What performance-related variables best differentiate between eliminated and qualified teams for the knockout phase of UEFA Champions League?

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Headline

The UEFA Champions League is the most prestigious football club competition worldwide (1). Reaching the knockout phase is paramount for participant clubs to warrant more revenues and international reputation. Although performance profiles vary among teams (2, 3), match events as total attempts, shots on target and passing accuracy have been previously associated with success in this tournament (1, 3, 4). However, since other performance-related variables (e.g., ball possession or yellow cards) displayed contradictory results (3, 4), further research is required to clarify the contemporary trends of successful teams' performance in elite football (5, 6).

Aim. This study aimed to identify the team performance variables of total attempts, shots on target, goalkeeper's (Gk) saves, ball possession, completed passes, passing accuracy, distance covered, balls recovered, fouls committed, yellow and red cards that best differentiate between eliminated and qualified teams for the knockout phase of 2017/2018 Champions League.

Methods

Sample. The sample consisted of all matches (n = 98) contested in the 32-team group stage of UEFA Champions League (season 2017/2018). At this stage clubs are divided into eight groups of four teams, playing a total of six matches against their pool opponents (1). Performance-related statistics of each match report were derived from the official website of UEFA (www.uefa.com) considering both teams. The study conformed to the recommendations of the Declaration of Helsinki.

Design. A retrospective observational study was conducted with a comparative data analysis. Matches were contested between September and December of 2017, whereas data collection and analysis were undertaken between February and March of 2018.

Methodology. For the independent variable 'group stage outcome', two groups of teams were created based on the final classifications of group stage (0: eliminated teams; 1: qualified teams). The two top teams of each group qualified for the knockout phase (n = 16). The third and fourth-place finishers were eliminated from the UEFA Champions League (n = 16). In line with previous research (1, 3), 11 performance-related statistics were selected for analysis: (1) variables related to goal-scoring: total attempts and shots on target; (2) variables related to passing and organising: ball possession (%), completed passes and passing accuracy (%); (3) variables related to defending: Gk saves, balls recovered, fouls committed, yellow and red cards; (4) variable related to physical performance: distance covered. The dataset was prepared on a Microsoft® Excel sheet containing the calculated means of selected performance-related variables for each team.

Statistical Analysis

Non-clinical magnitude-based inferences were employed using a spreadsheet arranged by Hopkins (7). Effects of group stage outcome (eliminated vs. qualified) on performance-related variables were evaluated by using the smallest worthwhile change (SWC) - that is - 0.2 multiplied by the pooled between-group standard deviations (SD), in accordance with the Cohen's d principle. To reduce bias arising from non-uniformity error, log-transformed values were used to calculate effect sizes (ES) based on standardised mean differences with 90% confidence intervals (CI) (8). Magnitudes of clear effects were described according to the following scale: 25-75%, possible; 75-95%, likely; 95-99.5%, very likely; >99.5%, almost certain (9). If the probabilities of the effect being substantially positive (or beneficial) and negative (or harmful) were both >5%, the effect was deemed unclear (8). Standardised differences were classified as trivial (<0.2), small (0.2-0.6), moderate (0.6-1.2) and large (>1.2) (9).

Results

Despite the effects presented in table 1, when it comes to differences between-group means analysed in standardised units (with 90% CI) considering the SWC (Figure 1), the team performance variables that best differentiated between eliminated and qualified teams for the knockout phase were shots on target, total attempts, ball possession (almost certainly beneficial) and completed passes (very likely beneficial). Whilst passing accuracy was likely beneficial, likely harmful effects were found for Gk saves, fouls committed, yellow and red cards. The other differences were unclear.

