Prevalence of the Female Athlete Triad in NCAA Division I Collegiate Female Athletes

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Abstract

The *Female Athlete Triad* is a system of 3 components that afflicts up to 60% of female athletes (McArdle et al., 2015). The components have been defined by the American College of Sports Medicine (ACSM) as low energy availability, menstrual dysfunction, and low bone mineral density. Due to the intense energy expenditure during training and the age at which intense training begins in order to compete at the collegiate level, NCAA Division I female athletes are at a heightened risk for the *Female Athlete Triad*. This study used the LEAF-Q survey to collect risk assessment levels from each participant. The purpose of this study was to examine the prevalence of the *Female Athlete Triad* in NCAA Division I female athletes using a large and diverse sample.

Introduction

- Up to 60% of female athletes suffer from the *Female Athlete Triad* (McArdle et al., 2015).
- The *Female Athlete Triad* consists of the interrelation of low energy availability (LEA), menstrual dysfunction, and low bone mineral density (BMD) (McArdle et al., 2015; Brook et al., 2017). See the figure below.
- Females presenting with LEA, hormone dysfunction, or low BMD, either alone or in combination, are considered at risk of the consequences of the *Triad* (Javed et al., 2013).
- Weight-dependent sports have a higher incidence of the *Triad's* components (Doyle-Lucas et al., 2014).
- LEA is prevalent in up to 58% of female athletes and can lead to the other two *Triad* components: menstrual dysfunction and low BMD (Logue et al., 2020).
- Menstrual dysfunction is prevalent in 32% of female athletes (Cheng et al., 2021).
- Bone stress fractures occur in 34.3% of female collegiate athletes (Thein-Nissenbaum et al., 2011).
- Previous studies have not focused on NCAA Division I athletes.
- There is a current need for a study with a large, well-diversified sample in order to find an accurate estimate of the prevalence level.

https://www.goldcrownfoundation.com/the-female-athlete-triad/
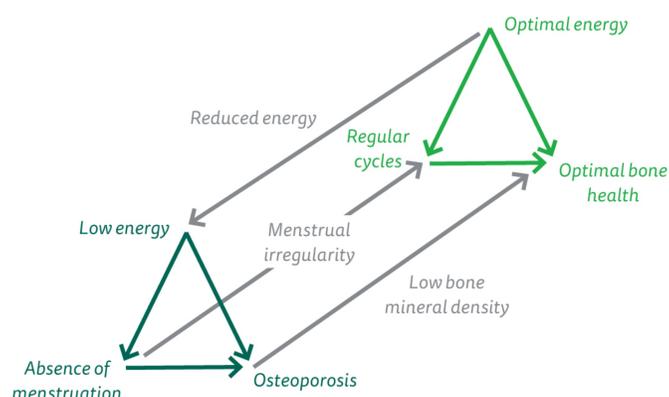
Purpose & Hypothesis

- The purpose of this study was to examine the prevalence of the *Female Athlete Triad* risk factors in NCAA Division I colligate female athletes across a broad and ethnically diverse sample.
- It was hypothesized that at least one *Triad* component would be prevalent in a majority of NCAA Division I colligate female athletes. Additionally, it was expected that the prevalence of the *Triad* would be higher than found in previous studies on similar demographics due to the larger sample used.

Methodology

Participants
- Inclusion criteria: biological female and current NCAA Division I collegiate athlete
- Voluntarily obtained from 10 universities
- Completed Informed Consent form

Research Design
- Quantitative, non-experimental, descriptive study
- Online survey completed by all participants
- Risk scores and subject characteristics obtained from participants' completed surveys

Instrumentation
- Low Energy Availability in Females Questionnaire (LEAF-Q)
- Score < 8: low risk for *Female Athlete Triad*
- Score >8: high risk for *Female Athlete Triad*

Procedure
- Permission granted from Athletic Director of each school
- Questionnaire distributed to the 10 school's female athletes
- Participants completed LEAF-Q.

Data Analysis
- Risk values were obtained from the LEAF-Q results
- JASP was used to find descriptive statistics
- Spearman's rho test was used to determine correlations
- Significance was set at an alpha level of 0.05

Operational Definitions

Amenorrhea: Amenorrhea is characterized by the absence of three or more consecutive menstrual cycles after menarche, the absence of a menstrual cycles for 6 or more months, or no onset of a menstruation cycle by age 15 (*Amenorrhea* 2021).
Low Bone Mineral Density: Low bone mineral density is defined by the ACSM as a bone mineral density (BMD) score (z-) of less than -1 (*Bone mass measurement: What the numbers mean* 2018).
Low Energy Availability: Low energy availability (LEA) is calculated by subtracting energy expenditure during exercise from daily energy intake, divided by fat free mass (FFM) of the individual, in kilograms. A measurement less than 30kcal/kg-FFM per day is considered at risk of LEA (Torres-McGehee et al., 2020).
Menstrual Dysfunction: Bleeding and ovarian regularities such as amenorrhea and oligomenorrhea (Cheng et al., 2021).
Osteoporosis: Bone mineral density more than 2.5 standard deviations below the mean for an individual's gender and age (*Bone mass measurement: What the numbers mean* 2018).

Future Directions

- The results of this study may be helpful in creating intervention programs for young female athletes to educate athletes of the risks and increase early diagnosis of the *Female Athlete Triad*.
- This study was limited in its ability to clinically diagnose the components of the *Female Athlete Triad*.
- Future studies should aim to clinically assess population for the prevalence of the *Female Athlete Triad*.
- This could be done by measuring participants' bone mineral density, calculating the participants' energy availability by documenting food intake and energy expenditure over a several week time period, and documenting menstrual irregularities over a several month time period.

Acknowledgements

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