



Fighting Fatigue: Investigating factors that influence 3-point percentage in NCAA men's basketball



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PURPOSE

- In the competitive arena of NCAA Division I men's basketball, optimizing player performance is critical
- We were interested in how factors like game schedule, player rotations, and other factors influencing fatigue impact 3-point shooting accuracy
- The purpose of our research was to determine what variables related to fatigue are statistically significant predictors of 3-point shot accuracy in NCAA Division I men's basketball
- Understanding the impact of fatigue on shooting accuracy can guide better training, recovery, game strategies, and scheduling

EXISTING LITERATURE

- Previous research has found that physical fatigue alters the position of release in jump shots, leading to decreased shooting accuracy (Erculj et al., 2009)
- Research on NCAA Division I basketball players found that mental fatigue from academic stress significantly impairs shooting performance (Daub et al., 2014)
- Previous studies have researched physical fatigue and the effects of mental fatigue, but our research aimed to investigate how 3-point shot accuracy was affected by fatigue in the context of NCAA men's basketball

VARIABLES

Table 1.

Codebook

| | Description |
|-------------------|---|
| gamekey | Game ID |
| team | Institution |
| days_elapsed | Number of rest days since the last game |
| three_pt_pct | Percentage of successful 3-point shots in the game |
| three_pt_attempts | Number of 3-point shots attempted in the game |
| three_pt_season | Percentage of successful 3-point shots for the regular season |
| travel | Number of miles traveled to the game |
| num_players | Number of players that played more than 4 minutes |
| late_round | Whether the game occurred in the sweet 16 and on |

APPROACH

- Data was collected from the 2023 NCAA Division I men's basketball tournament
- Each case in the data set was one team of each game in the tournament
- The primary dependent variable was the 3-point shooting percentage of a team in a game, but 3-point shooting during the regular season was also investigated
- Three linear regression models were constructed to investigate what fatigue-related factors may be able to predict 3-point shooting percentage

DESCRIPTIVE STATISTICS AND CORRELATIONS

Table 2.

Descriptive Statistics and Correlations

| | M | SD | DAY | TPP | TPA | TPS | TVL | NUM |
|-------------------|-------|------|--------|-------|-------|---------|-------|-------|
| days_elapsed | 4.9 | 2.6 | | | | | | |
| three_pt_pct | 31.8 | 10.8 | -.004 | | | | | |
| three_pt_attempts | 21.0 | 5.3 | .005 | .113 | | | | |
| three_pt_season | 35.1 | 2.3 | .065 | .114 | -.019 | | | |
| travel | 627.9 | 675 | .562** | .079 | -.026 | .030 | | |
| num_players | 8.2 | 1.0 | -.048 | .175* | .151 | -.245** | -.140 | |
| late_round | .22 | .418 | -.138 | .172* | .006 | .121 | .044 | -.034 |

* $p < .05$; ** $p < .01$

- A moderate correlation with statistical significance was found between the number of players rotated in a game and 3-point shot accuracy during the regular season
- A weaker, but existing correlation, was found between player rotation and the primary independent variable, 3-point shot accuracy
- A strong correlation was also found between the number of days between games and number of miles traveled to a game
- The variables represent different constructs and was determined to not be a concern for our model

RESULTS

Table 3.

Linear Regression Analysis Results

| Predictor Variables | Model 1 | Model 2 | Model 3 |
|-------------------------------------|--------------|--------------|--------------|
| travel | .119 (1.13) | .134 (1.29) | .064 (.55) |
| days_elapsed | -.070 (-.67) | -.058 (-.56) | -.068 (-.63) |
| three_pt_attempts | | .087 (1.02) | .077 (.902) |
| three_pt_season | | .152 (1.73) | .162 (1.85) |
| num_players | | .220 (2.48)* | 2.18 (2.47)* |
| late_round | | .148 (1.70) | 0.124 (-.56) |
| interaction_late_round_days_elapsed | | | .205 (.74) |
| interaction_late_round_travel | | | .131 (.78) |
| F-statistics | 0.6387 | 2.402 | 2.225 |
| R ² | 0.009657 | .1019 | .1246 |
| ΔR ² | -0.005463 | .05948* | .06861* |

Standardized coefficients reported (β); t-values in parentheses; * $p < .05$; ** $p < .01$

MANAGERIAL IMPLICATIONS

- Our research found that travel distance and rest days between games are not significant factors for predicting a successful 3-point shot percentage
- According to our model, bench depth has the most significant effect on the 3-point shooting percentage compared to our other variables
- For every player in the rotation, there is a 2.33% increase in 3-point percentage

LIMITATIONS AND FUTURE RESEARCH

- The sample only contained data from the NCAA Division I men's basketball tournament in 2023
- Women, professional, and regular season data was not included in the analysis
- A larger dataset investigating change over time may yield different results
- Travel schedule data could also influence our model since differences in transportation (e.g., bus or plane) could have different effects