

**Table 1** Summary of study setting, study design, Achilles tendinopathy types, participant characteristics, and interventions protocols of included studies

Study	Setting, Country	Study Design	AT	Participants <sup>a</sup>				Interventions		
				Group (n)	Age, yrs	Sex (M:F)	Symptom duration, months	Protocol	Supervision	Adh.
Beyer, et al. <sup>34</sup>	Sports medicine centre, Denmark	RCT	MP <sup>††</sup> (C)	Ecc Ex (25)	48 (SEM 2)	18:7	19 (SEM 5)	12-week eccentric loading programme: as per Alfredson protocol	Unsupervised, with follow-up supervised session	Diary <sup>ξ</sup>
				HSR (22)	48 (SEM 2)	14:8	17 (SEM 3)	12-week HSR programme: 3 times a week. Two-legged loading exercises; 3-4 sets with 2-3 minute rest between sets. Repetitions decreased and load increased as 'tendon got stronger' (3x15RM week 1; 4x6RM weeks 9-12). Full range of ankle joint motion and participants instructed to spend 3 seconds on concentric phase and 3 seconds on eccentric phase of exercise (6s per exercise)	Unsupervised, with follow-up supervised session	Diary <sup>ξ</sup>
De Vos, et al. <sup>27</sup>	Sports medicine centre, Netherlands	RCT	MP <sup>†</sup> (I+C) U/L (46) B/L (12)	Ecc Ex (34 tendons)	44.1 (7.0)	20:12	33.7 (55.6)	12-week eccentric loading programme: as per Alfredson protocol	Unsupervised	Diary <sup>ξ</sup>
				Ecc Ex + Splint (36 tendons)	45.1 (8.9)	17:14	27.7 (45.9)	12-week eccentric loading programme: as per Alfredson protocol + night splint to be worn for the first 4 weeks with ankle at 0° then to increase to 5	Unsupervised	Diary <sup>ξ</sup>

Study	Setting, Country	Study Design	AT	Participants <sup>a</sup>				Interventions		
				Group (n)	Age, yrs	Sex (M:F)	Symptom duration, months	Protocol	Supervision	Adh.
Herrington and McCulloch <sup>31</sup>	University research department, UK	qRCT	MP <sup>+</sup> (I)	Ecc Ex (3)	37 (9.3)	NR	21.3 (17.7)	<i>12-week eccentric loading programme:</i> as per Alfredson protocol <i>Co-intervention:</i> Deep transverse frictions (20 minutes) and ultrasound (1 MHz, on a continuous setting at 1.0 W/ cm <sup>2</sup> for a period of 5 min), 6 sessions over first six weeks. All participants also received an instruction sheet with a stretching programme targeting gastrocnemius and soleus stretches in standing	Unsupervised	Diary $\xi$
				Control (12)	36.6 (7.1)			NR	27.6 (12.9)	Co-intervention: as per exercise group
Horstmann, et al. <sup>32b</sup>	University research department, Germany	RCT	MP <sup>+</sup> (I)	Ecc Ex (19)	45.7 (8.5)	32:26	NR	<i>12-week eccentric loading programme:</i> as per Alfredson protocol (36 training sessions over 12 weeks)	Supervised in clinical setting	Diary $\xi$
				Vibration training (23)	46.0 (6.9)			<i>12-week vibration training program:</i> warm-up (1 min exercise at 13-18Hz, including single leg standing and heel raises), a training phase (4-6 min at 16-21 Hz, based on alternate heel raises and heel drops to fatigue), and a cool down (1 min static stretching at 13-18 Hz) 36 training sessions, 4-5 mins/session wk 1-4, 5-6 mins wk 5-8 , 6-7 mins las weeks.	Supervised in clinical setting	NR $\xi$
				Control (16)	44.4 (7.7)			<i>Co-interventions:</i> all participants were allowed to continue their regular activity schedule without increasing their training workload	n/a	n/a

