

Epidemiology of Acromioclavicular Joint Injuries at a Colorado Ski Resort

Naomi Kelley¹; Lauren Pierpoint²; Morteza Khodaei¹

¹University of Colorado School of Medicine, Aurora, CO. ²Center for Outcomes-Based Orthopedic Research, Vail, CO.



School of Medicine
UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

Background

- The acromioclavicular joint (ACJ) is a ligamentous connection between the clavicle and acromion.
- Stability of the Acromioclavicular joint (ACJ) is provided horizontally by the acromioclavicular (AC) ligament, and vertically by the coracoacromial ligament. Overall, the anatomy of the ACJ provides resilience against significant forces.
- While the joint is robust, ACJ injuries remain very common,^{2, 5-7} accounting for more than 40% of all shoulder injuries.¹⁻⁴ In younger populations, the vast majority (91%) of ACJ injuries are associated with sports due to direct fall onto the superolateral aspect of an adducted arm.^{6,8}
- Several studies address shoulder injuries among skiers and snowboarders, however the rate of ACJ injury among this population remains unknown.

Purpose

- To determine the incidence of ACJ injuries and trends with respect to injury mechanism, environmental factors, associated injuries, and demographics amongst patients treated for acute ACJ injuries at the Winter Park Ski Resort clinic in Colorado over 5 winter seasons (2012/13-2016/17).

Methods

- Design: retrospective descriptive cohort analysis
- All patients with an ACJ injury secondary to skiing or snowboarding who presented to Winter Park Resort clinic between 11/2012 and 4/2017 were included.
- Medical records were reviewed for patient/injury characteristics: demographics, sport, mechanism of injury, ACJ injury type, laterality, slope difficulty/terrain park.
- All ACJ injuries/radiographs were classified according to the Rockwood classification.⁹

