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Return to Play: It's not a date and it's not a test

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Disclosures

I have no financial disclosures

Objectives

- Participants will understand how the entire rehab process sets the stage for return to sport decision making and present the return to sport continuum
- Be able to apply an understanding of movement quality assessment into the return to sport decision making process
- Discuss the best testing strategies for different performance variables and include the importance of monitoring workload in the return to sport process
- Provide a case-based discussion to highlight the key points involved in the return to sport process

Ashigbi, *Med Sci Sports Exerc* 2020
Ardern *Br J Sports Med* 2014
Lau *Br J Sports Med* 2018

ACL Return to Sport Statistics

- Any Sport - 81% (Ardern 2014)
- Pre-injury Level of Sport - 65% (Ardern 2014)
- Competitive Level of Sport - 55% (Ardern 2014)
- Elite Athletes Return- 83%
  - 5.2% Graft Rupture (Lau 2018)
- Return to Sport Re-injury Risk 1.5-37.5% (Ashigbi 2020)

The Denver Channel

What is a success?

1. Return to previous level of activity
2. Do everything we can to minimize risk of re-tear

How?

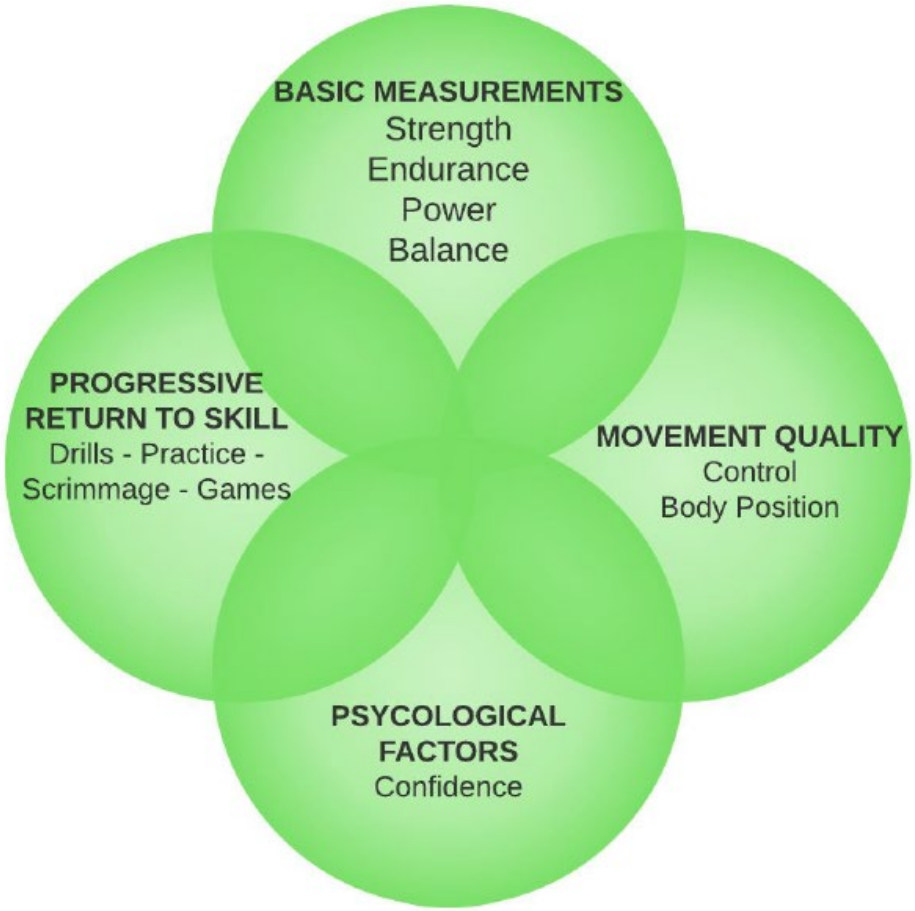
Systematic progressions addressing biomechanical risk factors to safely prepare the athlete to be able to participate in their desired level of athletic activities

