Research Article

Trampoline-Related Injuries: A Comparison of Injuries Sustained at Commercial Jump Parks Versus Domestic Home Trampolines

Jesse Doty, MD
Ryan Voskuil, MD
Caleb Davis, MD
Rachel Swafford, MPH
Warren Gardner II, MD
Dirk Kiner, MD
Peter Nowotarski, MD

Abstract

Introduction: The nature of trampoline injuries may have changed with the increasing popularity of recreational jump parks.
Methods: A retrospective review was performed evaluating domestic trampoline and commercial jump park injuries over a 2-year period.
Results: There were 439 trampoline injuries: 150 (34%) at jump parks versus 289 (66%) on home trampolines. Fractures and dislocations accounted for 55% of jump park injuries versus 44% of home trampoline injuries. In adults, fractures and dislocations accounted for 45% of jump park injuries versus 17% of home trampoline injuries. More lower extremity fractures were seen at jump parks versus home trampolines in both children and adults. Adults had a 23% surgical rate with jump park injuries versus a 10% surgical rate on home trampolines.
Discussion: Trampoline-related injury distribution included a higher percentage of fractures/dislocations, lower extremity fractures, fractures in adults, and surgical interventions associated with jump parks versus home trampolines.
Level of Evidence: Level III

From the Department of Orthopaedic Surgery, University of Tennessee College of Medicine Chattanooga, Chattanooga, TN (Dr. Doty, Dr. Voskuil, Ms. Swafford, Dr. Gardner, Dr. Kiner, and Dr. Nowotarski), and University of Tennessee Health Science Center, Memphis, TN (Dr. Davis).

Correspondence to Dr. Doty: jessd90@hotmail.com

J Am Acad Orthop Surg 2018;00:1-9

DOI: 10.5435/JAAOS-D-17-00470

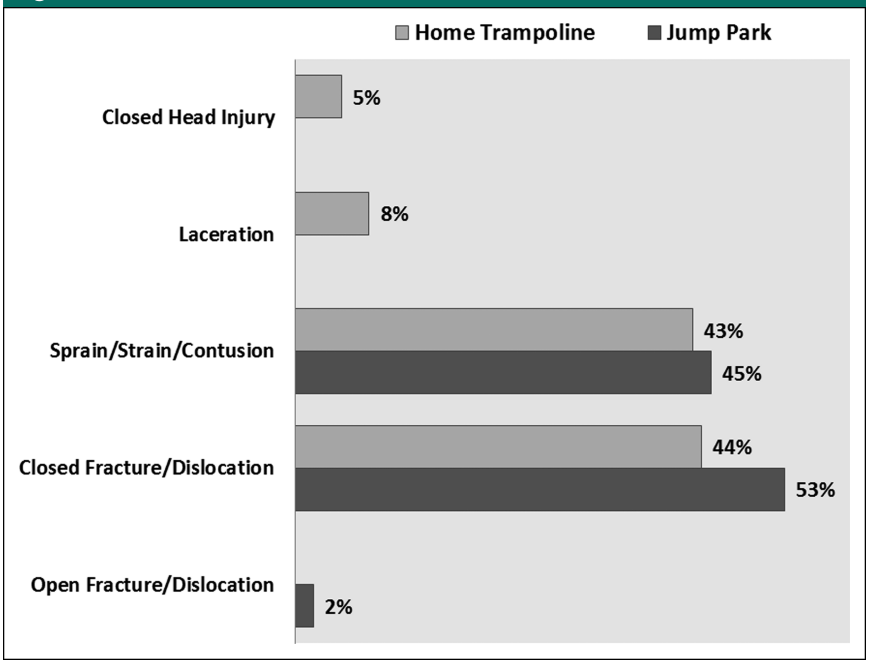
A jump park, or trampoline park, is an interconnected network of trampolines designed specifically for entertainment purposes, similar to a skateboard park or a bicycle park. Jump parks incorporate games, obstacles, and variable geometric configurations of trampolines to enhance the jumper's experience. They may include modifications of more traditional sports, such as basketball goals, volleyball nets, or gymnastic balance beams. Jump parks have gained traction locally, nationally, and even globally in the past 5 years.

In 2009, there were only a few operational jump parks. However, by the end of 2014, there were approximately 350 operating jump parks in the United States alone.[1] Recent estimates suggest that jump park admission rates may be nearly 150,000 to 200,000 participants per year.[1]

Nearly all jump parks require an injury liability waiver before admission and many parks cite a 2002 report estimating a rate of two injuries per 1,000 home trampoline users.[2] These data are used by the jump park industry to justify claims of superior safety profiles compared with other sports such as soccer, which has an injury rate of nearly 21 per 1,000 players.[3]

In 2014, there were roughly 100,000 emergency department (ED) visits related to trampoline use across the United States.[4] A single urban trauma center reported approximately 31

Figure 1



Graph showing the percentage of injuries by type of injury.

trampoline-related ambulance responses annually.[5] A potential rise in severe injuries at a time when jump park popularity is skyrocketing has increased media attention and ignited public interest about the serious nature of jump park injuries.