Study	Setting, Country	Study Design	AT	Participants <sup>a</sup>				Interventions		
				Group (n)	Age, yrs	Sex (M:F)	Symptom duration, months	Protocol	Supervision	Adh.
Kedia, et al. <sup>29</sup>	Four clinic locations of private orthopaedic practice, USA	RCT	Ins <sup>†</sup> (C)	Ecc Ex (16)	53.5 (9.2)	10:26	NR (> 3)	<i>12-week eccentric loading programme:</i> Alfredson protocol Co-interventions: stretching (gastroc, soleus, hams x 30s x 3 daily), cryotherapy, heel lifts and night splint	Unsupervised	NR
				Control (20)				No eccentric training Co-interventions: as for exercise group	Unsupervised	NR
Knobloch, et al. <sup>42</sup>	University research department, Germany	RCT	MP or Ins <sup>††</sup> (I) U/L or B/L	Ecc Ex (15)	33 (12)	11:9	NR (> 3)	<i>Eccentric loading programme:</i> as per Alfredson protocol; continued over at least three weeks	Unsupervised, with follow-up supervised session	NR
				Control (5)	32 (10)			Cryotherapy and relative rest in the event of any pain	Unsupervised, with follow-up supervised session	NR
Knobloch, et al. <sup>13</sup>	University research department, Germany	RCT	MP <sup>††</sup> (I)	Ecc Ex + Splint (43)	47 (11)	36:54	NR (>3)	<i>12-week eccentric loading programme:</i> as per Alfredson protocol + Splint: Airheel brace worn continuously during the day and during sports	Unsupervised	NR
				Ecc Ex (54)	48 (11)			<i>12-week eccentric loading programme:</i> as per Alfredson protocol	Unsupervised	NR
Mafi, et al. <sup>35</sup>	Two Sports Medicine centres,	RCT	MP <sup>††</sup> (C)	Ecc Ex (22)	48.1 (9.5)	24:20	21 (range 3-120)	<i>12-week eccentric loading programme:</i> as per Alfredson protocol	Unsupervised, with follow-up supervised session	NR

Study	Setting, Country	Study Design	AT	Participants <sup>a</sup>				Interventions		
				Group (n)	Age, yrs	Sex (M:F)	Symptom duration, months	Protocol	Supervision	Adh.
	Sweden.			Con Ex (22)	48.4 (8.3)			<p><i>12-week concentric training programme:</i></p> <p>Week 1-2: seated exercise: toe raise with knee flexed and also with knee straight (2-3 x 20 reps), 2 x daily</p> <p>Week 3-5: toe raise in standing with knee flexed and extended (3 x 15 reps). No eccentric loading allowed. 3x1 min of step-ups with knee bent.</p> <p>Weeks 6-12: Toe raises with knee straight (3x15 reps), toe raises with knee bent (3x1 min, slow speed), rope skipping (3-4 min, slow speed) and side jumps (3x20 reps)</p> <p><i>Co-interventions:</i> all participants continued their regular activity schedule without increasing their training workload</p>	Unsupervised, with follow-up supervised session	NR
Mayer, et al. <sup>22 b</sup>	University outpatient clinic, Germany	RCT	MP <sup>†</sup> (I)	Orthoses (10)	35 (6.7)	20:0	13.8 (16.5)	Individually fitted orthoses (based on dynamic plantar pressure distribution measurement), semi-rigid insoles worn for all physical activities during the 4 week treatment phase	Unsupervised	NR
				Control (10)			7.9 (6.8)	No intervention	n/a	n/a
McAleenan, et al. <sup>33 c</sup>	Hospital physiotherapy department, N. Ireland	RCT	NR <sup>†</sup> (C)	'Eccentric' Exercise (6)	39.7 (9.2)	6:5	18.5 (11.9)	<p><i>12 week exercise programme:</i></p> <p>Daily exercise; plantarflexion against elastic resistance, progressed to 'bilateral heel raises (knee straight and bent) in standing then single leg heel raises'. Further progression to heel raises off a step ultimately with added weights</p>	Unsupervised	NR

Study	Setting, Country	Study Design	AT	Participants <sup>a</sup>				Interventions			
				Group (n)	Age, yrs	Sex (M:F)	Symptom duration, months	Protocol	Supervision	Adh.	
				'Eccentric' Exercise + Splint (5)	41.8 (6.2)		11.2 (14.3)	12 week exercise programme: as described above + Splint: custom made night splint comprised of dynacast backslab; foot in 0 degrees plantar flexion	Unsupervised	NR	
Munteanu, et al. <sup>28</sup>	University clinic, Australia	RCT	MP <sup>++</sup> (I) <80 on VISA-A	Orthoses + Ecc Ex (67)	43.5 (8.2)	M: 58.2%	29.3 (54.3)	Customised foot orthoses + 12-week eccentric calf strengthening programme	Unsupervised	Diaryξ	
				Control (73)	43.6 (7.6)	M: 39%	33.7 (96.3)	Sham foot orthoses + 12-week eccentric calf strengthening programme	Unsupervised	Diaryξ	
Niesen-Vertommen, et al. <sup>43</sup>	University sports medicine clinic, Canada	RCT	NR <sup>+</sup> (I)	Ecc Ex (8)	Male: 31.0 (2.6) Female: 39.5 (3.2)	10:7	Range: 1 to 30	12-week eccentric loading programme: as per Alfredson protocol + standard warm up, flexibility of calf and ice application	Unsupervised	Diary	
				Con Ex (9)	Male: 28.7 (3.2) Female: 37.3 (1.7)			12-week concentric exercise programme: 5x10 reps dorsiflexion and plantarflexion programme starting with '4 resistance weights', and increasing according to patient's symptoms + standard warm up, flexibility of calf and ice application	Unsupervised	Diary	
Norregard, et al. <sup>44</sup>	Hospital sports medicine centre, Denmark	RCT	NR <sup>++</sup> (I)	Ecc Ex (21)	43 (2)	Male: 54%	NR (>3)	12-week eccentric loading programme: as per Alfredson protocol	Unsupervised	Diary	
				Stretch Ex (24)	41 (2)	Male: 48%		12-week stretching programme: Standing stretching exercises of the soleus and gastrocnemius; 5 reps with 30sec hold	Unsupervised	Diary	