Results

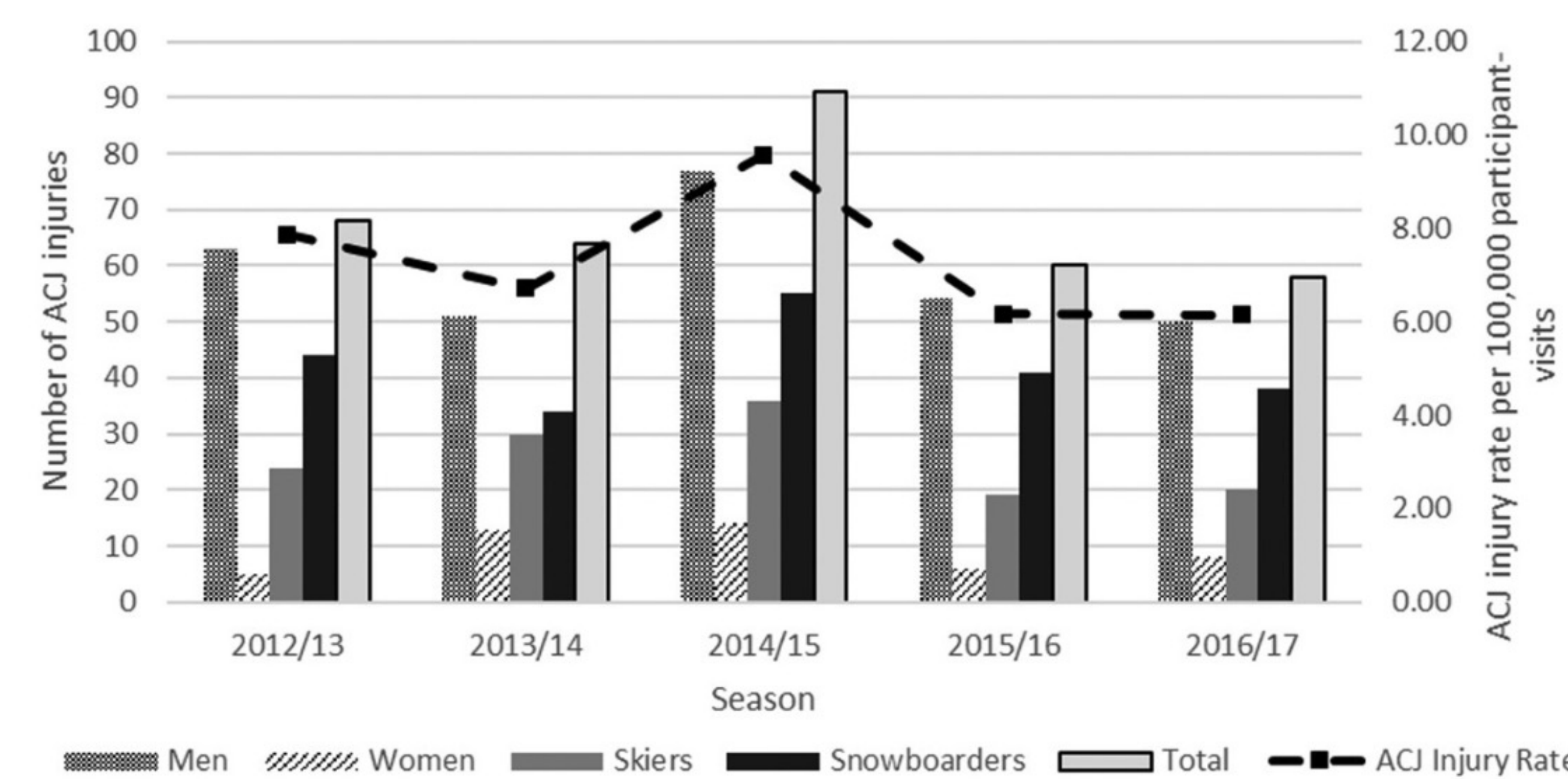


Figure 1: ACJ injury count categorized by sex and sport and rates per 100,000 participants over time. Between 2012 to 2017, a total of 341 ACJ injuries (6.7% of total visits) were diagnosed at Denver Health Winter Park Medical Center. The overall injury incidence was 7.28 per 100,000 participants visits.