No published reports have exclusively examined traumatic jump park-related injuries and comparing them with injuries attributed to home trampolines. Little to no public data define adult trampoline injury rates. The purpose of this study was to describe the epidemiology of jump park-related injuries compared with domestic trampoline injuries, with particular emphasis on the injury distribution in adults. This information may lead to increased public awareness of the potential for serious injuries and permanently disabling outcomes for those who participate in recreational trampoline use, including commercial jump park activities.

Methods

A retrospective chart review was performed of patients who presented to one of the three EDs of an urban level I trauma center after sustaining a trampoline-related injury. The study population was determined by a hospital database query of International Classification of Diseases (ICD)-9 and ICD-10 injury codes for trampoline-related injuries (E005.3 and Y93.44). Data collection encompassed patients of all ages during a 2-year period from January 2014 to December 2015. Reported variables include sex, age, diagnosis, mechanism, anatomic location, admission status, treatment, hospital course, surgical intervention, and complications. Data were stratified into two groups to allow comparison of patients sustaining an injury at a commercial jump park and patients sustaining an injury on a domestic home trampoline. A two-tailed mid-P exact test was used to analyze associations between discrete variables, with a significance level set at 0.05. Unadjusted odds ratios (ORs) were calculated to describe the prevalence of injuries between groups.

Results

A total of 439 patients were identified after being treated for trampoline injuries within a university healthcare network. Of these trampoline injuries, 150 (34%) occurred at a commercial jump park, and 289 (66%) occurred on a private home trampoline.

Of the 150 jump park-related injuries, 67 (45%) of these were strains/sprains, 80 (53%) were closed fractures or dislocations, and 3 (2%) were open fractures or dislocations (Figure 1). There were 109 (73%) injuries to the lower extremities, 19 (13%) injuries to the upper extremities, and 22 (14%) injuries to the spine, torso, or head (Figure 2). The average age of jump park injured patients was 15 years (range, 16 months to 51 years). Eighteen (12%) of the commercial jump park injured patients required emergency transportation by ambulance. Nineteen patients (13%) required surgical intervention, and thirteen patients (9%) had a hospital admission with

Dr. Doty or an immediate family member is a member of a speakers' bureau or has made paid presentations on behalf of Arthrex; serves as a paid consultant to Arthrex, Globus Medical, and Wright Medical Technology; and has stock or stock options held in Globus Medical. Dr. Nowotarski or an immediate family member is a member of a speakers' bureau or has made paid presentations on behalf of Synthes; and serves as a paid consultant to Synthes. None of the following authors or any immediate family member has received anything of value from or has stock or stock options held in a commercial company or institution related directly or indirectly to the subject of this article: Dr. Voskuil, Dr. Davis, Ms. Swafford, Dr. Gardner, and Dr. Kiner.

an overnight stay (range, 1 to 23 days).

One hundred eleven (74%) of the patients injured at a jump park reported that their mechanism of injury was related to routine jumping or an awkward landing on the nylon weave mat surface. Twenty (13%) patients reported getting caught in the springs or striking the edge outside the nylon weave mat. Twelve (8%) patients were injured from falling off the trampoline or while participating in park obstacles (eg, foam pit, basketball goal). Seven (5%) patients reported that they were injured by a collision with another participant on the trampoline (Figure 3).

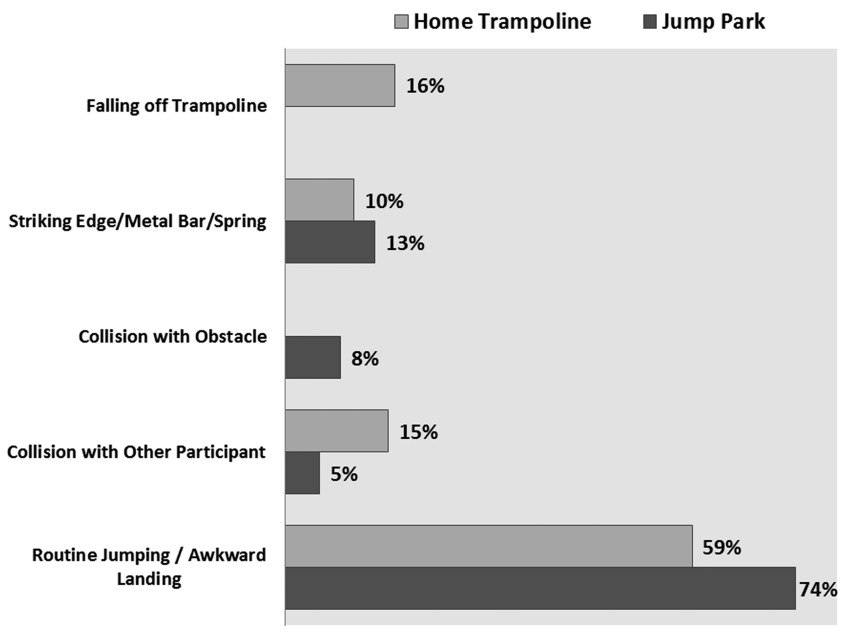
The commercial jump park injury group comprised 110 (73%) pediatric patients (range, 16 months to 17 years) and 40 (27%) adult patients (range, 18 to 51 years). Sex distribution was similar between age groups, with 49 (45%) female and 61 (55%) male pediatric patients and 17 (43%) female and 23 (57%) male adult patients. Most patients with jump park injuries were male children (41%).

