



Stony Brook University



# The Transitional Phase: Functional testing and progressive return to running in distance runners and sprinters

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Distance Runner



Sprinter

When can I run?

Runner's want to know...



## Objectives

Present a clinical framework on determining whether a runner is ready to run

Outline characteristics of return to run programs based upon running goals



# Clinical Decision Making

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Blend of time and criterion

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Goal development

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Establish trust/ limit frustration

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Efficient and Practical





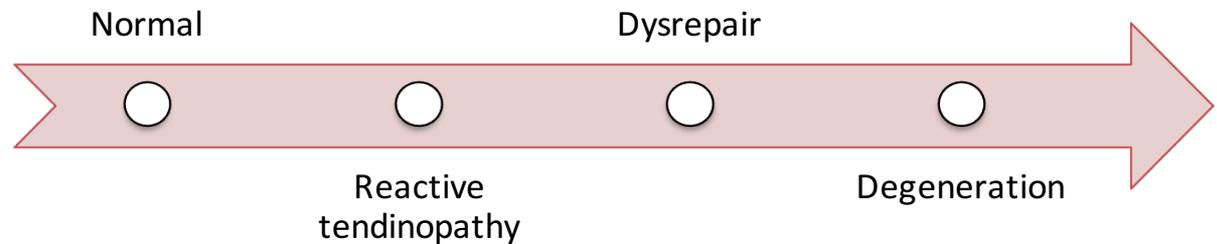
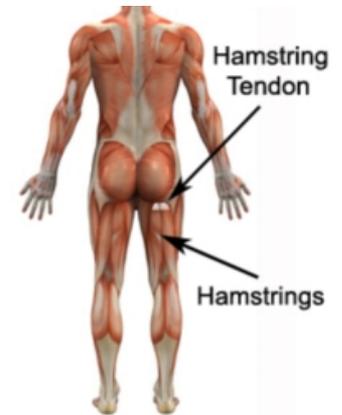
# Physiological Tissue Capacity

Load management in relation to physiologic tissue healing

Tissue Type

Location

Stage of Healing



When Can I Run?



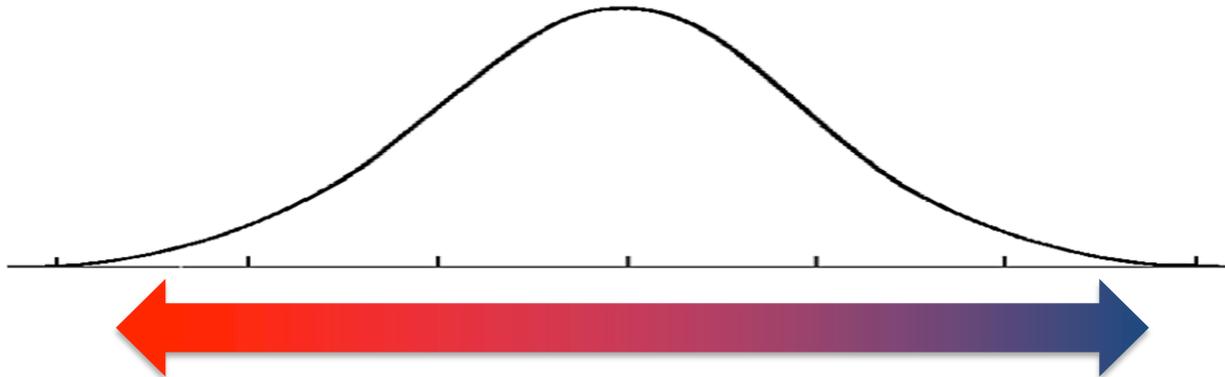
# Running Demands

## Distance Running

Unilateral control of the body with the ability to sustain reciprocal, **repetitive loads** for **long durations** at a **submaximal intensity**

