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# Temperature-Controlled Mattress Topper Improves Sleep and Recovery in NCAA Division I Female Soccer Players



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## INTRODUCTION

- Sleep is imperative to physiological restitution and may have indices to improve performance.
- There is evidence to suggest that sleep quantity and quality may improve when sleeping in temperatures under 21° C.
- Insufficient sleep has been found to negatively impact metabolism and endocrine function, increase rate of perceived exertion, and impair performance outcomes. Sufficient amounts of sleep, however, have been linked to improved recovery time due to a reduction in exercise-induced inflammation and circulating cortisol concentrations; thus, allowing for a quicker return to optimal performance in athletes.
- There are little data surrounding the topic of sleep temperature on performance and recovery in elite athletes, let alone elite female athletes.

**PURPOSE:** To examine the impact that controlled sleep temperature has on sleep quantity, sleep quality, and markers of recovery (resting heart rate, heart rate variability, respiratory rate, and recovery score) in elite female athletes.

## PARTICIPANTS

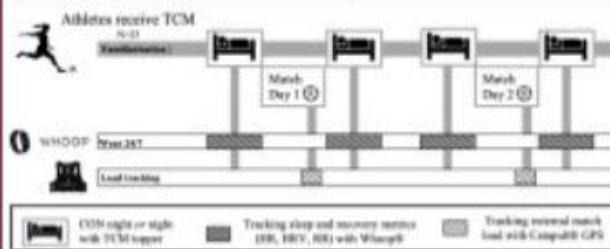
23 Division I female soccer players from Florida State University participated.

	N = 23	Mean ± Standard Deviation
Age (y)		20.5 ± 1.7
Height (m)		1.7 ± 0.1
Weight (kg)		62.3 ± 8.1

## METHODS

23 NCAA Division I female soccer players participated  
Inclusion criteria included:

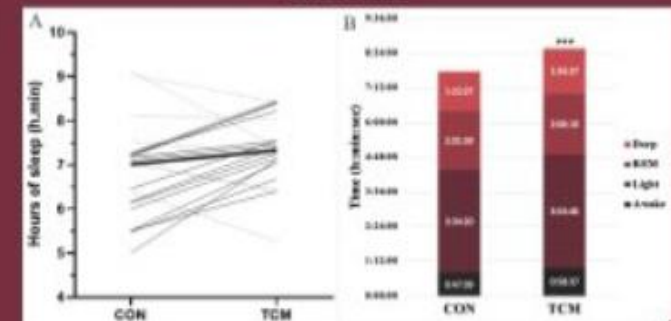
1. Eligible NCAA Division I athlete
  2. Wore WHOOP, Inc. band on dominant wrist continuously for 24h per day for an entire competitive season
  3. Given and utilized a temperature-controlled sleep mattress (TCM) topper during the season
- Athletes utilized the mattress for one week to familiarize themselves. Preceding nights from two top-20 home matches were selected for data collection; one without the mattress (CON) and one with the mattress (TCM)
  - Athletes recorded subjective sleep quality on a 10-point visual analog scale (1 = poor, 10 = excellent) the next day before the respective practice or game.



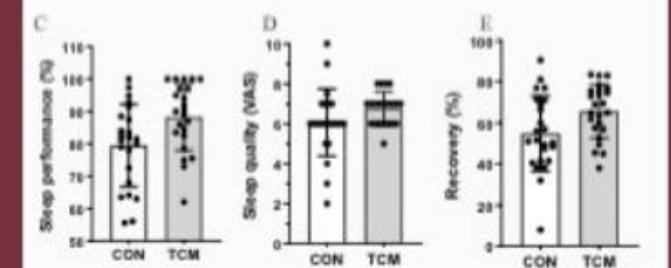
**Statistical Analysis:** Paired t-tests and linear regression were used to examine the impact of TCM on sleep quantity and quality, and markers of recovery. Significance was set at  $p \leq 0.05$ .

**Limitations:** The study was not randomized, nor was placebo feasible. Additionally, menstrual cycle and diet were not accounted for.

## RESULTS



**Figure 1:** Individual hours of sleep evolution (A) and total time in bed including sleep times in the different sleep stages (B) during CON vs. TCM topper nights (REM: rapid eye movement, \*  $p < 0.05$ , \*\*\*  $p < 0.0005$  CON vs. TCM)



**Figure 2:** Sleep performance (C), perceived sleep quality (D), and recovery score (E) during CON vs. TCM topper nights (\*  $p < 0.05$ , \*\*\*  $p < 0.0005$  CON vs. TCM)

## CONCLUSIONS

The use of temperature-controlled sleep mattress toppers may help to improve sleep quantity and quality, however, more research is needed to understand how recovery and performance are impacted by the use of TCM.