

Culvenor et al., SUPER-Knee trial protocol

Supplementary File 1. Overview of SUPER intervention exercise delivery according to Consensus on Exercise Reporting Template (CERT) guidelines

Section/Topic	Checklist item	SUPER Exercise Intervention Description
WHAT: materials	1. Detailed description of the type of exercise equipment	<p>Various weighted equipment (e.g., dumbbells, barbells, resistance band, pin-loaded leg press, leg extension, hamstring curl machine) will be used. Participants will be provided with equipment (e.g., resistance band, 20kg adjustable dumbbells) to complete exercises at home.</p> <p>Details of equipment used are in Supplementary File 2.</p>
WHO: provider	2. Detailed description of the qualifications, expertise and/or training	<p>Approximately 30 registered physiotherapists with ≥ 3 years musculoskeletal clinical experience and work in private clinics in metropolitan and regional Victoria. All SUPER physiotherapists will complete 3 hours of online webinars and participate in a 4-hour workshop (7 hours total) before study commencement. Refresher training will be completed as required. SUPER physiotherapists will be supported with regular (approximately bi-monthly) contact by a member of the research team.</p>
HOW: delivery	3. Describe whether exercises are performed individually or in a group	<p><u>Phase 1:</u> Participants will perform a mix of supervised 1:1 and small group (≤ 6 participants) exercise sessions based on individual preference, clinic availability, and clinical reasoning by the treating physiotherapist. Participants will complete additional unsupervised sessions at home/local fitness centre (gym).</p> <p><u>Phase 2:</u> All exercises will be completed individually unless <i>a priori</i> discharge criteria are not met, in which case one supervised exercise session per week may continue.</p>
	4. Describe whether exercises are supervised or unsupervised and how they are delivered	<p><u>Phase 1:</u> Supervised by a physiotherapist twice per week AND unsupervised at least once per week encouraged.</p> <p><u>Phase 2:</u> Unsupervised 2-3 times per week unless <i>a priori</i> discharge criteria are not met, in which one supervised session per week may continue.</p>

Culvenor et al., SUPER-Knee trial protocol

5. Detailed description of how adherence to exercise is measured and reported
- Phase 1: Physiotherapists will record attendance at supervised exercises sessions. During supervised exercises, participants and/or physiotherapists will record dosage completed for each exercise in a clinic logbook. Participants will record unsupervised exercises either through an online exercise diary, or paper-based exercise logbook. Participants will also report their exercise adherence fortnightly via an online questionnaire.
- Phase 2: Participants will report their exercise adherence monthly via an online questionnaire and/or paper-based logbook.
- The percentage of supervised (and unsupervised) exercise sessions completed will be reported.
6. Detailed description of motivation strategies
- Phase 1: (i) Physiotherapists will be trained to use simple motivational interviewing techniques to support intervention adherence; (ii) Functional assessments will be completed in the clinic (hop tests, one leg rise) monthly; (iii) Participants will maintain exercise training logbooks at the clinic and at home; (iv) Participants will be contacted monthly by a member of the research team; (v) Exercise variations available to cater for individual needs and preferences; (vi) Participants will be provided an activity monitor (e.g., Garmin watch) and encouraged to track daily activity; (vii) Small group exercise training with other SUPER-Knee trial participants.
- Phase 2: (i) Access to a local gym; (ii) Booster session with physiotherapist, including functional re-assessment at 8 and 11 months; (iii) Followed up regularly by a member of the research team; (iv) Exercise variations available; (vi) Participants will continue using an activity monitor (e.g., Garmin watch).
- 7a. Detailed description of the decision rule(s) for determining exercise progression
- Exercises will be progressed based on: (i) perceived difficulty using rating of perceived exertion (RPE) (e.g., RPE $\geq 7/10$, 3 sets of 8-12 reps and one lighter week per month of 5/10 RPE to increase motivation and allow recovery periods), and (ii) minimal pain (e.g., $< 3/10$ on numerical pain scale).
- 7b. Detailed description of how the exercise program is progressed
- Exercises will be progressed to match pre-defined RPE of each week by any of the following: i) increasing load used; ii) increasing exercise difficulty level; iii) changing exercise position (e.g.,

