

Injuries Presenting to a Walk-in Clinic at a Summer Dance Intensive Program

A Three-Year Retrospective Data Analysis

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Abstract

Summer dance intensive programs are an integral part of many serious dancers' training. The risk and rate of injury in this setting have not been well studied. The goal of this data analysis is to detail the epidemiology of dance injuries reported during a summer dance intensive over a consecutive 3 year period. Data collection included information regarding the number of evaluation and treatment sessions conducted at the program's walk-in clinic, body regions injured, whether the injuries were recurrences of pre-existing conditions or newly sustained during the intensive, and at what point in the program they were recorded. Overall, more of the clinic's clientele presented with multiple injuries than with single discrete injuries. The anatomic distribution of injuries appears to be consistent with previously reported data, with the four most commonly injured body regions being ankle, pelvis and hip, knee, and lumbar spine. Injuries sustained during

the intensive (IR) occurred at a 2:1 ratio to pre-intensive injuries (PR). Relative to those with PR injuries, dancers with IR injuries were far more likely to present during the first half of the program. This study is a first step toward filling a gap in the literature by describing injury incidence in a specific population within the dance community.

Due to the physically demanding nature of current dance styles, a dancer, like any other athlete, is not immune to injury. The most common injuries sustained during dance, specifically ballet and modern, are to the lower leg, ankle, foot, lumbar spine, and knee.¹⁻³ With a high injury incidence, it is important to consider the impact of several factors on injury risk, including dance style, hours danced, flooring surface, and shoe type.⁴ These factors are present in all dance environments, particularly

given the often intense and repetitive nature of rehearsal and performance for trained dancers.

The regimen of non-recreational dancers is typically year-round and includes summer dance intensive programs as an integral part of their training. These intensives are multi-week events with hours of training in a variety of styles. For most participants, the number of hours danced per week during an intensive is significantly higher than during the year. The injury rate over a one year period was as high as 70% in dancers who were surveyed for this study prior to beginning an intensive program,⁵ which is consistent with other reported injury rates among dancers.⁶⁻⁸ These injuries were perceived by the dancers to be a product of overuse in the year leading up to the program. In studies involving other settings, such as professional dance companies, subjective reports related to injury incidence include statements such as "feeling overtired, run down, overworked, and under strain and pressure."⁹ While these studies are helpful in understanding dance-related injuries, none have been conducted during a summer dance program, which may improve understanding of the mechanisms behind these injuries.

The purpose of this study was to fill a gap in the literature by describing injuries incurred during a 6 week summer dance intensive. The goal of this data analysis was to detail

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the epidemiology of dance injuries sustained during this program over a 3 year period. Specifically, the focuses of the study were to: 1. provide the rate of incidence of injury and then classify those injuries by body region; 2. describe the relationship between pre-intensive (or chronic) injuries and intensive-related (or acute) injuries; and 3. examine the point in time at which program participants sought care for their injuries. The data presented in this study are intended to provide insight into the medical implications of this unique environment.

Materials and Methods

The intensive's students ranged from 12 to approximately 50 years of age and were of skill levels ranging from recreational to professional. Dancers came from North America, South America, Asia, and Europe. This specific program focuses on modern dance, with additional classes in ballet, hip-hop, African, yoga, and Pilates. The number of hours danced varies, based on the level of training and classes selected by each individual, number of rehearsals for performance, and the performances themselves. Thus, a definitive statement of time spent dancing could not be made based on the available data.

The dance intensive has an onsite triage and care facility called the Dance Medicine Walk-in Clinic (DMWC), staffed by a local sports medicine physical therapy practice, to manage orthopaedic injuries. The purpose of the clinic is to provide basic diagnosis, treatment, and tracking of injuries, as well as physician referral as needed. The clinic and its services are available to all students, faculty, and staff associated with the program, operating for 10 hours each week over 3 half-days. Dance intensive participants self-refer to the clinic during these hours. For the purposes of this study, injury is defined as any incident leading to self-referral to the clinic.

