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# Recovering from Injury – Return to Gymnastics Smarter, Stronger, and Safer

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# Objectives

- Discuss steps to take when a gymnast is injured
- Review common pediatric sports medicine rehabilitation principles
- Review tips for a successful return to gymnastics progression



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# Emily Sweeney

- Former Level 10 Gymnast
  - Retired at age 16 after back surgery
  - Coach and level 10/NCAA Judge for 10+ years
  - Undergrad and Medical School: University of Missouri
  - Pediatric Residency: Phoenix Children's Hospital
  - Sports Medicine Fellowship: Nationwide Children's Hospital
- 
- University of Colorado School of Medicine, Department of Orthopedics
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# Principle #1: Pediatrics

- Children are not little adults
  - Open growth plates are weaker
  - More likely to fracture than adults
  - Increased risk of injury during growth spurt
  - Psychologically need more support than adults



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# Principle #2: Acute vs Overuse

- Acute: a one time fall/bad landing
  - Fracture, ankle sprain, ACL tear, concussion
- Overuse/chronic/insidious
  - Apophysitis, tendonitis, stress fracture, gymnast's wrist, spondylolysis



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# Principle #3: Impact vs Stability

- Impact related injuries
  - Stress fractures
  - Ankle impingement
  - Apophysitis
  - Osteochondral defect (OCD)
  - Gymnast's wrist
- Instability injuries
  - Patella (knee cap), elbow or shoulder dislocation
  - ACL or MCL tear
  - Ankle sprain
  - Labral tears



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# Injured Athlete

- Communication
  - Directly and quickly with parents
  - Referral to a medical provider
    - Gymnastics knowledge ideal but not required
  - Written info from medical team (MD, DO, PT)
  - Parent permission for verbal communication with medical team
- Education
  - With the patient, parent, medical team
- Give athlete time/space to process/grieve



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# Stages of Grief

- Denial
- Anger
- Bargaining
- Depression
- Acceptance



# The Athlete in Rehab

- Comply with medical provider's advice
- No pressure
- Periodic check-ins
- Don't ignore the gymnast
- Get creative



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# To Gym or Not to Gym?

- Not at all
  - First few days or if significant pain
  - Gymnast can't follow recommendations
- Partial practice
  - Be a part of the team and around friends
  - Don't over-train uninjured body part
  - Don't condition the whole time (isolated, hate it, won't report injuries)
- Be creative
  - Teach them to coach or judge (Code of Points)
  - Come up with their own assignments
  - Do homework



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# Getting “cleared”

- Can mean multiple things
- Still need to progress slowly
- 10% rule
- Slow and easy (assume it will take weeks)
- Physically ready AND mentally ready



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# Return to Play (RTP) Principles

## Returning to Sport After Gymnastics Injuries

Emily A. Sweeney, MD<sup>1,2</sup>; David R. Howell, PhD, ATC<sup>1,2</sup>; David A. James, DPT, OCS, SCS<sup>3,4</sup>;  
Morgan N. Potter, BA<sup>1</sup>; and Aaron J. Provance, MD<sup>1,2</sup>

Current Sports Medicine Reports, 2018



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# Prior to RTP Start

- Cleared by a medical provider (MD, DO, PT, AT)
  - Minimal to no pain
  - Full range of motion
  - Equal/near equal strength (>90%)
  - Appropriate balance/proprioception
  - Functionally be ready
  - Mentally be ready



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# Starting the RTP process

- <50% of normal number of reps
- Slow progression (e.g. increase by 10% per day/week)
- Stop if pain (soreness ok)
  - If pain not improving in 2-3 days, follow up with medical team
- Tailor progression to your athlete
- May need to stay at a certain stage for >1 day or more than 1 practice
- Start with skills they previously had mastered
- No new skills until back to baseline



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# Lower Body

- Impact
- Stability
  
- Hip
- Knee
- Shin/lower leg
- Ankle
- Foot/toe



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# Impact Injuries

- Start with softer surfaces (tumble track, rod floor, 8 incher)
- Tumbling in connection may be easier than single skills (e.g. cartwheel back tuck vs standing back tuck)
- Very low reps and slow progression for stress/overuse injuries



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# Stability Injuries

- Single skills to start
- Firm landing surface (limit resi pit, 8 inchers)
- Add twisting skills last



