



Circadian Rhythm Effects of Travel on Team Performance in Major League Soccer

Elizabeth Allen, Embry-Riddle Aeronautical University, allene10@my.erau.edu



Introduction

Major League Soccer (MLS) teams travel extensively for competition, averaging more than 37,000 miles flown per team each season. While the league takes numerous steps to encourage competitive parity among teams, there is an area of potential advantage that the league has not yet considered. Previous studies show that circadian rhythmicity impacts physiology and human performance. This research seeks to determine if there is a significant circadian rhythm disadvantage for east coast teams traveling to the west and a significant advantage for west coast teams traveling to the east.



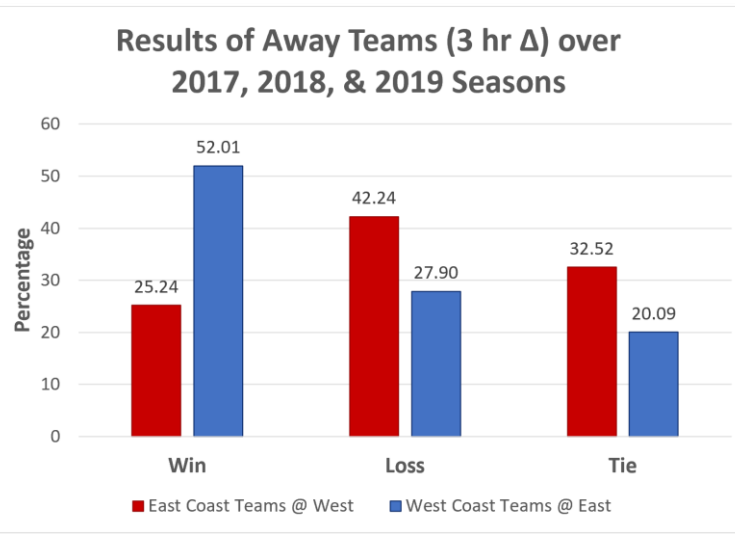
Methods

Every instance of an Eastern Conference team playing a Western Conference team in the last three seasons (2017, 2018, 2019) was recorded in a spreadsheet. This information was gathered individually from each team's websites. The spreadsheet included columns for date of game, location (Home/Away), time of kickoff (EST), the time difference between teams (1,2,3), Result (W/L/T), Goals For Eastern Team, Goals against Eastern team, and whether or not the game was "late."

Games were deemed "late" if they kicked-off at 8:30pm (EST) or later. This is an important distinction because east coast teams travelling to the west to play a match will feel as if the game is kicking off much later, and therefore will experience a physiological disadvantage against their opponent, who is not "circadian affected."

Results

A total of 161 games were included in the analysis, with 93 games played on the east coast and 68 games (with kickoffs at 8:30pm EST or later) played on the west coast. The graph below shows that when east coast teams travel west across three time zones, the east coast teams win only 25% of their games. On the other hand, when west coast teams travel to the east coast, west coast teams win 52% of those matches.



A chi-square test was performed to determine if there were any significant differences between expected and observed frequencies. If results were truly random, we'd expect to see 33% wins, losses, and ties. The test was significant, $\chi^2(2, N = 161) = 12.8, p = .00168$. A two-sample t-test between proportions showed there was a significant difference between away win percentages of east coast and west coast teams, $t(160) = 3.431, p = .0008$. These results suggest that there is in fact a significant difference in the away win results for east and west coast teams. That difference could perhaps be explained by the physiological disadvantages and advantages players face when losing and gaining 3 hours, respectively.

Conclusions & Future Research

Avenues for continued research include statistical comparisons of physiological outputs of players and investigations of injury rates between matches played in different time zones. The implications of this research are profound; in a league where every game is competitive, research that leads to improvements in player health and wellness will have a positive impact on match results.

References

Leatherwood, W. E., & Drago, J. L. (2013). Effect of airline travel on performance: A review of the literature. *British Journal of Sports Medicine, 47*(9), 561-467.

Reilly, T., Waterhouse, J., & Edwards, B. (2005). Jet lag and air travel: Implications for performance. *Clinics in Sports Medicine, 24*(2), 367-380.

Vitošević, B. (2017). The circadian clock and human athletic performance. *Natural Sciences, 7*(1), 1-7.

Huyghe, T., Scanlan, A. T., Dalbo, V. J., & Calleja-González, J. (2018). The negative influence of air travel on health and performance in the national basketball association: A narrative review. *Sports, 6*(3).