Of the 110 pediatric patients, 65 (59%) had a fracture or joint dislocation, whereas 18 of the 40 (45%) adult patients sustained a fracture or joint dislocation. In pediatric patients, there were 47 (72%) lower extremity, 16 (25%) upper extremity, and 2 (3%) spine fractures/dislocations (Figure 4). In adult patients, there were 17 (94%) lower extremity, no upper extremity, and 1 (6%) spine fractures/dislocations (Figure 5). Ten (9%) pediatric patients and nine adult patients (23%) required surgical intervention (Tables 1 and 2). The odds ratio of the necessity for surgical intervention for adult patients versus pediatric patients was 2.88 (P = 0.04; 95% confidence interval [CI], 1.043 to 7.893) (Table 3). Thus, adults injured at the jump park were almost three times more likely than children to undergo surgery, which was a notable difference.

Figure 2

Graph showing injury distribution: jump park versus home trampoline.

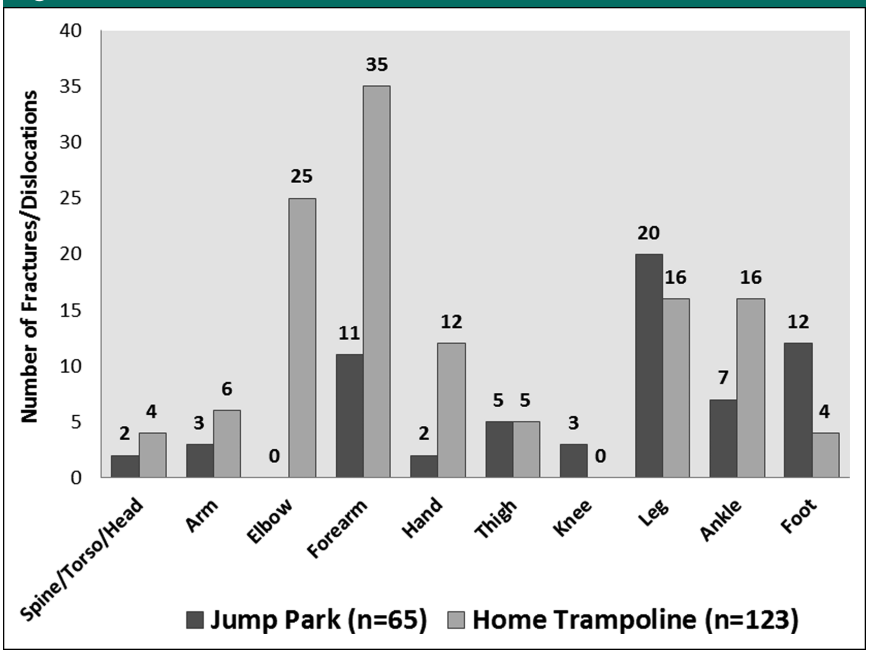
Figure 3



Graph showing the mechanism of injury.