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**Return to Gymnastics Protocol for Females  
Lower Extremity – Impact-related Pathology**

Step	Tumble Track	Vault	Uneven Bars	Balance Beam	Floor
1	Jumps		Strap bar and pit bar without dismounts	Balance work	Turns and low-impact choreography
	Jumps to firm surface with good landing technique		Basic Skills on regular bars	Turns Straight jumps with good landing technique	Straight jumps with good landing technique
2			Dismounts into pit	Low beam jumps and leaps	Leaps and jumps
			All swinging skills	Low beam cartwheels, handstands and walkovers	Roundoff back handsprings Front handsprings (use rod floor if possible)
3		Run throughs	Release moves over pit	High beam: Balance work, jumps and leaps; Cartwheels, handstands and walkovers	Individual skills
				Floor beam: flight series with hands	Roundoff back handspring to single salto onto soft mat Front handsprings and front saltos
4		Limited volume running and board drills	Low-level dismount to mat in the pit	Tumbling (acro) series on low beam	Basic tumbling/twisting skills onto regular floor
		Handspring and Tsuk timers	Release moves (with spotter as needed)		Front tumbling passes
5		Yurchenko timers	Full dismount to mat in pit	High beam tumbling (acro) series	Double saltos
			Single salto dismount to regular landing mat	Dismounts into pit/resi mat	
6		Flipping onto soft mat without twists	Dismounts onto regular mats	Dismounts onto regular mats	Full progression
7		Full vault onto regular mat			



**Return to Gymnastics Protocol for Males**  
**Lower extremity – Impact-related pathology**

Step	Tumble Track	Floor	Pommel Horse	Rings	Vault	Parallel Bars	High Bar
1	Jumps	Flare/circle and handstand skills	Basics without dismounts	Basics without dismounts		Basics without dismounts	Strap bar and pit bar basics without dismounts
	Roundoff back handsprings (add single salto)	Straight jumps with good landing technique		Strength skills			
	Front handsprings						
2	Standing skills (back handsprings, tucks)	Jumps with good landing technique	Full skills with dismounts	Full swing skills		Full swing work	Full swing skills
	Twisting saltos	Roundoff back handsprings		Dismount into pit		Dismounts into pit	Release moves over pit
		Front handsprings					
3	Add double salto skills onto soft mat	Standing back handsprings and tucks		Basic dismounts onto regular mat	Run throughs	Basic dismounts onto regular mat	
Add single saltos to tumbling passes onto a soft mat							
4		Twisting saltos			Handspring and Tsuk timers		Dismount onto mat in pit
		All front tumbling					
5		Double saltos			Yurchenko timers	Releases and dismounts without twisting	Basic dismounts onto regular mat
6				Full dismounts	Flip vault onto soft mat without twisting	Twisting releases and dismounts	Full dismounts
7					Vault to regular mat		



**Return to Gymnastics Protocol for Females**  
**Lower Extremity – Stability-related Pathology**



Step	Tumble Track	Vault	Uneven Bars	Balance Beam	Floor
1	Jumps		Strap bar and pit bar; no dismounts	Balance work	Leaps and jumps without turns
	Jumps to firm surface with good landing technique		Basic Skills on regular bars	Turns	Standing back handsprings
				Jumps with 2-foot landings without turns	
2			Nontwisting dismounts to regular mat	Handstands, cartwheels and walkovers	Front handsprings
				Low beam single leg landing leaps	
3		Run throughs	Increasing difficulty of skills, spotted if needed to avoid unstable landings	Back and front handsprings	Single saltos without twisting on regular floor
				High beam balance skills, jumps and leaps	
4		Tsuk, handspring and Yurchenko timers to back	Progress to regular dismounts and release moves	Tumbling (acro) series on low beam	Basic twisting and double salto skills
				Tumbling (acro) series on high beam	
5		Basic flipping vaults (no twisting)	Increasing difficulty of skills and dismounts with twisting	Roundoff rebound off beam	Gradually increase to full skills
				Dismounts without twisting to regular mat	
6		Full vaults		Twisting dismounts	



