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Key determinants of team success in elite men's wheelchair basketball

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Introduction

Sports performance analysis is used in collaboration with coaches' knowledge to objectively evaluate performances and provide augmented feedback to athletes and/or the team (Maslovat and Franks, 2015). The data is also assisting coaches and staff with the planning of training sessions, development of game plans and the decision-making process during performances (Wright, Atkins and Jones, 2012). Within wheelchair basketball, previous research has predominately compared individual player performance against player classification (e.g. Gómez *et al.*, 2015). The studies have utilised secondary box data, which measures 14 individual action variables, and suggest coaches can use the findings to help with game planning. The action variables used in the previous studies do not present a valid insight into team-specific components, such as the type of defensive system adopted, as only individual behaviours are recorded. The purpose of this study, therefore, was to explore the key determinants of team success within elite men's wheelchair basketball by using a valid and reliable wheelchair basketball data collection system, and to assess how team-related variables predict game-outcome.

Method

Following ethical approval, each possession from 31 men's games at the 2015 European Wheelchair Basketball Championships was coded using a developed template in SportsCode (V10, SportsTec Inc.) that included 108 action variables grouped into 19 categories: Time, Home Team, Away Team, Offensive Unit (3.0/3.5), Offensive Unit (4.0/4.5), Defensive Unit (3.0/3.5), Defensive Unit (4.0/4.5), Match Status, Start of Possession, Man Out Offence, Shot Taken, Shot Point, Shot Outcome, Shot Location, Shot Clock Remaining, End of Possession, Defensive System, Defensive Outcome and Possession. The template's reliability had been assessed by Francis *et al*. (2015) (inter-observer reliability: 0-5% error; intra-observer reliability 0-5% error). The data was subjected to a two-stage statistical analysis procedure in R.

<u>Stage one: Team-related variables that discriminant between winning and losing teams.</u>

Chi-square tests was used to discriminate significant variables ($p < 0.05$) that separated between winning and losing teams.

<u>Stage two: Influence of team-related variables on final game outcome.</u>

Binary logistic regression models were used to explore the impact of each category on game-outcome using significant categories. The multicollinearity between explanatory categories were explored. Categories that demonstrated perfect collinearity were removed. Using a 70% sample of the data (4,288 possessions), forward and backwards stepwise elimination approaches were used to build a final model, which included seven categories comprising of 37 action variables. The estimated coefficients in the model for each action variable (associated through letters) were used to predict game-outcome (i.e. winning or losing).

$$\begin{aligned}\text{Game Outcome} &= \text{Intercept} + \text{Match Status}^{a,b} + \text{Def Unit} - 3.0 - 3.5^{c,d,e} \\ &+ \text{Off Unit} - 4.0 - 4.5^{f,g} + \text{Stage}^{h.i.j.k} + \text{Defensive System}^{l,m,n,o,p,q,r} \\ &+ \text{Start of Possession}^{s,t,u,v,x,y,z,aa} + \text{Off Unit} - 3.0 - 3.5^{ab.ac.ad}\end{aligned}$$

Results

<u>Stage one: Team-related variables that discriminate between winning and losing teams.</u>

Chi-square tests showed a significant relationship ($p < 0.05$) between 15 out of the 19 game-related categories for winning and losing men's wheelchair basketball teams. Eleven of the categories reported a p-value of less than 0.001. The category with the largest chi-square value and lowest p-value was Match Status.

<u>Stage two: Influence of team-related variables on final game outcome.</u>

The quality of the model was explored using the remaining 30% of the data. An area under the curve value of 0.749 was achieved, suggesting the model has a 'fair' ability to predict game outcome. The data highlighted if a coach were to put three 4.0 classified players on court their probability of winning reduced by 30.71%, whereas if the coach were to put three 3.0 or 3.5 players on court their probability of winning increased by 7.67%. In addition, if a team were winning when they start a possession their probability of winning a game increases by 10.70% in comparison to a decrease of 21.99% if they start the possession in a state of losing. The model also suggested if the opposition team were operating a pressing defensive system the probability of winning can increase up to 5.88%.

Practical Application

The final model indicates the importance of maintaining a winning state throughout the game, selecting a unit which predominately comprises of three point players and countering when the defence are pressing.

Coaches, players and support staff can utilise the findings from the study to assist with the planning of offensive and defensive game strategies by identifying areas for development within training sessions, supporting selection and line-up combinations and informing the decision-making process of coaches and players during performances.

References:

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