Analysis of playing style across different developmental stages in Football

Jacob Dayus[1], Andrew Callaway[1]*, Shelley Ellis[1], Andrew Butterworth[2]

[1]*Department of Rehabilitation and Sport Science, Bournemouth University, UK;*

[2]*School of Human Sciences, Derby University, UK;*

*corresponding author: acallaway@bournemouth.ac.uk

Analysis of playing style across different developmental stages in Football

Notational analysis research to date has often overlooked Youth football, predominantly examining First teams in elite competitions. As a result, the current study aims to compare performance between U16s, U18s and First teams. 3311 final third entries were analysed over the course of 45 matches, equally distributed across three age-groups, during the 2018-2019 season. The sample consisted of 10 U16 teams, 16 U18 teams and 16 First teams. The study found that there were significant differences in playing styles across the age groups. As experience increases, there is a tendency of more wing than central attacks, more forward-diagonal movements, more crosses, but fewer shooting opportunities due to developments in defence abilities. The differences in the patterns of play across the age groups, suggests that younger players are more independently focused when attempting to breakdown their opposition's defence, with older teams using space more effectively and more team focused.

Keywords: Soccer; Playing style; Youth teams; Tactical skill; Performance level

Introduction

Football studies have frequently explored the relationship between various action or performance indicators and successful performance or outcome, in particular; possession (Jones et al. 2004; Lago-Penas and Dellal 2010; Castellano et al. 2012; Collet 2013), passes (Reep and Benjamin 1968; Hughes and Franks 2005; Yue et al. 2014), ball recovery (Barreira et al. 2013; Almeida et al. 2014; Casal et al. 2016) and shooting opportunities (Hughes and Franks 2005; Mahony et al. 2012; Bostanci et al. 2018; Michailidis et al. 2018). These variables assess behaviours while in possession of the ball and are considered significant features that result in the creation of a shooting opportunities.

English academy football has been heavily influenced by the introduction Elite Player Performance Plan (EPPP) (Premier League, 2021) which aims to create a talent

development structure within the academy setting. This has aided with the increasing professionalism of youth football and the practical implications of performance analysis, both of which are generally focused on the development of players and enhancing decision-making. Despite this, literature on youth populations in football seems to have been overlooked by many (Rosenbloom et al. 2006; Smith et al. 2013). Additionally, youth players are understood to have different needs and abilities from the elite or adult population (Rosenbloom et al. 2006), including their physical (Stølen et al. 2005; Djaoui et al. 2014; Harley et al. 2010), mental (Williams et al. 2012), playing styles or tactical and technical capabilities (da Costa et al. 2010; Sevil Serrano et al. 2017; Smith et al. 2013).

Focusing on playing styles, Smith et al. (2013), utilising a case study design, examined 86 matches of several key age-groups within a single club. Comparisons were made between the attacking methods of the U16s, U18s and First team squads and identified that no statistically significant differences were found between the percentage of forward passes, duration of attack and assist action. It was, however, found that all ages showed variances in the number of actions leading up to a goal, demonstrating the First team's ability to maintaining possession. Furthermore, the assist location between U18s and First team were seen to show disparities, with the First team utilising the wings more frequently than the U18s.

da Costa et al. (2010), observed the differences between Youth squads, from U11 through to U20. The study identified that no differences were found between the U15 and U17 teams, similar to the findings of Smith et al. (2013). Similarly, the study identified that older age groups were more likely to display higher values reflecting their tactical superiority over the younger age groups, with U 11's scoring offensive width and length values of 42.74 (± 28.96) while U17s achieved a score of 67.51 (±

25.84). The biggest discrepancies in tactical indices were found to be between the U17 and U20 teams. This can be likened to the previously mentioned study by Smith and colleagues, who distinguished tactical differences between First team and U18 teams.

