

Table A1. Overview of cross sectional (CS), case-control (CC) and prospective cohort (PC) studies included in review. Bold font indicates that the study found a significant difference between golfers with and without low back pain (LBP) for that variable.

Study	Design	Quality Score, %	Population Characteristics	LBP Criteria	N (M:F)	Potential Risk Factors (Group Comparisons Available)				
						Demographics	Anthropometrics	Swing Characteristics	Strength/Flexibility	Practice Characteristics
Batt ³	CS	12.5	Members of a British golf club	Site of injury (back); differentiated between injuries received playing golf and injuries affecting golf	193 (164:29)	Age; sex				Handicap; years of experience; rounds per month
Burdorf et al ⁶	PC	100.0	Male novice recreational golfers at Dutch ranges and clubs	Lifetime history of low back pain (frequency, duration and severity of episodes); 1-year incidence of back pain	196 (196:0)	Age; education; occupation; physical activity at work;	Height; weight			Involvement in other sports; playing frequency; handicap at 1 year; number of lessons; regular warm-up
Cole and Grimshaw ¹²	CC	25.0	Not reported	≥20mm pain severity on VAS	27 (27:0)	Age	Height ; mass; BMI	Onset and cessation of external oblique and erector spinae activity		Handicap
Cole and Grimshaw ⁹	CC	33.3	Not reported	≥20mm pain severity on VAS	30 (30:0)	Age	Height; mass	Amplitude of external oblique and erector spinae activity		Sub-grouped into high-handicap and low-handicap cohorts
Cole and Grimshaw ¹¹	CC	25.0	Golfers at local private and public courses in Australia; over 18 years; playing for >12 months; current handicap	History of LBP when playing or practicing golf	27 (27:0)	Age	Height ; mass; BMI	Trunk lateral flexion; trunk and hip axial rotation and separation angle; trunk axial angular velocity; crunch factor		Handicap
Evans and Oldreive ¹⁵	CC	16.7	Recreational golfers from single UK club; playing twice weekly; age 20-45 years; playing > 2 years	History of LBP that prevents playing golf in last 2 years; no pain in previous 3 months	20 (20:0)				Endurance of transversus abdominis muscle	

Evans et al ¹⁶	PC	33.3	Trainee professionals in the Queensland PGA	Moderate or severe symptoms; symptom impact on golf; presence/absence of leg pain	14 (14:0)		BMI	Endurance of abdominals and erector spinae; endurance asymmetry ; peak hip and trunk extensor strength; hamstring and hip flexor flexibility; lumbar spine range of motion	
Gosheger et al ²¹	CS	12.5	Golfers at 24 German courses; professional and recreational golfers	Site of symptoms (lumbar, thoracic, cervical spine, categories collapsed into spine for most analyses); trauma versus overuse; duration of absence from golf; symptoms related to or unrelated to golf	703 (456:187)	Age; sex	BMI		Stretching and warm-up behaviors; rounds per week; driving range shots per week; golf bag carrying ; professional status
Gulgin and Armstrong ²²	CS	12.5	Professional golfers on LPGA Tour	Site of symptoms (right, left, bilateral, upper back, mid back, low back)	31 (0: 31)	Age	Height; weight	Passive hip internal and external rotation range of motion; side-to-side asymmetry	Stretching routine; strengthening program

Horton et al ²⁷	CC	25.0	Professional and elite recreational golfers; members of Alberta PGA or Alberta GA; under 55 years	Report of always or often experiencing LBP after golf; symptoms for > 6 months	18 (18: 0)	Age	Height; weight; BMI	Amplitude of rectus abdominis, external oblique and internal oblique activity before and after practice session; onset of external oblique and internal oblique before and after practice session	Abdominal muscle fatigue before and after practice session
Kalra et al ³⁰	CC	25.0	Handicap ≤ 20; right-handed; 25-65 years	History of LBP for > 2 weeks; affecting golf within past year; ODI score ≥ 24%; symptoms central or on right side; symptoms resulted from or aggravated by golf;	30 (not reported)			Trunk strength; trunk range of motion; hamstring flexibility	
Lindsay and Horton ³⁴	CC	25.0	Members of Alberta PGA	Report of always experiencing LBP after golf	54 (54:0)	Age	Height; mass	Trunk flexion, extension, lateral flexion , axial rotation; peak trunk angular flexion , extension, lateral flexion and axial velocity	Rounds per month; practice sessions per month; balls per practice session; putting sessions per month; time per putting session
Lindsay and Horton ³⁵	CC	25.0	Members of Alberta PGA; elite amateurs; patients of local physical therapy clinics; under 50 years	Report of always or often experiencing LBP after golf; symptoms for > 6 months	39 (39:0)	Age	Height; mass	Trunk axial rotation strength; trunk axial rotation endurance	