In order to analyze the injury incidence, data were collected from 3 consecutive years (2010-2012), based on all attendees to the DMWC.

Participants presenting to this clinic included dancers, teaching faculty, and program staff. Clinic staff physical therapists or student physical therapists performed an examination or treatment and subsequently recorded all relevant information regarding each participant's injury. Two physical therapy students then removed identifying information and entered this data into a database at the end of the 2012 season. Due to the retrospective and anonymous nature of the study, informed consent was not obtained from participants, and on this basis the study was approved by the Institutional Review Board.

Retrospective analysis of participants' data was planned to include body region injured, number of treatment sessions, whether the session was a new or return visit, and extent of acuity for each individual injury. When possible, data presentation included results from all 3 years, but rates of injury by specific body region were only included for the years 2011 and 2012, as the data from the first year (2010) was collected in a way that described all affected regions but did not differentiate individual injuries for each participant. This made it difficult to separate the injuries by body region for participants who presented with multiple injuries to diverse body regions. This limitation was not applicable to the 2011 and 2012 data sets. Thus, a dancer presenting in 2011 or 2012 with both a knee and a shoulder injury would be classified as having two individual injuries, whereas a participant with the same presentation in 2010 would have been classified as having "multiple injuries." When body region comparisons were performed across all 3 years, all participants with more than one injury to separate body regions were summarized as "multiple injury."

The variables of interest for the study focused on intensive-related injuries and prior injuries, as well as the body part injured. Intensive-related injuries (IRs) were defined as those that occurred during the dance program, whereas pre-intensive-related

injuries (PRs) represented those that existed prior to attendance but were exacerbated by the intensive (typically described as "chronic"). Based on detailed notes about each injury from the clinic staff physical therapists, the student physical therapists who performed data entry were able to classify the injury as IR or PR and categorize each injury by body region, as described by Allen.¹ The data were analyzed using descriptive statistics for trends in incidence, prevalence, injury type, and number of visits per injury or participant, depending on the nature of the available data.

Results

One hundred and one participants were seen in the clinic in 2010, 96 in 2011, and 124 in 2012, representing 16%, 17%, and 21% of the total program population for each year, respectively. This included both those presenting with single injuries and others with multiple injuries. While the percentage-of-total-population data indicate a trend toward increased utilization each year, these differences were not statistically significant ($\chi^2 = 4.39$, $df = 2$, $p = 0.11$).

Most participants were screened at the clinic for a single evaluation, which might include assessment of more than one injury. They were rarely seen for more than three separate evaluations (Table 1), with 90% only requiring a single physical therapy evaluation, 7% two evaluations, and 2% three or more evaluations. When considered in terms of individual injuries over the 3 year span, 67% were seen for one evaluation only, 18% required one PR follow-up visit, 10% were seen for three visits, and 2% for up to six visits.

For 2011 and 2012 the four most commonly injured body regions were: ankle ($N = 54$, 17%), pelvis/hip ($N = 44$, 11%), knee ($N = 41$, 10%), and lumbar spine ($N = 41$, 10%), as seen in Figure 1. When participants with more than one injury were classified as "multiple injuries," those multiple injuries occurred more often than any single discrete injury.

Table 1 Total Number of Participants Who Were Seen for 1, 2, and 3 or More Clinic Visits

