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# Injury Patterns in Hip Hop Dancers

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## Abstract

Hip hop dance is becoming increasingly popular. It is performed in a variety of environments and can be fused with other dance styles. There is limited research on this dance demographic. The object of this study was to record and assess the injury patterns and diagnoses of hip hop dancers who presented to a dancer injury clinic at the Royal National Orthopaedic Hospital (RNOH) in London over a 5-year period. Of the 800 patients who attended the clinic, 73 (28 males, 45 females) identified themselves as hip hop dancers. The mean age of these dancers was 26.1 years ( $\pm$  6.59 years). The majority were professionals (49%) and the next largest group was students (31.5%). The most common site of injury was the knee (36%), followed by the lumbar spine (19%) and the foot and ankle (15%). The site of injury appeared to be influenced by the sub-style of hip hop the dancer performed. There were gender differences in knee injuries; male dancers predominantly sustained meniscal injuries (45%) and female dancers primarily sustained patellofemoral pain (60%). All lumbar disc injuries were at the L5/S1 level. These results are comparable to those of previous studies investigating injury in hip hop dancers. More research is needed to explore injury etiology, develop injury

prevention measures, and increase awareness of the injury complexities in this dance population.

**H**ip hop culture originated in 1970s New York.<sup>1</sup> “Breaking” was the original hip hop dance style and was practiced primarily in street and club environments. Today, hip hop dance is an umbrella term used to describe several sub-styles including, but not limited to, breaking, popping, locking, hip hop freestyle, club styles, and commercial. These dances are practiced and performed in a variety of contexts, including competitions (called “battles”) and can have a strong element of improvisation. Training and performance venues vary significantly and frequently occur outside of traditional dance studios. While some dancers may have access to studio space, they often practice, perform, and compete on concrete flooring. The sub-optimal training environments, high prevalence of improvisation, and competitive context of hip hop dance are just some of the factors that increase the risk of injury in this dance demographic.

There are very few publications that have investigated the patterns and incidence of injuries in hip hop dancers. The most recent and comparable study to ours, by Ojofeitimi et al., looked at injuries in several sub-sets of hip hop dancers: breakers, poppers, lockers, and new schoolers, which included krump, house, and street jazz.<sup>2</sup> That retrospective study recruited 312 dancers over a 5-month period from battles, dance conferences, and online. It found that breakers had a higher rate of injury compared with popper/lockers and new schoolers, probably due to the more acrobatic nature of breaking. Injury was defined as the result of a physical complaint or loss of time (at least 1 day off) from performance and rehearsal. This differs from previous studies.<sup>2-4</sup> There have also been differences in methodology among studies when recording the severity and incidence of injury (Table 1).

Differences in the methodology of recording injury greatly complicate direct comparisons between dance genres and other sports. Moreover, accurate diagnosis of injury needs to be made; self-reported injuries in particular are notoriously inaccurate and are known to be associated with recall bias.<sup>5</sup> Medical diagnosis of dancers’ injuries generally provides more detailed information, which can be used for comparison with other sports and to analyze potential risks for specific injuries. Unfortunately,

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**Table 1** Differences Between Recording of Injury Incidence and Severity in Recent Studies

	Allen et al., 2012	Ojofeitimi et al., 2012	Jubb, Wolman
Type of Dance	Ballet	Hip Hop	Hip Hop
Injury Recording	Medical Assessment	Self-reported	Medical Assessment
Injury Definition	Time loss Any injury that prevented a dancer from taking part in all dance-related activities required of them in a 24 hours period	Physical complaint sustained as direct result of dancing Time Loss Prevention of 1 or more days of performance or rehearsal	Any physical complaint or injury presented to the dance clinic
Injury Severity			Not specified
Transient	Less than 7 days	1-7 days	
Mild	8-28 days	8-28 days	
Moderate	29-84 days	over 28 days	
Severe	Return after 84 days		
Incidence	Number of injuries or days absent per 1,000 hours of dancing	Dividing number of injuries by total number of subjects	Not recorded; only injured dancers present to the clinic. No data on hours dancing
Diagnosis	Clinically	Self-reported	Clinically

previous published research in hip hop has relied more heavily on self-reporting of injuries than medical diagnosis. The injuries in the current study have been medically diagnosed, often with the aid of imaging. The aim of the study was to analyze this unique data set of injuries and inform health professionals regarding the injury profile of hip hop dancers.

