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Explanations for the United States of America's dominance in basketball at the Beijing Olympic Games (2008)

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Abstract

Anecdotally, the fast pace at which the USA men's basketball team played at the 2008 Olympics was the main reason for their dominance, although there is no way of quantifying what a fast pace is or how it contributed to point differentials. The aim of this study was to examine the game-related statistics that discriminate between fast- and slow-paced games, as well as to identify key performance factors relating to point differentials. We analysed game-related statistics for each quarter of the eight games played by the USA using a k-means cluster analysis to classify game pace using ball possessions per game quarter. We then tested for differences in game statistics between slow- and fast-paced game quarters using analysis of variance and discriminant analysis. How differences in game-related statistics affected point differentials was examined using linear regression. The largest structure coefficient between game paces for the USA was for recovered balls (0.33, $P < 0.001$). The biggest contributors to the point differences in games were recovered balls (16.9, $P < 0.001$) and field goals (22.2, $P < 0.001$). We conclude that when the USA play a fast-paced game, they are able to recover more balls from opponents that they then turn into effective field-goal shooting.

Keywords: *Statistics, team sports, match analysis*

Introduction

Preparing basketball teams to perform at the highest standard of competition is a complex process that is heavily dependent on the fitness and anthropometric characteristics of available players, which are important for developing team strategy (Drinkwater, Pyne, & McKenna, 2008). Traditionally, the National Basketball Association (NBA) from the United States of America and the USA national teams dominate international play. With the increasing numbers of foreign players in the NBA in recent years, it could be anticipated that the gap between USA basketball and the rest of the world would be narrowing. However, at the 2008 Beijing Olympics, the USA team won the gold medal with eight wins and a mean difference in points over opponents of 27.9 ± 11.8 (range 11–49). It was suggested by basketball analysts that this success was based on a faster game pace leading to greater ball possession for the USA (Oliver, 2004). In fact, the USA team had 81.1 ± 3.0 ball possessions per game versus 70.7 ± 2.1 for the reamaining tournament teams (Pelton, 2008). This faster game pace is probably supported by the superior defensive assertiveness of highly conditioned players. The defensive performances are difficult to measure, because they can either have direct consequences (such as a steal or blocked shot) or, as is usually the case, indirect consequences (such as an opponent turnover or a low probability field-goal attempt) (Trninic & Dezman, 2005). Therefore, the sum of team ball steals and blocked shots (gaining possession) and opponent-team turnovers provides a fair estimate from recovered balls of defensive assertiveness. Defensive assertiveness is used to change game pace (Trninic, Dizdar, & Dezman, 2000) – that is, a team can accelerate a game by increasing defensive assertiveness. However, there is no information on how playing faster or slower affects game performance. Also, there are no studies that characterize elite-standard basketball performance.

In general, basketball performance depends offensively on shooting field goals and defensively on securing defensive rebounds (Ibanez, Sampaio, Saenz-Lopez, Gimenez, & Janeira, 2003; Ittenbach

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& Esters, 1995; Karipidis, Fotinakis, Taxildaris, & Fatouros, 2001). Closely contested games, fouls, and free-throws have been reported to be important for game outcome (Kozar, Vaughn, Whitfield, Lord, & Dye, 1994). Other game-related statistics such as offensive rebounds, turnovers, steals, and assists are not reported consistently as discriminators between winning and losing teams. Conversely, when the criterion is not game outcome (winners against losers) but season-long success (best teams against worst teams), these results change. Ibanez et al. (2008) attributed season-long success in basketball to performance in assists, steals, and blocks, highlighting the importance of overall passing skills and better outside and inside defensive intensity. For instance, Krause and Pim (2004) noted the importance of offensive performances to winning games and of defensive performances to winning championships. This is probably attributable to greater stability in defensive performances (Oliver, 2004) because they are less influenced by environmental factors (such as game location). More recently, it has been suggested that the best breakdown of offensive and defensive performances can be obtained by analysing four factors in the following order of importance: (1) effective field-goal percentage, (2) offensive rebounding percentage, (3) turnovers per ball possession, and (4) free-throw rate (Kubatko, Oliver, Pelton & Rosenbaum, 2007; Oliver, 2004). Thus, the aim of the present study was to identify the game-related statistics that discriminate between fast- and slow-paced games played by the USA team and their opponents. Additionally, we wished to identify how the four performance factors are related to the USA team's game-quarter outcome.

