



From Rehab to Peak Performance: Integrating Olympic Lifts into Athletic Recovery Program

Erin Pletcher, PhD, LAT, ATC, CSCS

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Conflict of Interest

- I have no financial or other associations with companies having a direct link and/or financial relationship that is related to the topic/content of their presentation to disclose.

Learning Objectives

1. Identify the limitations of traditional rehabilitation methods in addressing neuromuscular deficits, power, and coordination in athletes recovering from injury.
2. Demonstrate the proper techniques for incorporating Olympic lifts and power exercises into rehabilitation protocols to enhance neuromuscular re-education, power, coordination, and functional strength.
3. Design a comprehensive rehabilitation program that integrates sport-specific training, including Olympic lifts and power exercises, tailored to the specific needs of athletes recovering from various injuries.

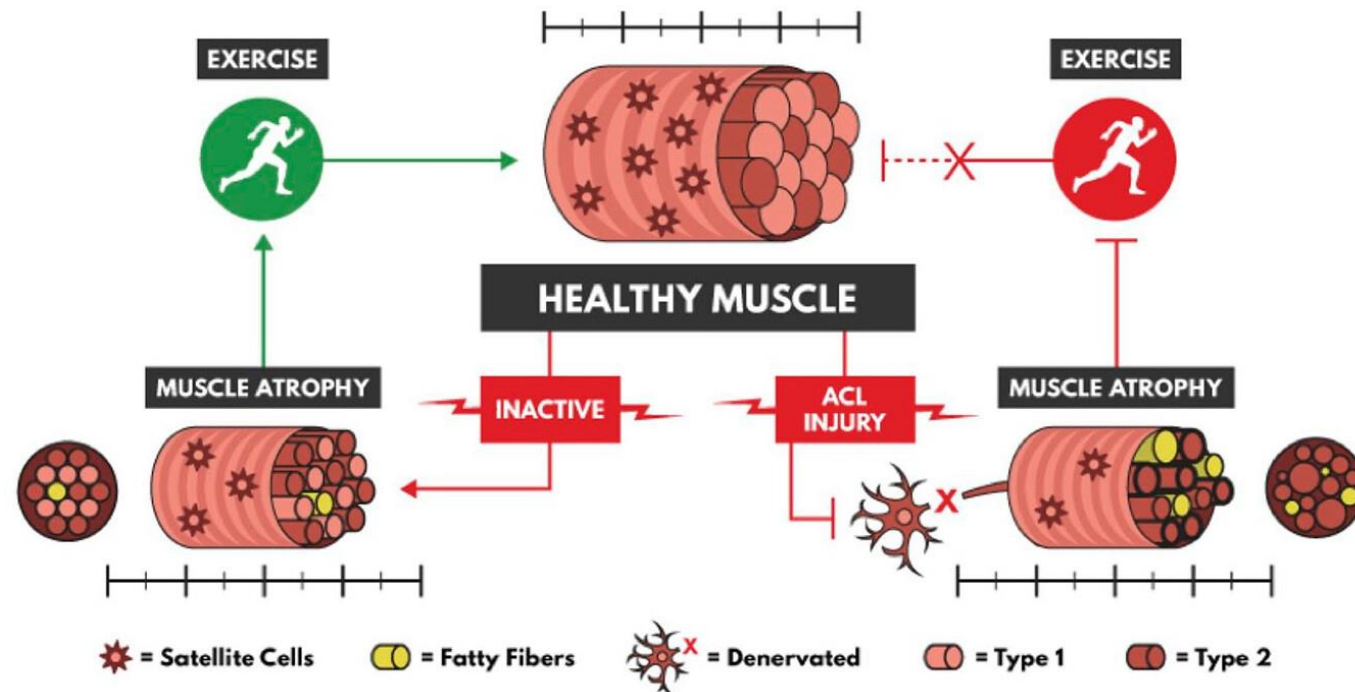
Changes Following Injury

- Altered Muscle Activation Patterns
- Proprioceptive Deficits
- Reduced Power and Explosiveness



Changes Following Injury

- Muscle atrophy after traumatic joint injury *different* from inactivity
 - Neurological disruptions uncouple nervous system from muscle



Gaps in Traditional Rehabilitation



- **Focus on Symptom Management and Basic Function**
 - Primarily aims to alleviate pain, reduce inflammation and restore ROM
 - Not encompass full spectrum of athlete's needs for returning to high-level performance
- **Lack of Sport-Specific Training**
 - Generic exercises that do not mimic specific movements and demands sport

