

# Influence of Training Load on the Risk of Injuries in Contemporary Dancers: A Systematic Review

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**INTRODUCTION:** Contemporary dance consists of a combination of many dance styles and explores movements that test the physical boundaries of the human form. A pre-professional contemporary dancer can have up to double the training load of some professional athletes. Despite intense training, the detailed factors influencing injury incidence, type, and severity among contemporary dancers are not completely understood. This systematic review analyzes studies that have investigated injuries in regard to injury type, incidence, and severity suffered among contemporary dancers.

**METHODS:** A systematic literature search was conducted according to the PRISMA guidelines. Six databases were searched for articles. The inclusion criteria included (a) studies reporting on a range of injury characteristics (b) research conducted after 2005 (c) pre-professional programs (d) research that documented training time, load, or dance exposure, and (e) articles published in the English language. Exclusion criteria included (a) training time or injury incidence correlated to factors apart from training. The initial search yielded 229 relevant records overall. Screening superficially yielded 111 studies in total, which underwent abstract review. The remaining 38 studies were selected for full-text review, which resulted in nine studies included in this systematic review.

**RESULTS:** Three main themes emerged from the nine studies included in this review. First, we found a lack of standardization in the definitions of injury across the studies. These variations affected the comprehensive assessment of the overall impact high-level training has on contemporary dancers. Second, we found a high incidence of overuse injuries reported. Overuse injuries ranged from 20% to 80% of the total injuries that were reported. Third, we found that sudden spikes in training hours during the final weeks leading up to performances resulted in a higher incidence of injuries, yielding a statistically significant non-linear correlation between training load and injury.

**DISCUSSION:** Functional measurements such as stability, pain levels, range of motion, and strength may provide more accurate insights into the true consequences of the injury as opposed to the number of days lost to injury. Comparing the type and intensity of training to the incidence of injury on a weekly basis is another approach, as technique class, rehearsal, and performance place different forms of stress on the body. Lastly, fluctuating training schedules predisposed dancers to increased injury incidence and should be modified. The sudden increase in training does not provide time for the dancers to make the necessary physiological compensations to handle the demands of a high dynamic load. Supplemental strength training should be introduced in a graduated manner and designed to complement the dance training from the school curriculum.

**SIGNIFICANCE/CLINICAL RELEVANCE:** The aim of this systematic review was to investigate how training intensity, type, and duration can impact the risk and severity of injury among pre-professional contemporary dancers. This information is relevant to physicians caring for this population in order to be aware of the injury details these dancers face, such as decreased functionality, change in movement quality, and length of time for recovery.

## IMAGES AND TABLES:

Figure 1. Methodology

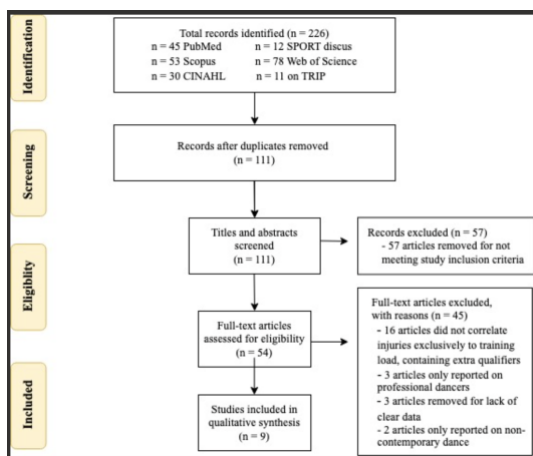


Table 1. Training and Injury Characteristics

\*Overuse/ Recurring vs. Traumatic/ Acute

\*\* Risk of injury (measured as Med-Inj)

\*\*\*Severity (reduction in training volume/time) of injury (measured as Time-Inj)

Training Characteristics			Injury Characteristics			
Author/Year	Duration	Number of Injuries	Location of injury	Injury type*	Risk of injury **	Severity of injury***
Cabalan et. al. (2018)	12.17 hours/week	155	Ankle/foot 12.9%, Knee 20.1%, Low back 9.7%, Other 60%	Overuse	8.4 injuries per 1000 hours	2.4 time-loss injuries per 1000 hours
van Winden et. al. (2019)	Total 132,906 dance exposure hours per 1 year	321	Ankle/foot 30%, Knee 15%, Low back 17%, Other 38%	Not specified	1.9 injuries per 1000 hours	58.1% time-loss injuries
Mallabu et. al. (2021)	Total 96,047.25 dance exposure hours per year; 1055.54/276.2 hours per year per student	33	This study only assessed ankle injuries	Not specified	0.24 injuries per 1000 hours	15.4% time-loss injuries
Cabalan et. al. (2019)	21 hours per week	45	Ankle/foot 25.0%, Knee 20.5%, Low Back 9.1%, Other 45.4%	New 15 (33.3%); Recurring 29 (64.5%)	Not specified	46.7% time loss injuries 1-7 days (mild); 24.4% time loss injuries 8-21 days (moderate); 26.7% time loss injuries 21+ days (severe); 2.2% not stated
Kenny et. al. (2018)	Total 26363.45 hours per 31 weeks	Injury prevalence proportion (contemporary only): Time loss: 26.7; Medical attention: 30; All complaints: 78.3	Not specified	Not specified	1.091 injuries per 1000 hours; 2.087 155 days lost; 3.139 injuries per 1000 hours	1.125 days lost; 2.139 days lost
Fuller et. al. (2020)	30 hours per week for 28 weeks per year	119	Ankle 17.65%, Knee 16.81%, Other 65.54%	Acute 6%	2.71 injuries per 1000 hours	0.07 time loss injuries per 1000 hours
Lai et al. (2022)	Total 18,290 dance exposure hours per year; Average of 11 hours per week	This study only assessed ankle and foot injuries	Recurring 80%	Recurring	0.38 injuries per 1000 hours	Not specified
Campoy et al (2011)	9.38 +/- 8.34 hr/week (absence of injury); 15.84 +/- 12.49 hr/week (presence of injury)	89	Ankle/foot 21.43%; Knee 62.98%; 21.43%; Other 57.14%	Acute	1.33 injuries per participant; 1.73 injuries per injured participant	Not specified
Nunes et al. (2022)	13.56/12.9 hours/week	20	Not specified	Not specified	52.4% incidence of injury with a workload > 11.5 hrs/wk; 20% incidence of injury with a workload of <=11.5 hr/week.	Not specified