## Sprinting

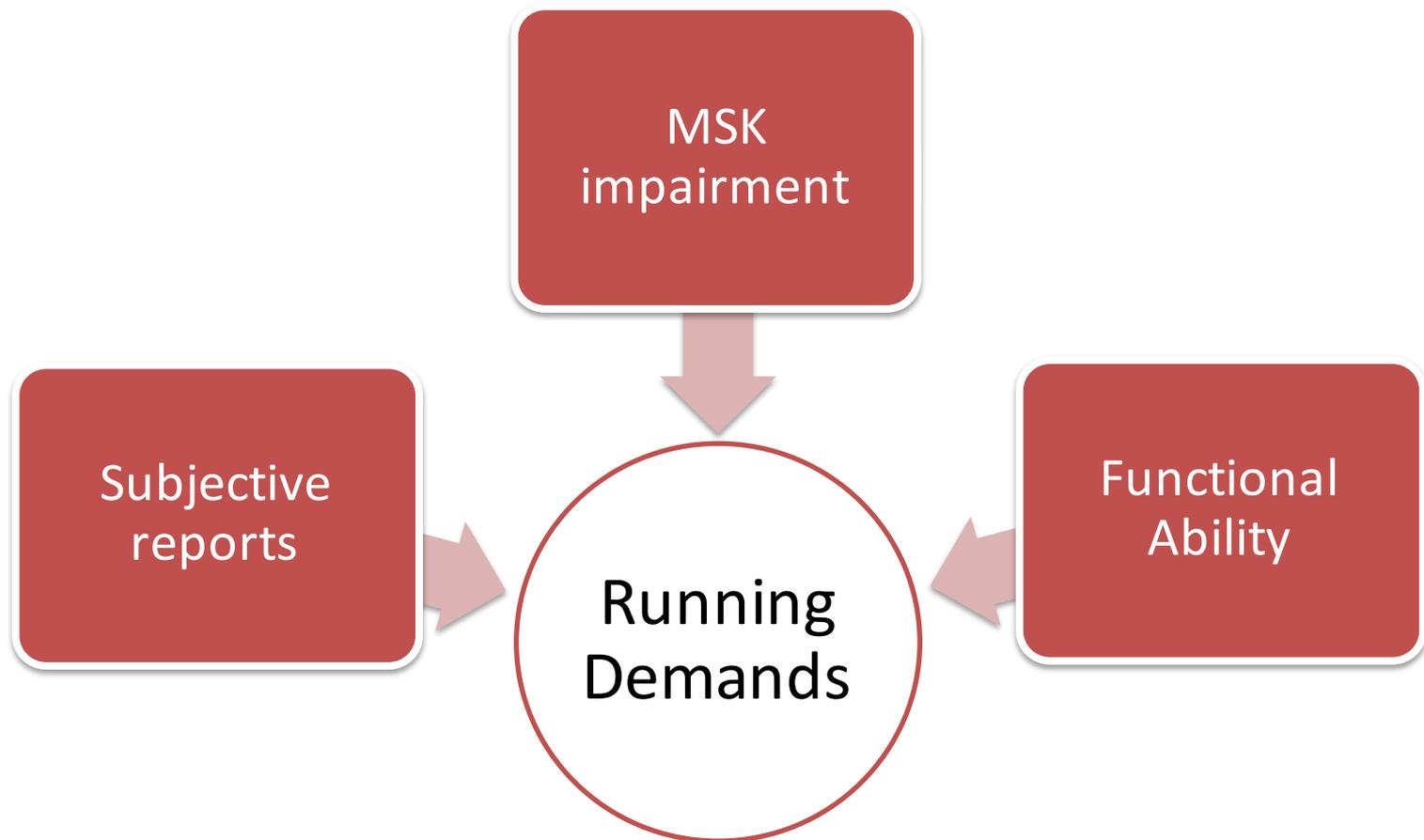
Unilateral control of the body with the ability to sustain reciprocal, **high and fast loads** for **short durations** at a **maximal intensity**



Continuum of Running Intensity



# Criterion Based Measures



When Can I Run?



