

Supplementary file 3. GRADE

Table S1. Diagnostics											
Test	Test result	Number of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Number of participants	Diagnostic accuracy	Certainty
Subacromial impingement											
Composit test (combination of Hawkins-Kennedy, Neer, Painful arc, Empty can/Jobe, external rotation against resistance) ¹	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	55	LR+=2.93 LR-=0.34	Low Low
Internal posterosuperior impingement											
Posterior impingement test ²	Positive Negative	1	Prospective cohort study	N/I	Not assessed	Not assessed	Not assessed	Not assessed	69	LR+=5.0 LR-=0.29	N/A ^c
Anterior instability											
Apprehension ¹	Positive Negative	2	Retrospective cohort studies	Not serious	Not serious	Serious ^a	Serious ^b	Large effect ^d	409	LR+=17.21 LR-=0.39	Moderate Low
Relocation ¹	Positive Negative	3	Cohort studies	Not serious	Serious ^e	Serious ^a	Serious ^f	None	509	LR+=5.48 LR-=0.55	Very low Very low
Surprise ¹	Positive Negative	2	Cohort studies	Not serious	Serious ^e	Serious ^a	Serious ^f	None	128	LR+=5.42 LR-=0.25	Very low Very low
Apprehension + relocation ¹	Positive Negative	1	Prospective cohort study	Not serious	Not serious	Serious ^a	Serious ^b	Large effect ^d	46	LR+=39.68 LR-=0.19	Moderate Moderate
SLAP											
Biceps load II ^{3c}	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	Large effect ^g	127	LR+=26.38/PPV=92.1 LR-=0.11/NPV=95.5	Moderate Moderate
Biceps-Labrum complex injuries											
O'Brien's active compression; Inside ^{4 d}	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	116	LR+=1.62/PPV=63.2 LR-=0.27/NPV=77.8	Low Low
O'Brien's active compression; Junctional ^{4 d}	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	116	LR+=2.48/PPV=82.4 LR-=0.15/NPV=77.8	Low Low
O'Brien's active compression;	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	Large effect ^h	116	LR+=2.00/PPV=65.7 LR-=0.08/NPV=92.6	Low Moderate

Bicipital tunnel ^d											
Throwing test; Inside ^d	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	116	LR+=2.32/PPV=71.2 LR-=0.36/NPV=72.1	Low Low
Throwing test; Junctional ^d	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	116	LR+=3.42/PPV=86.5 LR-=0.35/NPV=60.5	Moderate Low
Throwing test; Bicipital tunnel ^d	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	116	LR+=2.09/PPV=66.7 LR-=0.40/NPV=72.1	Low Low
Bicipital tunnel palpation; Inside ^d	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	116	LR+=1.92/PPV=67.2 LR-=0.16/NPV=85.7	Low Moderate
Bicipital tunnel palpation; Junctional ^d	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	Large effect ^h	116	LR+=3.43/PPV=86.6 LR-=0.09/NPV=85.7	Moderate Moderate
Bicipital tunnel palpation; Bicipital tunnel ^d	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	Large effect ^h	116	LR+=2.24/PPV=68.2 LR-=0.04/NPV=96.4	Low Moderate
Yergasons test; Inside ^d	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	116	LR+=2.13 LR-=0.76	Low Low
Yergasons test; Junctional ^d	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	116	LR+=6.57 LR-=0.83	Low Low
Yergasons test; Bicipital tunnel ^d	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	116	LR+=12.43 LR-=0.75	Moderate Low
Rotator cuff injury											
Painful Arc ⁵	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	104	LR+=3.70 LR-=0.36	Low Low
Gerber/Lift-off test ⁵	Positive Negative	2	Prospective cohort studies	Not serious	Serious ⁱ	Serious ^a	Serious ^b	None	233	LR+=1.40-1.50 LR-=0.63-0.85	Low Low
External rotation against resistance ⁵	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	203	LR+=2.60 LR-=0.49	Low Low
Full can ⁵	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	104	LR+=2.40 LR-=0.37	Low Low
Empty can/Jobe ⁵	Positive Negative	3	Prospective cohort studies	Not serious	Serious ^e	Serious ^a	Serious ^f	None	337	LR+=1.30 LR-=0.64	Very low Very low
Full rotator cuff rupture											
External rotation lag ⁵	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	None	37	LR+=7.20 LR-=0.57	Low Low