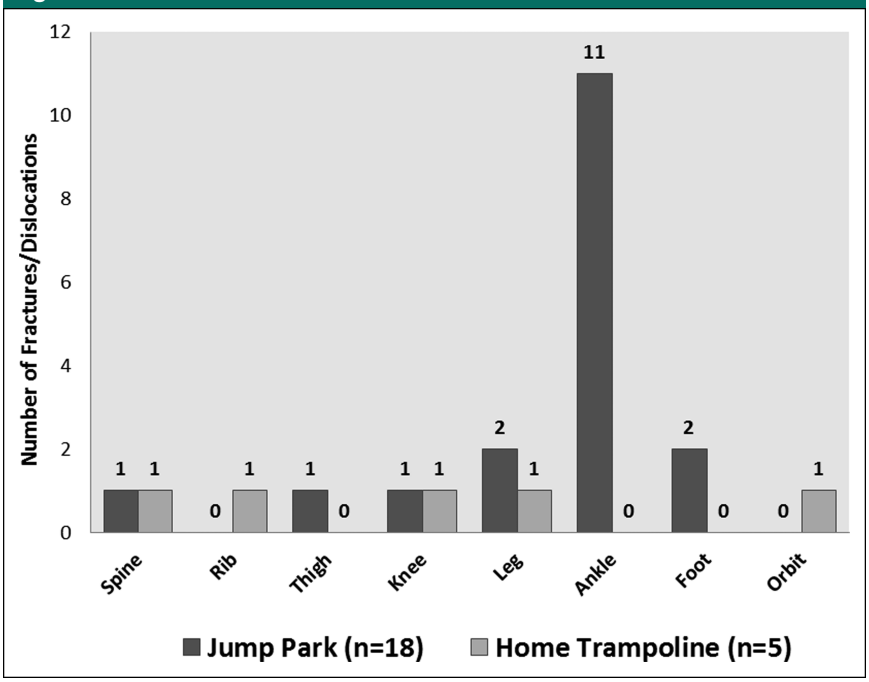
Among notable jump park injuries, two adult patients and one pediatric patient sustained open fractures. This

Figure 4



Graph showing pediatric fractures/dislocations by injury site.

Figure 5



Graph showing adult fractures/dislocations by injury site.

included a grade 3A ankle fracture-dislocation that required multiple operations and a grade 3A comminuted intra-articular supracondylar femur fracture. Bilateral open tibia shaft fractures occurred in an adult patient, who underwent multiple operations for a nonunion. Another adult patient had a knee dislocation with popliteal artery transection that required four compartment fasciotomies and an arterial repair, leading to multiple operations and a prolonged hospital stay with multiple medical sequelae including renal failure.

Private home trampolines accounted for 289 (66%) of the total 439 trampoline injuries. Of note, 127 (44%) were fractures or dislocations, 125 (43%) were sprains, strains, or contusions, 19 (7%) were lacerations, 14 (5%) were closed head injuries, and 4 (1%) were other injuries. There were no open fractures or dislocations (Figure 1). There were 130 (45%) injuries to the lower extremity, 97 (34%) injuries to the upper extremity, and 62 (21%) injuries to the spine, torso, or head (Figure 2). The average age of home trampoline injured patients was 10 (range, 1 to 65) years. Twenty-four (8%) of the home trampoline injured patients required emergency transportation by ambulance. Twenty patients (7%) required surgical intervention and thirteen patients (4%) had a hospital admission with an overnight stay (range, 1 to 2 days).

One hundred seventy-one (59%) of the patients injured on a home trampoline reported that their mechanism of injury was related to routine jumping or landing awkwardly on the nylon weave mat surface. Twenty-nine (10%) of the patients reported getting caught in the springs or striking the edge outside the nylon weave mat. Forty-six (16%) of the patients were injured from falling off the trampoline. Forty-three (15%) of the patients reported that they were injured by a collision with another participant on the trampoline (Figure 3).

Among the home trampoline injury group, 260 (90%) were pediatric patients (range, 1 to 17 years) and 29 (10%) were adult patients (range, 18

to 65 years). Sex distribution between age groups was 122 (47%) female and 138 (53%) male pediatric patients and 10 (34%) female and 19 (66%) male adult patients. Most patients with home trampoline injuries were male children (48%).

Of the 260 pediatric patients, 123 (47%) had a fracture or dislocation, whereas 5 of 29 (17%) adult patients sustained a fracture or dislocation. In pediatric patients, there were 41 (33%) lower extremity, 78 (64%) upper extremity, and 4 (3%) spine, torso, or head fractures/dislocations (Figure 4). In adult patients, there were two (40%) lower extremity, no upper extremity, and one each (20%) of spine, torso, or head fractures/dislocations (Figure 5). Seventeen (7%) of the pediatric patients and three (10%) of the adult patients required surgical intervention (Tables 4 and 5). The odds ratio of the necessity for surgical intervention for home trampoline injuries in adult patients versus pediatric patients was 1.65 (P = 0.45; 95% CI, 0.364 to 5.597) (Table 2). Although a greater percentage of adults underwent surgery, this was not markedly higher than children.