Number of Visits	2010	2011	2012
1	90	88	112
2	9	7	8
3 or more	2	1	4

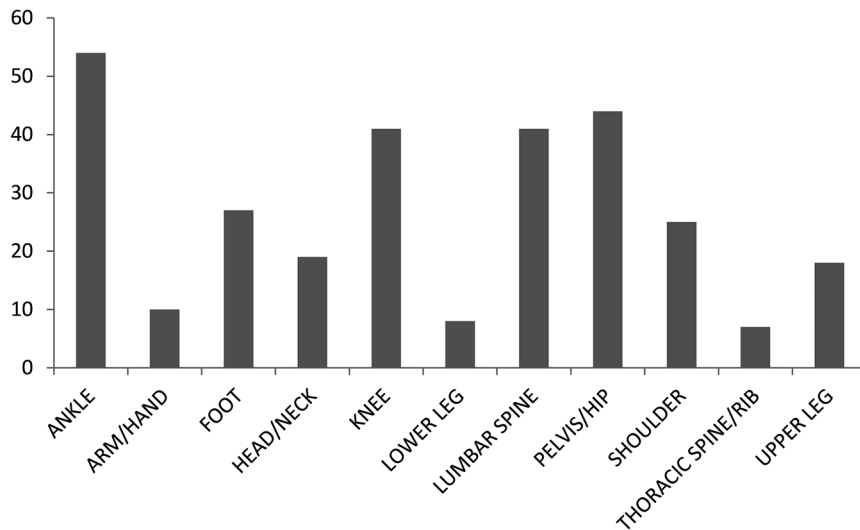


Figure 1 Number of injuries by body region for years 2011 and 2012.

Table 2 Total Number of IR, PR, and Not Recorded Injuries Per Year

	2010	2011	2012
Intensive-related	50, 50%	61, 64%	80, 65%
Pre-intensive	26, 26%	35, 36%	44, 35%
Not Recorded	25, 25%		
Total	101	96	124

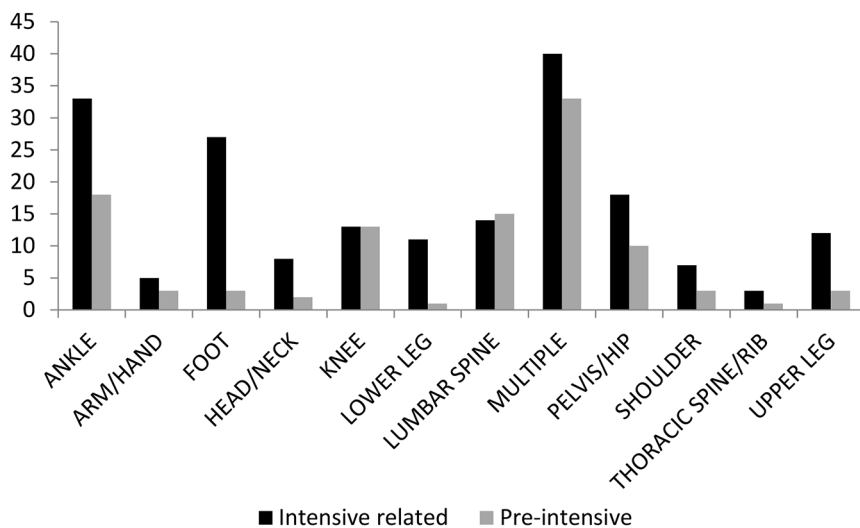


Figure 2 IR- vs. PR-related injuries by body region over 3 years.

A differentiation between PR and IR injuries is shown in Table 2 and Figure 2. The total incidence of injury type was 60% IR, 33% PR, and 7% uncategorized (from 2010), with no significant difference across the years ($\chi^2 = .09$, $df = 2$, $p = 0.95$: Table 2). The ankle was the most treated body region for both IR and PR injuries, while the foot was heavily skewed toward IR (27 versus 3 cases). A roughly equal rate of IR versus PR injuries occurred at the lumbar spine and the knee (Fig. 2).

The number of participants who presented per day with a new injury is summarized in Figure 3. Participants with IR injuries were more commonly seen in clinic early in the intensive, while those with PR injuries were more likely to be seen later in the program. Relative to those with PR injuries, participants with IR injuries were far more likely to present during the first half of the program than the second half (Odds Ratio = 4.29).

Discussion

To our knowledge, this is the first data collection to target the summer dance intensive population specifically. High rates of injury are common in dancers; as demonstrated by this study, the summer dance program population also experiences a high rate of injury. In addition to injury incidence, previous reports of variables contributing to injury were consistent with those subjectively reported by participants in this study. In addition to the aforementioned variables, this study examined the point in time at which IR and PR injuries surfaced throughout the course of the program.