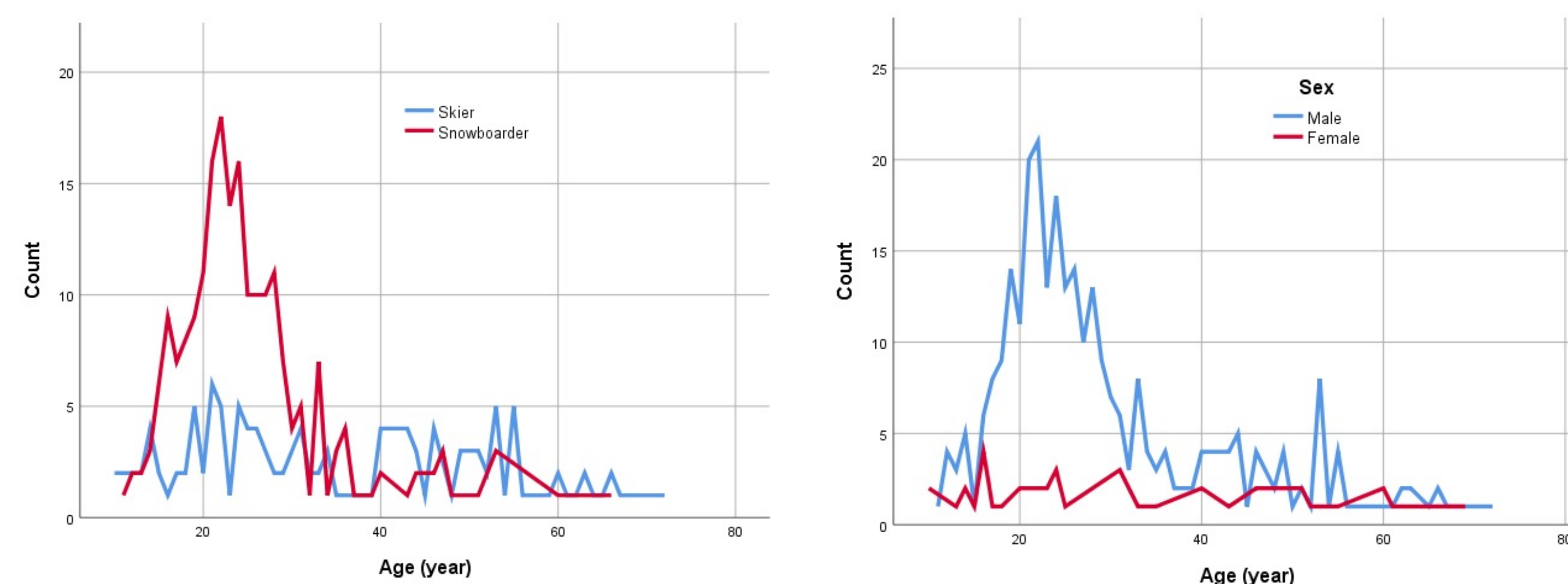


Figure 2: ACJ injury count by age and sex (a), and sport (b). ACJ injuries were more common in men (86.5%). The majority (96.8%) of cases were primary ACJ injuries on the right shoulder (56.9%). The average age was 30 years (range 10-72). Snowboarders sustained the most ACJ injuries (62.2% vs. 37.8%). The most common mechanism of injury (93.5%) was fall to snow while skiing/boarding.