Assess readiness to return to these activities

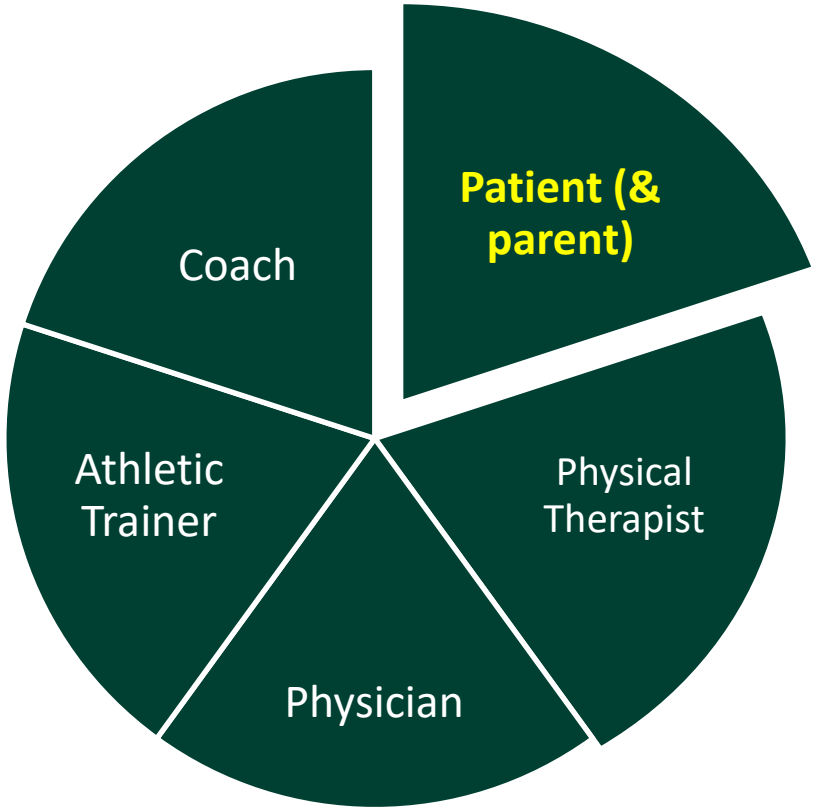
(Arden 2016, Meredith 2020)

Meredith *Ortho J Sports Med* 2020

Return to Sport Decision Making



Multidisciplinary Decision



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Burgi *Br J Sports Med* 2019
Meredith *Ortho Journal Sports Medicine 2020*

Criteria used for Return to Participation

- Time
- Clinical Examination (ROM, Effusion, laxity testing)
- Strength
- Hop Testing
- Performance Based Criteria
- Patient-Reported Outcome Measures

Beischer *JOSPT* 2020

Isn't it about time?

Young athletes returning **< 9 months** after ACL reconstruction


[RESEARCH REPORT]

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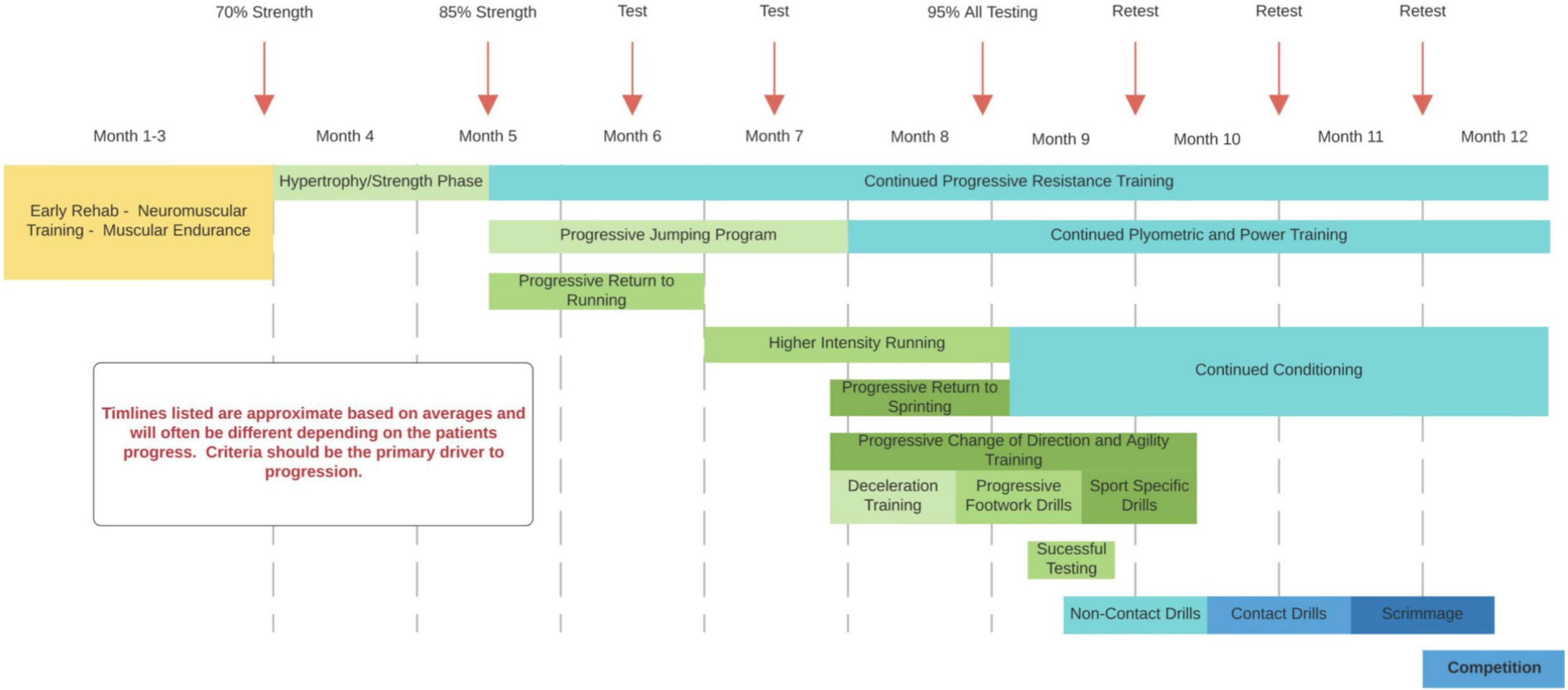
Young Athletes Who Return to Sport Before 9 Months After Anterior Cruciate Ligament Reconstruction Have a Rate of New Injury 7 Times That of Those Who Delay Return