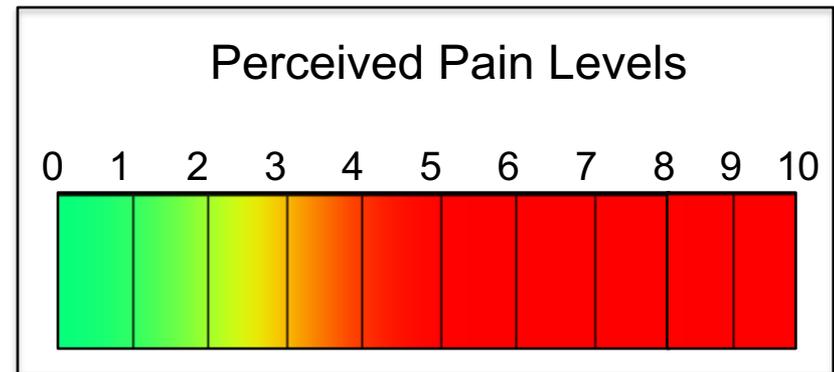
# Subjective Reports

Pain levels

No mechanical symptoms

Psychological Readiness Ardern, BJSM, 2013

- Motivation
- Confidence
- Fear





# Musculoskeletal Impairments



	Distance Running	Sprinting
ROM/Flexibility	<b>Normalized ROM/Flexibility</b>	
	Distal mobility Rabin, 2010, Rabin, 2014,	Proximal Flexibility/ Full AROM
Muscle Capacity	<b>Adequate Muscle Capacity</b>	
	Frontal/Transverse plane hip control, endurance, strength	Proximal power and deceleration

When Can I Run?



# Functional Abilities: Distance Runner

Accuracy, Quantity, Pain Response



Unilateral Control (Static)

Unilateral Control (Dynamic)

Unilateral Control (Loading)



SLS in running posture

When Can I Run?



# Functional Abilities: Distance Runner

Accuracy, Quantity, Pain Response



Unilateral Control/Endurance

Unilateral Control (Dynamic)

Unilateral Control (Loading)



Timed-lateral step down test

Haitz, JOSPT 2014, Rabin, JOSPT 2014



# Functional Abilities: Distance Runner

Accuracy, Quantity, Pain Response



Unilateral Control (Static)

Unilateral Control (Dynamic)

Unilateral Control (Loading)



Unilateral vertical hops  
(with metronome)



Hop test battery

Noyes, AJSM 1991

When Can I Run?



# Functional Abilities: Sprinter

Accuracy, Quantity, Pain Response

Unilateral Control (increased speeds)

Unilateral Anaerobic Power

Tolerate A and B Skips



Swing Test

Wilder, 2014

When Can I Run?



# Functional Abilities: Sprinter

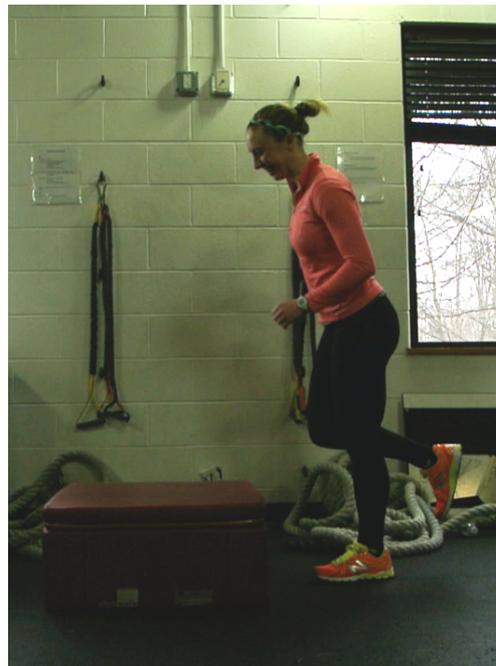
Accuracy, Quantity, Pain Response



Unilateral Control (increased speeds)