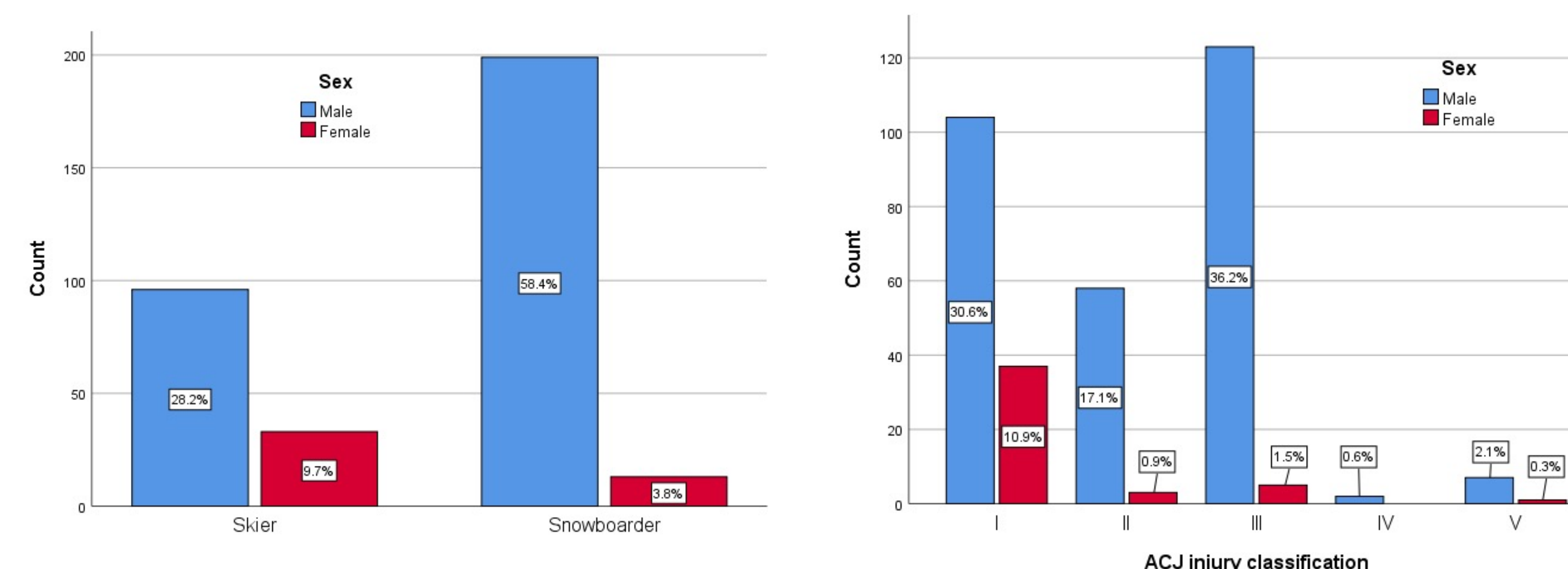


Figure 3: ACJ injury classification by sex (a), and sport (b). Grade I (41.3%) was the most common ACJ injury overall. Women were more likely to have a grade I ACJ injury than men (80.4% vs 35.4%; $P < 0.001$). Women were more likely to suffer the injury due to skiing than snowboarding (71.7% vs 28.3%; $P < 0.001$). Men were more likely to suffer the injury due to snowboarding than skiing (67.5% vs 32.5%; $P < 0.001$).



Discussion

- The overall ACJ injury incidence was 7.28 per 100,000 participants.
- Men accounted for over 80% of all ACJ injuries.
- Snowboarders sustained more ACJ injuries than skiers with fall to snow as the most common mechanism of injury.
 - The upper extremity of snowboarders are more likely to sustain direct impact to snow due to firm leg attachment to a single board.⁵
- Young adult (age 20-39) intermediate riders were the most likely to sustain an ACJ injury.
 - Snowboarders with higher skill may be more likely to engage in riskier riding while attempting aials or other challenging maneuvers.^{10,11}
- Understanding the epidemiology of injuries presenting to EDs can help guide prehospital care and medical coverage allocation for resorts, as well as identify areas for targeted injury prevention efforts.

Future Directions

- Future studies can address more specifics regarding the mechanism and details of the fall as it relates to ACJ injury (e.g. aerial features, speed, snow conditions) as well as long-term outcomes.

References

- Kiel J, Kaiser K: Acromioclavicular Joint Injury. In: StatPearls. Treasure Island (FL); 2020.
- Vainbak K, Trabasso J, Aerni G: Shoulder Conditions: Clavicle and Acromioclavicular Joint Conditions. *FP Essent* 2020; 491:27-32.
- Mazzocca AD, Arciero RA, Bicos J: Evaluation and treatment of acromioclavicular joint injuries. *Am J Sports Med* 2007; 35(2):316-329.
- Milek M: Long-term shoulder function after type I and II acromioclavicular joint disruption. *Am J Sports Med* 2008; 36(11):2147-2150.
- McCall D, Saffari MR: Injuries about the shoulder in skiing and snowboarding. *Br J Sports Med* 2008; 42(3):397-399.
- Pallis M, Cameron KL, Svoboda SJ, Owens BD: Epidemiology of acromioclavicular joint injury in young athletes. *Am J Sports Med* 2012; 40(9):2072-2077.
- Weinstein S, Khodaei M, Vainbak K: Common Skiing and Snowboarding Injuries. *Curr Sports Med Rep* 2019; 18(11):394-400.
- Frantz T, Ramkumar PN, Frangiamore S, Jones G, Soloff L, Kvit A, Currier FC, Schickendantz M: Epidemiology of acromioclavicular joint injuries in professional baseball: analysis from the Major League Baseball Health and Injury Tracking System. *J Shoulder Elbow Surg* 2021; 30(1):127-133.
- Williams GR, Nguyen VD, Rockwood CA: Classification and radiographic analysis of acromioclavicular dislocations. *Appl Radiol* 1989; 18(2):29-34.
- Kocher MS, Dupre MM, Foege JA Jr: Shoulder injuries from alpine skiing and snowboarding. Aetiology, treatment and prevention. *Sports Med* 1998;25(3):201-211.
- Chow TK, Corbett SW, Farstad DJ: Spectrum of injuries from snowboarding. *J Trauma* 1996;41(2):321-325.