

# All ACLs are not the Same: Sport Specific Differences in Presentation and Response Surrounding Pediatric and Adolescent ACL Reconstruction

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## INTRODUCTION

Knee injuries are the leading cause of sport-related surgery. Anterior cruciate ligament (ACL) injuries may account for a quarter or more of all knee injuries and are rising at a rapid rate in pediatric and adolescent populations.<sup>1</sup> Younger athletes participating in high-intensity sports that involve cutting and pivoting are at an especially high risk of ACL injury.<sup>2</sup> In the Western Hemisphere, soccer, football, and basketball are associated with the highest ACL rupture rates.<sup>3</sup> However, sport-specific differences in injury and recovery surrounding ACL rupture are not well defined.

## PURPOSE

The purpose of this study was to compare injury characteristics and outcomes in pediatric and adolescent soccer, football, and basketball players following ACL reconstruction (ACLR).

## METHODS

An IRB-approved review of consecutive ACL injuries treated in a pediatric sports medicine practice between January 2015 and February 2017 was performed. Inclusion required primary ACLR and preoperative sport participation. Charts were reviewed for injury and surgical data, patient reported outcome measures (PROM), functional clearance data, and any re-injuries. Soccer, football, and basketball players were compared using a Kruskal-Wallis test and ANOVA analysis followed by T-tests for multiple comparisons. A regression analysis was used to identify independent predictors of return to sport and the occurrence of contralateral ACL injury.

Table 1. Demographics

Variable	Soccer (n = 75)	Football (n = 66)	Basketball (n = 44)	p-Value
Age (years)	15.0 ± 2.5	14.7 ± 2.3	14.9 ± 1.6	0.75
Females (%)	66.7	1.5	63.6	<0.01
BMI (kg/m <sup>2</sup> )	23.09 ± 3.67	24.65 ± 6.3	24.04 ± 5.5	0.27
Level of Competition (%)				<0.01
Recreational	9.3	9.1	0.0	
Middle School	2.7	16.7	9.1	
High School	26.7	47.0	40.9	
Club/Select	45.3	12.1	36.4	
College	1.3	0.0	0.0	
n/a	14.7	15.1	13.6	

Table 2. Injury Data and Outcomes

Variable	Soccer	Football	Basketball	p-Value
<i>Injury Data</i>				
Contact Injury (%)	18.9	27.3	15.9	0.30
Right Sided Injury (%)	50.7	56.1	54.5	0.80
<i>Venue of Injury (%)</i>				
Recreational Play	22.2	17.1	7.7	0.18
Practice	30.6	14.6	19.2	
Game	47.2	68.3	73.1	
<i>Meniscal Injury (%)</i>				
Lateral	37.3	36.4	34.1	0.78
Medial	17.3	13.6	20.5	
Both	13.3	18.2	22.7	
None	32.0	31.8	22.7	
<i>Patient Reported Outcomes</i>				
Pedi-FABS (Baseline)	17.83 ± 10.42	17.05 ± 11.56	21.33 ± 8.68	0.60
Pedi-IKDC (Baseline)	54.51 ± 17.47	55.11 ± 21.36	51.89 ± 20.22	0.80
Pedi-FABS (1yr)	20.59 ± 8.43	21.38 ± 7.88	21.75 ± 7.59	0.90
Pedi-IKDC (1yr)	89.96 ± 10.91	93.06 ± 10.86	84.86 ± 18.56	<b>0.03</b>
Pedi-FABS (2yrs)	20.14 ± 9.03	25.00 ± 5.04	22.17 ± 8.95	0.32
Pedi-IKDC (2yrs)	84.94 ± 16.95	87.3 ± 18.09	75.91 ± 23.68	0.18
<i>Return to Sport and Complications</i>				
Return to Same Sport (%)	70.7	95.8	88.2	<b>0.03</b>
Graft Failure (%)	1.3	1.5	0	0.11
Contralateral ACL Tear (%)	12.0	3.0	2.3	<b>0.04</b>

## RESULTS

### Demographics

- N=185
- Majority of soccer and basketball injuries were female (Table 1)

### Injury Characteristics

- No differences noted in laterality, contact vs. non-contact, nor meniscal status (Table 1)
- Trend toward the majority of ACL injuries occurring during gameplay across all sports (Table 1)

### Return to Play Clearance

- No differences noted in functional clearance scores at one year
- Football players took longer to 'pass' return to play testing than both soccer and basketball players (318d vs. 270d vs. 256d; p=0.012) (Figure 1)

### Patient Reported Outcomes

- Football players had the highest Pedi-IKDC (p=0.03) at one year (Table 1)
- Soccer players demonstrates the highest mental coping and freedom from worry scores at two years on the ACSI-28 (p=0.036 and p=0.004, respectively)

### Outcomes and Re-Injuries

- 81.7% of athletes were able to return to the same sport (Table 1)
- Soccer players were most likely to sustain a contralateral ACL injury (12%; p=0.048)
- Soccer players were least likely to return to the same sport (29%; p=0.032)

## CONCLUSIONS

1. Football players may take the longest to clear functional testing but demonstrate low rates of secondary ACL injury (despite similar rates of initial non-contact injury) with high functional outcomes.
2. Soccer players appear to be at an increased risk of secondary ACL injury and less likely to return to playing soccer.
3. Sport may predict trends in psychological response to ACL treatment.