Murray et al ⁴³	CC	41.7	Members of two British golf clubs	Current LBP or history of LBP within previous year; symptoms for > 2 weeks; over-use rather than trauma	64 (43:21)	Age; sex	Height; weight ; handedness	Hip active and passive internal and external rotation; side-to-side hip asymmetry	Handicap; rounds per week; years of experience	
McHardy et al ⁴⁰	CS	12.5	Members of golf clubs randomly selected from across Australia	Current golf-related LBP or history of golf-related LBP in past 12 months	1725 (1316:318)	Age; sex			Handicap; duration of chipping/putting practice per week; full shot practice per week ; games per week	
Nicholas et al ⁴⁴	CS	75.0	Members of NY State GA; over 21 years; playing ≥ 1 year	Back condition from golf	368 (294:74)	Age; sex ; history of smoking; history of alcohol intake	Self-report of over-weight		Handicap; holes per week; weeks of play per year; years of play	
Silva et al ⁴⁸	CC	25.0	Right-handed golfers	Report of experiencing back pain after playing 18 holes > 65% of the time	21 (not reported)	Age	Height, mass	Discriminant capacity of non-linear muscle activation patterns of rectus femoris, biceps femoris, semi-tendinosis, external oblique, erector spinae and gluteus maximus	Handicap; years of play	
Tsai et al ⁵²	CC	25.0	Male, right-handed golfers with handicap < 20	Report of mechanical LBP aggravated by golf within previous 2 years; asymptomatic	32 (32:0)	Age	Height; mass	Axial trunk/pelvis separation; peak axial trunk rotation ; peak L5-S1 moments	Peak trunk and hip strength ; trunk and hip active range of motion; hamstring flexibility; FABER test; active spinal repositioning error; center of pressure velocity in	Handicap; estimated driving distance

Vad et al ⁵³	CC	33.3	Professional golfers on PGA Tour	Report of LBP limiting golf performance for > 2 weeks in previous year	42 (42:0)	Age	single-limb stance Hip internal rotation range of motion; FABER test; side-to-side hip asymmetry; trunk flexion and lumbar extension range of motion
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CC, case-control; CS, cross-sectional; F, female; LBP, low back pain; M, male; PC, prospective cohort.

Figure A1. Pooled standardized mean difference in age between golfers with and without low back pain. (a) All available data. (b) Subanalyses of studies explicitly reporting samples of recreational (top) and professional (bottom) golfers.

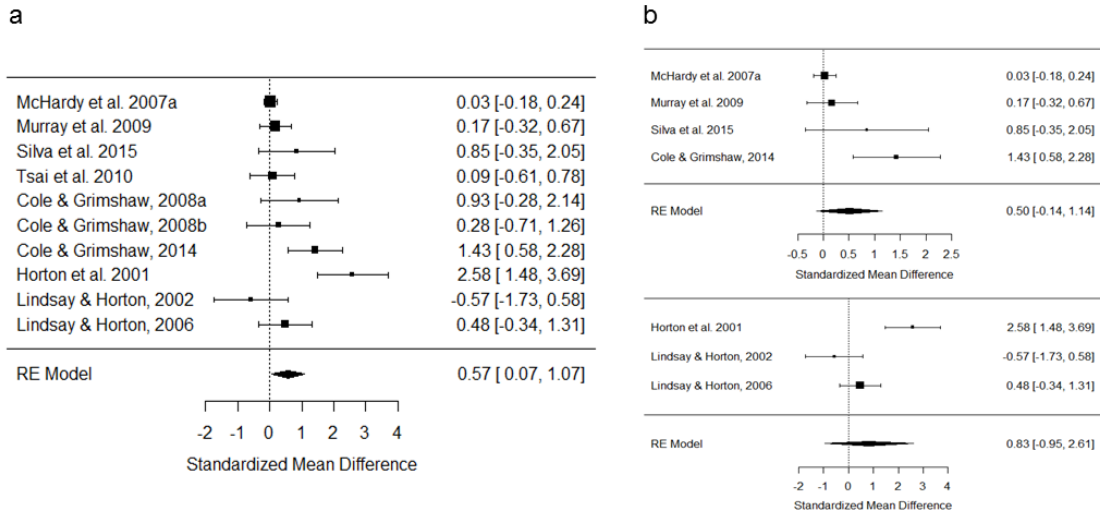


Figure A2. Pooled standardized mean difference in body mass between golfers with and without low back pain. (a) All available data. (b) Subanalyses of studies explicitly reporting samples of recreational (top) and professional (bottom) golfers.

