

Appendix B. Detailed characteristic of RCTs included in the systematic review of prevention strategies to reduce future impact of low back pain

| Source | Study design | Country | Participants | Outcome measure | Study Groups | Time and frequency of Interventions | Follow-up period |
|--|--------------|-------------|--|---|--|--|------------------|
| Barene et al, ¹⁷ (2014) | C-RCT | Norway | 118 hospital employees (nurses, healthcare assistant, and other professions, mainly bioengineers and social educators); mean (SD) age, 45.8 (9.3) y; female (91%). | LBP Intensity LBP Duration | I1: Soccer training: performed soccer training sessions supervised by an instructor. I2: Zumba training: The Zumba sessions consisted of continuous dance-movements with varying intensity level throughout the sessions. C: No intervention. | Two-three 1-hour sessions per week over 40 weeks for both intervention groups. | 10 months |
| Chaleat-Valayer et al, ⁸ (2016) | RCT | France | 342 healthcare workers from ten hospitals; mean (SD) age, 47.2 (8.5) y; female (77%). | LBP Intensity (VAS) Disability (QBPDs) | I: Three steps: a single education session; Exercise training sessions in the work place delivered by a Physio (8-10 participants); home-based self-managed exercise program (booklet). C: No intervention. | Single 2-hours education session and 5 weekly 90-min group exercise training sessions. | 18 months |
| Donaldson et al, ¹⁸ (1993) | RCT | Canada | 172 employees from hospital in the regional health care aging population facilities in Drumheller Region; mean (SD) age NR; sex NR. | LBP Intensity (MPQ) | I: Education course (classes) on how to use information from the "Back to Balance" booklet to prevent back injury, delivered by two experienced instructors. C: No intervention. | 9 classes per instructor. The classroom presentation lasted approximately one and a half hours. | 12 months |
| Donchin et al, ¹⁹ (1990) | RCT | Israel | 142 hospital employees from the various clinical, administrative and technical professions; mean (SD) age, 46.0 (NR) y; female (66%). | LBP (Painful months) | I1: Calisthenics training: Exercises aiming at strengthening the abdominal muscles, expanding spinal forward flexion, and rectifying the general posture. They were supervised by a physical education instructor. I2: Back school training: Instruction in proper body mechanics as well in exercises for the back and abdominal muscles. Sessions led by a physiotherapist. C: No intervention | I1: 45-min sessions, bi-weekly, for 3 months, in groups of 10 to 12 participants. I2: 4x 90-min sessions during a 2-week period in groups of 10 to 12 participants plus a fifth session after 2 months. | 12 months |
| Driessen et al, ²⁰ (2011) | C-RCT | Netherlands | 3047 workers from 4 Dutch companies; mean (SD) age, 42.0 (10.95) y; female (41%). | LBP Intensity (VAS) LBP Duration | I: Ergonomic program: implementation of ergonomic program (evaluation and prioritise the risk factors and ergonomic measures to prevent LBP). C: Minimal intervention: short educational movies about prevention of LBP. | I: Use the ergonomic program while on duty (first 3 months to implement the ergonomic measures). C: 3 short (45s) educational movies on back pain prevention. | 12 months |

