 0% | 1 |
| 2.2 | Feedback on behaviour  | 6 | 2 | 33% | 1 |
| 2.3 | Self-monitoring of behaviour | 14 | 5 | 36% | 2 |
| 2.4 | Self-monitoring of outcome(s) of behaviour | 6 | 1 | 17% | 0 |
| 2.5 | Monitoring outcome(s) of behaviour by others without feedback | 4 | 2 | 50% | 1 |
| 2.7 | Feedback on outcome(s) of behaviour | 2 | 1 | 50% | 0 |
| 3.1  | Social support (unspecified) | 10 | 1 | 10% | 1 |
| 3.3  | Social support (emotional) | 1 | 0 | NA | 0 |
| 4.1 | Instruction on how to perform a behaviour  | 20 | 5 | 25% | 11 |
| 5.1 | Information about health consequences | 10 | 1 | 10% | 8 |
| 5.2 | Salience of consequences | 1 | 1 | NA |  |
| 5.4 | Monitoring of emotional consequences | 1 | 0 | NA |  |
| 6.1 | Demonstration of the behaviour | 11 | 4 | 37% | 3 |
| 7.1 | Prompts/cues | 3 | 1 | 33% | 2 |
| 8.1 | Behavioural practice/rehearsal | 10 | 3 | 30% | 4 |
| 8.7 | Graded tasks  | 6 | 2 | 33% | 0 |
| 9.1 | Credible source | 19 | 6 | 32% | 12 |
| 9.2 | Pros and cons | 1 | 0 | NA |  |
| 10.3 | Non-specific reward | 1 | 0 | NA | 0 |
| 10.4 | Social reward | 1 | 1 | NA | 0 |
| 11.1 | Pharmacological support | 1 | 0 | NA | 1 |
| 11.2 | Reduce negative emotions | 1 | 0 | NA | 1 |
| 12.5 | Adding objects to the environment | 3 | 2 | 67% | 0 |
| 12.6  | Body changes | 1 | 0 | NA | 0 |
| 13.2 | Framing/reframing | 2 | 0 | 0% | 1 |
| Key: BCT = behaviour change technique; NA = not applicable; PA = physical activity |

Table 6: Behaviour change theory in studies

|  |  |
| --- | --- |
| Study | Theory and use |
| Baker 2020 | Social Cognitive Theory (2 – applied theory)Self-efficacy theory (2 – applied theory)Transtheoretical Model (2 – applied theory) |
| Basler 2007 | Transtheoretical Model (2 – applied theory) |
| Cederbom 2019 | Operant Conditioning (1 – Informed by theory)Self-efficacy theory (1 – informed by theory) |
| Chen 2020 (effective) | Transtheoretical Model (3 – tested theory) |
| Hughes 2006 (effective) | Social Cognitive Theory (3 – tested theory) |
| Kloek 2018 | Goal Setting Theory (1 – informed by theory) |
| Krein 2013 | Social Cognitive Theory (2 – applied theory) |
| Meng 2011 | Health Action Process Approach (2 – applied theory) |
| Nelligan 2021 | Capability-Opportunity-Motivation-Behaviour model and Theoretical Domains Framework (4 – building or creating theory)  |
| Pisters 2010 (effective) | Operant conditioning (2 – applied theory) |
| Schaller 2017 | Rubicon Model of Action Phases (1 – informed by theory) |
| Semrau 2021 | Health Action Process Approach (3 – tested theory) |

Table 7: Studies with significant health-related outcomes other than physical activity/sedentary behaviour

|  |  |  |
| --- | --- | --- |
| Outcome measure category | Number of studies assessing  | Studies with Significant outcomes (p<0.05) |
| Pain | 16 | Total: 5 (31.25%)Study name (measurement point): * Cederbom 2019 (post-intervention and longest follow-up)
* **Chen 2020 (post-intervention)**
* Hinman 2007 (post-intervention)
* **Hinman 2020 (post-intervention)**
* **Nelligan 2021 (post-intervention)**
 |
| Function | 18 | Total: 9 (50%)Study name (measurement point): * **Barone Gibbs 2018 (post-intervention)**
* Basler 2007 (longest follow-up)
* **Bennell 2017 (post-intervention and longest follow-up)**
* Cederbom 2019 (post-intervention)
* **Chen 2020 (post-intervention)**
* Hinman 2007 (post-intervention)
* **Hinman 2020 (post-intervention)**
* **Hughes 2006 (post-intervention)**
* Nelligan 2021 (post-intervention)
 |
| Psychological | 12 | Total: 7 (58.3%)Study name (measurement point): * Bieler 2017 (post-intervention - NW group)
* Bossen 2013 (longest follow-up)
* **Chen 2020 (post-intervention)**
* **Hinman 2020 (post-intervention and longest follow-up)**
* **Hughes 2006 (post-intervention and longest follow-up)**
* Meng 2011 (longest follow-up)
* Nelligan (post-intervention)
 |
| Quality of life (QOL) | 12 | Total: 4 (33.33%)Study name (measurement point): * Bieler 2017 (post-intervention)
* Cederbom 2019 (post-intervention)
* Hinman 2007 (post-intervention)
* Nelligan 2021 (post-intervention)
 |
| Physical/functional performance  | 9 | Total: 4 (44%)Study name (measurement point): * Bieler 2017 (post-intervention)
* **Chen 2020 (post-intervention)**
* Hinman 2007 (post-intervention)
* **Wallis 2017 (post-intervention)**
 |
| Cardiovascular health and risk factors  | 1 | Total: 1 (100%)Study name (measurement point): * **Wallis 2017 (post-intervention)**
 |
| Medication use | 1 | Total: 0 (0%) |