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ARTICLE

Integrating communication and passing networks in football using social network analysis

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ABSTRACT

Background: Effective intra-team communication (ITC) is an important component for optimal team performance. **Methods:** In this study, an intra-team communication tool (ITCT) was used for players to report the amount of communication (ACOM) received, and the amount of perceived benefit to performance of that communication (BCOM). The ITCT was used to understand how a professional football team is connected, by ITC and passing, and the relationship between ITC and passing, using social network analysis (SNA). **Results:** The results indicated that the team was highly connected and cohesive for ITC, but less so for passing. In matches won compared to lost, passing connections were lower and ITC connections were higher. There were negative correlations between ITC and passing for the mean sociometric status values. For the SNA metrics, network edges were higher in matches won compared to drawn for BCOM. Cohesion was lower in drawn compared to won matches for BCOM, and lower compared to matches won and lost for passing. SMS was higher in matches won compared to lost for ACOM and BCOM, but was higher in matches lost compared to won for passing. **Conclusions:** The results could indicate that in matches when possession was increased, and ITC decreased, the team may coordinate implicitly, by relying on pre-existing knowledge of practiced playing structures. Whereas, in matches with low possession, increased levels of ITC may be required, due to the uncertainty associated with defending. However, further research is needed to confirm the current explanations of the results. This study has implications for the design of training practice.

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KEYWORDS
Intra-team communication; passing; social network analysis; football

Introduction

One of the primary characteristics of successful sporting teams is the coordination of team members to achieve optimal performance (Eccles and Tenenbaum 2004; Cannon-Bowers and Bowers 2006; Eccles and Tran 2012; Silva et al. 2013; McEwan and Beauchamp 2014). Team coordination is complex and multi-faceted (Salas et al. 2005), yet it is acknowledged that a fundamental component of effective team coordination is effective verbal and nonverbal intra-team communication (ITC) (Jones 2002; Lausic et al. 2009, 2015; Silva et al. 2013). Sport science researchers have investigated the effect of communication on team cooperation and cohesion from a social construct perspective (Sullivan and Feltz 2003; Eccles and Tenenbaum 2004; Carron et al. 2005; Onağ and Tepeci 2014), and from theoretical based frameworks from an ecological dynamics perspective (Silva et al. 2013). This research has demonstrated that improving the social constructs within a team may positively influence performance (Eccles and Tenenbaum 2004), and that team coordination may be guided by shared affordances between team members (Silva et al. 2013).

However, minimal research exists on how ITC during actual competitive matches is related to performance (Lausic et al. 2009; McLean et al. 2017b). The research investigating ITC during competitive sporting matches has used video and audio recordings, and post-match self-confronting interviews to determine the ITC and its effect on task performance (Lausic et al. 2009, 2015; LeCouteur and Feo 2011). For example, in doubles tennis, winning teams exchanged twice as many verbal messages, consisting of more task related, and homogenous statements, compared to losing teams (Lausic et al. 2009). Furthermore, players on winning doubles tennis teams were more sensitive and adept at interpreting nonverbal cues, compared to players on losing teams (Lausic et al. 2015). These studies demonstrate the important role of effective verbal and nonverbal ITC in successful performance. However, in these studies, the ITC was recorded during the stoppages in play, between the points, and the ITC was restricted to dyadic interactions. Within many team sports the opportunity to communicate during the stoppages in play is minimal (Cannon-Bowers and Bowers 2006), and the majority of team sports contain more than two players, subsequently increasing the complexity of measuring and interpreting ITC (Steiner 1972). One study analysed video and audio recordings of the ITC amongst multiple team members (four netball defenders) during gameplay (LeCouteur and Feo 2011). The results indicated that the defenders had a higher frequency of ITC in unsuccessful defensive plays (i.e., when the opposition achieved a shot at goal).