Despite a number of studies and the importance of a range of player development aspects, research focused on performance analysis methodologies has often eluded younger populations which leaves the majority of previous adult-grounded research inapplicable to a youth population. The aim of this study is to contribute to the understanding of playing styles across different stages of football by comparing the tactical approaches used between U16s, U18s and First teams.

Method

Sample

With institutional ethical approval (Bournemouth University Ethics ID: 24548), 42 teams split between 3 age groups (Table 1), during the 2018/19 were analysed. All teams played in a league format; with First team matches being played in the 'Premier League', U18 matches in the 'Football League Youth Alliance South-West Division', and U16 matches in the 'Football League Youth Alliance Games Programme'.

*** TABLE 1 NEAR HERE ***

Variables recorded

The criteria for observed incidents was generated under the notion of Bate (1988) who identified that final third as the "critical scoring area". Given that entries into the final third are more frequent than shots at goal, it was expected to more accurately display the playing styles of a team, reflecting both successful (creation of shooting

opportunities) and unsuccessful (termination of attack) attacks. Relevant variables were established through the findings of previous research (Appendix 1).

GPS data were unavailable; therefore, distances were calculated from pitch locations. Under the assumption that pitches were set at a minimum of 100 yards by 70 yards (The FA 2019a), the pitch was divided into a 10 by 7 zones, whereby one zone was therefore 10 yards by 10 yards. This collection process enabled the pitch location to be re-categorised into larger zones based on differences in previous research. Pitch locations for passing and ball recovery have been examined to varying degrees, with areas ranging from three lateral zones (Tenga et al. 2010a), up to six (Fernandez-Navarro et al. 2016). Given our dissection of the pitch (10x7), we recatagorised these data into five equal zones parallel to the goal line. With horizontal division of the pitch, prior studies have frequently used the edge of the penalty area to distinguish wide zones (Barreira et al. 2013; Andrade et al. 2015; Fernandez-Navarro et al. 2016). This dissection of the pitch was implemented for analysing ball recovery and build-up action locations. Total distance (m) and average distance (m) were calculated from these pitch locations.

Procedure

All footage was provided by a Premier League club, in which video materials utilised a fixed aerial, wide-angle perspective. Each match was viewed using video analysis software, SportsCode (V11.2.25), where final third entries were analysed. These instances are recognised elements that reflect a successful outcome (Bate 1988) and prove to be more frequent than goal-scoring opportunities. Subsequently, the analysed matches were processed through a systematic observational methodology; where ball possessions resulting in a final third entry were examined and predefined action

variables were measured. Time codes were automatically created by SportsCode for each data entry were used for the calculation of time related variables.

Reliability

Intra-rater reliability was conducted using Cohen's kappa test, weighted kappa and percentage error, where appropriate prior to the data collection process (Robinson and O'Donoghue 2007). Two matches chosen at random were analysed using a test-retest design with a 21-day delay in an attempt to avoid biasing the results via the potential of a learning effect. Each nominal variable was individually tested, using Cohen's Kappa, where the accepted value was set to ≥ 0.80 (O'Donoghue and Holmes 2014). Values between 0.8 and 1.0 are considered to display a very good strength of agreement (Altman 1991). Meanwhile, percentage error tests were carried out on Possession Duration and frequency data such as Number of Passes, of which utilised the percentage error equation where significance levels were set to $\leq 5\%$. All results were within stated limits (Table 2).

*** TABLE 2 NEAR HERE ***

Data Analysis

Attaching plays which ended with a final third entry were averaged by team, per match. When a team performed more than once (i.e. home and away), each variable recorded was averaged to produce a single team performance in the data. Normality was tested using a Kolmogorov-Smirnov test, this revealed the data to be non-normally distributed across all performance indicators. Kruskal-Wallis with post-hoc Mann-Whitney U Tests

were used to identify any statistical differences found between the age groups.