Culvenor et al., SUPER-Knee trial protocol

		lowering squat depth, increasing step height); or iv) changing speed of exercise. Progression principles are in line with American College of Sports Medicine muscle strengthening guidelines.
	8. Detailed description of each exercise to enable replication	The priority exercises are: 1) Quadriceps, 2) Knee extension, 3) Plyometrics, 4) Balance & Agility, 5) Hamstrings. The additional exercises are: 6) Trunk/core, 7) Hip abduction, 8) Hip adduction, 9) Calf raises. Exercise descriptions are available in Supplementary File 2.
	9. Detailed description of any home program component	Home exercise variations for each of the priority and additional exercises can be found in Supplementary File 2.
	10. Describe whether there are any non-exercise components	Comprehensive education will be provided during the two dedicated physiotherapy 'education' consultations (Weeks 1 and 4, 30-60 minutes). Session 1 topics will include: Function and actions of the knee and ACL, mechanisms of ACL injury, risk factors, what is osteoarthritis, role and evidence for physical activity and exercise, pain education, recovery, goal setting. Session 2 topics will include: Returning to physical activity and sport, psychological factors, goal re-setting and long-term planning, weight control.
	11. Describe the type and number of adverse events that occur during exercise	Exercise-specific adverse events are increases in pain, swelling, re-injury caused by the exercises resulting in the participant needing to cease the exercise session, or an inability to complete subsequent sessions. Physiotherapists will record exercise-specific adverse events in their clinic treatment notes. For any serious adverse events, physiotherapists will contact a member of the research team immediately for suspected ACL re-injuries for medical review and incident reporting.
WHERE: location	12. Describe the setting in which the exercises are performed	<u>Phase 1:</u> Exercises will be performed individually or in small groups at physiotherapy clinics under the supervision of a trained SUPER-Knee physiotherapist, and independently at home/local gym.

Culvenor et al., SUPER-Knee trial protocol

WHEN/HOW MUCH: dosage	13. Detailed description of the exercise intervention including, but not limited to, number of exercise repetitions/sets/session duration, intervention/program duration etc.	<u>Phase 2</u> : Home/local gym, unless <i>a priori</i> discharge criteria are not met, in which case supervised exercise sessions at the physiotherapy clinic may continue.
TAILORING: what, how	14a. Describe whether the exercises are generic (one size fits all) or whether tailored to the individual	The standard exercise program will include the 5 priority exercises. The additional exercises are optional to cater for individual needs, preferences, including time commitments.
	14b. Detailed description of how exercises are tailored to the individual	Each exercise has 3-6 levels of difficulty that include options to cater for exercise training environment. Participants, with their physiotherapist, can select the exercise under each group that most suits individual needs and preferences.
	15. Describe the decision rule for determining the starting level at which people commence an exercise program	Exercise prescription is individualised and follows guidelines from the American College of Sports Medicine for developing muscle strength and power. Exercises will be individually tailored based on: baseline assessment and ongoing functional assessment, achieving intended RPE, exercise training environment and equipment availability, clinical reasoning (e.g., individual preferences and needs, pain).
		All exercise sessions will start with a 5-minute warm up (3-4/10 RPE). Strength exercises will be performed at a moderate-hard intensity (suggested 5/10 RPE) in Week 1, using guidance from baseline assessment information (e.g., strength and functional test results) contained in the handover form to physiotherapists. They will then be progressed for all participants in week 2 based on criteria outlined in 7a.

Culvenor et al., SUPER-Knee trial protocol

HOW WELL: planned, actual	16a. Describe how adherence or fidelity to the exercise intervention is assessed/measured	All SUPER-Knee physiotherapists will complete 3 hours of online webinars, attend the face-to-face 4-hour training workshop and receive a detailed treatment manual describing all aspects of the exercise (and education) intervention. After initiation of the trial, communication (e.g., telephone, email) between a member of the research team and each physiotherapist will occur to discuss issues experienced in the clinic and issues resolved as appropriate. In person fidelity checks will be performed by a member of the research team and refresher training will be completed annually.
	16b. Describe the extent to which the intervention was delivered as planned	This will be reported in the primary paper.