## REFERENCES

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Athletes Cleared to Return to Sport by Month

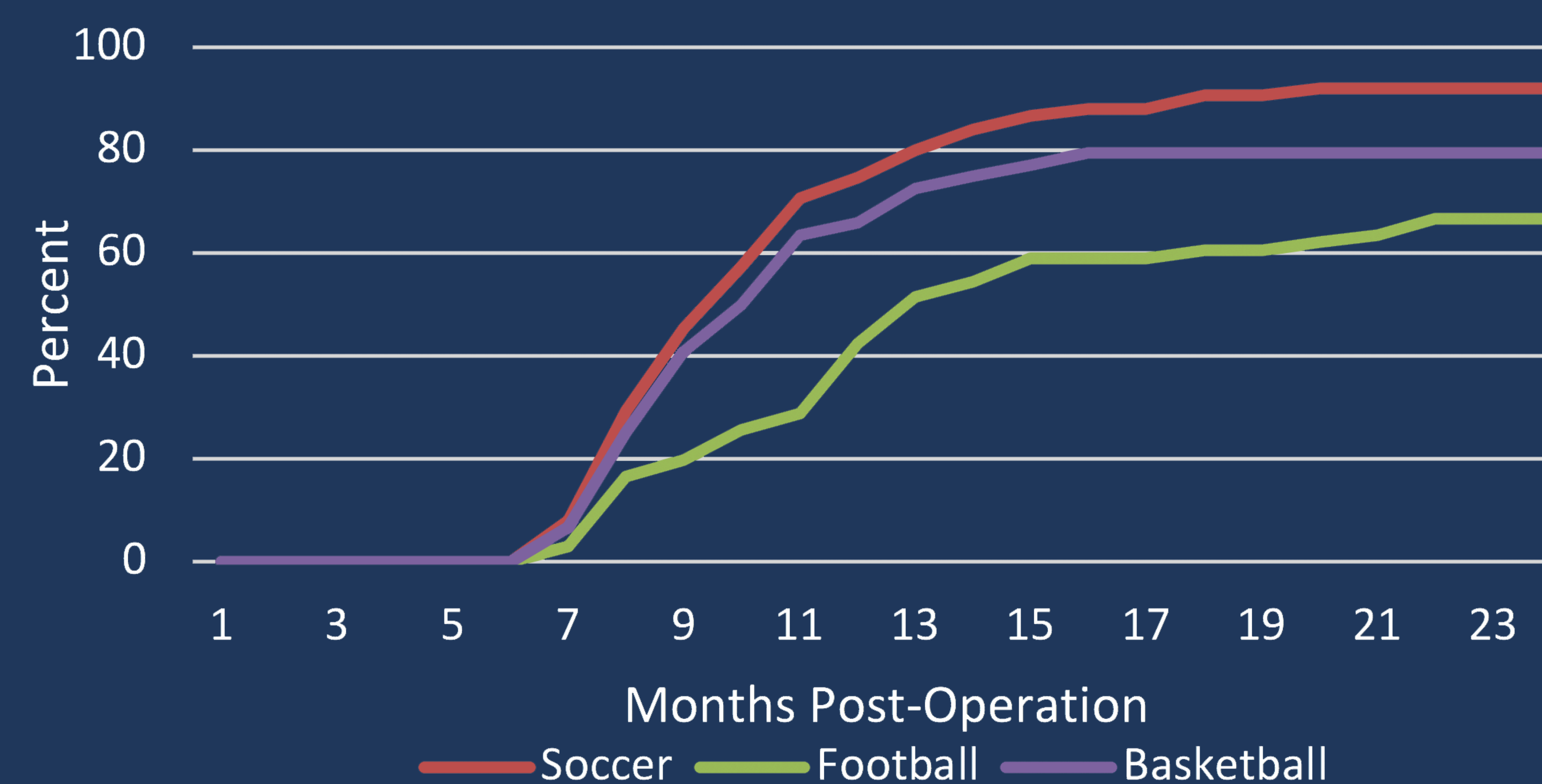


Figure 1. Graph demonstrating differences in the return to play timeline between sports