Gaps in Traditional Rehabilitation



- **Insufficient Neuromuscular Re-education**
 - May not adequately challenge neuromuscular system to re-learn patterns and regain full control
- **Minimal Emphasis on Power and Explosiveness**
 - Typically emphasizes low to moderate intensity exercises

Indicators of Incomplete Rehabilitation

- **Performance Metrics**
 - **Decreased Performance:** decline in speed, agility, strength
 - **Endurance and Fatigue:** reduced stamina and quicker onset of fatigue



Indicators of Incomplete Rehabilitation

- 14 yr follow up surgical repair Achilles tendon
 - 11-13% deficits soleus and gastrocnemius muscle volumes
 - 12-18% deficits plantar flexion strength



Indicators of Incomplete Rehabilitation

- **Functional Tests**

- **Movement Quality:** compensatory patterns
 - Biomechanics, gait, FMS
- **Neuromuscular Control:** deficits in coordination and control
 - SL hop, balance tests, agility drills



Indicators of Incomplete Rehabilitation

- **Re-Injury Rates**
 - Greatest predictor of injury is previous injury
 - Due to residual deficits in strength, coordination or proprioception, ?



What Are Olympic Lifts?



- **Competition lifts** = snatch and clean & jerk
- **Variations** = power snatch and power clean
 - More widely used because many athletes cannot achieve deep squat position necessary of the snatch and clean & jerk
- **Variations** = clean pull and snatch pull
 - Do not require the athlete to learn the intricacies of the catch position

What Are Olympic Lifts?



- **Universal Athletic Position**
- Generally regarded as most common position in all of sports
- Described as standing in $\frac{1}{4}$ squat with feet flat, hips behind the center of gravity, shoulders are in front, torso is flat (inclined at an angle of about 45°) weight distributed on a full foot, hands in front, knees over the toes, and shoulders over the knees

What Are Olympic Lifts?

- **Snatch**

- Athlete take the bar from the ground into an overhead position in one movement



What Are Olympic Lifts?

- **Clean and Jerk**

- Athlete moves barbell from the ground to their chest
- Then from their chest to an overhead position with arms and hips fully locked out



What Are Olympic Lifts?

- **Snatch**

- Pull: Emphasize importance pulls for posterior chain activation and power development
- Overhead Position: Focus on shoulder stability, thoracic mobility and core engagement

- **Clean & Jerk**

- Clean Pull: Like Snatch Pull, focusing on posterior chain activation and power
- Front Rack Position: Emphasize thoracic mobility, core stability and upper back strength
- Jerk: Focus on upper body power, coordination and stability

Benefit of Olympic Lifts

- Build Strength and Stability in Universal Athletic Position
- Multi-joint engagement
- Mimic dynamic demands of athletic activities and ensure strength gained is applicable to sport-specific movements



Benefit of Olympic Lifts

- Restore Power and Explosiveness
- Highly effective in developing explosive power
 - Generate maximal force rapidly
 - Retrain fast-twitch muscle fibers



Triple Extension =
ankle, knee, and hip
all extend
simultaneously

Benefit of Olympic Lifts



- **Enhancing Neuromuscular Coordination**
 - Require precise timing and coordination between multiple muscle groups
 - Challenges body's proprioceptive abilities
 - Enhancing balance and spatial awareness

Integrating Olympic Lifts into Rehabilitation

- Mayo Clinic: Strength training can become a part of fitness plan as early as age 7-8 years old
- **International Weightlifting Federation (IWF):** Youth age group as 13-17 years old for competitive purposes



Integrating Olympic Lifts into Rehabilitation

- **Assessment and Preparation:**
 - Evaluate patient's mobility, flexibility and neuromuscular control
 - Establish normal movement patterns and load tolerance
- **Progressive Loading and Adaptation**
 - Begin with lighter weights and simpler variations
- **Addressing Specific Deficits**
 - Identify specific deficits in strength, power, and coordination through assessments
 - Target with appropriate Olympic lift variations
- **Functional Relevance**
 - Incorporate Olympic lifts that closely mimic movements and demands of athlete's sport

Practical Application in Rehabilitation

- **Initial Learning Phase**
 - Safety Considerations: Use of alternative equipment (PVC pipes, broomsticks, dumbbells)
 - Movement Breakdown: break down lifts into smaller, manageable parts to ensure correct technique and neural engagement
 - Focus on form and coordination before adding significant weight
 - *Ex/* Teach hang clean by first practicing deadlift, then high pull, finally combining movements into full hang clean