Study	Setting, Country	Study Design	AT	Participants <sup>a</sup>				Interventions		
				Group (n)	Age, yrs	Sex (M:F)	Symptom duration, months	Protocol	Supervision	Adh.
Petersen, et al. <sup>36</sup>	Hospital orthopaedic department, Germany	RCT	MP <sup>++</sup> (I)	Ecc Ex (37)	42.5 (11.1)	60:40	7.4 (2.3)	12-week eccentric loading programme: as per Alfredson protocol	Unsupervised	NR
				Splint (35)				AirHeel brace to be 'worn during the daytime'	Unsupervised	NR
				Ecc Ex + Splint (28)				Combination of the above exercise and splint protocols	Unsupervised	NR
Rompe, et al. <sup>37</sup>	Hospital orthopaedic clinic, Germany	RCT	MP <sup>++</sup> (I+C)	Ecc Ex (25)	48.1 (9.9)	29:46	10.9 (7.7)	12-week eccentric loading programme: as per Alfredson protocol	Unsupervised	NR
				Control (25)	46.4 (11.4)			9.2 (10.5)	Wait and see: Paracetamol and NSAIDS prescribed if necessary	Unsupervised
Roos, et al. <sup>14</sup>	Orthopaedic clinic, Sweden	RCT	MP <sup>+</sup> (I)	Ecc Ex (16)	46 (range 20-60)	21:23	Median: 5.5 (range 1-180 months)	12-week eccentric loading programme: as per Alfredson protocol	Unsupervised	Diaryξ
				Splint (13)				Anterior splint (thermoplastic, Northcoast medical Inc.) applied for night to hold foot in 90 degrees dorsiflexion. To be worn every night	Unsupervised	Diaryξ
				Ecc Ex + Splint (15)				Combination of the above exercise and splint protocols	Unsupervised	Diaryξ

Study	Setting, Country	Study Design	AT	Participants <sup>a</sup>				Interventions		
				Group (n)	Age, yrs	Sex (M:F)	Symptom duration, months	Protocol	Supervision	Adh.
Silbernagel, et al. <sup>39</sup>	Sports rehabilitation clinic, Sweden	RCT	MP <sup>+</sup> (C)	Exercise (higher dose) (30 tendons)	47 (14.7)	31:9	20 (25.4)	<p><i>12-week exercise programme:</i></p> <p>Phase 1 (day 1-7): 30x20 reps of toe and foot flex/ext; calf muscle stretch with knee flexed then extended; 5x 30s one leg standing; 5 x 5m walk on toes and heels and 2x15 concentric/eccentric heels raise</p> <p>Phase 2 (week 2-3): Same programme as phase one but adding 2 x 20 two legged toe raise repeated on one leg starting with 3 x 5 reps increasing by 2 reps per day followed by eccentric raises x10 increasing by 2 reps per day. Calf stretches for 20s after ex</p> <p>Phase 3 (week 4-12): Same programme as above but increasing reps of all to 20, increasing by 2 reps per day. Adding eccentric loading over a step and 20-100 reps of quick rebounding toe raises.</p>	Unsupervised	Diary
				Exercise (lower dose) (27 tendons)	41 (10.2)		41 (55.9)	<p><i>12-week exercise programme:</i></p> <p>2x stretching of calf muscle and 2x30 reps of two legged concentric/eccentric exercise. 3 x 5 reps, increasing x 2 per day of concentric/eccentric toe raises</p>	Unsupervised	Diary