Discussion

The comparative analysis of team performance profiles associated with success may reveal which variables are more determinant in contemporary elite football (3, 6, 10). Particularly in the group stage of 2017/2018 UEFA Champions League, the team performance variables that best differentiated between eliminated and qualified teams for the knockout phase were shots on target, total attempts, ball possession and completed passes. These results support previous findings highlighting the goal-scoring variables shots on target and total attempts (shots) as major predictors of success in UEFA Champions League (1, 3, 4) and in the last three editions of FIFA World Cup (10, 11). Also in line with a couple of studies
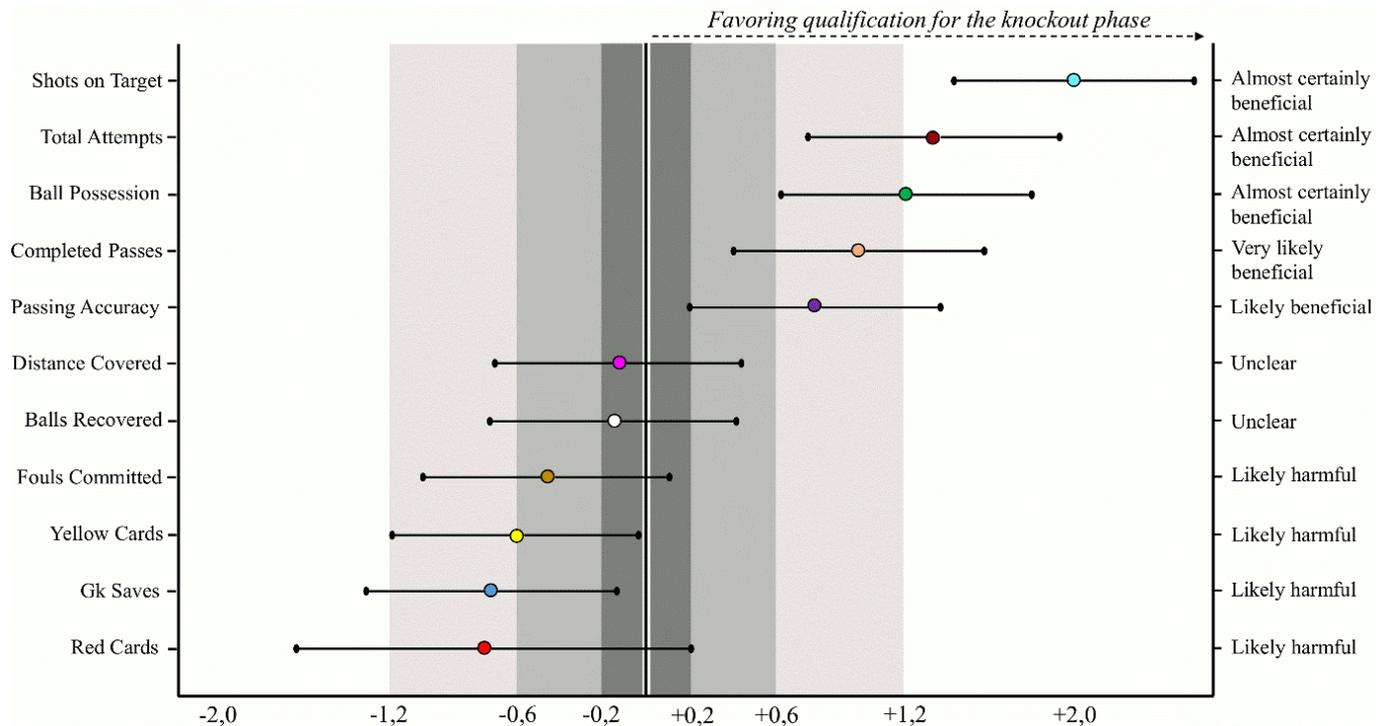
Fig. 1. Standardised mean differences with 90% confidence intervals (CI) for each performance-related variable based on group stage outcomes in the 2017/2018 UEFA Champions League. Dark grey area represents the smallest worthwhile change (SWC) [-0.2, 0.2].

Table 1. Team performance-related variables presented as means with standard deviations (SD), including Effect Sizes (ES) and magnitude-based inferences.