Invasion sports, such as football represent a complex system (McLean et al. 2017b), with teams containing multiple possible

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channels of ITC between multiple players, over a large playing area. Despite the apparent importance of ITC as a component of performance in football (McLean et al. 2017b), research on ITC directly related to performance in competitive professional football matches is lacking. In football, team members are continuously coordinating their actions to execute a common outcome (Cannon-Bowers and Bowers 2006). One method of assessing team coordination in football has been to investigate the passing connectivity of players, using social network analysis (SNA) (Grund 2012; Clemente et al. 2015a; Ribeiro et al. 2017; McLean et al. 2017a). Although SNA is relatively new to sport science, it has allowed for an understanding of the relational perspectives and interdependencies of players within a team (Wäsche et al. 2017), and goes beyond the reductionist notational methods of passing frequencies and success rates (Mclean et al. 2018; McLean et al. 2017a). SNA views the players as a network of nodes that are linked by passing connections (Grund 2012; Clemente et al. 2015a, 2015b; Mclean et al. 2018; Ribeiro et al. 2017; McLean et al. 2017a). SNA of passing, provides metrics of team connectivity, cohesiveness, and allows identification of the most connected players within the team (Clemente et al. 2015a; McLean et al. 2017a). SNA has furthered the understanding of how teams are connected and how they coordinate their actions (Passos et al. 2011; Clemente et al. 2015a, 2015b; Mclean et al. 2018; McLean et al. 2017a). A limitation of the utility of SNA for passing is that it only provides team and individual metrics whilst in possession, however, teams are also connected via verbal or nonverbal communication when not in possession.

Although sport research has not yet applied SNA to ITC, SNA has been used in other research domains to analyse communication between entities within different systems (Houghton et al. 2006; Salmon et al. 2014). Two examples include, communication interactions between drivers and vulnerable road users, to determine accident causation (Salmon et al. 2014), and in the emergency services, to determine coordination between response teams (Houghton et al. 2006). Analysing the ITC of a football team using SNA is possible and will provide information on the methods in which teams are connected via ITC during a match, and allow for the integration of ITC with passing data to determine the relationship between ITC and passing, from a whole of network perspective.

Therefore, the aims of this study were to (1) use a novel tool to obtain subjective measures of ITC of a professional football team, across a competitive season (2) determine, using SNA, the whole of network connectivity of the football team for ITC and passing, and as a function of match outcome, and (3) determine the relationship between ITC and passing.

Methods

Design

The current study was designed to investigate ITC, and the relationship between ITC and passing, of a professional football team across 22 matches of the 2016/2017 competitive A League season. Institutional ethical approval was granted for the research project. For the ITC data, each player completed a subjective intra-team communication tool (ITCT) (Appendix 1) for each match. Match passing data (including percentage possession) were provided by Optasports, which is a reliable system for the analysis of match actions (Liu et al. 2013). SNA metrics (see SNA section for detailed description) were calculated and used to determine the ITC, and the relationships and interactions between passing and communication. The team formation used in all the matches was consistent, see Appendix 1 for playing formation and position abbreviations.

Participants

Twenty-five professional football players, competing in the Australian A league (the top professional football league in Australia) were used in the current study, however, there was a core group of players that competed in most matches (Table 1).

Data from substitutes were collected for all variables. For positions in which substitutes were used, the ITC data were the mean of the two players, and the passing data were the sum of passes of the two players which played in the specific position. Substitute data were not included if the substitution was made after 80 min of play, as it was not considered to represent a meaningful contribution to the ITC for the entire match. The mean times for substitutions were 63 ± 6.6 min (n = 21) for substitute one, 71 ± 7.5 min (n = 17) for substitute two, and 74 ± 2.1 min (n = 5) for substitute three.

Social Network Analysis (SNA)

SNA combines mathematical theory and methods, focussing on the connections between entities within a given network (Wäsche et al. 2017). SNA provides various metrics to determine the char-

Table 1. Matches played and percent of matches played in by all players used in the study.