Internal rotation lag ⁵	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b	Large effect ^h	37	LR+=5.60 LR-=0.04	Low Moderate
Drop sign ⁵	Positive Negative	1	Prospective cohort study	Not serious	Not assessed	Serious ^a	Serious ^b		37	LR+=3.20 LR-=0.35	Low Low

Explanations:

^a Downgraded one level due to the population being non-athletes

^b Downgraded one level due to a limited number of included studies

^c The article by Meister et al. was not obtained in full text hindering risk of bias assessment

^d Positive test result upgraded one level due to high diagnostic accuracy

^e Downgraded one level due to significant heterogeneity in the pooled estimate

^f Downgraded one level due to wide 95% confidence intervals in pooled estimates

^g Positive and negative test results were upgraded one level due to high diagnostic accuracy

^h Negative test result was upgraded one level due to high diagnostic accuracy

ⁱ Downgraded one level due to large variability in point estimates between studies

Table S2. Prevention										
Outcome/intervention	Number of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Number of participants	Effect (95% CI)	Certainty
Risk of shoulder problems (all shoulder problems)										
Oslo Sports Trauma Research Center Shoulder Injury Prevention program vs. usual care ⁶	1	Randomized controlled trial	Not serious	Not assessed	Not serious	Serious ^a	None	660	OR= 0.72 [0.52 to 0.98]	Moderate
Risk of shoulder problems (substantial shoulder problems)										
Oslo Sports Trauma Research Center Shoulder Injury Prevention program vs. usual care ⁶	1	Randomized controlled trial	Not serious	Not assessed	Not serious	Serious ^a	None	660	OR= 0.78 [0.53 to 1.16]	Moderate
Risk of shoulder injury										
Shoulder Control program vs. usual care ⁷	1	Randomized controlled trial	Not serious	Not assessed	Not serious	Serious ^a	None	464	HRR= 0.44 [0.29 to 0.68]	Moderate
Throwing injury prevention program vs. usual care ⁸	1	Randomized controlled trial	Not serious	Not assessed	Not serious	Serious ^a	None	237	HR= 0.48 [0.21 to 1.08]	Moderate
FIFA 11+ shoulder prevention program vs. usual care ⁹	1	Randomized controlled trial	Not serious	Not assessed	Not serious	Serious ^a	None	726	IRR= 0.28 [0.13 to 0.60]	Moderate
Intervention including Sleeper's stretch vs. usual care ¹⁰	1	Prospective cohort study	Serious ^b	Not assessed	Not serious	Serious ^a	None	46	HR=0.35 [0.13 to 0.94]	Very low
Intervention including Sleeper's stretch and prone shoulder external rotation exercise vs. usual care ¹⁰	1	Prospective cohort study	Serious ^b	Not assessed	Not serious	Serious ^a	None	60	HR=0.47 [0.20 to 1.10]	Very low
Pas et al. ¹¹	1	Randomized controlled trial	Serious ^a	Not assessed	Not serious	Serious ^a	None	579	OR=0.96 (p=0.93)	Low
Achenbach et al. ¹²	1	Randomized controlled trial	Serious ^a	Not assessed	Not serious	Serious ^a	None	579	Absolute risk reduction= -2.5% [-10.3 to 5.4]	Low
Number of shoulder pain episodes										

Intervention including functional exercises using resistance bands or dumbbells vs. usual care ¹³	1	Randomized controlled trial	Serious ^c	Not assessed	Not serious	Serious ^a	None	26	Between-group difference in number of shoulder pain episodes= 2.8 [CI not reported], p=0.02	Low
Patient-reported shoulder pain										
Intervention including shoulder strengthening exercises vs. usual care ¹⁴	1	Randomized controlled trial	Not serious	Not assessed	Not serious	Serious ^a	None	206	Between group difference in VAS= 0.1 [CI not reported], p=0.746	Moderate
<p>Explanations:</p> <p>^a Downgraded one level due to a limited number of included studies</p> <p>^b Downgraded one level due to critical risk of bias in ROBINS-I</p> <p>^c Downgraded one level due to high risk of bias in ROB-2</p> <p>OR, odds ratio; HR, hazard ratio; IRR, incidence rate ratio; VAS, visual analog scale</p>										