7-fold increased rate of sustaining a second ACL injury

ACL Return to Sport Timeline



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(Screenshot provided by Shane

Movement observation

6 months post op

- 17yo female soccer player
- s/p R ACL-R quad autograft
  - Medial meniscus repair
- Assessment Measures
  - SL Squat x 1 minute= 85%
  - Iso Knee Ext HHD= 80%
  - Uni Knee Flexion 5RM = 100%
  - Isokinetic @ 60°/second
    - Quads 71%
    - Hamstrings 91%

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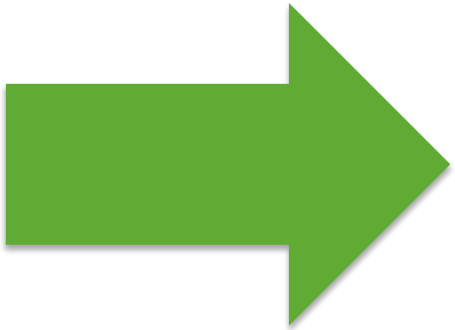
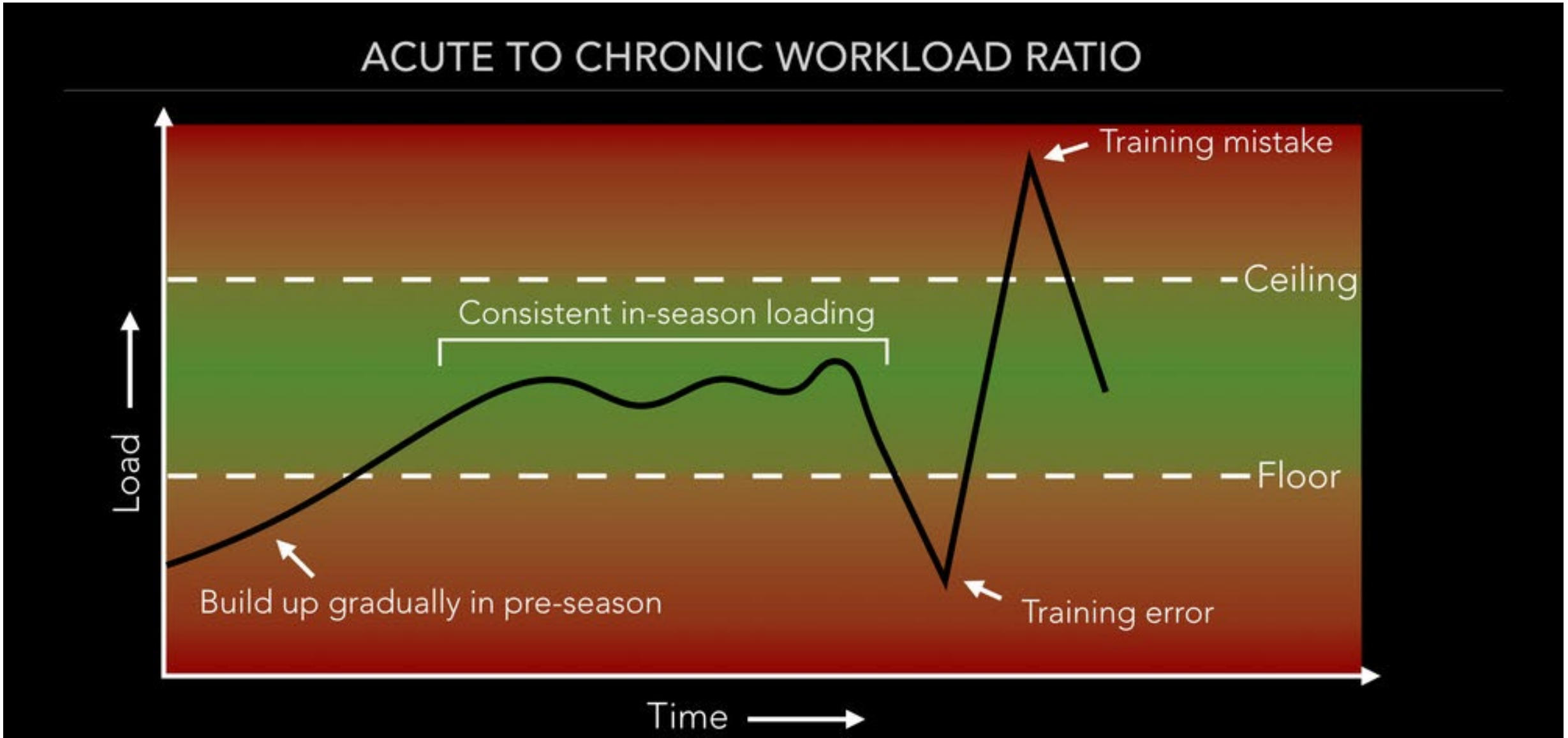