Table 1

Surgical Injuries in Pediatric Patients: Jump Park

Age	Sex	Mechanism	Injury
2	F	Foam pit	Midshaft femur fracture
2	M	Routine jumping	Midshaft femur fracture
3	M	Foam pit	Midshaft femur fracture
4	F	Routine jumping	Supracondylar humerus fracture
9	M	Routine jumping	Distal femur fracture
10	M	Routine jumping	Forearm fracture
11	F	Routine jumping	Bilateral forearm fractures
12	F	Routine jumping	Bimalleolar ankle fracture/dislocation
14	M	Routine jumping	Tibia shaft fracture
15	F	Routine jumping	Knee dislocation

Table 2

Surgical Injuries in Adult Patients: Jump Park

Age	Sex	Mechanism	Injury
19	M	Landed on metal bar	Open ankle fracture/dislocation
22	M	Routine jumping	Distal tibial shaft fracture with articular extension
27	M	Routine jumping	Trimalleolar ankle fracture
28	F	Routine jumping	Subtalar dislocation and calcaneus fracture
30	M	Routine jumping	Trimalleolar ankle fracture/dislocation
32	M	Routine jumping	Knee dislocation with popliteus tendon artery transection
33	M	Routine jumping	Supracondylar/intercondylar distal femur fracture
34	F	Routine jumping	Trimalleolar ankle fracture/dislocation
43	M	Trampoline collapsed	Bilateral open tibial shaft fractures

Discussion

Although some studies have investigated trampoline injuries in the domestic setting for personal use, few studies have evaluated commercial jump park-related injuries. Moreover, there is limited public information regarding trampoline injuries in adults, who seemingly have higher participation rates at jump parks than in the domestic setting. We think that our data support the notion of existence of a high potential for severe disabling injuries involving jump parks at a time when the industry is rapidly expanding in the recreation market.

Comparing jump park and home trampoline injuries, several significant notable differences may be observed. Fifty-five percent of ED visits for jump park injuries were diagnosed as a fracture or dislocation, whereas 44% of home trampoline ED visits were diagnosed as a fracture or dislocation (P = 0.02) (Table 6). When evaluating adult patients and pediatric patients independently, we found both groups exhibited a higher rate of fractures or dislocations when participating in a jump park versus on a home trampoline. Adults had a 45% fracture rate at jump parks versus a 17% rate on home trampolines (P = 0.02), whereas children experienced a 59% fracture rate at jump parks versus a 47% rate on home trampolines (P = 0.04).

For trampoline injuries at any site, our study found that children had a significantly higher rate of fractures and dislocations than did adults (51% versus 33%; P = 0.008) (Table 7). Fractures and dislocations accounted for 47% of pediatric injuries from home trampolines compared with 17% of adult injuries (P = 0.002). For jump parks, 59% of pediatric injuries were fractures/dislocations, whereas 45% of adult

Table 3

Comparison Between Adult Patients and Pediatric Patients With Trampoline-related Injuries (All Trampolines, Jump Parks, and Home Trampolines)

Location	Adults	Pediatrics	*P* Value[a]	OR[b]	CI
Any trampoline (N = 439)	N = 69 (16%)	N = 370 (84%)	—	—	—
Lower extremity fractures/dislocations	19 (28%)	88 (24%)	0.504	1.22	0.669, 2.158
Surgical intervention	12 (17%)	27 (7%)	**0.014**	2.67	1.239, 5.521
Jump park (N = 150)	N = 40 (27%)	N = 110 (73%)	—	—	—
Surgical intervention	9 (23%)	10 (9%)	**0.041**	2.88	1.043, 7.893
Home trampoline (N = 289)	N = 29 (10%)	N = 260 (90%)	—	—	—
Surgical intervention	3 (10%)	17 (7%)	0.451	1.65	0.364, 5.597

Numbers in bold type denote statistically significant results, 95% CI.
CI = confidence interval, OR = odds ratio
[a] Mid-*P* exact test (2-tailed)
[b] Conditional maximum likelihood estimate of odds ratio (crude)

Table 4

Surgical Injuries in Pediatric Patients: Home Trampoline

Age	Sex	Mechanism	Injury
4	M	Routine jumping	Midshaft femur fracture
4	F	Fell off trampoline	Supracondylar humerus fracture
5	F	Collided with another jumper	Supracondylar humerus fracture
5	M	Fell off trampoline	Lateral condyle humerus fracture
5	F	Struck metal bar	Supracondylar humerus fracture
5	F	Fell off trampoline	Both-bone forearm fracture
6	M	Routine jumping	Lateral condyle humerus fracture
6	F	Fell off trampoline	Midshaft femur fracture
7	F	Fell off trampoline	Supracondylar humerus fracture
9	M	Fell off trampoline	Supracondylar humerus fracture
9	M	Routine jumping	Supracondylar humerus fracture
9	F	Routine jumping	Supracondylar humerus fracture
10	M	Collided with another jumper	Supracondylar humerus fracture
12	F	Routine jumping	Tilaux ankle fracture
13	F	Routine jumping	Supracondylar humerus fracture
14	M	Routine jumping	Both-bone forearm fracture
17	F	Routine jumping	Anterior cruciate ligament tear

injuries were fractures/dislocations. Regardless of the trampoline setting, and although they had a lower rate of fractures and dislocations, adults had a significantly higher odds of undergoing surgical intervention for their trampoline injuries versus children (17% versus 7%; OR, 2.67; $P = 0.01$) (Table 3). Although no significant difference between adults and children was found in the rate of surgical intervention when evaluating home trampoline injuries ($P = 0.45$), adults injured at jump parks experienced a significantly higher rate of surgical intervention than did children ($P = 0.04$).