**Return to Gymnastics Protocol for Males**  
**Lower extremity – Stability-related pathology**

Step	Tumble Track	Floor	Pommel Horse	Rings	Vault	Parallel Bars	High Bar
1	Jump to firm surface with good landing technique	Jumps with good landing technique Standing back handsprings	Basic skills without dismounts	Basics without dismounts		Basic skills without dismounts	Strap bar and pit bar basics without dismounts
2		Front handsprings Roundoff back handsprings Standing back tucks	All skills with dismounts	More difficult skills (spot as needed)		More difficult skills (spot as needed)	Basic (no twisting) dismounts to the pit Releases over pit
3	Twisting and double salto skills to firm surface	Single nontwisting saltos		Basic (no twisting) dismounts to regular mat	Run throughs	Basic (no twisting) dismounts to regular mat	More difficult skills (spot as needed) Full releases
4		Basic twisting and double salto skills		Double salto dismounts	Tsuk, handspring and Yurchenko timers	More difficult dismounts	Dismounts to mat without twisting
5		More difficult tumbling passes		Twisting dismounts	Flip vaults without twisting		Dismounts with twisting
6					Regular vault		

# My Gymnast Is In A Boot

- YES

- Seated conditioning (pike leg lifts, sit ups, V-ups)
- Handstands
- Swing bars (usually)
  - Put tennis shoe or 1 pound weight on opposite foot
  - Strap bar, basics
  - No release moves
  - No dismounts



- NO

- Tumbling
- Dismounts
- Running
- Leaps
- Jumps
- Trampoline



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# Upper Body RTP

- Wrist
- Elbow
- Shoulder



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**Return to Gymnastics Protocol for Females**  
**Upper Extremity – Shoulder**

Step	Tumble Track	Vault	Uneven Bars	Balance Beam	Floor
1			Hang on bar x 10-60 s	Leaps and jumps	Shoulder shrug (protraction) in push up position x 10-15
					Handstand hold against wall x 10-60 s
					Cartwheels (10-15)
2	Roundoffs		Cast to horizontal	Cartwheels	
				Handstands	
3	Roundoff back handsprings		Tap Swings (~ 10-20)	Roundoffs	Walkovers
	Front-handsprings (may add single saltos)		Kips and casts to handstand		Roundoffs
4	Standing back handsprings		Clear hips and Stalders	Walkovers (start on low beam)	Roundoff back handsprings
	Twisting saltos				Front handsprings (may add single saltos)
5	Add double saltos	Handstand hops and blocking drills	Back giants	Round off to dismount	Standing back handsprings
				Salto	Pirouetting skills
6		Handsprings and Tsuk timers	Front giants	Back handsprings	
		Roundoff entry for Yurchenkos	Pirouetting skills		
7		Yurchenko timers	Release moves		Twisting and double saltos
8		Flip all vaults	Eagle giants		

Return to Gymnastics Protocol for Males  
Upper extremity – Shoulder

Step	Tumble Track	Floor	Pommel Horse	Rings	Vault	Parallel Bars	High Bar
1		Shoulder shrug (protraction) in push-up position x 10-15		Hang on rings 10-60s			Hang on high bar 10-60s
		Handstand against wall x 10-60 s					
		Cartwheels (10-15)					
2	Roundoff	Push up with shrug (protraction)					Cast to horizontal
3	Roundoff back handsprings (may add saltos)	Roundoffs				Support swings	Below bar tap swings
	Front handsprings					Under bar hangs	
4	Standing back handsprings	Roundoff back handsprings (may add saltos)	Scissor swings	Front support hold		Above bar drills	Kips
	Add twisting saltos	Front handsprings	Mushroom circles	Below ring swings			Cast to handstand
5	Add double saltos	Standing back handsprings		Handstands	Handstand hops and blocking drills	Above bar skills	Clear hips
							Stalders
6		Add twisting and double saltos		Bail drills	Handspring and Tsuk timers	Advance above bar sequences and under bar skills, no Tippelt	Back giants
							Dismounts
7		Flare/circle skills	Basic skills on 2 pommels and on leather	Basic strength skills	Yurchenko timers	Pirouette skills	Pirouette skills
						Advance under bar skills	Front giants
Step	Tumble Track	Floor	Pommel Horse	Rings	Vault	Parallel Bars	High Bar
8			Single pommel work	Moderate strength skills	Flipping vaults	Release moves including Tippelt	Release elements
				Full swing skills and sequences			
9			Connect multiple skills	All strength holds			Eagle and invert giants



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Return to Gymnastics Protocol for Females  
Upper Extremity – Elbow