“Sorry bro I’m doing rehab”

“Oh shoot I have practice tomorrow”



(Windt 2017, Gabbett 2016, Blanch 2016)

Patient Reported Outcome Measures - ACL

- **Activity**
  - PSFS
  - PEDI-FABS (Fabricant 2013/24, Iversen 2016)
- **Subjective Knee Function**
  - IKDC & Pedi – IKDC (Kocher 2011, Nesreddine 2017)
  - KOOS & KOOS – Child (Ortqvist 2012/14)
  - SANE (Winterstein 2013)

- **Psychological Readiness**
  - ACL-RSI (Webster 2008/2018)
- **Fear of Re-injury**
  - TSK- 11
- **Pain**
- **Quality of Life**

Single Assessment Numerical Evaluation

S.A.N.E

"On a scale of 0 to 100, how would you rate your knee's function, with 100 being normal?"

Fear & Psychological Readiness to Return to Sport

- ↑ Fear associated with stiffened movement patterns with ACL-R
- Fear of re-injury – ↓ return to sport ACL-R
- ACL-RSI Cutoff score of 76.7/100 - 90% Sn in identifying 2nd ACL injury
- Breakout Session!!

Arden *Am J Sports Med* 2013
Trigsted *Knee Surg Sports Traumatol Arthrosc* 2018

Criteria-based RTS

Kyritsis *Br J Sports Med* 2016

Six-part return to sport tests	Discharge permitted when each of these criteria was met
Isokinetic test @ 60, 180 & 300°/s	Quadriceps deficit <10% at 60°/s
Single hop	Limb symmetry index > 90%
Triple hop	Limb symmetry index > 90%
Triple cross over hop	Limb symmetry index > 90%
On-field sports-specific	Fully completed

4x > risk of an ACL graft rupture if all six RTS Criteria not met

10%↓ in Hamstring to quadriceps strength ratio → 10.6x higher risk

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Magill *Ortho J Sport Med* 2021

Criterion for RTS - Expected Performance

Performance Tests	Median
Single-leg stork; on Bosu	59.5s (ceiling effects)
Single leg squat, 0-45°; on Bosu (60s)	46.9; 33.0
Quadrant Hop - Clockwise; Counterclockwise (30s)	43.3; 38.8
Single-leg hop for distance	105.0cm
6-m timed hop	2.6s
Triple crossover hop for distance	294.1cm

