

Introduction

The interactions between players during a football match can be recorded as a matrix of passes and visualised as a network diagram.

The diagram provides semi-quantitative insight into the operation of the team as a whole, the functioning of units of the team (defence, midfield, attack) and the importance of individual players to team effort.

In addition, in-depth quantitative analysis of patterns of team passing using network mathematics techniques has given insight into team dynamics (Clemente, Martins & Mendes, 2016) and some network parameters have been shown to be correlated with team performance in football (Clemente, Martins, Kalamaras, Wong & Mendes, 2015; Grund, 2012; Peña & Touchette, 2012).

In the present study, passing networks were analysed using both informal and formal mathematical methods in an attempt to relate network parameters to the performance of an elite level team.

Methods

Six national and international matches of Manchester United Football Club during the 2015-2016 season were annotated using Dartfish 10 software.

The matches covered a range of team success in terms of match outcome.

Account was taken of completed passes by players of the focus team, the pitch location of those passes, the context of passing in relation to opposition play and an enhanced set of match statistics.

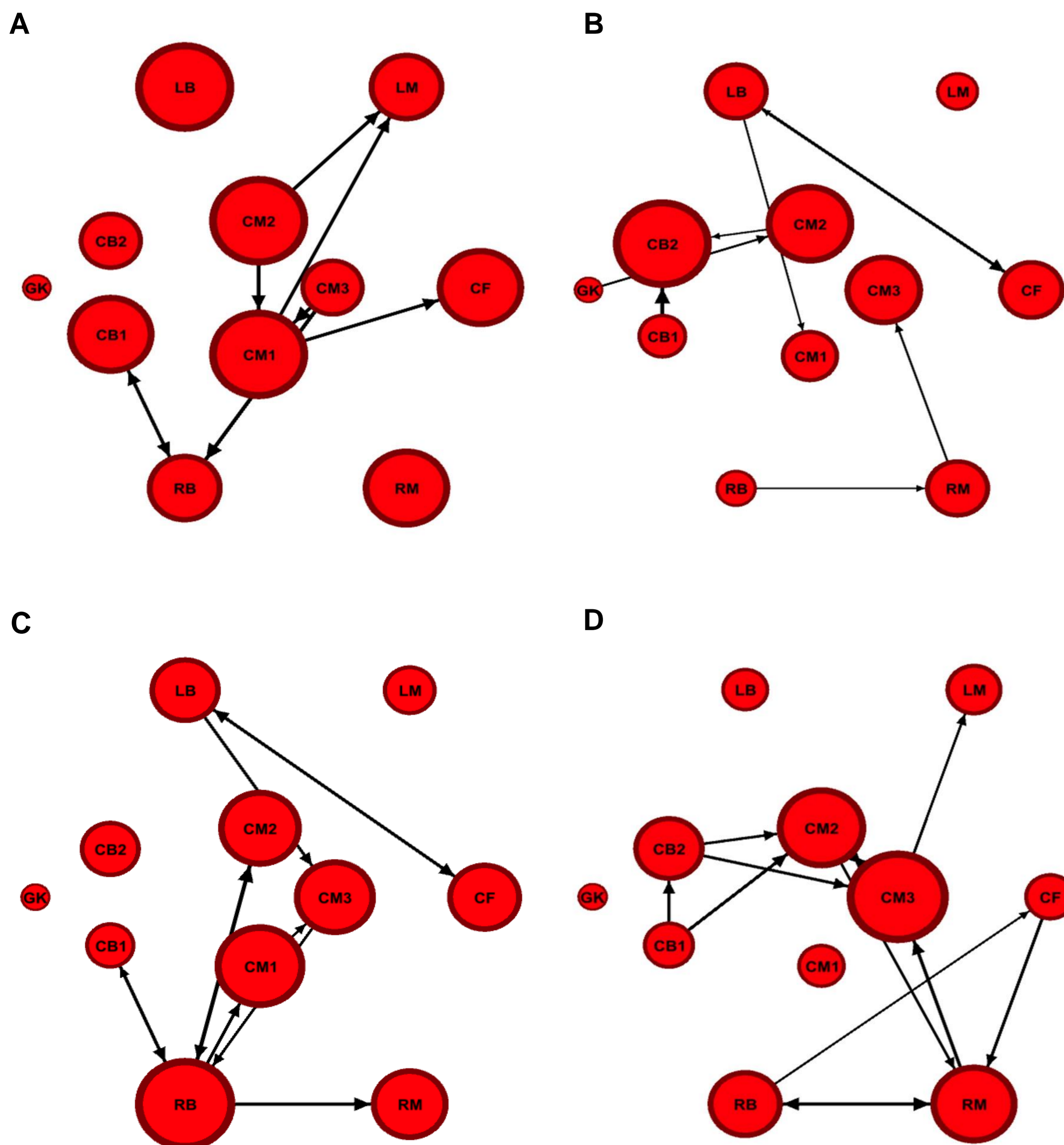


Figure 1. Dominant players and group interactions according to the total number of passes. A) Manchester United 0 – 3 Arsenal; B) Man U. 2 – 3 Wolfsburg; C) Man U 2 – 1 Crystal Palace 1; D) Man U 5 – 1 Middlesbrough.

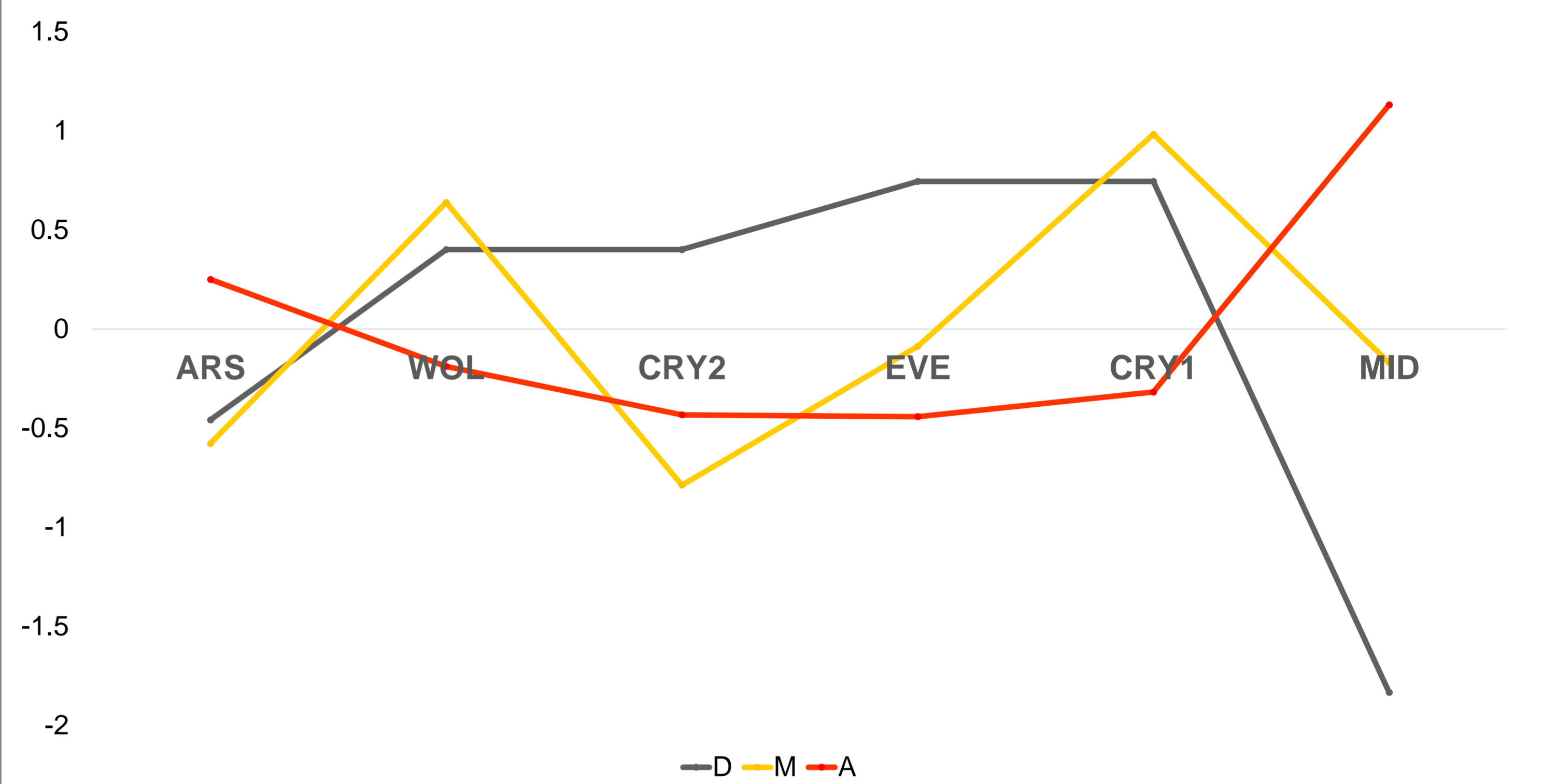


Figure 2. Identification of dominant units (Defenders, Midfielders and Forwards), across the six matches, according to their Z-scores for passing.

