Utilizing Training Load and Intensity to Predict Team Performance in NCAA Division I Men's Basketball

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nutrition metabolism performance body composition
APPLIED PHYSIOLOGY LAB

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BACKGROUND

The use of technology in sports has rapidly increased in recent years, with teams collecting vast amounts of data to help inform decision-making and optimize performance.

PURPOSE

To **utilize practice** and **game accelerometry data**, captured throughout a **Division I collegiate men's basketball season**, to **predict the odds** of the team **covering the predicted point spread** of an upcoming game.

PARTICIPANTS

NCAA DI Male Basketball Players (n=8)

Age (years)	21.4 (21.5)± 1.7
Playtime (min/g)	24.9 (30.3) ± 10.3

Table 1. Participant demographics presented as mean (median) ± standard deviation.

PRACTICAL APPLICATION

Understanding the effects of training load and intensity on game performance outcomes, such as point spreads, can help staff plan practices and workouts to support a successful game day.

September 26th, 2022 → **March 9th, 2023**

	Estimate	Std. Error	z value	Pr(>|z|)	
(Intercept)	1.1015	0.5213	2.11	0.0346	★
MI	-0.0420	0.0235	-1.79	0.0739	
AALOne	-0.0104	0.0027	-3.85	0.0001	★★★
MIOne	0.0904	0.0505	1.79	0.0737	
ExertionsOne	0.0200	0.0078	2.57	0.0101	★
MLTwo	0.0019	0.0007	2.83	0.0046	★★
MITwo	-0.0866	0.0404	-2.14	0.0321	★
ExertionsTwo	-0.0154	0.0058	-2.66	0.0078	★★

Table 2. The resultant multivariate logistic regression model used to predict the log-odds of the team exceeding an arbitrary game's point spread.

Our players participated in 33 games across 161 days made up of off-days, practices, workouts, and games.

METHODS

Wearable Accelerometers

KINEXON

Metrics: accumulated acceleration load (AAL), maximum acceleration load (AL max), mechanical load (ML), mechanical intensities (MI), and exertions.

Basketball Season

33 Games
128 Practices
- 2 days prior to game
- 1 day prior to game

Point Spread Odds

Predicted margins of victory in terms of closing point spread differential.

CAESARS CASINO & SPORTSBOOK

Statistical Analyses

A model selection algorithm and multivariate logistic regression model were used to determine the most impactful accelerometer metrics in predicting whether or not the team exceeded an arbitrary game's point spread using the accelerometer data two days prior, one day prior, and day of the game. The model formulated this prediction using the selection metrics.

RESULTS

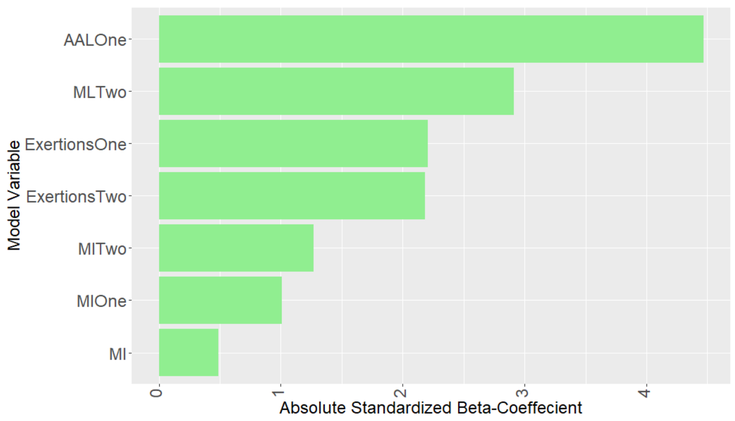

Figure 1. Standardized effect sizes of the model variables.

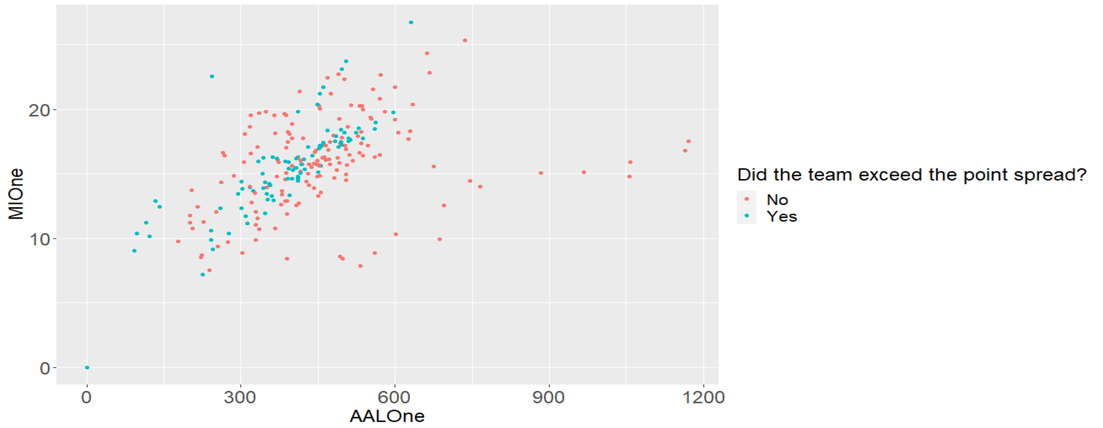

Figure 2. AALOne and MIOne clusters by whether or not the team covered the spread on the following gameday.

CONCLUSION

At a more generalized level, the model supports 'short and intense' practices the day before games and 'long and less intense' practices two days before games for covering the predicted spread. The model consistently emphasized the importance of the total volume of a session over its intensity, as seen by the greater standardized effect sizes of the load-related variables (ALL and ML) compared to the intensity-related standardized effect sizes for MI and exertions. This emphasis, along with the characteristics of the overall model suggests that practice planning, particularly in terms of volume, may have a direct link to on-the-court basketball performance.