Step	Tumble Track	Vault	Uneven Bars	Balance Beam	Floor
1			Hang on bar 10-60 s (my need to delay to step 2 or 3 for elbow stability issues)		Shoulder shrug (protraction) in push-up position 10x15
				Handstand at wall 10-60 s	
				Front and back walkovers (up to 10)	
2	Roundoff x 10				Push-up with shrug (protraction) x10-15
				Cartwheels (up to 15)	
3	Roundoff, back handspring		Tap Swings (10-20) (may need to delay until step 4 for elbow stability issues)		Press to handstand
	Front handsprings (may add single saltos)				
4	Standing back handsprings			Walkovers and cartwheels on low then high beam	Roundoff, back handsprings and front handsprings (may add saltos)
5			Glide and long hang kips	Roundoff and back handsprings on line on floor	Pirouetting skills
			Cast to handstands		
6		Handstand hops/blocking drills	Back giants and circling elements	Roundoff and back handsprings	Roundoff, back handspring (add single saltos)
			Dismounts		
7		Handsprings	Pirouetting skills		Standing back handsprings
		Roundoff entry only for Yurchenko <sup>1</sup>		Front handsprings	
8		Yurchenko and Tsuk vaults	Front and eagle giants		
			Release elements		

Return to Gymnastics Protocol for Males  
Upper extremity - Elbow

Step	Tumble Track	Floor	Pommel Horse	Rings	Vault	Parallel Bars	High Bar
1		Shoulder shrug (protraction) in push-up position x 10-15 Handstand at wall 10-60s		Hang on rings 10-60s (may need to delay to step 2 or 3 for elbow stability issues)			Hang on high bar 10-60s (may need to delay to step 2 or 3 for elbow stability issues)
2	Roundoff x 10	Pushup with shrug (protraction) x 10-15 Cartwheels (up to 15)					
3	Roundoff back handsprings	Press to handstand				Under bar hangs (may need to delay for elbow stability issue)	Tap swings on high bar (may need to delay to step 4 for elbow stability issues)
	Front handsprings (may add saltos)	Roundoffs					
4	Standing back handsprings	Roundoff back handsprings (may add saltos)		Below ring swings		Support swings	
		Front handsprings			Above bar basics		
5		Standing back handsprings		Front support holds	Handstand hops and blocking drills	Above bar sequences	Kips and casts
6		Flare/circle skills	Scissor skills		Handspring timers		Back giants
			Circles on mushroom				Stalders
							Dismounts

Step	Tumble Track	Floor	Pommel Horse	Rings	Vault	Parallel Bars	High Bar
7		All tumbling	Basic skills on 2 pommels and the leather	Handstand and basic swinging skills	Tsuk and Yurchenko timers	Pirouette skills Under bar basics	Pirouette skills
8			Single pommel work	More difficult swinging skills	Handspring vaults	Under bar skills	Front giants Release skills
9			Connect multiple skills	Strength and planche holds	Tsuk and Yurchenko vaults	Release skills	Eagle and invert giants



Step	Tumble Track	Vault	Uneven Bars	Balance Beam	Floor
1			Hang on bar 10-60 s		Push-up with shoulder shrug (protraction) x 10-15
					Push-up position rock forward and back x10-15
2			Tap swings on bars (~ 3 sets of 5)		Handstand hold against the wall x 10-60 s (facing wall will be easier on wrist than facing away from wall in the handstand position)
3	Roundoffs x 10				Free standing handstands
					Cartwheels on floor
4	Roundoff, back handspring (may add single saltos)		Glide and long hang kips		Press to handstand (up to 10)
					Front and/or back walkovers (up to 10)
5	Front handsprings (may add single saltos)		Cast handstand and back giants	Cartwheels and handstands	Roundoffs
					Pirouetting skills
6	Standing back handsprings		Clear hips and Stadlers	Front and back walkovers (progressing from low to high beam)	Roundoff, back handspring (add single saltos)
7		Handstand hops and blocking drills on floor (use softer mats initially if gymnast had impact type injury)	Front giants	Standing back handspring on a line	Standing back handsprings
			Pirouetting skills		Front handsprings