The walk-in clinic at this summer dance intensive saw an average of 18% of the total program population for the 3 years assessed. These numbers were not inclusive of all injuries sustained during the intensive, as some participants likely self-treated or sought treatment outside the clinic. Given the nature of the data collection, it was difficult to identify injuries that were not directly reported to the clinic staff. Despite these limitations, the number of evaluations and treat-

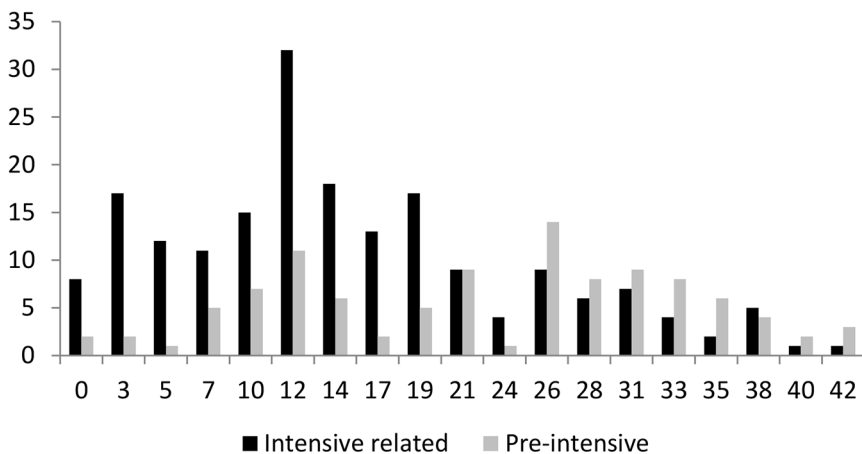


Figure 3 Number and type (IR vs. PR) of injuries reported by number of days from beginning of intensive over 3 years.

ments was consistent across these years and provides support for the need and continued usage of the clinic.

The classification of injuries by body region was consistent with previously reported data.^{1,3,9,10} Each body region demonstrated differences in IR and PR injury incidence (Fig. 2). By far the most striking difference between IR and PR injury rates was at the foot, where 27 versus 3 injuries occurred during the intensive. It is noteworthy to acknowledge the possibility that a previous foot injury could have prevented a dancer from participating in the intensive at all, and thus a subset of PR injuries may be missing from the data. Nonetheless, the variables associated with an intensive program specifically increase the risk of incurring a foot injury.

Subjective history obtained from participants during evaluation indicated that IR injuries were typically multifactorial. Dancers primarily attributed these injuries to a lack of experience, lack of physical preparation for an intense workload, overtraining prior to the intensive, or unfamiliarity with a new dance style and its physical demands. Reported secondary causes included inadequate instructions from the teacher, dancers making physical compensations to achieve what was being asked of them, or partnering-related injuries, which may have been out of the dancers' own control. These

subjective reports correspond with possible causative factors for injury based on the investigator's previous experience treating this population.

While the ratio of IR to PR injury was highest at the foot, the largest overall IR injury rate was seen at the ankle. This did not greatly exceed the total seen for PR injuries of the ankle, however, as PR ankle injuries were also the highest total for that category. Clearly, ankle injuries provide an opportunity for new-onset injury prevention in a dance intensive. There may also be benefit to specific rehabilitation training, either prior to or early in the intensive, for participants who report a history of ankle symptoms.

When examining the point in time at which participants sought care, individuals with IR injuries were more likely to attend the clinic in the first half of the program. This pattern was reversed in the second half, when PR injuries, such as chronic injuries or injuries that dancers had previously sustained, were more commonly seen (Fig. 3). It is possible that the rapid ramp-up in intensity upon entry into the program results in a large increase in IR injuries. It is also possible that fewer dancers utilize the walk-in clinic for IR injuries during the second half of the intensive because their newly sustained injury has caused them to essentially drop out of the program. In contrast, it is to be expected that dancers with more

chronic injuries may have increased pain the longer they dance, especially given the demanding workload of an intensive. Therefore, it is plausible that dancers with PR injuries are more likely to seek care in the second half of the program.