Table S3. Treatment										
Intervention/outcome	Number of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Number of participants	Effect (95% CI or SD)	Certainty
Subacromial impingement										
Intervention including shoulder specific warm-up and exercises vs. no intervention on pain (NRS) ¹⁵	1	Randomized controlled trial	Not serious	Not assessed	None	Serious ^a	None	30	Within-in group baseline and follow-up scores [SD] Intervention 7.88 [1.02] to 3.56 [1.31] Control 7.71 [0.83] to 8.00 [0.88]	Moderate
Intervention including strengthening exercises (no comparator group) on pain and function (SPADII) ¹⁶	1	Prospective cohort study	Not serious	Not assessed	None	Serious ^a	None	47	Within-in group baseline and follow-up scores [SD] 29.86 [17.03] to 11.7 [13.78]	Very low
Supraspinatus tendinopathy										
Interventions including hyperthermia or ultrasound vs. passive stretches on pain (VAS) ¹⁷	1	Randomized controlled trial	Not serious	Not assessed	None	Serious ^a	None	37	Within-in group baseline and follow-up scores [SD] Hyperthermia 5.96 [0.83] to 1.2 [0.63] Ultrasound 6.3 [0.86] to 5.15 [0.87] Passive stretches 6.1 [0.89] to 4.9 [0.88]	Moderate
Interventions including hyperthermia or ultrasound vs. passive stretches on physical function (Constant Murley Score) ¹⁷	1	Randomized controlled trial	Not serious	Not assessed	None	Serious ^a	None	37	Within-in group baseline and follow-up scores [SD] Hyperthermia 58.6 [3.9] to 82.0 [5.7] Ultrasound 58.9 [2.8] to 61.8 [4.2]	Moderate

									Passive stretches 59.5 [2.7] to 63.3 [5.6]	
Shoulder pain										
Intervention including anteroposterior mobilisation of the shoulder joint vs. manual treatment vs. attention on pain (VAS) ¹⁸	1	Randomized controlled trial	Not serious	Not assessed	None	Serious ^a	None	31	Within-group changes [95% CI] Mobilization 0.6 [0.1 to 1.1] Manual treatment 0.0 [0.0 to 0.3] Attention 0.2 [-0.2 to 0.7]	Moderate
Intervention including anteroposterior mobilisation of the shoulder joint vs. manual treatment vs. attention on physical function (DASH) ¹⁸	1	Randomized controlled trial	Not serious	Not assessed	None	Serious ^a	None	31	Within-group changes [95% CI] Mobilization 0.3 [-2.7 to 3.4] Manual treatment 0.5 [-0.3 to 1.3] Attention 0.7 [-0.6 to 2.0]	Moderate
Intervention including posture correcting exercises vs. no intervention on physical function and pain (ASES) ¹⁹	1	Randomized controlled trial	Serious ^b	Not assessed	None	Serious ^a	None	28	Within-in group baseline and follow-up scores [SD] Intervention Right shoulder: 89.1 [11.2] to 89.3 [14.6] Left shoulder: 89.9 [11.4] to 91.1 [10.6] Control Right shoulder: 90.8 [11.7] to 86.4 [17.9] Left shoulder: 90.7 [12.4] to 86.9 [15.5]	Low
Intervention includes strengthening	1	Prospective cohort study	Serious ^c	Not assessed	None	Serious ^a	None	29	Within-in group baseline and follow-up scores [SD]	Very low

exercises (no comparator group) on pain (VAS) ²⁰									3-months follow-up: 7.5 [2.3] to 3.4 [1.8] 6 months follow-up: 7.5 [2.3] to 2.9 [2.1]	
Intervention including scapula-focused stretching and strengthening exercises (no comparator group) on pain (VAS) ²¹	1	Prospective cohort study	Serious ^c	Not assessed	None	Serious ^a	None	31	Within-in group baseline and follow-up scores [SD] 3-months follow-up: 7.2 [1.3] to 2.4 [1.8] 6 months follow-up: 7.2 [1.3] to 2.6 [1.4]	Very low
<p>Explanations:</p> <p>^a Downgraded one level due to a limited number of included studies</p> <p>^b Downgraded one level due to high risk of bias in ROB-2</p> <p>^c Downgraded one level due to high risk of bias in ROBINS-I</p> <p>NRS, numeric rating scale; SPADI, Shoulder Pain and Disability Index; DASH, Disabilities of the Arm, Shoulder, and Hand; ASES, The American Shoulder and Elbow Surgeons Shoulder Score.</p>										

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