Larson and Davis[6] performed a 2-year retrospective review of recreational home trampoline injuries presenting to a metropolitan ED during 1991 to 1992. They reported injuries in 217 patients, which is half the number of injuries described in our retrospective 2-year review (439 trampoline injuries). This disparity may simply reflect divergent study populations, or our larger sample of injuries may be attributed to the increasing popularity of jump parks in urban areas. Moreover, Larson and Davis reported a peak incidence of trampoline injuries in July, which aligns with our study's high incidence of home trampoline injuries in the warmer months of April and May. However, contrary to the peak season for home trampoline injuries, our data showed that most jump park injuries occurred in March. This finding may represent an interesting trend: children entertain themselves on outdoor trampolines in the warmer seasons, whereas a broader population plays at jump parks in cooler seasons because weather patterns may limit outdoor activities (Figure 6).

Loder et al[7] reported data from the national database of trampoline injuries from 2002 to 2011. The injuries in this database occurred exclusively on traditional home or free-standing individual trampolines. Including all

Table 5

Surgical Injuries in Adult Patients: Home Trampoline

Age	Sex	Mechanism	Injury
28	M	Routine jumping	Orbital and zygomatic fracture
30	M	Routine jumping	Knee dislocation and medial patella facet cartilage injury
35	F	Routine jumping	Lateral meniscus tear

Table 6

Comparison Between Trampoline-related Injuries From Jump Parks and From Home Trampolines (All Patients, Adult Patients, and Pediatric Patients)

Distribution	Jump Park	Home Trampoline	*P* Value[a]	OR[b]	95% CI
All ages (N = 439)	N = 150 (34%)	N = 289 (66%)	—	—	—
Total fractures and dislocations	83 (55%)	127 (44%)	**0.020**	1.58	1.061, 2.353
Lower extremity injuries	109 (73%)	130 (45%)	**<0.0001**	3.24	2.123, 5.007
Surgical intervention	19 (13%)	20 (7%)	0.052	1.95	0.995, 3.804
Emergency transport	18 (12%)	24 (8%)	0.220	1.50	0.778, 2.875
Hospital admission	13 (9%)	13 (4%)	0.090	2.01	0.893, 4.531
Adults (N = 69)	N = 40 (58%)	N = 29 (42%)	—	—	—
Total fractures and dislocations	18 (45%)	5 (17%)	**0.017**	3.85	1.253, 13.380
Lower extremity fractures/dislocations	17 (43%)	2 (7%)	**0.001**	9.68	2.264, 67.740
Surgical intervention	9 (23%)	3 (10%)	0.210	2.49	0.629, 12.420
Pediatrics (N = 370)	N = 110 (30%)	N = 260 (70%)	—	—	—
Total fractures and dislocations	65 (59%)	123 (47%)	**0.039**	1.61	1.024, 2.535
Lower extremity fractures/dislocations	47 (43%)	41 (16%)	**<0.0001**	3.97	2.397, 6.602
Surgical intervention	10 (9%)	17 (7%)	0.400	1.43	0.609, 3.219

Numbers in bold type denote statistically significant results, 95% CI.
CI = confidence interval, OR = odds ratio
[a] Mid-*P* exact test (2-tailed)
[b] Conditional maximum likelihood estimate of OR (crude)

trampoline-related ED visits, 29% sustained a fracture, and 10% were admitted to the hospital. Similarly, Larson and Davis[6] reported that 39% of patients sustained a fracture and 7% of patients were admitted for observation. Likewise, we found an overall admission rate of approximately 6%, with only 4% of home trampoline injuries and nearly 9% of jump park injuries requiring admission (Table 6). Our data suggest a higher total incidence of trampoline-related fractures and dislocations at 48% compared with that of previously reported studies. When further stratified, a significantly higher rate of jump park injuries (55%) involved a fracture or dislocation compared with a rate of 44% from home trampolines ($P = 0.02$).