Player	Matches played in	Percent matches played in
1	21	95
2	20	91
3	20	91
4	20	91
5	19	86
6	19	86
7	18	82
8	18	82
9	18	82
10	17	77
11	14	64
12	12	55
13	11	50
14	9	41
15	7	32
16	5	23
17	4	18
18	2	9
19	2	9
20	2	9
21	2	9
22	1	5
23	1	5
24	1	5
25	1	5

Total matches played (n = 22). Total players included in data collection (n = 25).

acteristics of networks, and the different types of networks will require different types of analysis metrics (Wäsche et al. 2017). In the current study, the SNA metrics used described the basic network properties, the overall connectivity, the reciprocity of connections, and the influential entities. To perform SNA, adjacency matrices are produced to represent the connections between a player and an adjacent player (Table 2). In this analysis three social network adjacency matrices (ACOM, BCOM, and passing) were produced for each match (example in Table 2). The networks were directional (i.e., player A to player B), and indicate the strength of the connections between playing positions (i.e., where connections between the players is the total number of passes/communications connecting player A and player B). The network adjacency matrices were analysed using the Agna SNA tool (McLean et al. 2017a). The SNA outputs are used to describe the network characteristics using accepted metrics previously applied in football research (Lusher et al. 2010; Clemente et al. 2015a; Mclean et al. 2018; McLean et al. 2017a). A specific and detailed description of the SNA metrics used is provided in the relevant sections below.

Network edges

A network edge is a connection between two nodes (e.g., a pass between players, or communication between players). In the current context, the total number of network edges for passing, and communication represents the number of players that are connected by passes, or communication separately (Clemente et al. 2015a). For a team with 11 players, the maximum number of edges is 110, which would indicate every player was connected at least once.

Network density

Density provides a relative measure of the connectivity of the team members for the ITC, and passing networks (as opposed to network edges, which represents an absolute number of network connections), whereas network density provides a proportional metric of all potential connections. Density is expressed as a value between 0 and 1, with 0 representing a network with no connections between team members, and 1 representing a network in which every team member is connected to every other team member within the network (Clemente et al. 2015a; Mclean et al. 2018; McLean et al. 2017a). For example, a network density value of 1 for passing is achieved when all players in the team made a successful pass to one another at least once.

Network cohesion

Cohesion is defined as the number of reciprocal connections in the network divided by the maximum number of possible connections. In this context, cohesion gives an indication of which players coordinated their passes, or communication with each other. Using passing as an example, a reciprocal pass occurs when player A passes to player B who then passes back to player A (Mclean et al. 2018; McLean et al. 2017a).

Sociometric status

Sociometric status (SMS) is a common SNA metric used to identify the most connected entities within the network being analysed (Houghton et al. 2006; Salmon et al. 2014). Typically, SMS is used in SNA studies to identify the key nodes by determining how active each player is in the network, via the connections relative to the total number of players in the network (Houghton et al. 2006). In football passing and communications analysis, players with higher SMS values are those who are the most connected with other players within the network in terms of outgoing and incoming passes and communications. For each game in the current study, an individual playing position SMS value was calculated for ACOM, BCOM, and passing. To obtain a team measure for SMS, the mean SMS of all 11 playing positions for the match was calculated, which provides an indication of the ACOM and BCOM provided and received, and passing performed by the individuals within the team.

Procedure

A communication tool for players to subjectively rate the ITC was developed (Appendix 1). The ITCT was comprised of two parts designed to measure the players' perceived ratings of, the amount of communication (ACOM) received from each player, and how beneficial this communication was to their individual performance (BCOM). The ITCT had a scale of 0–4, with 0 representing no communication, or benefit to performance, and 4 representing a very high amount of communication, or a very high benefit to performance. The ITCT was designed by sport scientists, football experts (football researchers and coaches), and a researcher experienced in the development of Human Factors methods (Stanton et al. 2013). The ITCT was trialled with a regional football team (who's players were skilled and equal in age, and playing experience to the study participants) in three competitive matches and feedback was used to refine the tool. The participants in the current study were instructed and trained

Table 2. Example network adjacency matrix representing the raw match passing data.