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| Eggen et al, ²¹ (2012) | RCT | Norway | 257 health pregnant women before gestation week 20; mean (SD) age, 30.3 (4.8) y; female (100%). | LBP Intensity (VAS) Disability (RMDQ) | I: Exercises, including ergonomic advice, in groups and advise to do home exercises. Goal of the exercises was to achieve efficient motor control and the ability to dynamically control and stabilize the lumbo-pelvic region during daily activities. Sessions supervised by a physiotherapist. C: No intervention. | 1x/week 1-hour group exercise session for 16 to 20 weeks. | 4 months |
| Fanucchi et al, ²² (2009) | RCT | South Africa | 72 children in Grade 6 and Grade 7 primary school; mean (SD) age, 12.3 (0.7) y; female (46%). | LBP Intensity (VAS) | I: Education session on the importance of exercise for LBP. Exercise classes at school and weekly home exercise program. C: No intervention. | 8x classes 40–45min each over 8 weeks | 6 months |
| Garshasbi et al, ²³ (2005) | RCT | Iran | 212 pregnant women (17–22 nd weeks of gestation); mean (SD) age, 26.4 (4.6) y; female (100%). | LBP Intensity (KQ) | I: Exercise training aiming to strength the abdominal-pelvic region, including 5 min of slow walking, 5 min of extension movements, and 10 min of general warming up, 15 min of anaerobic exercise, 20 min of specific exercise and 5 min to cool down. C: No intervention. | 3x per week for 60min each for 12 weeks. | 3 months |
| Gatty et al, ²⁴ (2004) | RCT | USA | 16 clerical and office workers; mean (SD) age, NR; female (100%). | LBP Intensity (VAS) LBP Duration | I: Implementation of individualized work injury prevention program (WIPPs). The program combined approaches which incorporate various strategies or components, such as education, workstation redesign, and task modification. C: No intervention. | 1-hour session over 4 weeks period (4 sessions). Intervention continuous during study period. | 9 months |
| Glomsrod et al, ²⁵ (2001) | RCT | Norway | 81 community and participants referred from primary care clinicians; mean (SD) age, 39.4 (6.8) y; female (54%). | LBP Intensity (VAS) Disability (VAS) | I: Exercise and education: active back school-didactic session; practical session included bending the knee and hip joints, while keeping the lumbar segments near mid-position and using short lever arms during functional exercises and obstacle course simulations; strength training and some stretching exercises. C: No intervention. | 2 Sessions per week for 7 weeks; 1 session per week for 6 weeks; each session 60 min. | 36 months |
| Gundewall et al, ²⁶ (1993) | RCT | Sweden | 69 nurses and nurse's aides at a geriatric hospital; mean (SD) age, 37.5 (10.5) y; female (98%). | LBP Duration | I: Back muscle exercises to increase endurance, isometric strength and functional coordination. C: No intervention. | 6x monthly sessions of 20 min each. | 13 months |

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| Haufe et al, ²⁷ (2017) | RCT | Germany | 226 workers from 3 medium-sized companies; mean (SD) age, 42.7 (10.2) y; female (40%). | LBP Intensity (VAS) Disability (ODI) | I: Monthly individual counselling/supervision sessions with a physiotherapist. Also, general training for the trunk and shoulder muscles. C: Participants were asked to continue their current lifestyle. | I: 20-min non-supervised general exercise session 3x per week. 5x once monthly counselling session. | 5 months |
| Ijzelenberg et al, ²⁸ (2007) | C-RCT | Netherlands | 489 workers performing physically demanding jobs in 9 large companies; mean (SD) age, 41.3 (9.7) y; female (3%). | LBP Intensity (NRS) Disability (RMDQ) | I: Education, training, and ergonomic adjustments: individually tailored education and training, immediate treatment of acute LBP, and advice on ergonomic adjustment of the workplace. C: Usual care - Dutch guidelines for the health care of patients with LBP. | 3x group training sessions. Unclear frequency. | 12 months |
| Irvine et al, ²⁹ (2015) | RCT | USA | 597 workers from 4 companies (trucking, manufacturing, technology, and a corporate headquarters), also general work population; mean (SD) age, NR; female (60%). | LBP Intensity LBP Duration LBP Functionality | I1: FitBack website program: Online education and behavioral strategies encouraging users to adopt appropriate strategies for prevention of LBP. I2: Alternative care: received 8 email with links to 6 websites with general information about LBP. C: No intervention | I: Weekly emails and unlimited access to online material during study period. | 4 months |
| Jensen et al, ⁷ (2006) | C-RCT | Denmark | 210 home care workers, nurses, and nurse's aides from 3 separate eldercare wards; mean (SD) age, 44.3 (8.9) y; female (100%). | LBP Intensity (NRS) | I1: Transfer Technique Intervention (TTI): Based on the Stockholm training concept, which aims to reduce the biomechanical load on the back, minimize work in asymmetric postures, and prevent sudden unexpected loads. Practical classroom education and instruction at the work site I2: Stress Management Intervention (SMI): Developed to address the work stress in health care with particular attention to prevention of burnout and development of strategies for stress management. C: No intervention | I1: 2x 4-hours classes and 30-hours site education delivered over 6 months period. I2: Group sessions every 2 weeks for 2-hours, over 20 weeks period. | 24 months |
| Kamioka et al, ³⁰ (2011) | C-RCT | Japan | 88 female caregivers from 4 nursing homes in Tokyo; mean (SD) age, 38.15 (13.75) y; female (100%). | LBP Intensity (VAS) | I: A lecture and stretching exercise. The lecture contained information on risk factors, biomechanics of care-movement, treatment, and recommended exercise. Daily stretching exercises aiming to prevent LBP based on William and McKenzie exercises. C: No intervention. | Single lecture of 30min; 1-hour instruction on stretching exercises. Daily stretching for about 6min. | 3 months |