Step	Tumble Track	Vault	Uneven Bars	Balance Beam	Floor
8		Handspring and Tsuk timers	Release skills	Round offs and back handsprings (progressing from low to high beam)	
		Roundoff entry only for Yurchenko	Eagle giants		
9		Yurchenko timers		One arm skills (e.g., one arm back handspring)	
		Flipping handspring and Tsuk vaults			
10		Flipping Yurchenko vaults			



Step	Tumble Track	Floor	Pommel Horse	Rings	Vault	Parallel Bars	High Bar
1		Push-up with shoulder shrug (protraction x 10-15)		Hang on rings 10-60 s			Hang 10-60 s
		Push-up position - rock forward and back x 10-15					
2		Handstand hold against the wall x 10-60 s (facing wall will be easier than facing away from wall in the handstand position)					Tap swings on bar (~3 sets of 5)
3	Roundoffs	Free standing handstands				Under bar hangs	
		Cartwheels					
4	Roundoff, back handsprings (may add single saltos)	Press to handstand		Swings		Support swings	Long hang kips
						Above bar basics	
5	Front handsprings (may add single saltos)	Roundoffs	Basic circles on mushroom Scissors	Front support holds		Above bar sequences	Kips and casts to handstand
6	Standing back handsprings	Roundoff back handsprings (may add saltos)	Double pommel basic skills	Handstand and basic swinging skills			Clear hips and Stalders
							Back giants
Step	Tumble Track	Floor	Pommel Horse	Rings	Vault	Parallel Bars	High Bar
7		Standing back handsprings	Single pommel basics	More difficult swinging skills	Handstand hops and blocking drills on floor (use softer mats initially if gymnast had impact type injury)	Under bar drills	Front giants and pirouetting skills
		Front handsprings	Leather basics				
8		Flare/circle and hold skills	More difficult skills and single pommel work	Strength and planche holds	Handspring and Tsuk timers	Under bar skills	Release moves Eagle and invert skills
9			Connect multiple skills		Yurchenko timers	Release skills	
					Flipping handspring and Tsuk vaults		
10					Flip Yurchenko vaults		



# Spine

- Extension based pain
- Flexion based pain



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## Return to Gymnastics Protocol for Females

Back

Step	Tumble Track	Vault	Uneven Bars	Balance Beam	Floor
1	Roundoffs		Hang on bar 10-60 s	Turns	Handstand against wall x 10-60 s
				Kicks forward and sideways	Cartwheels
					Straight jumps with good landing technique
2			Glide and long-hang kips	Cartwheels	Tuck, straddle and pike jumps with good landings
				Handstands	
3	Roundoff back handsprings		Tap Swings (10-20)	Basic jumps	Leaps and split jumps (without arch)
	Front handsprings		Kips to casts handstand (lower level gymnasts may need to delay this step if not proficient)		
			Clear hips and Stalders		
4	Standing back handsprings		Back and front giants	Roundoffs	Roundoff back handsprings
	Nontwisting saltos (no double layouts); land on soft mat		Dismount timers onto soft mat	Leaps and split jumps (without arch)	Front handsprings
5	Twisting saltos	Handspring and Tsuk timers onto soft mat	Limited release moves (no Tkatchev, Pak or hechts which require arching)	Back/front handsprings on line on floor	Single salto without twisting (standing and tumbling)
				Dismount timers onto soft mat	Leaps and jumps with arch
6	Double layouts		All release skills	Back handsprings	Twisting skills
			Dismounts onto regular mats	Leaps and jumps with arch	Walkovers on line (if required)
7		Yurchenko timers onto soft mat	All skills	Layout step outs	
				Salto on the beam	
8		Start flipping vaults onto soft mat	Rotate	Walkovers if required	



**Return to Gymnastics Protocol for Males**  
**Back**

Step	Tumble Track	Floor	Pommel Horse	Rings	Vault	Parallel Bars	High Bar	
1	Roundoffs	Handstand holds against wall (10-60 s)						
		Cartwheels						
		Straight jumps with good landing technique						
2	Roundoff back handsprings	Roundoffs	Scissor swings	Basic swings		Above bar support swing basics	Kips	
	Front handsprings			Front support holds			Tap swings	
3	Standing back handsprings	Roundoff back handsprings	Basics on pommels and leather, no dismounts	Handstand and basic strength skills	Handspring and Tsuk timers	Above bar support swing skills	Cast to handstand (lower level gymnasts may need to delay this step if not proficient)	
	Nontwisting saltos (no double layouts)	Front handsprings		Bail drills			Under bar drills	Clear hips
		Flare/circle skills						Stalders
4	Add double layouts	Add single saltos without twisting	All skills and sequences	Back giants	Handspring and Tsuk vaults	Under bar skills, no Tippelt	Back and front giants	
		Standing back handsprings					Dismounts into pit	
5		Add double salto skills	Add dismounts	Front giants	Yurchenko timers	Full dismounts	All release moves	
6		Add twisting skills		Add dismounts	Full vaults	Full under bar skills and Tippelt		