	GK	RFB	RCD	LCD	LFB	RDMF	LDMF	RAMF	LAMF	RFWD	CFWD
GK		3	10	8	4	0	2	0	1	1	0
RFB	3		4	1	0	5	7	5	1	9	1
RCD	6	14		16	1	6	6	1	0	0	0
LCD	4	6	17		8	2	11	1	1	0	0
LFB	3	1	2	5		4	8	3	6	3	1
RDMF	0	5	9	2	3		9	4	2	5	0
LDMF	1	3	3	9	11	7		8	5	7	4
RAMF	0	2	1	0	3	3	3		7	8	1
LAMF	1	1	0	0	8	4	0	1		1	1
RFWD	0	9	0	0	2	6	8	7	5		0
CFWD	0	0	1	0	0	0	2	0	2	1	

Data are the total number of passes between players. For example, the GK passed the ball to the RFB on three occasions, and to the RCD on 10 occasions.

Table 3. Communication and passing as a function of match outcome, and overall matches (n = 22), for edges, density, cohesion, and sociometric status.

Variable	Match outcome	Edges	Density	Cohesion	SMS
ACOM	Win	105.0 ± 2.8	0.95 ± 0.03	0.91 ± 0.05	4.41 ± 0.17*,**
	Draw	102.1 ± 2.3	0.93 ± 0.02	0.86 ± 0.04	4.22 ± 0.18**
	Loss	102.7 ± 3.5	0.93 ± 0.03	0.87 ± 0.06	4.02 ± 0.12
	Overall	103.4 ± 3.0	0.94 ± 0.03	0.88 ± 0.05	4.24 ± 0.23
BCOM	Win	105.0 ± 2.1*	0.95 ± 0.02	0.91 ± 0.04*	4.50 ± 0.16**
	Draw	101.4 ± 2.3	0.92 ± 0.02	0.85 ± 0.04	4.30 ± 0.17**
	Loss	103.0 ± 2.8	0.94 ± 0.03	0.88 ± 0.05	4.04 ± 0.31
	Overall	103.2 ± 2.79	0.94 ± 0.02	0.88 ± 0.05	4.30 ± 0.28
Passing	Win	84.1 ± 4.94	0.76 ± 0.04	0.66 ± 0.07*	6.71 ± 1.26**
	Draw	81.1 ± 4.52	0.74 ± 0.04	0.61 ± 0.05**	5.82 ± 0.80**
	Loss	85.5 ± 1.76	0.78 ± 0.02	0.66 ± 0.02	7.32 ± 0.89
	Overall	83.4 ± 4.37	0.76 ± 0.04	0.64 ± 0.06	6.36 ± 1.15

Data are mean ± SD.
*Significant (P < .05) difference compared to draw; **Significant (P < .05) difference compared to loss.

on how to complete the post-match tool by the research team, were informed of the different types of communication (e.g., verbal, non-verbal), and that they were to consider and include these when completing the ITCT. The participants were instructed not to consider any emotion attached to the match outcome that may influence the responses provided. Prior to the commencement of the competitive season, the tool was used in five pre-season matches as a familiarisation period. The ITCT layout reflected the playing formation of the team and therefore provided a visual representation to assist the participants when entering their data (Appendix 1). The ITCT was completed individually and confidentially by each player in the team's dressing room within 60 min post-match. In total, 526 individual communication ratings were collected and analysed, and a total of 7693 passes were analysed. Data were collected for the total number of matches (n = 22), home (n = 9), and away (n = 13), and for match outcomes; win (n = 8), draw (n = 8), loss (n = 6).

Statistical analysis

Statistical analyses were conducted using SPSS (version 22, IBM Corporation, Armonk, NY, USA). One-way analysis of variance tests (ANOVA) were conducted to determine differences between the match outcomes (win, draw, loss), and match location (home, away) for ACOM, BCOM, Passing, density, edges, cohesion, SMS, and percentage possession. The level of significance was set at $P < .05$, and *post hoc* pairwise comparisons were conducted using the least significant difference (LSD) test, with no adjustments for multiple comparisons. Partial eta squared (η_P^2) was used as an indicator of effect size. Effect size categories were defined as small (0.01), medium (0.06), and large (0.14) (Levine and Hullett 2002). Pearson's correlation coefficient was used to determine relationships among ACOM, BCOM, and passing, using the mean of the player's individual SMS values. The magnitude of the correlation coefficient was categorised as trivial (<.1), small (.1–.3), moderate (.3–.5), and large (> .5) (Cohen 1988).