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| Ketola et al, ³¹ (2002) | RCT | Finland | 109 office workers; mean (range) age, 48.0 (29 to 59) y; female (60%). | LBP Discomfort | I1: Intensive ergonomics: Ergonomic checklist emphasizing the layout and environmental conditions of the workroom, adjustments of the workstation, and breaks during work under guidance of a physiotherapist. I2: Ergonomic education: Training session in ergonomics in groups of 2 to 6 persons plus advice pauses during work. C: No intervention | I1: Around 2-hours of implementation. I2: a single 1-hour session. | 10 months |
| Lonn et al, ³² (1999) | RCT | Norway | 81 participants recruited through media advertisement and referred from primary care clinicians; mean (SD) age, 39.4 (6.8) y; female (54%). | LBP Intensity (VAS) Disability (VAS) | I: Exercise and education: active back school-didactic session; practical session included bending the knee and hip joints, while keeping the lumbar segments near mid-position and using short lever arms during functional exercises and obstacle course simulations; strength training and some stretching exercises. C: No intervention. | 2 Sessions per week for 7 weeks; 1 session per week for 6 weeks; each session 60 min. | 12 months |
| Menzel et al, ³³ (2006) | RCT | USA | 31 registered nurses and nursing aides; mean (SD) age, 41.94 (9.0) y; female (97%). | LBP Intensity (VAS) Disability (ODI) | I: Psychoeducational sessions for stress and pain management. C: No intervention. | 6x 1.5-hours group-discussion session. | 3 months |
| Pedersen et al, ³⁴ (2013) | C-RCT | Denmark | 537 industrial laboratory technicians; mean (SD) age, 42.0 (10.5) y; female (85%). | LBP Intensity (VAS) | I: Exercise training sessions for the shoulder, neck and arm with dumbbells, supervised by an experienced instructor. C: No intervention. | 3x weekly for 20min each over 5 months. | 5 months |
| Pedersen et al, ³⁵ (2009) | C-RCT | Denmark | 549 office workers recruited from a Danish public administration authority, from 12 offices in geographically different locations in the eastern part of Denmark; mean (SD) age, 45.1 (9.4) y; female (64%). | LBP Duration | I1: Specific Resistance Training (SRT): Exercise training sessions for the shoulder, neck and arm with dumbbells, supervised by an experienced instructor. I2: All-round Physical Exercise (APE): consisted of various types of physical activities at the worksite plus 8-minute CD-based exercise program for aerobic fitness and general strength. C: Reference group (REF): Encouraged to form groups with the purpose of improving their knowledge on health and working conditions. | I1: 3x weekly for 20min each over 12 months. I2: 1x introductory session at worksite; 1-hour per week | 12 months |
| Soukup et al, ³⁷ (2001) | RCT | Norway | 77 community and primary care participants; mean (SD) age, 37.7 (8.0) y; female (53%). | LBP Intensity (VAS) Disability (VAS) | I: Mensendieck exercises and biomechanical/ ergonomic, back anatomy, pain mechanisms, and working posture education. C: No intervention. | 20 Sessions for 60 min over a period of 13 weeks. | 36 months |
| Soukup et al, ³⁶ (1999) | RCT | Norway | 77 community and primary care participants; mean (SD) age, 37.7 (8.0) y; female (53%). | LBP Intensity (VAS) Disability (VAS) | I: Mensendieck exercises and biomechanical/ ergonomic, back anatomy, pain mechanisms, and working posture education. C: No intervention. | 20 Sessions for 60 min over a period of 13 weeks. | 12 months |