Practical Application in Rehabilitation

- **Progressive Integration**

- **Gradual Complexity:** as athlete's neuromuscular control improves, gradually increase complexity and load of lifts
 - Ensures continuous neural stimulation and adaptation
- *Ex/* Progress from hang clean to full clean, to clean and jerk
 - Incorporating each component gradually to maintain focus on technique and control

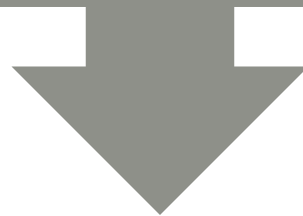


Foundational Movements & Progressions

Starting Exercise

Hip hinge

Foundation of many posterior chain exercises.
Involves hinging at the hips while maintaining a neutral spine, emphasizing glute and hamstring engagement.
Essential for power development, lower back health and injury prevention.



Olympic Derivative

Power clean

Foundational Movements & Progressions

Starting Exercise

Hip hinge

Progression 1

Romanian deadlift

Progression 2

Good mornings

Progression 3

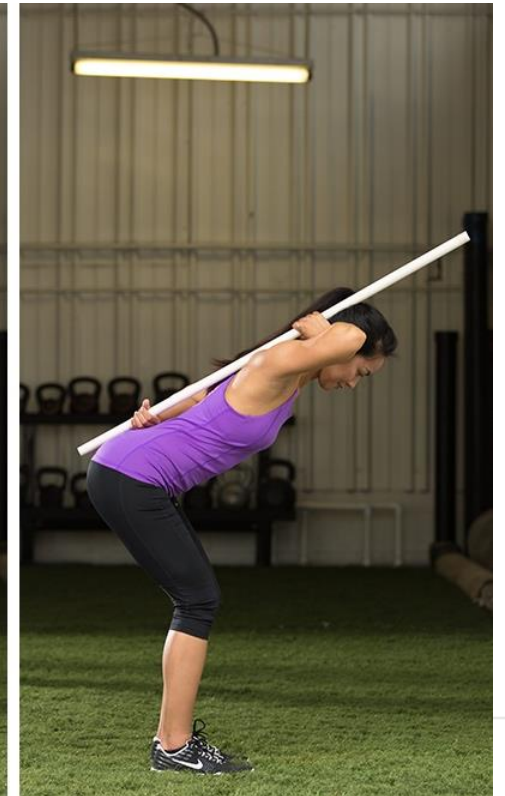
Deadlift

Progression 4

Hang power clean

Olympic Derivative

Power clean



Foundational Movements & Progressions

Starting Exercise	Hip hinge
Progression 1	Romanian deadlift
Progression 2	Good mornings
Progression 3	Deadlift
Progression 4	Hang power clean
Olympic Derivative	Power clean



Foundational Movements & Progressions

Starting Exercise

Hip hinge

Progression 1

Romanian deadlift

Progression 2

Good mornings

Progression 3

Deadlift

Progression 4

Hang power clean

Olympic Derivative

Power clean



Foundational Movements & Progressions

Starting Exercise

Hip hinge

Progression 1

Romanian deadlift

Progression 2

Good mornings

Progression 3

Deadlift

Progression 4

Hang power clean

Olympic Derivative

Power clean



Foundational Movements & Progressions

Starting Exercise	Hip hinge
Progression 1	Romanian deadlift
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Progression 3	Deadlift
Progression 4	Hang power clean
Olympic Derivative	Power clean



Foundational Movements & Progressions

Starting Exercise

Hip hinge

Progression 1

Romanian deadlift

Progression 2

Good mornings

Progression 3

Deadlift

Progression 4

Hang power clean

Olympic Derivative

Power clean

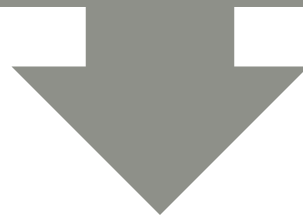


Foundational Movements & Progressions

Starting Exercise

Calf raise

Triple extension: simultaneous extension of ankle (plantarflexion), knee and hip.
This coordinated movement is essential for generating power in activities like jumping, running, and throwing.