Results

There was a significant main effect (P = .050; η_P^2 .270; ß .584) for percent possession as a function of match status. *Post hoc* pairwise comparisons revealed that losses (59.2 ± 3.3%) had significantly (P < .05) higher percent possession compared to wins (52.1 ± 8.0%), and draws (50.7 ± 5.8%).

For the ACOM as a function of match status, there was a significant (P < .05) main effect for SMS (Table 4). For BCOM as a function of match status, there were significant (P < .05) main effects for network edges, cohesion, and SMS (Table 4). For passing as a function of match status, there was a significant (P < .05) main effect for SMS (Table 4). *Post hoc* pairwise analyses revealed that for ACOM, SMS was higher in wins compared to draws (P = .047) and losses (P < .001), and draws were higher compared to losses (P = .031). For BCOM, network edges, and cohesion were higher in wins (P = .010) compared to draws (P = .011), and for SMS, wins (P = .001) and draws (P = .036) were higher compared to losses. For passing, SMS was higher for losses compared to wins (P = .050) and draws (P = .013) (Tables 2 and 3).

There were no significant difference (P < .05) for ACOM, BCOM, or passing as a function of match location (home vs. away).

There was a significant strong positive correlation (r = .800; P < .001) between ACOM and BCOM (Figure 1, Panel A). There was no correlation (r = –.283; P < .202) between the ACOM and passing (Figure 1, Panel B). There was no correlation (r = –.296; P < .181) between BCOM and passing (Figure 1, Panel C).

Discussion

The current study used SNA to determine the connectivity of players within a professional football team using ITC and passing, and to determine the relationship between ITC and possession.

Table 4. Statistical values of network edges, density, cohesion, SMS as a function of match status.

Variable		P	F	η_P^2	ß
ACOM	Edges	.150	2.102	.181	.377
	Density	.320	1.211	.113	.232
	Cohesion	.177	1.901	.167	.345
	SMS	.002*	9.196	.492	.952
BCOM	Edges	.033*	4.106	.302	.655
	Density	.091	2.720	.223	.473
	Cohesion	.037*	3.928	.293	.634
	SMS	.004*	7.403	.438	.898
Passing	Edges	.122	2.341	.190	.418
	Density	.174	1.919	.168	.348
	Cohesion	.066	3.144	.249	.534
	SMS	.037*	3.952	.294	.637

ACOM (amount of communication), BCOM (communication beneficial to performance), P (probability), F (F statistic), ß (observed power), and η_P^2 (effect size).
*Significant difference (P < .05) between the match outcomes.