Study	Setting, Country	Study Design	AT	Participants <sup>a</sup>				Interventions		
				Group (n)	Age, yrs	Sex (M:F)	Symptom duration, months	Protocol	Supervision	Adh.
Silbernagel, et al. <sup>40</sup>	Sports rehabilitation clinic, Sweden	RCT	MP <sup>++</sup> (C)	Exercise (26 tendons)	44 (8.8)	18:20	48 (84.5)	12-week exercise programme: Phase 1-3: as described in Silbernagel, et al. <sup>47</sup>  Phase 4: (week 12 to 6 months): one legged and eccentric toe raises (3x15) plus quick rebounding toe raises	Unsupervised	Diary
				Control (25 tendons)	48 (6.8)		24.4 (40.8)	Active rest: Not allowed to perform any physical activity causing symptoms or any tendon loading activity during first 6 weeks of programme (swimming allowed)	Unsupervised	Diary
Stasinopolous and Manias <sup>30</sup>	Private outpatient clinic, Greece	qRCT	MP <sup>+</sup> (I)	Ecc Ex (lower dose) (21)	48.4 (5.1)	NR	'about' 7 months	12-week eccentric loading programme; Stannish Protocol: stretching of gastrocnemius and soleus (30 s each) x 3 followed by 3 x 10 of eccentric loading once daily for 6 weeks then increasing to 3 x 10 three times per week for following 6 weeks, adding weight as tolerated	Unsupervised	Diary
				Ecc Ex (higher dose) (20)	48.2 (11.3)			12-week eccentric loading programme: as per Alfredson protocol	Unsupervised	Diary
Stevens and Tan <sup>38</sup>	Hospital physiotherapy department, and GP clinics, UK	RCT	MP <sup>+</sup> (I) <80 on VISA-A	Ecc Ex (higher dose) (15)	48.2 (10.8)	11:17	6.2 (2.1)	12-week eccentric loading programme: as per Alfredson protocol	Unsupervised	Diaryξ
				Ecc Ex (lower dose) (13)	47.7 (10.1)		8.9 (5.1)	12-week eccentric loading programme: As above, but repetition and volume self-selected 'as tolerated'	Unsupervised	Diaryξ



Study	Setting, Country	Study Design	AT	Participants <sup>a</sup>				Interventions		
				Group (n)	Age, yrs	Sex (M:F)	Symptom duration, months	Protocol	Supervision	Adh.
Tumilty, et al. <sup>41</sup>	University Clinic, New Zealand	RCT	MP <sup>†</sup> (I)	Ecc Ex (higher dose) (20)	47.2 (18.5)	9:11	NR (>3)	12-week eccentric loading programme: as per Alfredson protocol	Supervised in clinical setting and also unsupervised	Diary <sup>ξ</sup>
				Ecc Ex (lower dose) (20)	49.2 (11.3)	7:13		12-week eccentric loading programme: as per Alfredson protocol, but once per day, twice per week	Supervised in clinical setting and also unsupervised	Diary <sup>ξ</sup>
Yu, et al. <sup>45</sup>	Hospital outpatient clinic, Korea	RCT	NR U/L <sup>†</sup> (I)	Ecc Ex (16)	20.1 (1.8)	32:0	9	8-week Eccentric loading programme: 10 mins bicycle warm up + Combined protocols of Curwin and Stannish and Alfredson (50 mins 3 times/week)	Supervised in clinical setting	NR
				Con Ex (16)	20.4 (1.3)			12	Concentric exercise programme: 10 min bicycle warm up. + Long sitting plantarflexion against theraband resistance (3x15); progression from assisted toe raises to weight bearing toe raises (50 mins 3 times/week)	Supervised in clinical setting

Means (standard deviation), unless otherwise stated.

<sup>a</sup> All participants recruited from the general population, except <sup>b</sup> who recruited runners, and <sup>c</sup> who recruited participants actively involved in sport.

Diagnosis: <sup>†</sup> Pre-specified clinical criteria; <sup>††</sup> Pre-specified clinical plus ultrasound criteria; (I) diagnosis by study investigator; (C) diagnosis by independent clinician; (I+C) diagnosed by both study investigator and independent clinician

<sup>ξ</sup>: Adherence to prescribed interventions reported in results

Adh: adherence; AT: Achilles tendinopathy; B/L: bilateral; Con Ex: concentric exercise; Ecc Ex: eccentric exercise; HRS: heavy slow resistance; Ins: insertional; MP: mid-portion; n/a: not applicable; NR: not reported; qRCT: quasi-randomised controlled trial; RCT: randomised controlled trial; SEM: standard error of measurement; Stretch Ex: stretching exercise; U/L: unilateral; VISA-A: Victorian Institute of Sport Assessment – Achilles Questionnaire