Olympic Exercise

Clean & jerk

Foundational Movements & Progressions

Starting Exercise

Calf raise

Progression 1

Jump squat

Progression 2

Jump shrug

Progression 3

Box jump

Progression 4

High pulls

Olympic Derivative

Clean & jerk



Foundational Movements & Progressions

Starting Exercise

Calf raise

Progression 1

Jump squat

Progression 2

Jump shrug

Progression 3

Box jump

Progression 4

High pulls

Olympic Derivative

Clean & jerk



Foundational Movements & Progressions

Starting Exercise

Calf raise

Progression 1

Jump squat

Progression 2

Jump shrug

Progression 3

Box jump

Progression 4

High pulls

Olympic Derivative

Clean & jerk



Foundational Movements & Progressions

Starting Exercise

Calf raise

Progression 1

Jump squat

Progression 2

Jump shrug

Progression 3

Box jump

Progression 4

High pulls

Olympic Derivative

Clean & jerk



Foundational Movements & Progressions

Starting Exercise

Calf raise

Progression 1

Jump squat

Progression 2

Jump shrug

Progression 3

Box jump

Progression 4

High pulls

Olympic Derivative

Clean & jerk



Foundational Movements & Progressions

Starting Exercise

Calf raise

Progression 1

Jump squat

Progression 2

Jump shrug

Progression 3

Box jump

Progression 4

High pulls

Olympic Derivative

Clean & jerk

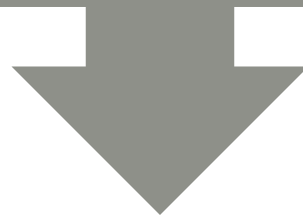


Foundational Movements & Progressions

Starting Exercise

Arm wall slides

Achieving and maintaining a **stable overhead position** requires adequate shoulder mobility, stability, and core strength.



Olympic Exercise

Snatch



Foundational Movements & Progressions

Starting Exercise

Arm wall slides

Progression 1

Overhead press

Progression 2

Landmine press

Progression 3

Overhead squat

Progression 4

Drop snatch

Olympic Derivative

Snatch



Foundational Movements & Progressions

Starting Exercise	Arm wall slides
Progression 1	Overhead press
Progression 2	Landmine press
Progression 3	Overhead squat
Progression 4	Drop snatch
Olympic Derivative	Snatch



Foundational Movements & Progressions

Starting Exercise	Arm wall slides
Progression 1	Overhead press
Progression 2	Landmine press
Progression 3	Overhead squat
Progression 4	Drop snatch
Olympic Derivative	Snatch



Foundational Movements & Progressions

Starting Exercise	Arm wall slides
Progression 1	Overhead press
Progression 2	Landmine press
Progression 3	Overhead squat
Progression 4	Drop snatch
Olympic Derivative	Snatch



Foundational Movements & Progressions

Starting Exercise	Arm wall slides
Progression 1	Overhead press
Progression 2	Landmine press
Progression 3	Overhead squat
Progression 4	Drop snatch
Olympic Derivative	Snatch



Foundational Movements & Progressions

Starting Exercise	Arm wall slides
Progression 1	Overhead press
Progression 2	Landmine press
Progression 3	Overhead squat
Progression 4	Drop snatch
Olympic Derivative	Snatch



Program Design

- Structuring a Training Program
 - Well-structured training program should balance volume and intensity of Olympic lifts with other strength and conditioning work to avoid overtraining and facilitate recovery
 - Use periodization to manage training loads effectively
- *Ex/* A weekly program might include *two sessions focused on Olympic lifts*, with additional sessions dedicated to mobility, stability and auxiliary strength exercises

Program Design: Week 1

- **Day 1: Movement Assessment and Introduction to Olympic Lifting Principles**
 - Thorough movement assessment to identify limitations and asymmetries
 - Introduction to basic mechanics of the snatch and clean & jerk using PVC pipe or broomstick
 - Focus on proper hip hinge, overhead squat, and front rack positions
 - *Light resistance training* focusing on major movement patterns (squats, lunges, presses, rows)
- **Day 2: Mobility and Stability**
 - Dynamic warm-up with emphasis on injury prevention
 - *Mobility* work targeting restrictions identified in the movement assessment
 - *Stability exercises*: core work, single-leg exercises, and balance drills

Program Design: Week 1

- **Day 3: Light Olympic Lifting Variations and Auxiliary Strength**
 - Hang power cleans and hang power snatches with *light weight* (50-60% of 1RM)
 - Focus on proper technique and bar path
 - *Auxiliary strength exercises*: Romanian deadlifts, overhead press, pull-ups
- **Day 4: Active Recovery**
 - Light cardio, stretching, or foam rolling
- **Day 5: Rest**