## Methods

Demographic data, dance information, and injury reporting were collected from the files of the 800 dancers presenting to the National Health Service (NHS) dance injury clinic at Royal National Orthopaedic Hospital, UK, between April 2012 and February 2017. Injured dancers were referred to the clinic by their general practitioner and then assessed by an experienced member of the specialist NHS dance clinic team. If necessary, blood tests and imaging, including x-ray, magnetic resonance imaging, ultrasound, and computed tomography, were requested. The final diagnosis (a combination of clinical examination and imaging) was recorded on the dancer's clinical notes, collected in a spreadsheet, and stored in the hospital's electronic patient base. Imaging, both that performed locally and externally, was

collected using the picture archiving and communication system (PACS) where possible. For data protection purposes, only the patients' hospital number was used to identify them on the spreadsheet. Based on the dance information, the dancers were categorized into the style of dance they "most participated in" (e.g., classical, contemporary, hip hop). Information regarding the "level" of dancing was also recorded (e.g., professional, student, teacher, choreographer, amateur). Patients were not given any guidance regarding sub-style dance definitions; hence, they reached their own conclusion as to what they believed their most prominent dance style to be.

This study was reviewed by officials of the Royal National Orthopaedic Hospital NHS Trust, who found that it did not require approval from the authors' Research Ethics Committee or R&D Office.

## Statistical Analysis

Categorical variables including gender, level of dance, dance genre, and anatomic area of injury were expressed as numbers and percentages. Continuous variables such as age were expressed using means and standard deviations. Chi-square tests were used to assess the significance of

mean differences for the categorical variables.

## Results Demographics

The hip hop group was sub-divided into what the participants described as their most prominent dance style. Twenty dancers (27.4%) described themselves as hip hop, 19 commercial (26%), 17 breaking (23.3%), and 17 street (23.3%). No significant differences in the age or site of injury of participants were found in the sub-categories. The self-described dance level was recorded, and 36 dancers reported being professionals (49%), 23 students (31.5%), six teachers (8.3%), three amateurs (4%), three retired (4%), and two choreographers (2.7%). There were significant differences in age with regard to the dance level of participants. This is to be expected, as the retired group, for example, would naturally be older than the student group (Table 2).

## Site and Diagnosis of Injury

From the group of 73 dancers, the most common site of injury was found to be the knee (N = 26, 36%), followed by the lumbar spine (N = 14, 19%), and foot and ankle (N = 11, 15%). The site of injury was then broken down by diagnosis using the

**Table 2** Demographics by Hip Hop Subtype

	Hip Hop	Commercial	Breaking	Street
Total	20 (27.4%)	19 (26%)	17 (23.2%)	17 (23.2%)
Male	8	7	11	2
Female	12	12	6	15
Age (years)	25.8 SD (6.5)	25.7 SD (6.5)	26.3 SD (6.6)	26 SD (6.5)
Dance level				
Amateur	0	2	1	0
Choreographer	1	0	0	1
Professional	11	10	10	5
Retired	1	0	1	1
Student	6	7	4	6
Teacher	1	0	1	4
Injury site				
Knee	7 (35%)	9 (47%)	6 (35%)	4 (23.5%)
Lumbar Spine	3 (15%)	3 (15.8%)	2 (11.8%)	7 (41%)
Foot and Ankle	4 (20%)	1 (5.3%)	4 (23.5%)	2 (11.8%)
Hip	1 (5%)	3 (15.8%)	1 (5.9%)	4 (23.5%)
Shoulder	2 (10%)	0	1 (5.9%)	0
Thigh	1 (5%)	2 (10.5%)	0	0
Wrist and Hand	0	0	3 (17.7%)	0
Elbow and Forearm	2 (10%)	0	0	0
Cervical and Thoracic	0	1 (5.3%)	0	0

Orchard Sports Injury Classification System (OSICS). Table 1 is a summary of the injury diagnoses.

Knee injuries were diagnosed as meniscal injuries, patellofemoral pain, ligament injuries, osteoarthritis (OA), or other (Table 3). The most prevalent knee injury in male dancers involved the meniscus (45%, compared to

6.6% in females), whereas patellofemoral pain was the most commonly reported knee injury in females (60%, compared to 27% in males). There were no statistically significant differences between genders with regard to type of knee injury ( $p = 0.313$ ), which might be due to the small numbers in our study.

**Table 3** Comparison by Gender of Diagnosed Knee Injuries

Knee Injuries	Male (11)	Female (15)
Meniscal Injury	5	1
Patellofemoral Pain	3	9
Ligament Injuries	2	2
Osteoarthritis	0	1
Other	1	2

**Table 4** Comparison by Gender of Diagnosed Lumbar Spine Injuries

Lumbar Injuries	Male (3)	Female (11)
L5/S1 Disc Prolapse	1	4
Degenerative Disc	1	1
Lumbar Pain Undiagnosed	1	1
Lumbar Scoliosis	0	1
Lumbrosacral Instability	0	3
Spondylolisthesis	0	1

The second most common site of injury was the lumbar spine. Females had more lumbar spine injuries than males, 24% versus 10%, respectively. Lumbar spine injuries were further broken down into the following diagnoses: L5/S1 disc prolapse, degenerative disc, lumbar scoliosis, lumbo-sacral instability, spondylolisthesis, and lumbar spine undiagnosed. Female dancers were diagnosed as having 36.4% L5/S1 disc prolapse, in comparison to 33% of male dancers. All of the lumbar disc injuries were in the L5/S1 region (Table 4).