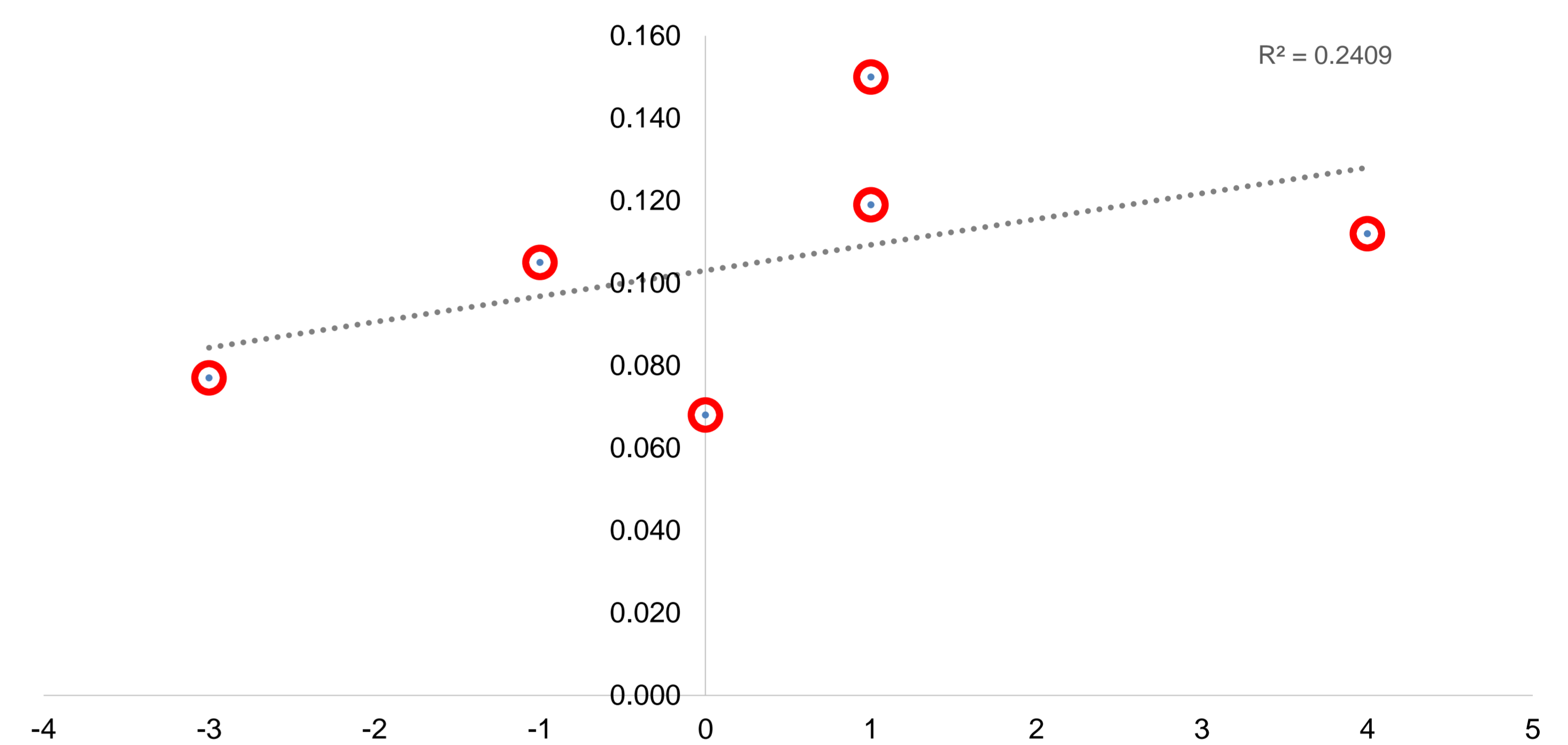


Figure 3. Modularity measurements for the six matches according to Manchester United Performance. A) Arsenal (Goal Difference = -3); B) Wolfsburg (GD = -1); C) Crystal Palace 2 (GD = 0); D) Everton (GD = 1); E) Crystal Palace 1; (GD = 1); F) Middlesbrough (GD = 4).