Program Design: Week 1

Day	Focus	Exercise	Reps	Sets	Intensity
1	Movement Assessment	Movement Assessment (Overhead Squat, Hip Hinge, Front Rack)			
		PVC Pipe Snatch Practice	3	5	Technique-focused
		PVC Pipe Clean & Jerk Practice	3	5	Technique-focused
		Goblet Squats	12	3	Light (bodyweight or 15-20%)
		Dumbbell Rows	12	3	Light

Program Design: Week 1

Day	Focus	Exercise	Reps	Sets	Intensity
2	Mobility & Stability	Foam Rolling (Thoracic, Hip Flexors)			5min ea
		Dynamic Warm-Up (Lunges, Toy Soldiers)			10min ea
		Dead Bug or Bird Dog	10/side	3	Bodyweight
		Single-Leg Romanian Deadlifts	10/leg	3	Bodyweight or light dumbbell

Program Design: Week 1

Day	Focus	Exercise	Reps	Sets	Intensity
3	Light Olympic Lifting Variations & Strength	Hang Power Snatch	3	4	50-60% 1RM
		Hang Power Clean	3	4	50-60% 1RM
		Romanian Deadlifts	10	3	Moderate
		Pull-Ups	8	3	Bodyweight

Program Design: Week 1

Day	Focus	Exercise	Reps	Sets	Intensity
4	Active Recovery	Light Cardio (Bike/Row)		15min	Low intensity
		Stretching (Focus on Hips, Shoulders)			10min
5	Rest				

Program Design: Week 2

- **Day 1: Olympic Lifting Focus**
 - Snatch pulls and clean pulls (60-70% of 1RM)
 - Overhead squats and front squats with light weight
 - Snatch balances and jerk balances
- **Day 2: Mobility and Stability**
 - Like Week 1, with progressions in exercise difficulty

Program Design: Week 2

- **Day 3: Olympic Lifting Variations and Auxiliary Strength**
 - *Full* clean and snatch with light weight (60-70% of 1RM)
 - Focus on technique and consistency
 - *Auxiliary strength exercises:* back squats, push press, rows
- **Day 4: Active Recovery**
- **Day 5: Rest**

Program Design: Week 2

Day	Focus	Exercise	Reps	Sets	Intensity
1	Olympic Lifting Focus	Snatch Pulls	3	4	60-70% 1RM
		Clean Pulls	3	4	60-70% 1RM
		Overhead Squats	8	3	Light weight (~40-50% 1RM)
		Snatch Balances	3	4	Light
2	Mobility & Stability	Progressed Dead Bug (Resisted)	10	3	Bodyweight + resistance band
		Single-Leg Squats (Supported)	8/leg	3	Bodyweight or light weight

Program Design: Week 2

Day	Focus	Exercise	Reps	Sets	Intensity
3	Olympic Lifting Variations & Strength	Full Snatch	3	4	60-70% 1RM
		Full Clean	3	4	60-70% 1RM
		Back Squats	10	3	Moderate (50-60% 1RM)
		Push Press	8	3	Moderate
4	Active Recovery	Yoga or Mobility Flow		20min	Low intensity
		Foam Rolling			10min
5	Rest				

Program Design: Week 3

- **Day 1: Olympic Lifting Focus**
 - Increase weight in snatch and clean & jerk (70-80% of 1RM)
 - Focus on explosive power and speed
 - Incorporate complexes (combinations of Olympic lift variations)
- **Day 2: Mobility and Stability**
 - Continue with progressions in exercise difficulty

Program Design: Week 3

- **Day 3: Olympic Lifting Variations and Auxiliary Strength**
 - *Power* snatch and power clean & jerk (70-80% of 1RM)
 - *Auxiliary strength exercises:* front squats, push jerks, pull-ups
- **Day 4: Active Recovery**
- **Day 5: Rest**

Program Design: Week 3

Day	Focus	Exercise	Reps	Sets	Intensity
1	Olympic Lifting Focus	Snatch + Snatch Balance Complex	2+2	4	70-80% 1RM
		Clean Pull + Front Squat Complex	2+2	4	70-80% 1RM
2	Mobility & Stability	Single-Leg Deadlifts with Dumbbells	10/leg	3	Moderate
		Plank with Shoulder Taps	12/side	3	Bodyweight

Program Design: Week 3

Day	Focus	Exercise	Reps	Sets	Intensity
3	Olympic Lifting Variations & Strength	Power Snatch	3	4	70-80% 1RM
		Power Clean & Jerk	3	4	70-80% 1RM
		Pull-Ups	10	3	Bodyweight or weighted
4	Active Recovery	Low-Impact Cardio		20min	Low impact
		Stretching			10min
5	Rest				