When reviewing injury type across all ages, the odds of a lower extremity injury were significantly higher in those who were at jump parks than those who were using home trampolines (73% versus 45%; OR, 3.24; $P \leq 0.0001$). Furthermore, both adults and children had higher rates of lower extremity fractures and dislocations occurring from jump parks than from home trampolines. In adults, 43% of the jump park injuries were fractures involving the lower extremity, compared with only 7% of the home trampoline injuries ($P = 0.001$). In children, 43% of the jump park injuries were lower extremity fractures, whereas only 16% of the home trampoline injuries were lower extremity fractures ($P \leq 0.0001$). Loder et al,[7] as well as Larson and Davis,[6] reported a higher incidence of upper extremity than lower extremity injuries. Even when combining jump park and home trampoline injuries, we found a 54% lower extremity, 26% upper extremity, and 19% spine/torso/head injury rate. These findings suggest that higher-energy mechanisms of

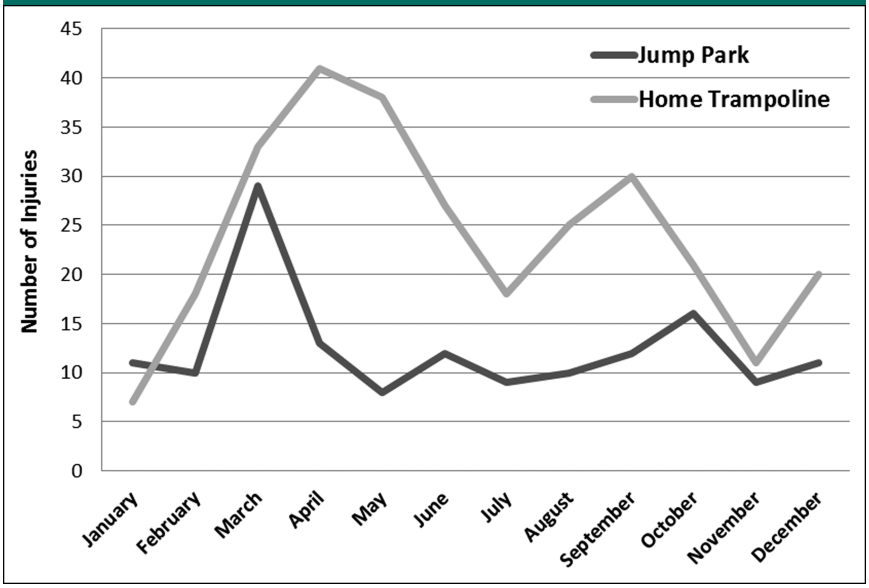
Table 7

Comparison Between Adult Patients and Pediatric Patients With Trampoline-related Injuries (All Trampolines, Jump Parks, and Home Trampolines)

Location	Pediatrics	Adults	*P* Value[a]	OR[b]	95% CI
Any trampoline (N = 439)	N = 370 (84%)	N = 69 (16%)	—	—	—
Total fractures and dislocations	188 (51%)	23 (33%)	**0.008**	2.06	1.207, 3.590
Jump park (N = 150)	N = 110 (73%)	N = 40 (27%)	—	—	—
Total fractures and dislocations	65 (59%)	18 (45%)	0.132	1.76	0.845, 3.696
Lower extremity fractures/dislocations	47 (43%)	17 (43%)	0.984	1.01	0.484, 2.127
Home trampoline (N = 289)	N = 260 (90%)	N = 29 (10%)	—	—	—
Total fractures and dislocations	123 (47%)	5 (17%)	**0.002**	4.29	1.664, 12.990
Lower extremity fractures/dislocations	41 (16%)	2 (7%)	0.207	2.52	0.667, 16.280

Numbers in bold type denote statistically significant results, 95% CI.
CI = confidence interval, OR = odds ratio
[a] Mid-*P* exact test (2-tailed)
[b] Conditional maximum likelihood estimate of OR (crude).

Figure 6



Graph showing the seasonal incidence of trampoline injuries.

injury may emanate from less coordinated falls and high-flying acrobatics experienced at jump parks. This finding may also contribute to the increased number of ED visits resulting from fractures and dislocations, as well as the higher rate of surgical intervention for jump park injuries than for home trampoline injuries (13% versus 7%; $P = 0.052$). Furthermore, the finding of three open fractures in the jump park group and none in the home trampoline group also supports this notion.

Children and adolescents represented most jump park injuries with an average age of 15 years. In 2010, the American Academy of Orthopaedic Surgeons established a position statement on trampoline use in the domestic setting.[8] Likewise, in 2012, the American Academy of Pediatrics developed home trampoline rules and regulations based on their evaluation of available published research and statistics.[9] Both groups strongly recommend against multiple persons on a trampoline at the same time and suggest that independent use may markedly decrease the risk. These statements, although based on home trampoline use, suggest that there may be a higher risk of injury at jump parks where multiple jumpers across all ages commonly participate simultaneously. In our study, 5% reported that they were injured at the jump park by collision with another participant, with person-to-person contact severe enough to cause immediate injury (Figure 3). However, this may underrepresent the dangers of multiple jumpers because it did not include injuries obtained by being bumped into obstacles, knocked off the trampoline, or being pushed into a hazard.

Kasmire et al[10] documented an increase in US ED visits for jump park-related injuries from 581 visits in 2010 to 6,932 visits in 2014. The same authors reported no change in visits for home trampoline-related injuries. We believe that our reported findings

add further clarification to the trampoline public database and strengthen the American Academy of Orthopaedic Surgeons position statement.