As suggested by dancer report and therapist hypothesis, PR injuries (such as IR injuries, but for different reasons) are multifactorial in nature. These chronic injuries may be exacerbated by the intensive session, a failure to implement periodization throughout training, or a lack of cross training to address muscle imbalances common in dancers. Perhaps dancers with chronic or episodic pain are knowledgeable about controlling their symptoms in the early stages but have difficulty managing them as they increase in severity over the course of the intensive.

Participants more commonly presented to the clinic with multiple injuries rather than one single injury (Fig. 2), which further indicates that chronicity is not the only factor to be considered as a cause of their injuries. There are many intrinsic and extrinsic factors that could contribute to multiple injuries. Intrinsic factors may include hypermobility, weakness, muscle imbalance, and poor neuromuscular control.^{3,5} Extrinsic factors include variability in flooring, overtraining, improper footwear, and choreographic demands.^{3,11} During this specific program, many of these factors cannot be controlled. For example, due to limited studio space and the large number of classes offered, many spaces are used for dance classes that are not designed for that purpose. Ideally, dance studios have sprung floors instead of merely a wooden surface over concrete, which is commonly pressed into service in this intensive (and other environments).¹² Many of these risk factors for injury have been observed subjectively by participants or objectively by physical therapists. In the future, dancers should be educated prior to the intensive on how they can self-modify their training technique to avoid a new injury or exacerbate a

chronic one. Education regarding injury risk and prevention would also be advisable for instructors to better understand the physical stress and possibility for injury inherent in their technique classes and choreography.

Future Research

Further examination of the total intensive population (including participants presenting to the clinic with injuries and those with or without injury who did not seek care) will create a better picture of participants' injury prevalence and pre-existing risk factors. It would be interesting to explore the potential effect of periodization on the dance intensive community and to learn more about how pre-existing risk factors affect injury rates in this population. With a schedule lacking periodization and demanding extreme daily hours of training, discovering the "off-season" habits of participants may be a key to preventing summer dance program injuries. Incorporating rest, dance-specific training, and cross training into the schedule might mitigate the injury rate. This population demonstrates the need for an injury prevention and education program. A future study could examine if implementation of such a program has an impact on injury incidence.

Use of standardized outcomes or other follow-up questionnaires would help to assess the effectiveness of the clinic intervention, in terms of quality of life and satisfaction with the service. Furthermore, it would be relevant to explore the difference in injury incidence of dancers throughout the year as compared to during the intensive.

Limitations

Due to the retrospective nature of this study, it has some inherent limitations. As described above, the specific data collected were adapted as the years progressed, resulting in some differences in available data between years. This resulted in limited comparison for some variables of interest. In addition, no demographic informa-

tion was collected from the dancers, limiting the researchers' ability to make predictions or correlate specific demographics with particular injuries. Also, utilization of the standardized definition of injury was not obtainable in this study due to the retrospective nature of the data collection.¹³ It is important to note that there was, in all probability, a subset of dancers who self-treated or chose to seek care elsewhere. Because this study only captured those who chose to self-refer to the walk-in clinic, there is a group of individuals who likely sustained injuries but are not included in the data.

Conclusion

Dance intensives are physically demanding environments that can result in increased incidence of injury. The most common injuries recorded over the course of this study were IR lower extremity injuries. Despite the regular availability of clinicians, the vast majority of injuries were seen for evaluation only, indicating that the primary utilization of the clinic was for screening and evaluation, as opposed to follow-up treatment. Participants presenting with multiple injuries were common, and injury rates varied by location and previous history of injury. Additional research is required to address the needs of this unique environment.

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