Eleven dancers presented with foot and ankle injuries (15%), five females and six males. These injuries ranged from ankle impingements to Achilles ruptures (Table 5). There were no statistical differences between genders, levels of dance, or subtypes of dance.

#### Level of Dancer—Students Versus Professionals

The 73 dancers were predominantly professionals ( $N = 36$ , 49%) and students ( $N = 23$ , 31.5%). We compared the two most common sites of injury between these two levels. This revealed a higher percentage of professional

**Table 5** Ankle and Foot Injuries by Diagnosis and Gender

Diagnosis	Total	Male (6)	Female (5)
Impingement	3	2	1
Talocrural Osteochondritis Dissecans	1	0	1
Metatarsal Fracture	1	0	1
Tendinopathy	1	0	1
Achilles Tendon Rupture	1	1	0
First Metatarsophalangeal	4	3	1

dancers reporting knee injuries (N = 16, 44%) in comparison to eight (31%) of students. Professionals and students shared similar percentages of meniscal injuries (25%) and patellofemoral injuries (PFJ): professionals 43%, students 37.5%. However, 25% of professionals suffered a knee ligament injury, whereas no students presented with this injury. Although there were more total meniscal and PFJ injuries in the professional group compared to the student group, this difference was not statistically significant.

Lumbar spine injuries were compared between professionals and student dancers. Four professional dancers had L5/S1 disc injuries that were prolapsed (N = 3) or degenerative (N = 1). Eight student dancers complained of lumbar spine injuries: extension-related low back pain (N = 3), L5/S1 disc prolapse (N = 1), soft tissue strain (N = 1), scoliosis (N = 1), sacroiliac joint pain (N = 1), and unspecified (N = 1). Students had a statistically significant higher percentage of total lumbar spine injuries compared to professional (31% and 11%, respectively;  $p = 0.005$ ).

## Discussion

### Study Comparison

Trends and patterns within sites of injury were compared across sub-groups in our study and the study by Ojofeitimi et al.<sup>2</sup> (Fig. 1). The sub-groups hip hop and breaking showed similar percentages in both studies, the commercial and street sub-groups less so. Neither of the latter sub-groups presented with any upper extremity injuries, unlike hip hop and breaking, which tend to use more upper

limb maneuvers such as handstands and freeze poses. Similarly, popping tends to make frequent use of the upper limb; hence, this dance form may also be expected to have an increased number of upper limb injuries compared to street and commercial. Street dancers in our study showed greater percentages of trunk injuries than did the comparable dancers in Ojofeitimi et al. (41% vs. 7%). Both studies highlight the differences in site of injury between sub-groups, indicating that the style of dance influences dancers' injuries.

### Professional Versus Student: Site of injury

Student hip hop dancers presented with a significantly larger number of lumbar spine injuries than professional dancers. There are a number of plausible reasons for this difference (e.g., age, workload, experience in dance style) all of which need to be investigated in more depth to determine the exact nature of this finding.

Then it might be possible to put injury preventative measures in place at the student level.

### Gender

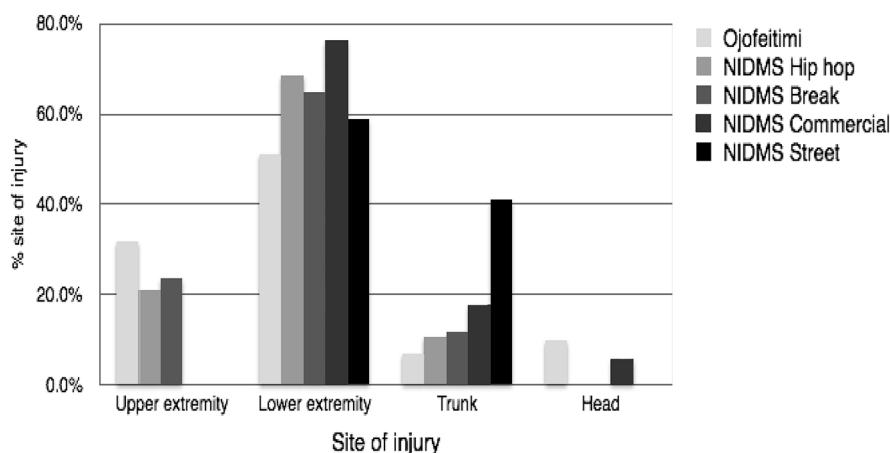
It is generally presumed that women have a larger Q-angle ( $4.6^\circ$  greater than males) due to a wider pelvis, shorter stature, and increased femoral anteversion.<sup>6</sup> Increased Q-angle potentially translates into greater force of the quadriceps on the patella, encouraging mal-tracking. This would explain the higher number of patellofemoral injuries in females than males.

