

**TABLE 16-1**  
**INJURY PREVALENCE**

<b>SPORT/ ACTIVITY</b>	<b>PREVALENCE OF HIP OR THIGH INJURY (OUT OF ALL INJURIES REPORTED)</b>	<b>REFERENCE, YEAR</b>
Ballet	Hip, thigh, or pelvis: 6.4% to 7.2%	Garrick and Requa 1993 <sup>2</sup> Leanderson et al 2011 <sup>10</sup>
Musical theater	Hip: 4.6% to 6.2% Injured patients were more likely to be female or occur if on a raked stage	Evans et al 1996 <sup>7</sup> Evans et al 1998 <sup>8</sup>
Hip-hop or break dance	Hip or thigh: 9% to 12%	Kauther et al 2009 <sup>13</sup> Ojofeitimi et al 2012 <sup>14</sup>
Irish dance (females)	Pelvis or lumbar spine: 5.1%	Noon et al 2010 <sup>9</sup>
Gymnastics	Hip or groin: 6.6% of overuse injury in club-level gymnasts Hip, groin, thigh, or hamstring: 10.5% Right-sided injury more common	O'Kane et al 2011 <sup>11</sup> Sands et al 1993 <sup>5</sup>
Cheerleading	Upper leg: 1.2% of injuries presenting to the emergency department	Jacobson et al 2012 <sup>12</sup>
Figure skating	Groin pain: 5.9% Hamstring: 2%	Dubravcic-Simunjak et al 2003 <sup>3</sup>

There are some sport-specific patterns to these injuries. In musical theater, injuries were more likely to occur in females and when performers were on a raked stage. A raked stage is tilted toward the audience to improve the view of the dancers, which requires accommodation in the dancers' center of gravity.<sup>7,8</sup> In a series of collegiate gymnasts, lower extremity injuries<sup>5</sup> occurred more often on the right, although the authors did not speculate on the underlying reason for this observation. For cheerleading, injury rates have been reported only by the National Electronic Injury Surveillance System (NEISS). The NEISS collects data on acute injuries presenting to a network of hospital emergency departments. In this data set, the upper leg made up 1.2% of acute injuries in cheerleaders who presented to the emergency department.<sup>12</sup> The epidemiology of less acute or chronic injuries in cheerleaders is unknown. In figure skaters, at least half of all injuries are overuse injuries that take weeks to months to resolve.<sup>3</sup> A disproportionate amount of overuse injury occurs in singles skaters, whereas pairs and ice dancers are more likely to sustain acute injuries from falls.<sup>3</sup> In adult masters-level skaters, hip injuries were the most common acute or chronic injuries causing skaters to take time off of the ice.<sup>18</sup>

## BIOMECHANICS

The hip is central to the movements in these sports. Ballet is the most studied, but often other dancers have some background in ballet.<sup>14,19</sup> The turnout is the foundation of many movements in classical ballet, which involves maximal external rotation of the lower extremity. For the aesthetics of ballet, 90 degrees of turnout is desirable. The total external rotation is the sum of the rotation