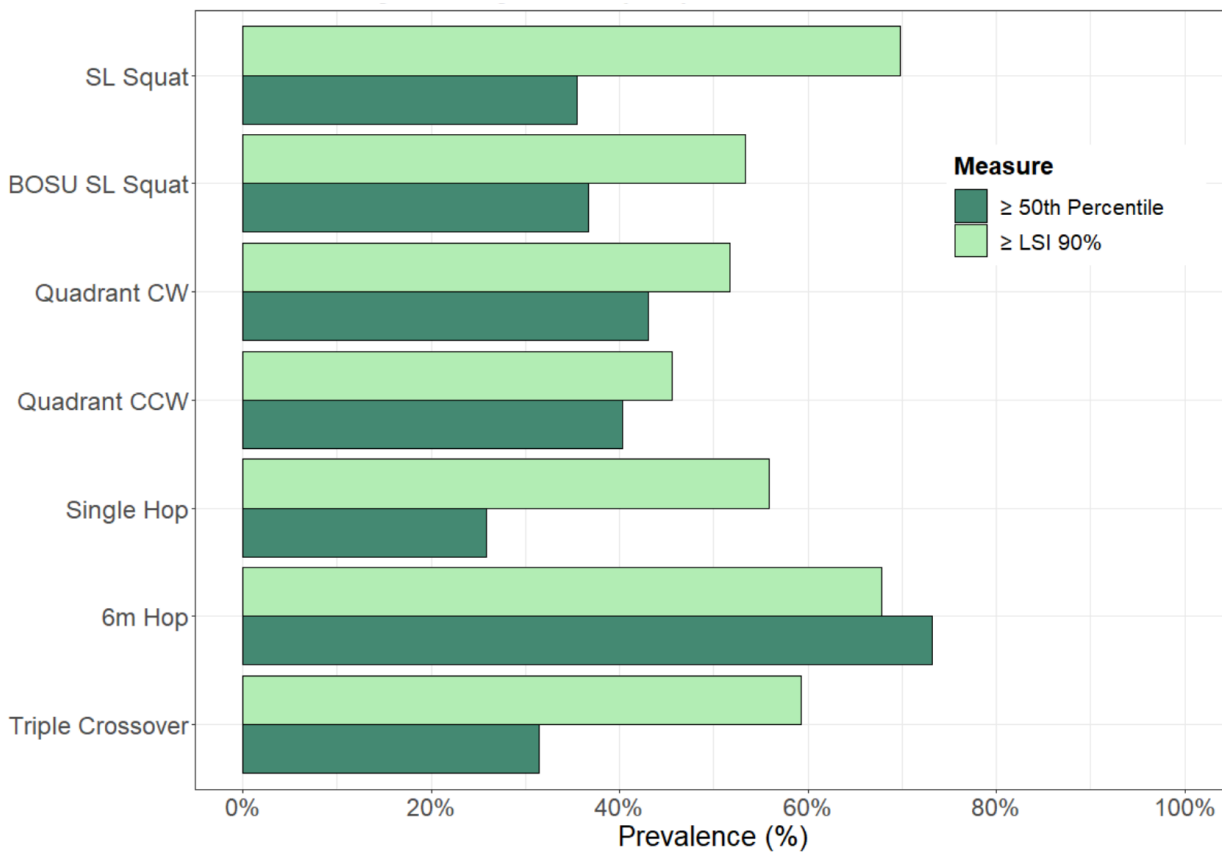

Figure 1: Prevalence of 50th Performance Percentile and 90% Limb Symmetry Index (LSI) for each PPT

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Schmitt *JOSPT* 2012
Ithurburn *Knee Surg Sports Traumatol Arthrosc* 2018

Return to Participation - Strength

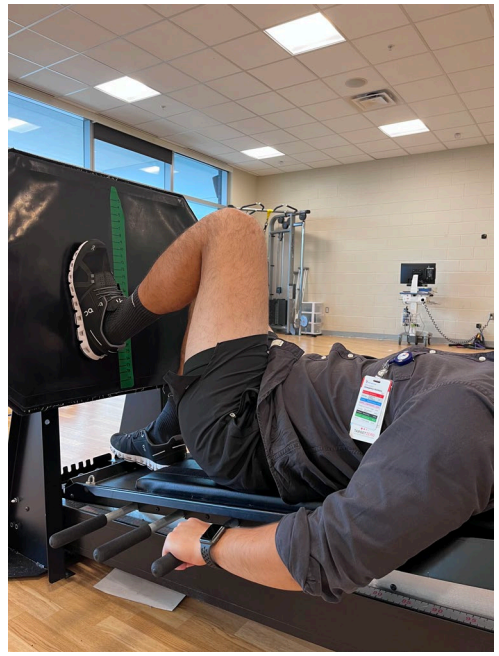
- Strength ≥ 90% LSI to RTS
  - ↑ performance on a SL Hop Test
  - ↑ knee-related function & % RTS @ 1 year post op
  - ↑ level of sport participation over the year following RTS clearance
  - If 90% LSI NOT achieved by RTS, 3x more likely to suffer a contralateral ACL injury

Wall Street Journal

Grindem *Br J Sports Med* 2016

Return to Participation - Strength

For every 1% ↑ LSI = 3% ↓ in injury risk



Return to Participation – Functional ~~Strength~~

Single leg squat to box

Lateral step-down test

Forward step-down test

Movement analysis – motor control

- Hip Stability (knee valgus)
- Pelvis Stability (pelvic drop)
- Trunk Stability (trunk lean)
- Hip Strategy (trunk angle)

“A major share of non-contact ACL injuries in team sports occur during complex and dynamic situations requiring rapid decision making and movement adaptations to unexpected external stimuli.” (Niederer 2020)

Nawasreh *Br J Sports Med* 2018

Return to Participation – Hop Testing

- Commonly used hop tests
  - Single leg hop for distance
  - Triple hop for distance
  - Cross over hop for distance
  - 6m timed hop
- LSI > 90% suggested passing criterion