The difficulty of epidemiologic data collection in these particular study groups may have contributed to the limitations of this study. The true incidence of trampoline injuries remains inconclusive because the number and frequency of individuals who actually participated in trampoline activities during the study time frame is unknown. Furthermore, a database query of ICD-9 and -10 codes may not have captured all trampoline-related injuries if the cause of injury code was not included at the initial patient encounter. Therefore, the prevalence of trampoline-related injuries may actually be higher than that documented based on these data sets. Although this health system includes four EDs, and has the only regional level I trauma center, some patients may have presented to outside hospitals and walk-in clinics, thereby, making extrapolation of data limited based on geographic variations in healthcare delivery models.

To our knowledge, this is the first report evaluating trampoline-related injuries in adults. Our data suggest that there is a much higher rate of adult participation than previously considered, with 27% of jump park injuries occurring in adults, as opposed to 10% of home trampoline injuries occurring in adults (OR, 3.25; $P = 0.00$; 95% CI, 1.919 to 5.552). Although the average age of patients with home trampoline injuries in our review was 10 years ($\pm$8.82) (concurring with the average age of 10 years reported by Larson and Davis in the early 1990s), we found that the average age of injury in jump park patients was 15 years ($\pm$10.54). This increase in age was statistically significant ($t = 4.97$; $P < 0.0001$) and is likely attributed to the increase in the number of adult participants.

Finally, most adult fractures and dislocations occurring at jump parks involved the lower extremity (94%). In addition, we noted a trend toward increased surgical necessity for adults injured at jump parks (23%) compared with children (9%). However, the need for surgical intervention was similar between age groups for home trampolines (adults 10% versus pediatric 7%).

Summary

Fractures and dislocations, hospital admissions, and surgical intervention secondary to jump park-related injuries can be seen in children and adults. There were a higher percentage of total fractures, lower extremity fractures, open fractures, adult fractures, and surgical fractures among patients with commercial jump park injuries compared with patients who sustained home trampoline injuries. Commercial jump parks may contribute to higher-energy mechanisms of trauma than previously suggested based on data extrapolated from domestic trampoline use. Our data suggest that with the expansion of commercial jump parks, the incidence, severity, and economic effect of trampoline injuries may be underestimated. Jump park participants, legal guardians, and public policy-makers should have accessibility to accurate safety profiles. This implication is of particular importance as healthcare costs continue to rise, and public safety is emphasized as a prevention mechanism. This report also highlights the need for further evaluation into the economics and societal effect of jump park-associated injuries.

References

Evidence-based Medicine: Levels of evidence are described in the table of contents. In this article, reference 10 is a level III study. References 2-4, 6, and 7 are level IV studies. References 1, 5, 8, and 9 are level V expert opinion.

References printed in **bold type** are those published within the past 5 years.

1. Sarris T: Indoor trampoline parks continue to be one of the fastest growing indoor entertainment attractions worldwide. *Play Meter Magazine* April 2015:66-69.
2. Smith GA: Injuries in the United States related to trampolines, 1990-1995: A national epidemic. *Pediatrics* 1998;101: 406-412.
3. Radelet MA, Lephart SM, Rubinstein EN, Myers JB: Survey of the injury rate for children in community sports. *Pediatrics* 2002;110:e28.
4. United States Consumer Product Safety Commission: NEISS Data Highlights 2014. www.cpsc.gov/en/Research-Statistics/NEISS-Injury-Data/. Accessed November 20, 2015.
5. Alltucker K, Hansen RJ, Berry J: Trampoline parks face scrutiny over safety. *The Arizona Republic* February 7, 2012. http://archive.azcentral.com/arizonarepublic/news/articles/20120207trampoline-parks-face-scrutiny-over-safety.html. Accessed August 10, 2016.
6. Larson BJ, Davis JW: Trampoline-related injuries. *J Bone Joint Surg* 1995;77: 1174-1178.
7. **Loder RT, Schultz W, Sabatino M: Fractures from trampolines: Results from a national database, 2002 to 2011. *J Pediatr Orthop* 2014;34:683-690.**
8. America Academy of Orthopaedic Surgeons: Position Statement: Trampolines and Trampoline Safety. 2010. http://www.aaos.org/CustomTemplates/Content.aspx. Accessed August 10, 2016.
9. American Academy of Pediatrics: AAP Advises Against Recreational Trampoline Use. 2012. https://www.aap.org/en-us/about-the-aap/aap-press-room/pages/AAP-Advises-Against-Recreational-Trampoline-Use.aspx. Accessed August 10, 2016.
10. **Kasmire KE, Rogers SC, Sturm JJ: Trampoline park and home trampoline injuries. *Pediatrics* 2016;138:e20161236.**