# Return to Sport After Concussion

- Recognition is key
- Know your state's law:
  - <https://www.momsteam.com/health-safety/every-state-has-youth-sports-concussion-safety-law>
- The Shift Show: Why We Need to Take Concussions More Seriously in Gymnastics:
  - <https://podcasts.apple.com/us/podcast/why-we-need-to-take-concussions-more-seriously-in-gymnastics/id1441930368?i=1000490424123?i=1000490424123>
- Rest in first 24-48 hours
- Ok to return to school as soon as possible
  - May need modifications/accommodations
- Ok to do 10-20 min light aerobic activity that does not cause symptoms



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# Concussion RTP

- Step 1: Light aerobic activity: 10-20 min stationary bike/jog; stretching
- Step 2: Moderate aerobic activity: 20-30 min of body weight exercises and conditioning; stretching
- Step 3: handstand work (basics, jumps), run through on vaults; kips, tap swings on bar; jumps and leaps on low beam/floor; all conditioning
- Step 4: timers on vault, intro level tumbling, low bar and low beam skills; start high bar skills if comfortable; basics on high beam
- Step 5: individual skills; transition to high beam; may need a spot on more difficult skills
- Step 6: full practice
- Step 7: competition



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# Other RTP Factors

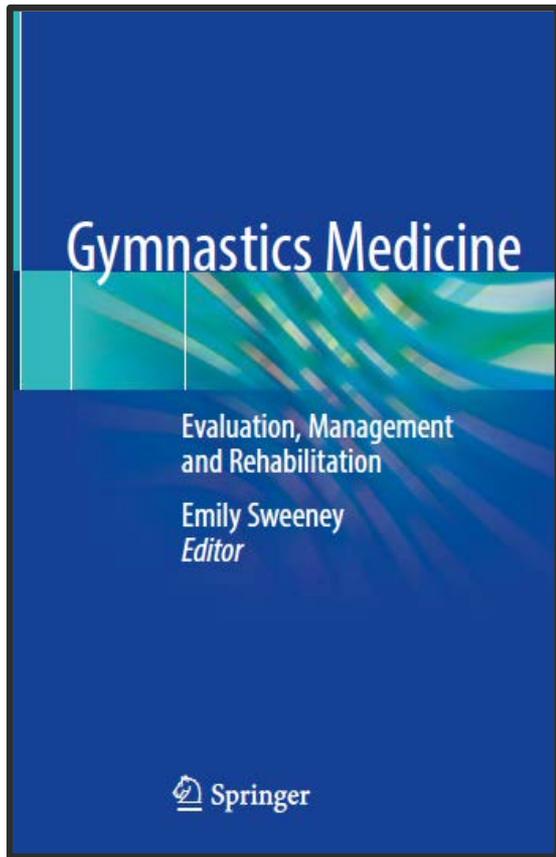
- Sleep
- Nutrition
- School
- Fear/anxiety
- Other stressors



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## **Returning to Sport After Gymnastics Injuries**

Emily A Sweeney<sup>1,2</sup>, David R Howell<sup>1,2</sup>, David A James<sup>3,4</sup>, Morgan N Potter<sup>1</sup>, Aaron J Provance<sup>1,2</sup>  
Current Sports Med Reports, 2018

## **A systematic review of injuries in gymnastics**

Roger Edmund Thomas<sup>1</sup>, Bennett Charles Thomas<sup>2</sup>  
The Physician and Sportsmedicine 2019

## **The Young Injured Gymnast: A Literature Review and Discussion**

Elsbeth Hart<sup>1</sup>, William P Meehan 3rd, Donald S Bae, Pierre d'Hemecourt, Andrea Stracciolini  
Curr Sports Med Reports 2018



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# Thank You!

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