Program Design: Week 4

- **Day 1: Olympic Lifting Focus**
 - Increase weight further in snatch and clean & jerk (80-90% of 1RM)
 - Focus on maximal strength and power
- **Day 2: Mobility and Stability**
 - Maintain focus on mobility and stability

Program Design: Week 4

- **Day 3: Olympic Lifting Variations and Auxiliary Strength**
 - Incorporate more challenging variations (*ex/* hang snatch, snatch balance, split jerk)
 - *Auxiliary strength exercises:* deadlifts, overhead press, rows
- **Day 4: Active Recovery**
- **Day 5: Rest**

Program Design: Week 4

Day	Focus	Exercise	Reps	Sets	Intensity
1	Olympic Lifting Focus	Full Snatch	2	5	80-90% 1RM
		Full Clean & Jerk	2	5	80-90% 1RM
		Overhead Squats	6	3	Moderate to heavy
2	Mobility & Stability	Advanced Core Stability (Plank Variations)	12/side	3	Bodyweight
		Single-Leg Box Squats	10	3	Moderate

Program Design: Week 4

Day	Focus	Exercise	Reps	Sets	Intensity
3	Olympic Lifting Variations & Strength	Hang Snatch	3	4	70-80% 1RM
		Split Jerk	3	4	70-80% 1RM
		Deadlifts	6	4	Heavy (~80% 1RM)
4	Active Recovery	Yoga or Stretching		20min	Low intensity
5	Rest				

Program Design

- **Key Considerations:**

- Individualization: Adjust exercises, sets, reps and intensity based on athlete's specific needs and progress.
- Progression: Gradually increase volume and intensity over time to avoid overtraining. Monitor athlete's response and adjust accordingly.
- Recovery: Prioritize sleep, nutrition and active recovery to optimize performance and reduce injury risk.
- Technique: Focus on proper technique for all exercises, especially Olympic lifts. Start with light weights and gradually increase as technique improves.
- Listen to your body: Take rest days when needed and address any pain or discomfort immediately.
- Supervision: Ensure athlete is supervised by qualified coach or athletic trainer, especially when performing complex Olympic lifts.



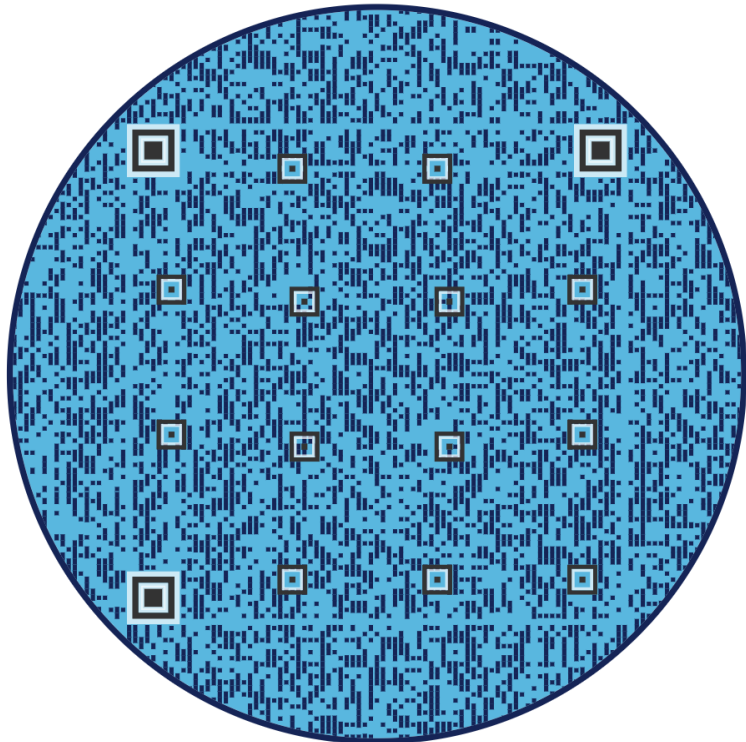
- **Integration of Performance with Rehabilitation**

- Olympic lifts can serve as effective tools to bridge traditional rehabilitation with performance enhancement
- Addressing the neuromuscular control, power production and movement coordination often missing in conventional rehab protocols
- *Hopefully*, this provides you with a model for expanding your clinical toolkit
 - You are key facilitators in the athlete's transition from patient to performer

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Add Contact



Erin Pletcher, PhD, LAT, ATC, CSCS
Erin.Pletcher@Jefferson.edu

Thomas Jefferson University
Associate professor



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