Methods

Sample and procedures

Archive data were obtained from open-access official FIBA (International Basketball Federation) play-by-play records for the Beijing Olympics (2008). The USA team played eight games against the following opponents: China (preliminary round, 31-point win), Angola (preliminary round, 21-point win), Greece (preliminary round, 23-point win), Spain (preliminary round, 37-point win), Germany (preliminary round, 49-point win), Australia (quarter-final, 31-point win), Argentina (semi-final, 20-point win), and Spain (final, 11-point win). The play-by-play game-related statistics were accumulated by game quarters ($n = 64$) and included free-throw, two- and three-point field goals (both missed and made), defensive and offensive rebounds, assists (passes that contribute directly to a field goal), fouls committed, blocked shots, steals, and turnovers. Recovered balls were determined by adding steals, blocked shots (that ended in gaining possession), and opponents' turnovers. Team ball possessions and accumulated score differences at the beginning of each game quarter were also calculated and registered. Ball possessions, defined as the period of play between when one team gains control of the ball and when the other team gains control of the ball (Oliver, 2004), were calculated using the following equation: ball possessions = (field goals attempted) − (offensive rebounds) + (turnovers) − 0.4 × (free throws attempted).

Based on the available literature (Kubatko et al., 2007; Oliver, 2004), effective field-goal percentage was calculated from the following equation: effective field-goal percentage = (field goals made + 0.5 × three-point field goals made)/field goals attempted. Offensive rebounding percentage was calculated by the equation: offensive rebounding percentage = offensive rebounds/(offensive rebounds + opponents' defensive rebounds). Recovered balls per ball possession was calculated using the following equation: recovered balls per ball possession = (steals + blocked shots + opponents' turnovers)/ball possessions. Finally, the free throw rate was calculated from the equation: free throw rate = free throws made/field goals attempted.

Differences between the competing teams in these four performance factors were analysed. All data were gathered by FIBA professional technicians; however, two games were used to test data reliability (kappa coefficients). The results showed coefficients of agreement of 1.0 for free-throws, two- and three-point field goals (both missed and made), fouls committed, defensive and offensive rebounds, turnovers, steals, and blocked shots. For assists, the coefficient of agreement was high (kappa = 0.92).

Data analysis

Stage 1: Game-related statistics that discriminate between faster- and slower-paced game quarters. A *k*-means cluster analysis was performed to identify a cut-off value of ball possessions and classify game quarters (Rost, 1995). The results identified cluster 1 (faster game quarters) with 20.9 ± 0.9 ball possessions (range 19.3–22.7; $n = 21$) and cluster 2 (slower game quarters) with 17.0 ± 1.3 ball possessions (range 15.1–18.8; $n = 11$).

One-way independent-measures analysis of variance (ANOVA) was used to compare slower and faster game quarters and effect sizes were calculated to determine the magnitude of the effects. Magnitudes of effect sizes (ES) were based on the following criteria: < 0.20 = trivial, 0.20–0.59 = small, 0.60–1.19 = moderate, 1.20–2.0 = large, and > 2.0 = very large (Hopkins, 2002). All game-related statistics were normalized to quarter ball possessions. Additionally, a descriptive discriminant analysis was performed to determine which of the variables were more useful in predicting game pace. Discriminant analysis is robust for these derived rate variables (Norusis, 2004). Interpretation of the obtained discriminant function was based on examination of structure coefficients greater than $|0.30|$, meaning that variables with higher absolute values were best placed to discriminate between groups (Tabachnick & Fidell, 2007). Validation of discriminant models was conducted using the leave-one-out method of cross-validation (Norusis, 2004). Cross-validation analysis evaluated the usefulness of discriminant functions when classifying new data. This method involved generating the discriminant function on all but one of the participants ($n - 1$) and then testing for group membership on that participant. The process was repeated for each participant (n times) and the percentage of correct classifications was taken as the mean for the n trials.

Stage 2: Relationship between performance factors and game-quarter outcome. Linear regression models were used to explore the effects of the independent variables on game-quarter outcome (difference between points scored and conceded) in the whole game, in the first-half game quarters, and in the second-half game quarters. When estimating both models, no heteroscedasticity in residuals or multicollinearity among regressors was observed. Moreover, the RESET test of Ramsey (1969) did not reveal specification problems. When interpreting the statistical results, positive or negative coefficients indicate a greater or lower propensity to increase/decrease game-quarter outcome, respectively. Four independent variables were included in the model: effective field-goal percentage, offensive rebounding percentage, recovered balls per ball possession, and free-throw rate. The model is as follows:

$$QO = \beta_1 + \beta_2 \cdot FG + \beta_3 \cdot OR + \beta_4 \cdot RB + \beta_5 \cdot FT + \varepsilon_i$$

where QO = game-quarter outcome, FG = effective field-goal percentage, OR = offensive rebounding percentage, RB = recovered balls per ball possession, and FT = free-throw rate.

Differences in accumulated score differences at the beginning of each quarter and in game-quarter outcome were tested using the non-parametric Wilcoxon matched-pairs test.