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| Tuchin et al, ³⁸ (1998) | RCT | Australia | 61 employees of a large mailing house; mean (SD) age NR; sex NR. | Disability (ODI) | I: A comprehensive lecture detailing spinal structures, an explanation about back pain, correct lifting techniques, treatments for back problems, effective exercises, ergonomics, and specific relationship of back pain to occupation and tasks involved. C: A series of daily exercises. The exercises consisted of a routine series of stretching procedures used as “warm up” program for sports. | I: Single 120min lecture session. C: Daily over 6 months period. | 6 months |
| van Poppel * et al, ³⁹ (1998) | C-RCT | Netherlands | 312 airline company workers whose jobs included manual material handling; mean (SD) age, 35.1 (7.8) y; sex NR. | LBP Duration | I1: Lumbar Support + Education: Back belts with adjustable elastic side pulls with Velcro fasteners and flexible stays + Education on lifting. I2: Lumbar Support only: Back belts with adjustable elastic side pulls with Velcro fasteners and flexible stays I3: Education only: education on lifting C: No intervention. | Lumbar support: Wear for 6 mo (work hours) Education (lifting instructions): 1x 2-hrs; 2x 1.5-hs; 3x (12 wks) C: No intervention | 6 months |
| Warming et al, ⁴⁰ (2008) | C-RCT | Denmark | 181 hospital nurses; mean (SD) age, 35.2 (10.5) y; female (90%). | LBP Intensity (NQ) Disability (RS) | I1: Education: patient transfer technique based on the law of physics and the natural movement pattern of moving 1 body part at a time. I2: Exercise and education: physical fitness training - aerobic fitness and strength training and transfer technique (TTPT). C: No intervention. | I1: 2x 6 weeks sessions. I2: 2x weekly for 1-hour over 8 weeks period. | 12 months |
| Yassi et al, ⁴¹ (2001) | C-RCT | Canada | 346 staff performing patient lifts and transfers (nurses and unit assistants); mean (SD) age NR; sex NR. | LBP Discomfort Disability (ODI) | I1: Arm B - Safe Lifting program. Intensive training in back care, patient assessment, and handling techniques used to improve patient handling techniques using manual equipment. I2: Arm C - No Strenuous Lifting program. Intensive training in back care, patient assessment, and handling techniques aimed to eliminate manual patient handling through use of additional mechanical and other assistive equipment. C: Arm A – Usual practice. | I1 and I2: 3-hours single session | 12 months |

Abbreviations: RCT, Randomised Controlled Trial; C-RCT, Cluster Randomised Controlled Trial; LBP, Low Back Pain; SD, Standard Deviation; VAS, Visual Analog Scale; QBPDS, Quebec Back Pain Disability Scale; MPQ, McGill Pain Questionnaire; RMDQ, Roland Morris Disability Questionnaire; KQ, KEBK Questionnaire; ODI, Oswestry Disability Index; NRS, Numeric Rating Scale; NQ, Nordic Questionnaire; RS, Rating Scale; I, Intervention group; C, Control group; NR, Not Reported.

* van Poppel et al³⁹ study was analysed as a 2x2 factorial design (ie, 4 groups) with the following intervention contrasts: Lumbar Support versus No Lumbar Support, and Education versus No Education.