

# The Effect of Nutritional Status on the Presence of Lower-Extremity Stress Fracture in Young Vocational Dancers

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## Abstract

Research on overuse injury risk in young vocational dancers is limited, but it is crucial to explore this area to help develop preventative strategies to combat these injuries. For this study, 100 female, vocational dance students from four Charlotte, NC area studios were followed over the course of one dance year. Stress fracture injuries were diagnosed by licensed physiotherapists, bone mineral density (BMD) tests were conducted, and food records and food frequency questionnaires were collected to evaluate nutritional intake. Together, these testing measures provided valuable data to answer if nutritional status affects stress fracture incidence in young female vocational dancers.

## Introduction

- Overuse injuries are a leading concern for pre professional dancers, with the lower extremity accounting for 58% of all dance-related injuries (“Dance Related Injuries by the Numbers”, 2013).
- Most dancers are reluctant to take time off from training, leading to a high incidence of stress fractures, which are caused by overload without proper recovery (Arliani et al., 2016)
- Female athletes with nutritional deficiency have a 2.5 times higher risk of developing stress fractures, which is increased for dancers as disordered eating is common due to high image standards (Dohi et al., 2019; Russell, 2013).
- Reduced nutritional status is correlated to low BMD as various nutrients promote bone growth; compromised growth leads increased fracture sensitivity (Barrack et al., 2014).



## Purpose & Hypothesis

- The purpose of this study was to investigate if specific nutritional status, and resulting bone mineral density (BMD), plays a role in the incidence of lower-extremity stress fractures in young, female vocational dancers.
- It was hypothesized that reduced amounts of nutritional intake and BMD would present as a positive risk factor for lower-extremity stress fracture.

## Methods

### Participants

- Female dancers from vocational programs at 4 Charlotte, NC studios
- Must be 8 to 16 years old, dance 5 to 20 hours/week, & take a variety of dance styles
- Informed consent had to be signed by participants & their parents

### Process

- Participants attended a meeting at the beginning, middle, & conclusion of the study to collect food records and complete surveys & scans
- Any injury sustained throughout the year was reported to the physiotherapist for examination and diagnosis
  - ◆ Injury characteristics were recorded by the physiotherapist, including cause, type, and severity (in days of time lost)
  - ◆ Only stress fractures were included in the study, but other diagnosed injuries were referred to other doctors for treatment
- Physiotherapists checked in with all participants every two weeks to assure a non-reported injury hadn't been sustained

### Instrumentation

- A licensed physiotherapist diagnosed injury using x-ray & MRI
- A three-day food record of one weekend day & two weekdays was kept by participants to assess food intake
- The National Cancer Institute Food Frequency Questionnaire (FFQ) was administered to evaluate long-term nutritional intake of specific foods & nutrients
- GE Lunar Prodigy DXA scan used to assess whole-body BMD

### Data Analysis

- Descriptive and multivariate statistics reported for all data
- Pearson's r and linear regression analysis used to report correlations
- SPSS Statistics software used for all data analysis

## Conclusion

- Overall, research suggests that stress fracture incidence has a strong correlation to reduced nutritional status and BMD in female athletes.
- In addition, stress fracture incidence is high in the dance population due to high training demands with little time for injury recovery, while nutritional intake is typically low due to image standards and prevalence of disordered eating.
- While much research exists involving stress fracture epidemiology and risk, as well as dance injury, more research is needed on the stress fracture risk of dancers in particular, specifically for young, vocational dancers.
- Limitations of this study include self-reported data from participants that can lead to error, training differences between studios, and the possibility of non-reported injuries.

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