Statistical analyses were performed using SPSS software release 16.0 (SPSS Inc., Chicago, IL, USA) and STATA for Windows version 10.0 (Stata Corp., LP, Texas, USA). Statistical significance was set at $P < 0.05$.

Results

Stage 1: Game-related statistics that discriminate between faster and slower paced game quarters

Table I presents the accumulated game-related statistics, normalized to ball possessions, for faster- and slower-paced game quarters for the USA team and their opponents. For the USA team, there were differences in two-point field goals made (ES = −0.90), free-throws missed (ES = −0.88), and recovered balls (ES = −1.28), with higher values in faster games ($P \leq 0.02$). Differences in the opponents were observed only for fouls committed ($P < 0.001$, ES = −0.86). In the discriminant analysis, a χ^2 of 34.5 was obtained for the USA team games ($P < 0.001$), which allowed us to identify a smaller subset of game statistics to discriminate between fast- and slow-paced games. For the opponents' games, this was not the case ($\chi^2 = 19.0$, $P = 0.06$). The structure coefficients quantify the potential of each game-related statistic to maximize differences between means among slower- and faster-paced game quarters. The higher the coefficient, the greater the contribution of that game-related statistic to the discriminant function. For the USA team, the discriminant function reflected an emphasis on recovered balls (structure coefficient = 0.33; see Table I).

The leave-one-out test summarizes the ability of the discriminant functions to classify correctly game quarters in their respective groups (slower of faster). This analysis provided an overall percentage of successful classification of 93.8% for the USA team.

Stage 2: Relationship between performance factors and game-quarter outcome

Effects of the four independent variables on game-quarter outcome are displayed in Table II. For the whole-match model (Model 1), this outcome was explained by the four factors. However, their order of importance was changed and recovered balls appeared as the second most important factor in explaining differences in game-quarter scores. For each recovered-ball-per-possession more than the opponent, the USA team increased game-quarter outcome by 16.9 ± 5.1 points (see Table II). The intercept was not statistically significant. The linear regression model explained about 71% of the variance in game-quarter outcome.

Game-quarter outcome in the first-half game quarters (Model 2, Table II) was explained by the four independent variables included in the model. The importance of each recovered-ball-per-possession more than the opponent increased game-quarter outcome to 18.5 ± 6.3 points ($P < 0.001$). The coefficient of determination was 0.87.

Table I. Descriptive results (quarter accumulated frequencies by ball possessions), effect sizes (ES), and discriminant function structure coefficients (SC) from game-related statistics for slower and faster games (mean ± s).

Game-related statistic	Slow-paced	Fast-paced	ES	SC
USA				
Two-point field goals missed	3.45 ± 2.16	3.52 ± 1.75	−0.04	0.01
Two-point field goals made[b]	6.09 ± 2.12	8.00 ± 2.10	−0.90	0.25
Three-point field goals missed	3.73 ± 1.95	4.00 ± 1.45	−0.16	0.05
Three-point field goals made	2.18 ± 1.78	2.52 ± 1.33	−0.22	0.06
Free-throws missed[b]	1.27 ± 1.49	2.62 ± 1.56	−0.88	0.24
Free-throws made	4.00 ± 2.45	4.90 ± 2.39	−0.37	0.10
Recovered balls[a, b]	2.64 ± 1.43	5.24 ± 2.47	−1.28	0.33
Assists	4.91 ± 2.12	4.52 ± 1.97	0.19	−0.05
Offensive rebounds	2.73 ± 2.00	3.14 ± 2.08	−0.20	0.06
Defensive rebounds	7.36 ± 1.91	7.48 ± 2.20	−0.06	0.01
Fouls committed	4.82 ± 2.48	6.24 ± 2.02	−0.62	0.18
Opponents				
Two-point field goals missed	5.82 ± 1.72	4.71 ± 1.82	0.62	—
Two-point field goals made	5.36 ± 1.96	4.95 ± 2.20	0.20	—
Three-point field goals missed	3.73 ± 1.10	4.86 ± 2.26	−0.63	—
Three-point field goals made	1.64 ± 1.21	1.95 ± 1.28	−0.25	—
Free-throws missed	0.91 ± 1.22	1.29 ± 1.19	−0.31	—
Free-throws made	3.73 ± 3.13	3.90 ± 2.45	−0.06	—
Recovered balls	2.27 ± 1.49	3.10 ± 1.48	−0.56	—
Assists	2.45 ± 1.04	2.67 ± 1.74	−0.15	—
Offensive rebounds	4.09 ± 1.45	3.00 ± 1.79	0.66	—
Defensive rebounds	5.64 ± 1.50	5.57 ± 1.47	0.05	—
Fouls committed[b]	4.73 ± 1.68	6.81 ± 2.96	−0.86	—

[a]Discriminant structure coefficient above |0.30|.
[b]Univariate differences between slow- and fast-paced game quarters ($P < 0.05$).