### Back Injuries

All lumbar injuries in the study were diagnosed as L5/S1 disc injuries. Interestingly, the mean age of dancers with back injuries was 24.2 years. Previous studies have identified a correlation between age and level of disc herniation and degeneration,<sup>7,8</sup> which is further supported by the results presented in this study.

### Patterns of Injury Across Dance Styles

Trends and patterns of injury across dance styles are difficult to compare accurately due to differences in defining dance style. Even within the dance community there is some confusion over defining dance styles, which would include "street" dance. Often dance styles are used interchangeably; hence, the hip hop sub-groups we have identified may not be a "true"

**Figure 1** Comparison of injury sites across studies and dance styles.



accounting of the dancers in each dance group. Dancers sometimes fuse a combination of styles in describing the variety of dance they practice and perform. Future researchers would benefit from having more clearly defined styles of dance, and medical professionals would benefit from knowing in what style of dance their patients were injured and the mechanism of injury. Knowledge of dancers' previous dance experience (i.e., years dancing and in what style) may help identify injury trends.

### Limitations

This study only investigated dancers presenting to the authors' clinic; therefore, it no doubt underestimates the number of hip hop injuries in the community at large. We are unable to report incidence of injury as we have limited information regarding current hours of dance exposure (some clinicians routinely noted number of hours dancing and others did not). Workloads of self-employed dancers vary dramatically throughout the year so that even they have difficulty calculating them. For research purposes it would be far easier to prospectively track a specific dance company's injury incidence and calculate hours of exposure to dance as other researchers have done with ballet companies.<sup>3</sup>

This was a cross-sectional study so no conclusions regarding causal relationships can be drawn.

### Conclusion

Hip hop is a genre that is becoming increasingly popular among dancers. There is limited research into the incidence and patterns of injuries that hip hop dancers develop. This study provides an accurate description of the injury patterns of hip hop dancers who presented to a specialist dance clinic. The most common injury site was the knee, followed by the lumbar spine and then the foot and ankle. Sub-styles of hip hop present with difference sites of injury; this is probably due to the different types of dance moves utilized. Further research is required to calculate patterns and incidence of injuries in hip hop dancers, preferably using recommendations from the IADMS Standard Measures Consensus Initiative.<sup>9</sup> The use of accurate medical diagnoses and recording of injuries by use of the Orchard Code would also aid in comparisons of injuries across dance genres and different sports.

### References

1. Davey D's History 101. What is Hip Hop Directory. Available at: [www.daveyd.com/whatiship.html](http://www.daveyd.com/whatiship.html).

2. Ojofeitimi S, Bronner S, Woo H. Injury incidence in hip hop dance. *Scand J Med Sci Sports*. 2012 Jun;22(3):347-55.
3. Allen N, Nevill A, Brooks J, et al. Ballet injuries: injury incidence and severity over 1 year. *J Orthop Sports Phys Ther*. 2012 Sep;42(9):781-90.
4. Smith TO, Davies L, de Medici A, et al. Prevalence and profile of musculoskeletal injuries in ballet dancers: a systematic review and meta-analysis. *Phys Ther Sport*. 2016 May;19:50-6.
5. Jenkins P, Earle-Richardson G, Slingerland DT, May J. Time dependent memory delay. *Am J Ind Med*. 2002 Feb;41(2):98-101.
6. Horton MG, Hall TL. Quadriceps femoris muscle: normal values and relationships with gender and selected skeletal measures. *Phys Ther*. 1989 Nov;69(11):897-901.
7. Skaf GS, Ayoub CM, Domloj NT, et al. Effect of age and lordotic angle on the level of lumbar disc herniation. *Adv Orthop*. 2011;2011:950576.
8. Dammers R, Koehler PJ. Lumbar disc herniation: level increases with age. *Surg Neurol*. 2002 Sept-Oct;58(3-4):209-12.
9. Liederbach M, Hagins M, Gamboa JM, Welsh T. Assessing and reporting dancer capacities, risk factors and injuries: recommendations from the IADMS Standard Measures Consensus Initiative. *J Dance Med Sci*. 2012 Dec;16(4):139-53.

Accessed May 13, 2019.