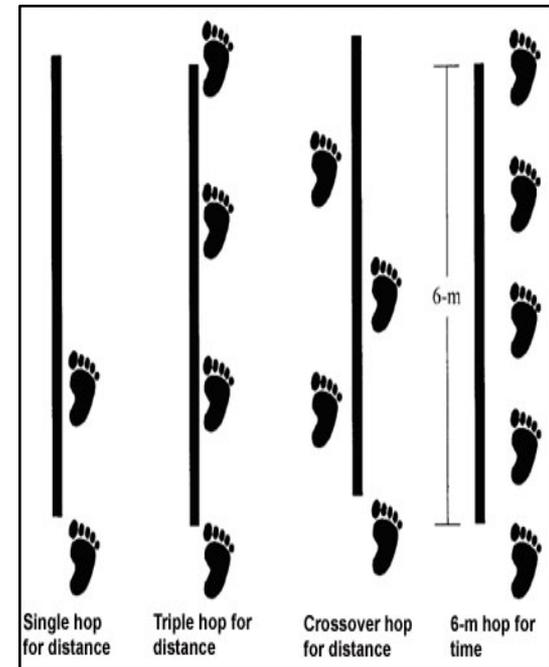
Unilateral Anaerobic Power

Tolerate A and B Skips



Unilateral Box Jump

Reiman and Manske, 2009



Hop test battery

Noyes, AJSM 1991

When Can I Run?



# Functional Abilities: Sprinter

Accuracy, Quantity, Pain Response



Unilateral Control (increased speeds)

Unilateral Anaerobic Power

Tolerate A and B Skips



A skip



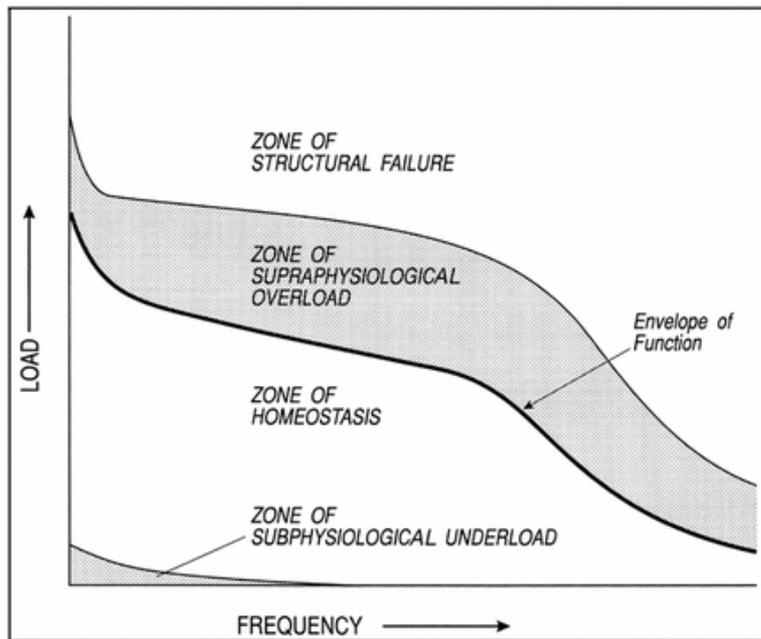
B skip

When Can I Run?

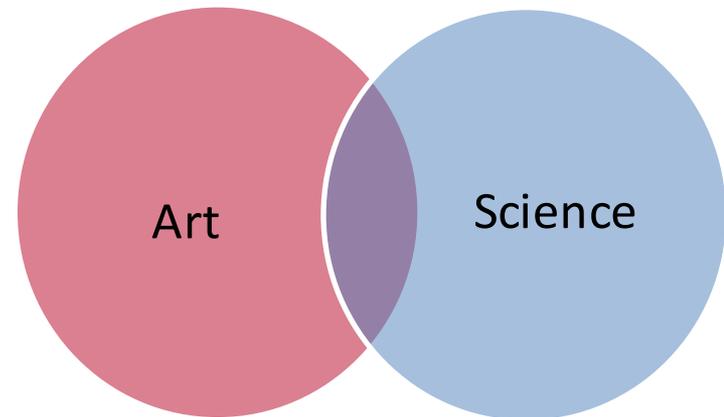


# Returning to Running: Program Guidelines

**Individualized** and in conjunction with a **progressive loading program**



“Envelope of Function” Dye, 1996



**“A Blend of Art and Science”**



# Graded Return

## Distance Runner

- High intensity walking program
  - Early in rehab process
- Progressive loads and Fatigue
  - Walk/run program
  - Incorporate recovery day
  - “10% rule”