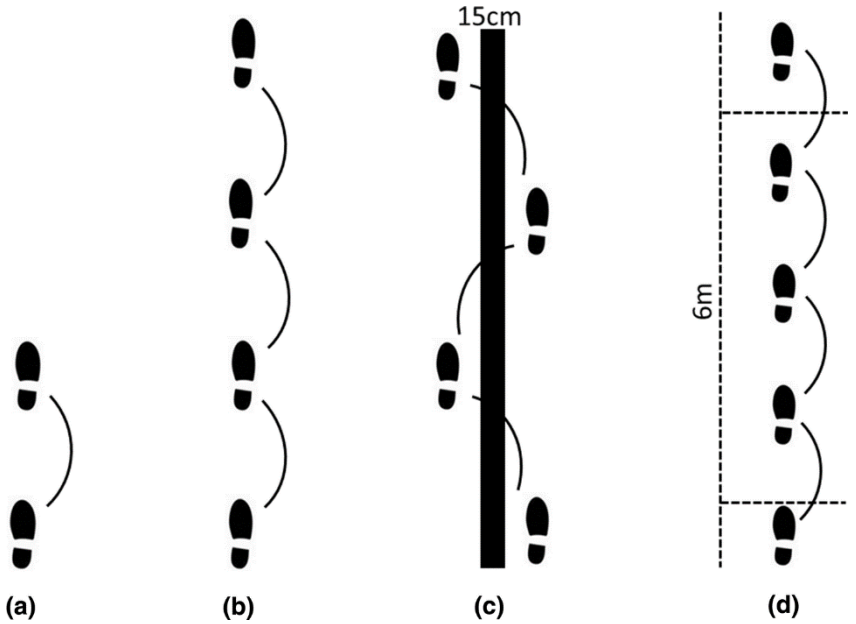


Fig 2: Davies *Sports Medicine* 2020

Davies *Sports Medicine* 2020
Wren *JOSPT* 2018

Return to Participation – Hop Testing

- Movement observation is a must
- Adolescents post ACL-R offload involved knee @ 5 & 12 mo post op (Regardless of hop symmetry)

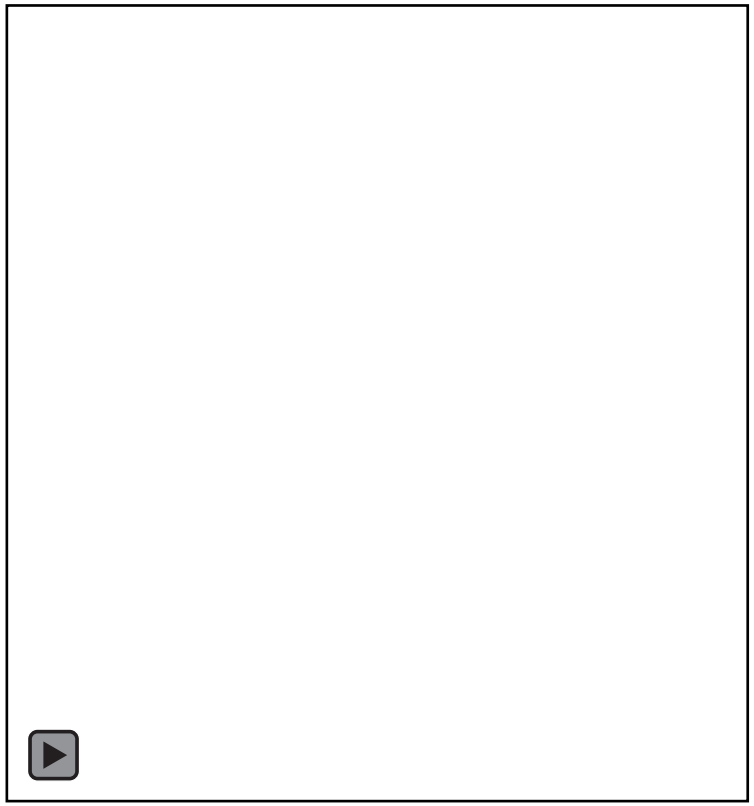
Key Movement Observations

- ↓ knee flexion during landing (stiffness)
- Dynamic Valgus
- ↓ lower extremity shock absorption

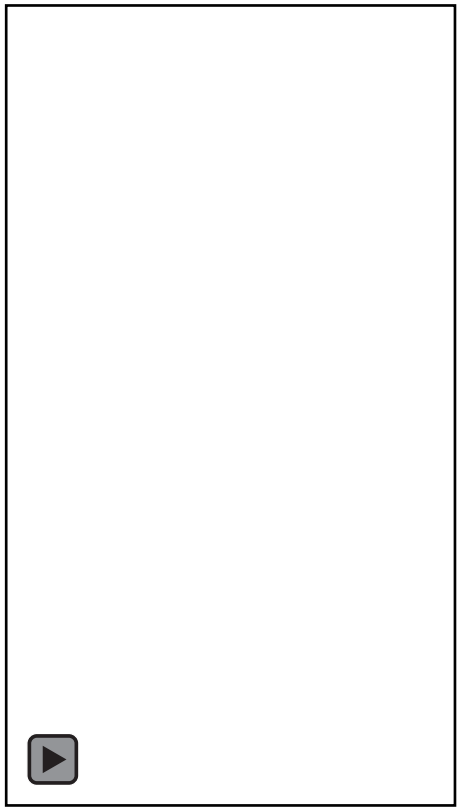
Hewett *Am J Sports Med* 2005
Padua *Am J Sports Med* 2009
Paterno *Am J Sports Med* 2010