Team performance variables	Eliminated (mean ± SD)	Qualified (mean ± SD)	ES	Magnitude-based inferences
Total attempts (n)	11.0 ± 2.96	14.9 ± 2.76	1.32	*63% possible large increase*
Shots on target (n)	3.5 ± 1.11	6.1 ± 1.25	2.07	*99% very likely large increase*
Goalkeeper saves (n)	3.7 ± 1.12	3.0 ± 0.77	-0.74	*66% possible moderate decrease*
Ball possession (%)	46.4 ± 5.78	53.7 ± 5.67	1.23	*54% possible large increase*
Completed passes (n)	389.0 ± 85.6	498.1 ± 118.2	0.99	*87% likely moderate increase*
Passing accuracy (%)	82.4 ± 3.62	85.5 ± 4.21	0.78	*69% possible moderate increase*
Distance covered (km)	110.2 ± 3.20	109.8 ± 3.41	-0.12	*41% possible small decrease*
Balls recovered (n)	48.8 ± 4.85	48.0 ± 3.23	-0.16	*45% possible small decrease*
Fouls committed (n)	12.3 ± 2.23	11.2 ± 2.08	-0.47	*78% possible small decrease*
Yellow cards (n)	2.0 ± 0.62	1.6 ± 0.47	-0.63	*53% possible moderate decrease*
Red cards (n)	0.1 ± 0.15	0.06 ± 0.08	-0.70	*58% possible moderate decrease*

on UEFA Champions League (1, 3), ball possession and completed passes clearly differentiated unsuccessful and successful teams; however, Collet (4) suggested that, when confounding factors as team quality are controlled, ball efficiency (i.e., shots on target, completed passes and passing accuracy) tends to be more closely related to competitive success than ball retention (i.e., time in possession).

For the variables related to defending, Gk saves, fouls committed, yellow and red cards had a negative relationship with success in the group stage. Basically, if teams do not have the competence to master the ball efficiently, they not only tend to concede more goal-scoring opportunities to opponents (3, 4, 10, 11), but also struggle to regain possession, committing more fouls and being booked more often. This trend was already observed through fouls committed (3), yellow and red cards (1) in earlier editions of UEFA Champions League. A recent study of Lago-Peñas et al. (12) showed a decreased

competitive performance post-player dismissal for the punished teams, while advantaged teams exhibited increased performances, for instance, in ball possession, completed passes, passing accuracy and total shots. Therefore, regardless of the match context, the ability to manage emotions and behaviours is a key aspect to achieve success in elite football. The effect of balls recovered was unclear as the total distance covered by teams. Apparently, this report confirms the claim that match running performance is a poor predictor of success in elite football (8).

By using data from multiple matches, the present investigation examined a combination of different performance-related variables based on group stage outcomes. Collecting a large volume of real-world data and compressing it into a smaller set of variables with qualitative descriptors provide to coaches quick profiles of (un)successful performances and objective

information to optimise the design of training practices and game plan preparation.

Practical Applications

- Since shots on target and total attempts seem to be major predictors of success in football, coaches are strongly encouraged to design playing-form practice activities (e.g., small-sided and/or conditioned games) incorporating full-size goals and goalkeepers.
- Although findings suggest the adoption of ball-possession strategies, the purpose to achieve the attacking third of the pitch and create goal-scoring opportunities is key to succeed in elite football.
- Elite practitioners should develop emotional and behavioural skills to avoid unnecessary fouls, yellow and red cards because these variables are related to competitive failure.

Limitations

- No operational definitions of performance-related statistics could be accessed on the official website of UEFA to provide more comprehensive explanations of terms under investigation.
- The practical inferences drawn from this study require a more integrated research approach that take different competitive scenarios (i.e., situational variables) into account.
- The extent to which the present findings may be generalised to other phases of UEFA Champions League, national teams' tournaments or domestic leagues need to be confirmed.

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