Level	Walk/Run	Cycles	Total Run Time
	Times		
Level 1	1' run/ 1'walk	10	10 min
Level 2	3' run/ 1'walk	4	12 min
Level 3	5' run/ 1' walk	3	15 min
Level 4	7' run/ 1' walk	3	21 min

	Mon	Tues	Wed	Thur	Fri	Sat	Sun	Total Miles
Level 1	Recover	1 mi	Recover	2 mi	Recover	2 mi	Recover	5 mi
Level 2	Recover	2 mi	Recover	3 mi	Recover	3 mi	Recover	8 mi
Level 3	Recover	4 mi	Recover	3 mi	Recover	4 mi	Recover	11 mi
Level 4	5 mi	Recover	3 mi	3 mi	Recover	5 mi	Recover	16 mi
Level 5	5 mi	Recover	6 mi	4 mi	Recover	5 mi	Recover	20 mi



# Graded Return

## Sprinter

- Intensity Driven
  - % of pre-injury time/ RPE
- Importance of recovery
- Progressions
  - Falling Starts → Blocks
  - Straights → curves → hurdles

<b>Phase A:</b>	<b>50 - 60% INTENSITY</b> Level 1 → 2 → 3
<b>Phase B:</b>	<b>70 - 80% INTENSITY</b> Level 1 → 2 → 3
<b>Phase C:</b>	<b>90 - 100% INTENSITY</b> Level 1 → 2 → 3

Level 1
20 m x 6
40 m x 4
60 m x 2
80 m x 2
100 m x 2
80 m x 2
60 m x 2
40 m x 4
20 m x 6
30 runs ; 1320 m

Level 2
20 m x 6
40 m x 6
60 m x 4
80 m x 2
100 m x 2
80 m x 2
60 m x 4
40 m x 6
20 m x 6
38 runs ; 1560 m

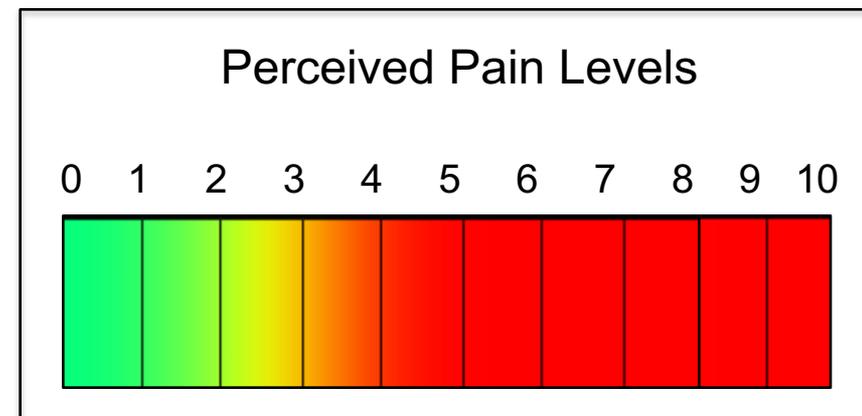
Level 3
20 m x 6
40 m x 8
60 m x 4
80 m x 2
100 m x 2
80 m x 2
60 m x 4
40 m x 8
20 m x 6
42 runs ; 1880 m



# Response to Running

## Pain Monitoring Model Silbernagel, 2007

- No more than 2-3/10 pain
- Returns to baseline before next morning
- No increase in stiffness
- No increase in effusion/inflammation
- **Unaltered gait pattern**



Adapted from Silbernagel, 2007



## Take Home Points

A combination of ***tissue capacity, subjective reports, and objective measures*** can assist in the decision making process of running readiness

Criterion for return should be based upon the ***demands of the running activity***

Return to running programs should be ***individualized, systematic and clearly outlined***