THE ASSOCIATION BETWEEN SMART RING MEASURED SLEEP VARIABLES AND IN-GAME BASKETBALL PERFORMANCE

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BACKGROUND

- Sleep is critical to athlete health and has been shown to influence basketball performance, including player efficiency.
- Modern wearable devices claim improved precision and convenience in tracking sleep over traditional methods of data collection like subjective sleep journals.
- However, research regarding the accuracy of newer methods and their relationships to sports performance is limited.

PURPOSE

- The purpose of this study was to evaluate the relationship between night-prior sleep data recorded by a smart ring sleep tracker and next day in-game basketball performance.

METHODS

- National Collegiate Athletic Association (NCAA) Division I men's basketball athletes (n=4; age: 19.8±1.3 years; height: 189.2±3.0 cm; mass: 82.5±5.0 kg;) wore smart ring sleep trackers the night before games.
- Sleep variables collected included hours (hr) of total sleep (TS), rapid eye movement sleep duration (RS), deep sleep duration (DS), and heart rate variability (HRV).
- In-game performance was evaluated using field goal percentage (FG%) and a composite stat, efficiency rating (EFF), which was calculated from NCAA offensive and defensive statistics.
- Relationships between variables were evaluated via Pearson correlation coefficients computed for the group and for individual athletes.
- Kendall's Tau was run along with Pearson's r for correlations including one or more non-parametric dataset.

KEY FINDINGS

The results did not show a generalizable association between smart-ring measured sleep variables and in-game performance. However, they do suggest the relationship may be highly individual-dependent.

Table 1: Correlation Table

Athlete	TS-EFF (r)	RS-EFF (r)	DS-EFF (r)	HRV-EFF (r)	TS-FG% (r)	RS-FG% (r)	DS-FG% (r)	HRV-FG% (r)
Group	0.2	0.19	0.04	0.03	0.11	0.09	0.11	-0.05
1	-0.1	0.09	0.02	-0.26	0.07	0.18	0.27	-0.21
2	0.48*	0.51*	0.15	-0.25	0.36	0.47*	0.15	0.0
3	-0.03	-0.24	-0.3	0.12	-0.08	-0.17	-0.11	-0.07
4	0.15	0.26	0.11	0.19	-0.07	0.07	-0.12	0.24

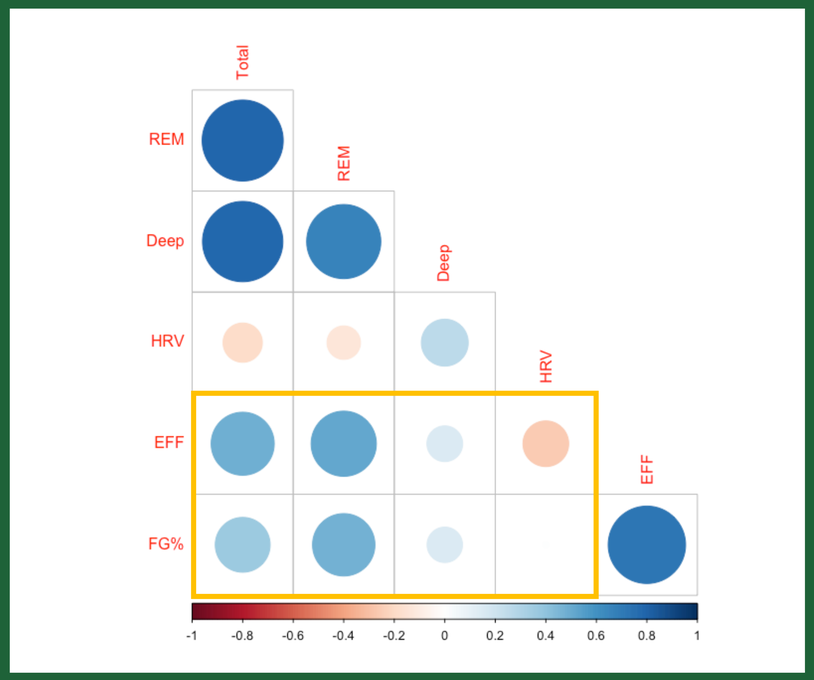
Sleep: TS=Total Sleep Duration, RS=Rapid Eye Movement Sleep Duration, hrs=Hours, Mean±Standard Deviation **Basketball Stats:** FG%=Field Goal Percentage, EFF=Efficiency Rating. **Correlations:** TS-EFF=Total Sleep Duration with Efficiency, RS-EFF=Rapid Eye Movement Sleep Duration with Efficiency, TS-FG%=Total Sleep Duration with Field Goal Percentage, RES-FG%=Rapid Eye Movement Sleep Duration with Field Goal Percentage, r=Pearson's r Value, p<=0.05*.

Table 2: Correlation Comparisons

Athlete	TS-EFF (r)	TS-EFF (τ)	TS-FG% (r)	TS-FG% (τ)
Group	0.2	0.07	0.11	-0.01
2	0.48*	0.28	0.36	0.19

Sleep: TS=Total Sleep Duration **Basketball Stats:** FG%=Field Goal Percentage, EFF=Efficiency Rating. **Correlations:** TS-EFF=Total Sleep Duration with Efficiency, TS-FG%=Total Sleep Duration with Field Goal Percentage, r=Pearson's r Value, p<=0.05*. τ=Kendall's Rank Correlation Coefficient.

Figure 1: Athlete 2 Correlation Matrix



Notes: Total=Total Sleep Duration, REM=Rapid Eye Movement Sleep Duration, Deep=Deep Sleep Duration, HRV=Heart Rate Variability, EFF=Efficiency.

Table 3: Correlation Strength

Strength	Pearson	Spearman	Kendall
Negligible	0.00	0.00	0.00
Weak	0.10	0.10	0.06
Moderate	0.40	0.38	0.26
Strong	0.70	0.68	0.49
Very Strong	0.90	0.89	0.71

RESULTS

- The grouped analysis showed TS, RES, DS, and HRV demonstrated weak to negligible relationships with EFF and FG% (Table 1).
- When analyzed for individuals, there were no consistent relationships observed among variables (Table 1).
- The Kendall's Tau correlations were agreeable with the Pearson's r values (Table 2).
- As shown in Table 1 and Figure 1, Athlete 2 exhibited strong to moderate correlations for TS-EFF (r=0.48*), RS-EFF (r=0.51*), TS-FG% (r=0.36), and RS-FG% (r=0.46*).
- Athlete 2 averaged less sleep and double the variance in sleep duration night to night.

CONCLUSIONS and PRACTICAL APPLICATIONS

- Results suggest a lack of association between smart ring-measured sleep variables and in-game basketball performance.
- Homogeneity of the small sample size of athletes, consistency of sufficient sleep durations, and lack of sleep variations may have affected the inconsistent correlations.
- Athlete 2's data suggest that TS and RS may have a positive association with some measures of in-game performance for some athletes.
- The extent to which these variables affect performance appears to be individualized, highlighting the need for ongoing athlete monitoring to assess individual responses.

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