

# The Role of Gender and Age in Pediatric Sports-Related Concussions

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## BACKGROUND

Concussions continue to be a significant focus of the medical and athletic communities. However, there has been relatively little research dedicated to the pediatric concussion problem.

Our understanding of recovery rates in male and female pediatric athletes is minimal. Researchers are beginning to focus on age and sex differences in concussion outcomes while sports specific recovery rates in the pediatric population remains little understood.

This study describes gender differences in recovery rates among pediatric athletes. Furthermore, we will present recovery rates in specific sports by gender. Finally, we will describe recovery rates among younger vs. older pediatric athletes.

## METHODS

The data collected for this project was from patients seen in the Concussion Clinic at Children's Hospitals & Clinics of Minnesota from 2011-2013.

All subjects were evaluated/treated in the Concussion Clinic following mild head trauma. We identified 390 patients who suffered a sports-related concussion between the ages of 10 to 18 years old.

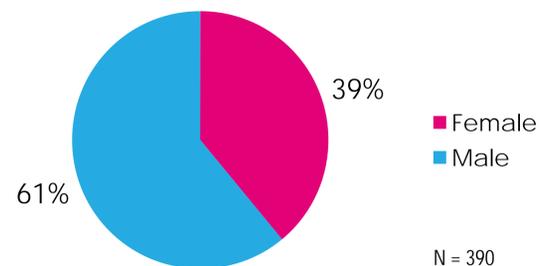
The sample was 61% male and 39% female. We compared male versus female and young (mean age = 12.5) vs. older (mean age = 16.0) athletes overall recovery rates and then recovery rates by specific sports by gender, which included soccer, hockey, basketball, and softball/baseball.

Recovery rate was defined as time in days between date of injury and date of recovery as determined by clinical assessment in the concussion program.

Parametric (i.e., independent samples t-tests) and non-parametric (i.e., chi-square) statistical analyses was conducted using SPSS.

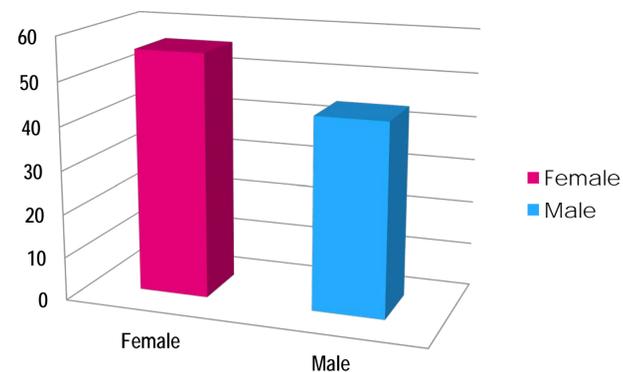
IRB approval was obtained for this project.

## Gender Distribution of Sample

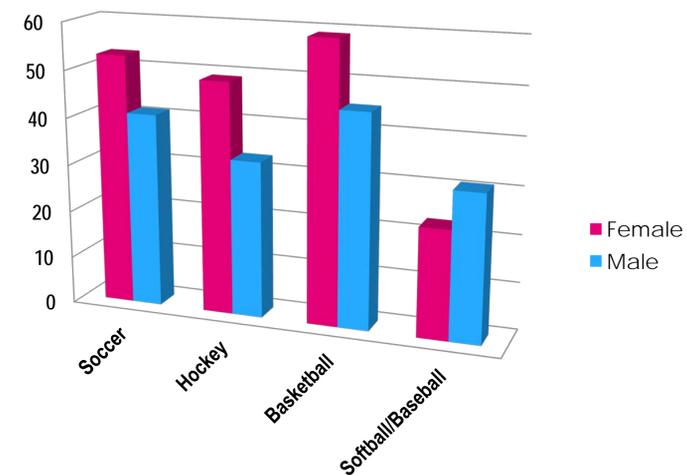


Gender Group Characteristics		
	FEMALES	MALES
N	151	238
Age at Injury	13.8 (2.0)	13.7 (2.2)
Hx of Concussion	26%	34%
LOC w/ presenting Injury	13%	17%
Disorientation w/ presenting injury	30%	35%
Seen in ED?	66%	64%
Days from injury to 1 <sup>st</sup> Clinic Visit	11.6 (20.5)	15.4 (3.1)
Hx of Dep/Anx	13%	11%
Hx of Migraine	13%	11%
Hx of Other Neurological Problems	18%	16%
Hx ADHD	11%	17%
Hx LD	5%	5%
Days to Recovery	55.6 (64.8)	44.3 (65.8)

## Days to Recovery by Group



## Days to Recovery by Group



## RESULTS

Group statistics showed a comparable mean age at injury of 13.8 for females and 13.7 for males.

Initial injury severity was considered comparable between the females and males with similar loss of consciousness (13.4% vs. 17.4%; n.s.) and disorientation (29.5% vs. 35.4%; n.s.) rates. Furthermore, the two groups presented to the ED for assessment of their injury at very similar rates (66% vs. 64%; n.s.).

The females overall took longer to recover than the males though this was not a statistically significant difference (Mean = 55.6 vs. 44.3 days), due to the large variability in recovery rates for both groups (SD = 64.8 and 65.8 for the females and males, respectively).

The older patients took somewhat longer to recover (54.4 vs. 46.1 days) but again, this difference was not statistically significant.

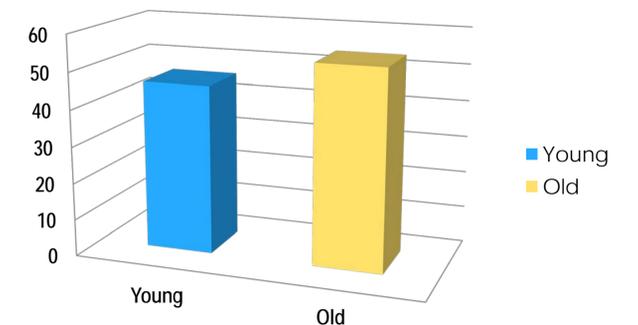
Comparison of sports-specific recovery rates by gender were as follows;

- Soccer: female > male (53.0 vs. 40.6 days, n.s.),
- Hockey: female > male (49.4 vs. 32.7 days, n.s.),
- Basketball: female > male (58.6 vs. 45.2 days, n.s.),
- Softball/Baseball: female < male (23.2 vs. 31.4 days, n.s.)

## Age Group Characteristics

	YOUNG	OLD
N	250	140
Age at Injury	12.5 (1.3)	16.0 (0.9)
Gender (% Male)	61%	62%
Hx of Concussion	30%	31%
LOC w/ Presenting Injury	16%	16%
Days to Recovery	46.1 (57.6)	54.4 (78.7)

## Days to Recovery by Group



## DISCUSSION

This study demonstrated a clear trend for longer recovery from concussion in female pediatric athletes when compared to males. We also showed a trend for older athletes taking longer to recover than younger athletes, which may reflect a greater extent of injury that can accompany physically stronger and more competitive play. Finally, we identified that female basketball players took the longest to recover while within a specific sport, hockey showed the greatest discrepancy in recovery rate between males and females.

Further analysis of this information is warranted to understand the factors be they biological, biomechanical, athletic rules-related, and/or culture of sport that explain these differences. Finally, these data will be valuable to help develop better clinical understanding and a more customized treatment plan for these student-athletes.