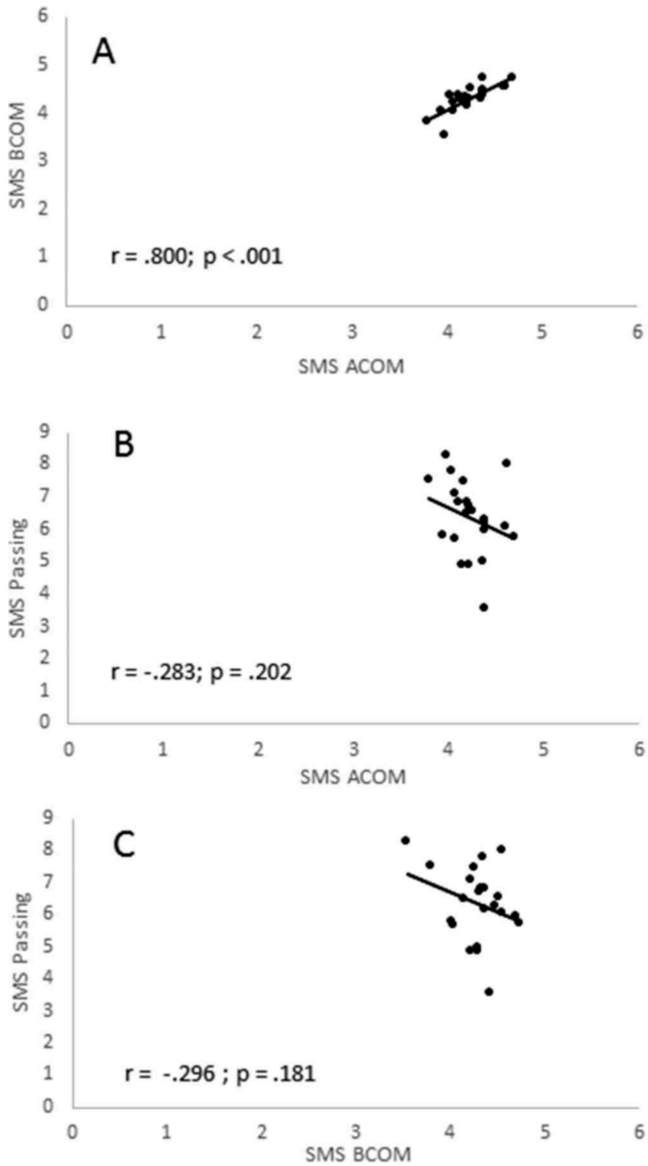

Figure 1. Relationships between the intra-team communication and passing for sociometric status.

The current results, for the first time, quantify the amount and benefit of ITC to task performance as perceived by the players within a professional football team.

Overall, the network characteristics indicated that the team was a highly connected and cohesive network for ITC, but the teams' passing was less connected and cohesive. For passing, the SNA metrics were consistently around 20% lower than ITC for all variables. In football, most time is spent either in possession or with the opposition in possession, with brief periods of transition (Sarmento et al. 2014). Therefore, a potential explanation for the higher levels for ITC compared to passing, is the need for team structural organisation when not in possession, as the passing connectivity only represents time in possession. An interesting topic for future investigation is how the ITC network changes for time in possession, time without possession, and in the transition phase.

Although there were significant differences found between the dependant variables for won and drawn matches, the significant differences between matches won and lost, were found for SMS. Given that SMS is a metric derived from individual player values, the significant changes to SMS as a function of match outcome suggest that the players performed differently to influence the match outcome, or were forced to perform differently by the opposition. The SMS for ACOM and BCOM was significantly higher in matches won and drawn compared to lost, indicating that in matches won and drawn, players perceived there to be (a) increased communication between players and a greater number of players engaging in more communication, and that (b) players communicated more information that was beneficial to performance. The increased ITC in won matches potentially represents the moment to moment adjustment of tactical strategy required to overcome the opposition (McEwan and Beauchamp 2014). Although the specific types of communication were not measured in the current study, the strong positive relationship between ACOM and BCOM indicates that the more communication that was received, the greater the amount of communication beneficial to performance was received. Given that the team consisted of highly specialised, elite level players with more than 250 individual national team appearances, it would be expected that communication would be primarily aimed at enhancing performance in competitive matches (LeCouteur and Feo 2011). Future studies could determine whether differences exist in the ITC between different levels of competition.

The negative relationships for both of the ITC variables and passing, indicates that when passing was increased, ITC decreased. Lost compared to won matches, had a higher passing SMS and percent possession, which was associated with a decreased ITC. These results may indicate that in lost matches, which contained increased passing and possession, the team coordinated implicitly (Jordan 2009), and relied on their pre-existing knowledge of the passing structures and player movements, rather than deliberate instructional communication (Eccles and Tenenbaum 2004; Silva et al. 2013). The players' pre-existing knowledge of team passing structures and player movements, developed through daily training and past experiences, may not require the same level of communication as in uncertain phases in play, such as defending (Eccles and Tenenbaum 2004; Duarte et al. 2012; Silva et al. 2013). In the current study, matches won compared to lost contained lower passing and possession, and were associated with increased ITC. The less possession in matches won intuitively suggests the team was required to increase defending compared to in matches lost, which potentially required increased ITC. In sporting teams, increased communication is beneficial to unstructured tasks (Eccles and Tenenbaum 2004, 2007), such as defending where player's actions are reactive to the opposition offence (LeCouteur and Feo 2011). Defensive uncertainty could potentially explain the increased ITC for the low possession (winning) matches. Furthermore, the increased BCOM in matches won, which required increased defending due to less possession, may be due to the use of cue words or phrases (Eccles and Tran 2012). Cue words and phrases are direct and unambiguous statements (Sullivan and Feltz 2003), which are effective when under time pressure, such as defending, and improve the shared knowledge of the team, thus reducing the potential for miscommunication (LeCouteur and Feo 2011; Eccles and Tran 2012). Although this is speculative and requires further research, it is a potential explanation as to why the perceived BCOM was higher in matches where defending (decreased possession) was increased, compared to matches with higher percent possession.

