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Modelling relationships between match events and match outcome in elite football

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Table I. Selected match events and variables

Groups	Events and variables: operational definitions
Variables related to goal scoring	<p>shot: an attempt to score a goal, made with any (legal) part of the body, either on or off target</p> <p>shot on target: an attempt to goal which required intervention to stop it going in or resulted in a goal/shot which would go in without being diverted</p> <p>shot blocked: a goal attempt heading roughly on target toward goal which is blocked by a defender, where there are other defenders or a goalkeeper behind the blocker</p>
Variables related to passing and organising	<p>ball possession (%): the duration when a team takes over the ball from the opposing team without any clear interruption as a proportion of total duration when the ball was in play</p> <p>pass: an intentional played ball from one player to another</p> <p>pass accuracy (%): successful passes as a proportion of total passes</p> <p>CROSS: any ball sent into the opposition team's area from a wide position</p> <p>corner: ball goes out of play for a corner kick</p> <p>offside: being caught in an offside position resulting in a free kick to the opposing team</p> <p>aerial advantage (%): aerial duels won by a team as a proportion of total duels of the match</p> <p>lost ball: a player from the attacking team lost the possession of ball due to a mistake/poor control, including turnovers, dispossesses and unsuccessful passes</p>
Variables related to defending	<p>ball recovery: the event given at the start of a team's recovery of ball possession from open play. In order to give a ball recovery the defending team must have full control of the ball and must start a new passage of play.</p> <p>tackle: the action of gaining possession from an opposition player who is in possession of the ball</p> <p>foul: any infringement that is penalised as foul play by a referee</p> <p>yellow card: where a player was shown a yellow card by the referee for reasons of foul, persistent infringement, hand ball, dangerous play, time wasting, etc.</p> <p>red card: where a player was sanctioned a red card by the referee, including straight red card and a red card from the second yellow card</p>
Contextual variable	<p>match location: playing at home or away</p>

Table II. Means and *s* of match events per match and the estimated within- and between-team SD from the reliability analysis (n = 640 observations, 320 close matches)

Indicator	Mean \pm <i>s</i>	Within-team SD	Between-team SD
shot	13.1 \pm 4.8	4.6	1.4
shot on target	4.6 \pm 2.4	2.4	0.4
shot blocked	2.8 \pm 2.0	1.9	0.4
ball possession (%)	50.0 \pm 11.2	9.6	6.3
pass	402 \pm 58	48	35
pass accuracy (%)	75.2 \pm 7.7	6.3	4.7
cross	21.5 \pm 7.6	6.9	3.5
corner	5.7 \pm 2.8	2.8	0.5
offside	2.7 \pm 2.1	2.1	0.4
aerial advantage (%)	50.0 \pm 6.7	6.2	2.7
lost ball	179 \pm 45	37	27
ball recovery	63.0 \pm 17.6	15.6	8.6
tackle	23.2 \pm 9.4	8.8	3.4
foul	15.5 \pm 6.7	6.0	3.1
yellow card	3.0 \pm 1.9	1.8	0.6
red card	0.20 \pm 0.49	0.48	0.07

Table III. Means and s of match events in subgroups defined by nine combinations of team and opposition end-of-season rank (high, medium, low)

Event	High-level teams ($n = 6$)			Medium-level teams ($n = 7$)			Low-level teams ($n = 7$)		
	vs high $N = 44$	vs medium $N = 65$	vs low $N = 69$	vs high $N = 65$	vs medium $N = 74$	vs low $N = 87$	vs high $N = 69$	vs medium $N = 87$	vs low $N = 80$
shot	12.6 ± 6.2	13.8 ± 4.5	12.6 ± 4.6	12.5 ± 4.5	13.8 ± 4.7	12.7 ± 4.2	14.1 ± 5.7	13.7 ± 5.1	12.3 ± 4.1
shot on target	4.2 ± 2.6	5.2 ± 2.4	4.7 ± 2.6	4.2 ± 2.3	4.9 ± 2.4	4.1 ± 2.3	5.0 ± 2.8	4.6 ± 2.3	4.2 ± 2.1
shot blocked	2.6 ± 1.9	3.2 ± 1.8	2.7 ± 1.7	2.2 ± 1.7	3.0 ± 2.3	2.5 ± 1.9	3.5 ± 2.5	2.9 ± 1.8	2.6 ± 1.8
ball possession (%)	50.0 ± 11.6	54.4 ± 11.2	57.7 ± 10.1	45.6 ± 11.2	50.0 ± 10.7	51.4 ± 11.0	42.3 ± 10.1	48.6 ± 11.0	50.0 ± 7.7
pass	447 ± 70	405 ± 55	429 ± 70	404 ± 50	378 ± 32	390 ± 46	421 ± 65	388 ± 48	386 ± 53
pass accuracy (%)	79.4 ± 6.4	78.8 ± 6.6	80.4 ± 7.6	73.9 ± 6.9	73.3 ± 6.5	73.9 ± 8.5	73.2 ± 7.3	73.3 ± 7.5	73.8 ± 7.1
cross	20.4 ± 9.9	21.1 ± 7.7	20.7 ± 8.1	20.7 ± 5.9	19.1 ± 6.6	21.0 ± 6.7	23.3 ± 8.0	23.3 ± 7.9	22.9 ± 7.6
corner	5.4 ± 2.7	6.0 ± 2.6	5.7 ± 2.8	5.5 ± 2.7	5.7 ± 2.8	5.4 ± 2.6	6.2 ± 3.0	5.5 ± 3.0	5.6 ± 3.0
offside	2.3 ± 2.2	2.6 ± 2.1	3.3 ± 2.3	2.6 ± 2.6	2.2 ± 1.9	2.9 ± 1.9	2.3 ± 2.4	2.4 ± 1.6	3.2 ± 2.1
aerial advantage (%)	50.0 ± 6.9	53.8 ± 5.3	52.6 ± 7.8	46.2 ± 5.3	50.0 ± 5.1	48.3 ± 6.2	47.4 ± 7.8	51.7 ± 6.2	50.0 ± 6.2
lost ball	165 ± 42	160 ± 36	150 ± 40	192 ± 47	179 ± 40	180 ± 47	204 ± 49	189 ± 45	182 ± 36
ball recovery	61 ± 15	58 ± 14	55 ± 13	73 ± 24	64 ± 17	61 ± 18	72 ± 21	64 ± 15	60 ± 17
tackle	22.3 ± 8.5	21.7 ± 8.0	19.0 ± 6.3	28.3 ± 13.9	23.5 ± 8.3	22.4 ± 8.6	27.8 ± 10.9	23.8 ± 8.7	20.4 ± 5.8
foul	16.6 ± 7.1	13.2 ± 6.0	11.0 ± 4.9	17.9 ± 6.0	17.1 ± 7.0	14.9 ± 6.0	18.6 ± 7.3	16.5 ± 7.3	14.2 ± 5.2
yellow card	3.1 ± 1.7	2.5 ± 1.7	2.1 ± 1.4	3.8 ± 2.1	3.4 ± 1.7	3.2 ± 2.1	3.5 ± 2.1	2.8 ± 1.9	2.8 ± 1.6
red card	0.10 ± 0.29	0.10 ± 0.32	0.16 ± 0.39	0.29 ± 0.58	0.26 ± 0.50	0.24 ± 0.54	0.23 ± 0.58	0.23 ± 0.56	0.17 ± 0.41

Note: n denotes the number of teams, N denotes the number of matches