Table II. The influence of the four performance factors on the USA team's game quarter outcome (results from the three regression models with standard errors in parentheses).

Variables	Whole game	First-half game quarters	Second-half game quarters
Intercept	2.2 (0.9)	1.2 (1.0)	3.7[a] (1.5)
Effective field-goal percentage	22.2[b] (3.7)	26.1[b] (4.3)	16.3[a] (6.5)
Offensive rebounding percentage	12.6[b] (3.0)	16.0[b] (3.3)	10.1 (5.4)
Recovered balls per possession	16.9[b] (5.1)	18.5[b] (6.3)	14.4 (9.5)
Free-throw rate	6.3[b] (3.6)	12.4[b] (5.0)	3.0 (5.3)
Number of observations	31	15	16
R^2	0.71	0.87	0.43

[a]$P < 0.05$, [b]$P < 0.01$.

Finally, game-quarter outcome in the second-half game quarters (Model 3, Table II) was explained only by superiority in field-goal percentages. The coefficient of determination was 0.43.

From the first-half game quarters to the second-half game quarters, the accumulated-score differences differed at the beginning of each quarter (7.3 ± 8.8 vs. 25.5 ± 10.3, $P < 0.001$) but not in game-quarter final outcome (8.5 ± 5.7 vs. 7.4 ± 5.1, $P = 0.09$).

Discussion

The aim of this study was to identify game-related statistics that discriminated between faster- and slower-paced games played by the USA team and their opponents. Also, we wished to identify how the advantages in the four performance factors were related to the USA team's game-quarter outcome. Our findings indicate that an increase in game pace resulted in more recovered balls and a higher number of successful two-point field goals, while not hindering performance substantially in any of the other game-related statistics. In contrast, when the opposition increased the pace of the game, only the number of fouls they committed increased. Our results also show that while this high rate of defensive pressure was important for asserting dominance in the first half of the game and the overall result of the game, its contribution was diminished in the second half.

Stage 1 analysis indicated the importance of recovered balls (our indirect measure of defensive pressure) to increase game pace and win. High-pressure defence is important because it leads to more turnovers from the opposition and thus more scoring opportunities for a team capable of maintaining a fast-paced game. In fact, this style of play requires complementary participation between team players, such as guards' ability to steal the ball and centres' ability to block field goals (Dezman, Trninic, & Dizdar, 2001; Sampaio, Janeira, Ibáñez, & Lorenzo, 2006). This is also the result of effective team defensive communication, which leads to increased defensive pressure in all passing plays and, ultimately, to bad passes, passes that are easier to steal or inadequate use of dribbling (Gomez, Tsamourtzis, & Lorenzo, 2006; Otto, 1998). Since we do not have any measure of fitness of the players studied, our suggested importance of fitness to assertive defence is speculative, but there is no doubt that high-pressure defence strategies such as the full-court press and challenging the opposition when they pass or shoot require much greater expenditure of energy. High fitness would allow players to maintain high-pressure defence for a greater proportion of the game. Sport-specific fatigue impairs technical components of a sport (Gabbett, 2008; Royal et al., 2006), so for teams whose members are less fit, switching to more assertive defensive techniques could simply result in them committing more fouls.

Stage 2 analysis assessed the contribution of four performance factors to the point differential. Results of the Stage 2 (model 1) analysis indicate that recovered balls are second in importance in their contribution to overall point differential of the game only to field-goal percentage. While the importance of field-goal percentage to winning is intuitive and consensual (Gomez, Lorenzo, Sampaio, Ibanez, & Ortega, 2008; Sampaio & Janeira, 2003), the relationship between field goals and recovered balls highlights the importance of scoring points when a turnover affects the overall outcome of the game. That measures of assertive play on both offensive (offensive rebounding) and defensive (recovered balls) play are factors in the first half but not in the second (Model 2) indicate that the USA's assertive play diminished in the second half. We cannot say whether this is the result of fatigue from the high expenditure of energy in the first half, or that once the team has asserted dominance in the first half (led by 25.5 ± 10.3 points) there is a strategic decision made to play more conservatively to the end of the game (led by 27.9 ± 11.8 points). However, because the games' schedule is concentrated, the importance of adequate recovery is enhanced. Therefore, it is more likely that winning by large margins results in much less intense play overall.

In conclusion, our results indicate the value of assertive play on both offence and defence to the overall outcome of a basketball game. Recovery of balls from the opposition, our indicator of defensive pressure, played an esoecially important role, and it was this attribute at which the USA excelled when they increased the pace of the game. The intuitive high energy expenditure of high-pressure offence and particularly defence means that teams hoping to execute this strategy effectively will need high fitness.

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