A limitation of the current study, was the analysis of only one professional team. The inclusion of multiple teams would provide information on the ITC and passing networks within and between different teams, however this was beyond the scope of the current study. Nevertheless, the opportunity to access elite level players immediately post-match is rare, meaning that studies of this type are often restricted to youth and reserve teams, which are not representative of the highest level of competition. Furthermore, the study itself is unique in that it relates to actual competitive performance, rather than contrived or simulated competitive scenarios that do not necessarily represent the stresses and pressure of the normal competitive setting (Cannon-Bowers and Bowers 2006; McLean et al. 2017b). A potential limitation of the current study is the subjectivity, and issues related to reliability of the ITCT. However, the players were familiar and experienced with completing other subjective scales such as RPE, and wellness scales, and were given instructions and familiarisation trials regarding the methods for ITCT. With regard to reliability, as performance is different from match to match, it was not possible to test how reliable the tool is across different matches, as player ratings would be expected to change on a match-by-match basis. The nature of the external factors influencing player behaviour in football, such as match status, different opposition, and playing home/away or away means that no two matches are the same. Test–retest reliability assessment could have been conducted by asking players to rate communications twice for the same game, however, given that the players and matches involved were elite level and only a short period of access post-game was permitted, this re-testing was not possible. Despite these issues significant differences were detected between the measured variables.

Future research should extend the use of the ITCT to other sports, and formally assess the validity and reliability of the ITCT in a more controlled and manipulatable setting rather than that of actual professional competition where there is less flexibility. Future research should also investigate how teams communicate in defensive, attacking, and transition phases to determine ITC during the different phases of play. Also, future research could differentiate between verbal and nonverbal ITC to inform coaches of the players' preferred communication styles, which could be used to help guide the design of practice sessions. Further, analysis of individual player's communication, and passing as a function of match outcome could be used to determine the prominent communicators in a given team and how their communication, and passing influences the outcome of matches. An interesting future direction would be to identify and then replace the highly connected players with different players, to determine the resultant changes that occur in team functioning.

Conclusion

To conclude, the current study is the first to investigate ITC in professional competitive football matches, using a novel ITCT, to determine the whole of network characteristics. The use of the ITCT allowed differences to be detected between the measured variables as a function of match status. The results indicate that the team was more connected by communication than by passing, and that there was a negative relationship between ITC and possession. These results indicate that when in possession, compared to defending, communication is reduced, and players may use implicit coordination and shared knowledge to guide their on-field behaviours. In contrast, defending may require increased communication due to the uncertainty of the unstructured defensive moments, which requires increased and more definitive ITC. Further applications of the ITCT are encouraged, in football, other team-based sports, and other domains involving high levels of teamwork.

Practical implications

Increased communication occurs when not in possession due the uncertainty of defensive situations. Therefore, coaches could train communication during unstructured defensive situations in practice. Furthermore, coaches could implement the use of cue words for given situations to help remove any ambiguity within the teams' intra-team communication.

Disclosure statement

The authors declare no competing interests.

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Appendix 1.

Intra-team communication tool (ITCT). Playing formation, and position abbreviations. GK (goalkeeper), L (left), C (centre), R (right), FB (fullback), CD (central defender), DMF (defensive midfield), AMF (attacking midfield), FWD (forward).