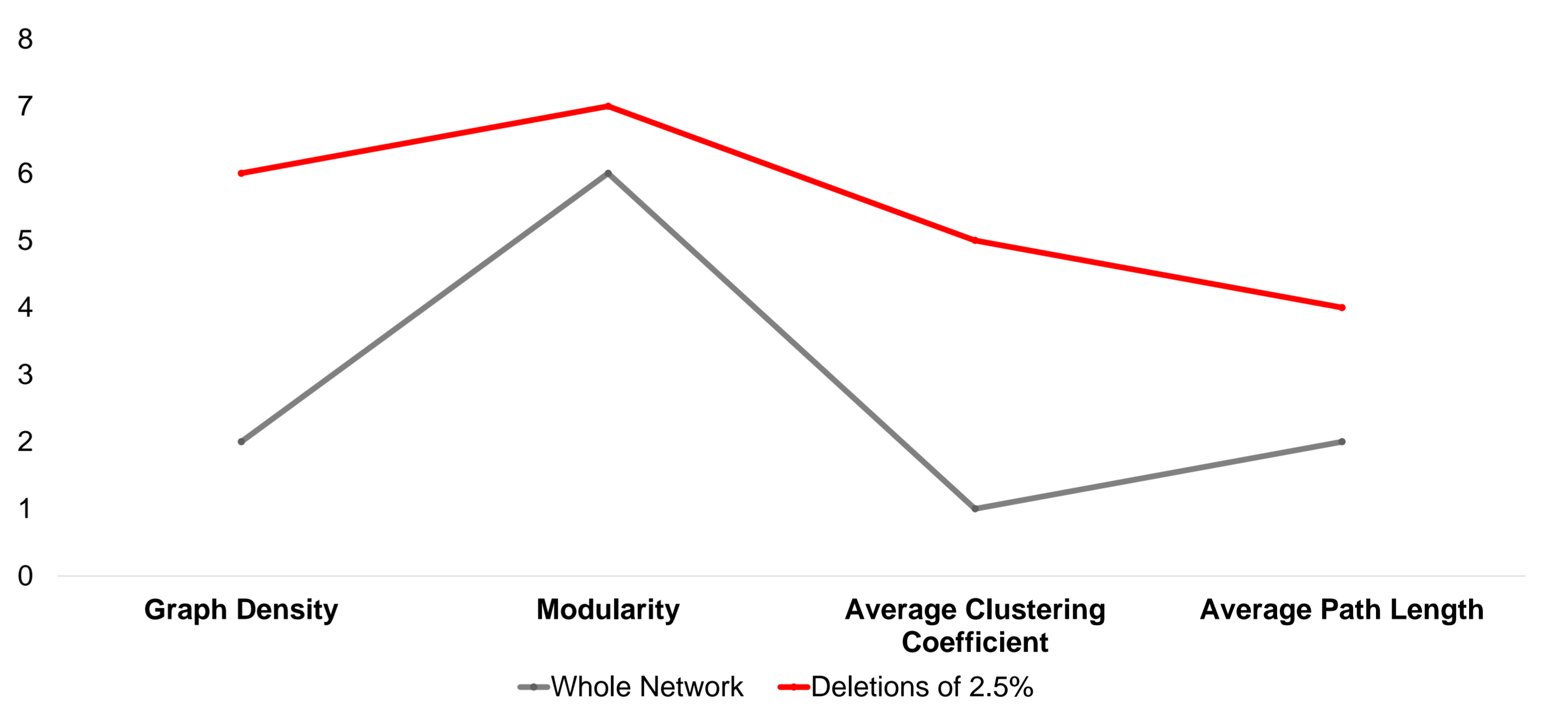


Figure 4. Results for network parameters for a whole match network and the percentage of changes after six separate deletions of 2.5% of connections, between the least connected players.

Results

This data is related to informal and standard network measures to match outcomes, unit performances and the influence of individual players, as supported in part by non-parametric statistics. The sensitivity of network parameters to errors in the recording of passes is reported.

Conclusion

This study highlights the potential and potential constraints of using network parameters in the analysis of performance of a football team.

References

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