Return to Participation – LESS

Drop Down Vertical Jump

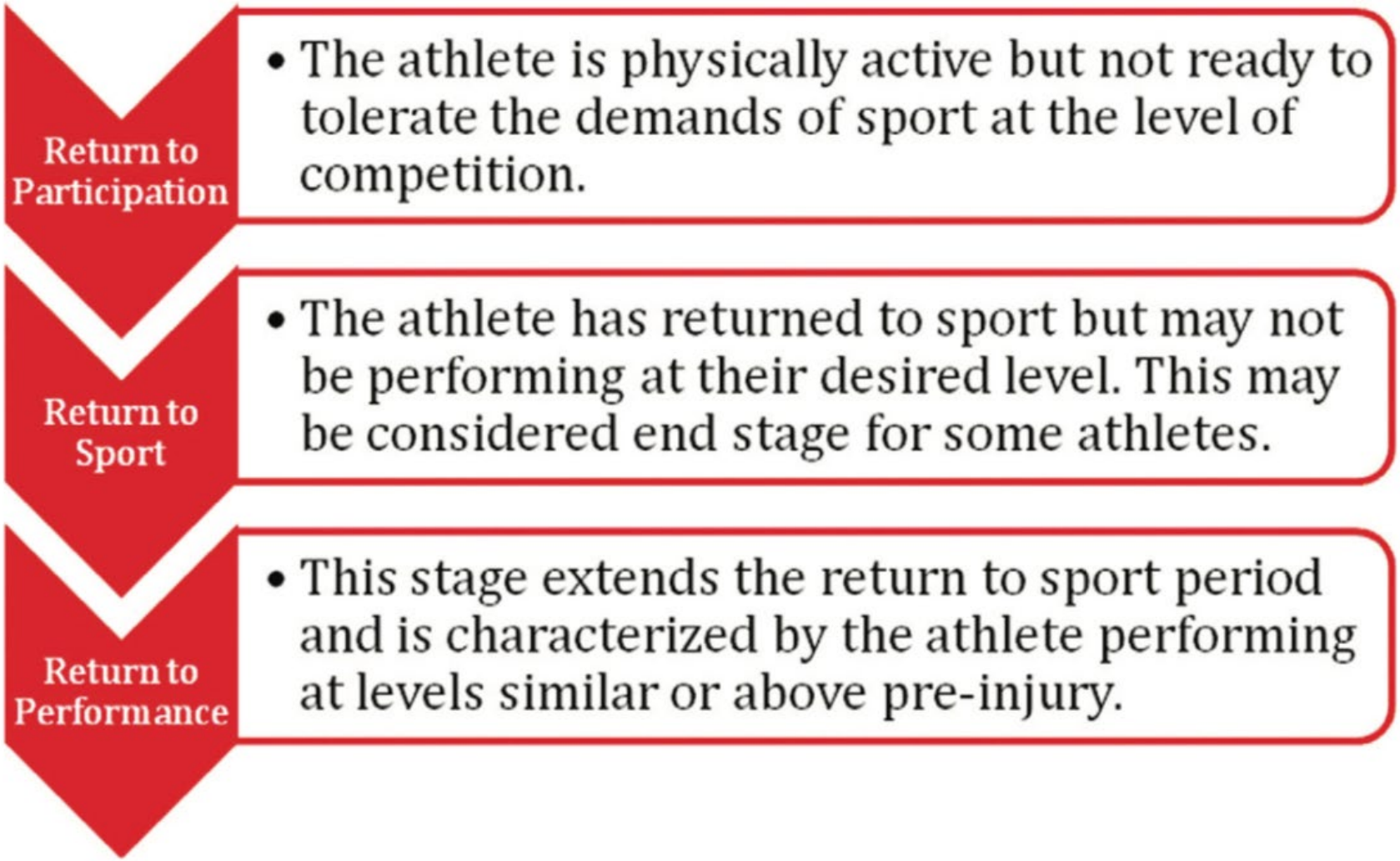


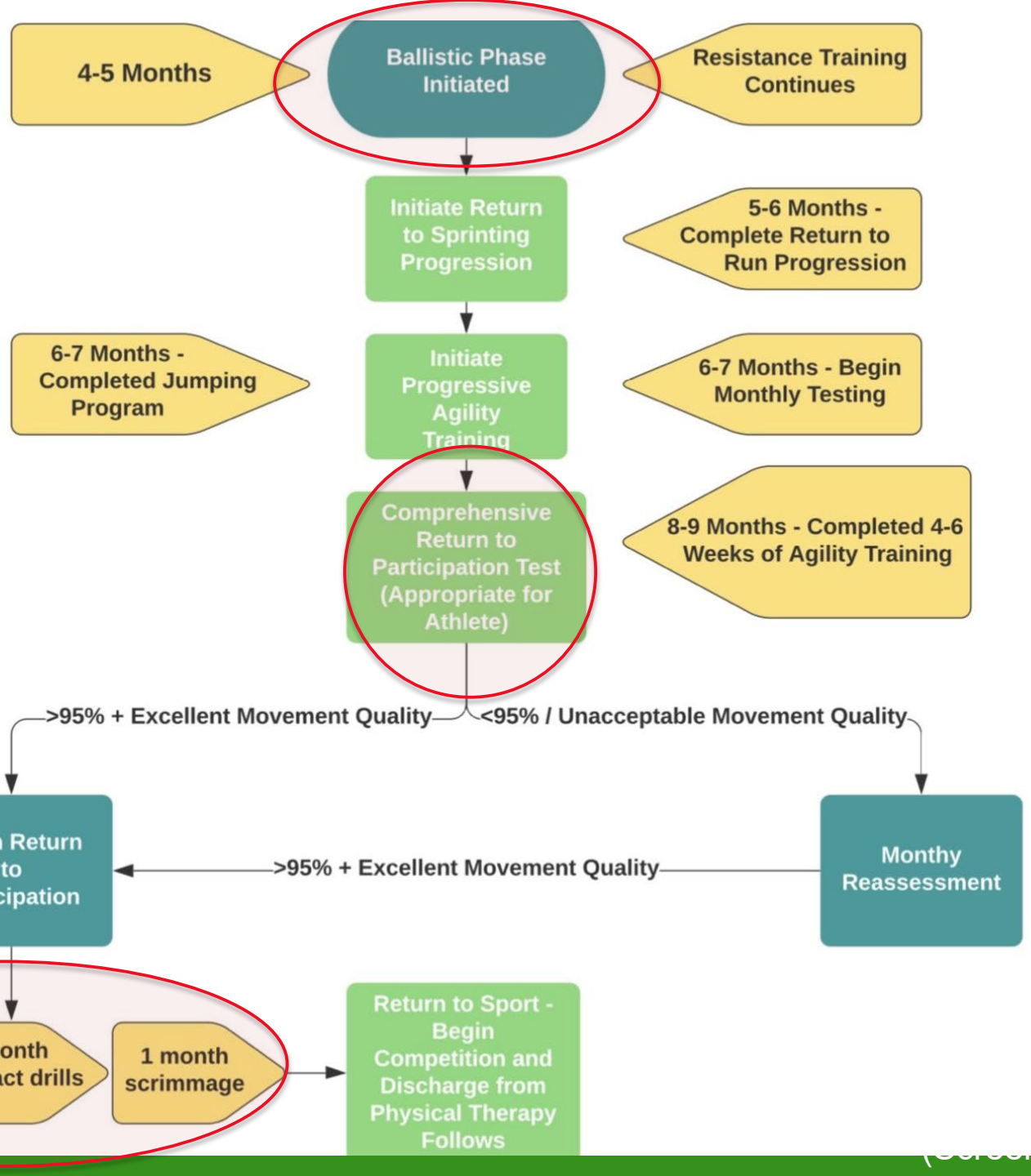
Tuck Jump



Criteria-based RTS

- Patients passing ALL RTS criteria were low @ 9 months after ACLR – **11%**
  - Insufficient self-reported knee function
  - Persistent quadriceps strength deficits


Return to Participation
• The athlete is physically active but not ready to tolerate the demands of sport at the level of competition.
Return to Sport
• The athlete has returned to sport but may not be performing at their desired level. This may be considered end stage for some athletes.
Return to Performance
• This stage extends the return to sport period and is characterized by the athlete performing at levels similar or above pre-injury.


4-5 Months
Ballistic Phase Initiated
Resistance Training Continues
Initiate Return to Sprinting Progression
5-6 Months - Complete Return to Run Progression
6-7 Months - Completed Jumping Program
Initiate Progressive Agility Training
6-7 Months - Begin Monthly Testing
Comprehensive Return to Participation Test (Appropriate for Athlete)
8-9 Months - Completed 4-6 Weeks of Agility Training
>95% + Excellent Movement Quality
<95% / Unacceptable Movement Quality
Begin Return to Participation
>95% + Excellent Movement Quality
Monthy Reassessment
1 month non-contact drills
1 month contact drills
1 month scrimmage
Return to Sport - Begin Competition and Discharge from Physical Therapy Follows

Summary

- Expectations and communication are key
- Strength development and testing are crucial and open chain is not bad!
- Time is a factor – but our number is 9 months, not 6
- Playing your sport is important…before playing your sport
- Fear and confidence is a double edged sword
- Injury prevention is part of RTS

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