Results

There were significant differences between 17 variables recorded (Table 3). First team and U18s were able to create considerably more final third entries than their younger, U16 counterparts (*H_2= 7.242, p=0.027, Post Hoc: z=-2.560, p=0.010, z=-2.042, p=0.041 respectively)*. Whilst there were fewer final third entries for U16 teams, there was no significant difference in the number of shots, on/off target shots or goals scored between age groups.

Ball recovery methods showed differences between teams in percentage of tackles (H2=9.420, p=0.009) and loose-ball (H2=9.906, p=0.007). U16 performed a significantly higher percentage of tackles than First team (z=-2.947, p=0.003) and U18 (z=-2.185, p=0.029). Conversely, the U16 team were found to regain the ball via loose-balls considerably less than the First team (z=-3.031, p=0.002).

There was a single pitch location for ball recovery location, the midfield zone (*H_2=11.512, p=0.003*), which was different between teams. U18s displayed significantly more regains in the midfield zone compared to First team (*z=-2.839, p=0.005*) and U16 (*z=-2.968, p=0.003*) teams.

Build-up play differed across ages groups with no significant differences found across groups regarding the duration of attack (H_2=0.890, p=0.641), total distance (H_2=3.792, p=0.150) and average distance per action (H_2= 2.059, p=0.357), number of actions (H_2=5.684, p=0.058). Significant differences were found between ages with number of passes (H2=7.371, p=0.025) with more passes in First team performances than U18 (z=-2.472, p=0.013) and U16 (z=-3.352, p=0.001). Significantly more dribbles (H_2=11.221, p=0.004) were performed by the U16 teams than the First team

(z=-2.653, p=0.008) and U18s (z=-2.510, p=0.012). Significantly more crosses (H2=18.880, p=0.000) were performance by the First team displayed than both the U18 and U16 (z=-2.196, p=0.028, z=-4.251, p=0.000, respectively).

There were significant differences in the direction of build-up actions with significantly more backwards (H2=8.172, p=0.017) performed by the U16s (z=-2.714, p=0.007) than the First team. Significantly more Forward-diagonal (H2=6.392, p=0.041) actions were used by the First team (z=-2.644, p=0.008) than the U16. Significantly more forward (H2=6.576, p=0.037) actions were used with the First team compared to the u16 (z=-2.380 p=0.017), but not the U18 (z=-1.935 p=0.053).

There were two areas during build up play with significant differences between teams. The defensive zone ($H_2=8.416, p=0.015$) had fewer actions in the defensive zone for the First team ($z=-2.988, p=0.003$) than to the U16. The wide zones ($H_2=16.475, p=0.000$) showed that First team and U18s performed significantly more actions in wide zones ($z=-3.913, p=0.000$, $z=-2.387, p=0.017$ respectively) than the U16s.

There were differences in assist method (Table 3) across age groups with crosses (H2=9.328, p=0.009) and dribbles (H2=8.801, p=0.012). The First team squad performed a greater percentage crosses compared to both U18 (z=-2.527, p=0.012) and U16 (z=-2.680, p=0.007). First teams also displayed a significantly lower percentage of dribbles than U18s (z=-2.211, p=0.027) and U16s (z=-2.976, p=0.003).

Team assist locations (Figure 1) revealed no areas with significant differences between age groups. With assists categorised into wide and central areas, a significant difference was observed between all ages ($H_2=7.701, p=0.021$). Post-hoc tests revealed the only significant difference being that the First team use a higher percentage of the

wings compared to U16s (*z=-2.729, p=0.006*), although there is a gradual decrease with age from U16s to First team.

*** FIGURE 1 NEAR HERE ***

The outcome of these possessions (Table 3) were observed to display significant differences in being lost or interrupted (H_2*=10.025, p=0.007*), and those ending in a shooting opportunity (H_2*=10.232, p=0.006*). The First team had significantly higher percentage of attacks that were lost or interrupted compared to both the U18s (*z=-2.050, p=0.040)* and U16s (*z=-3.168, p=0.002)*. Furthermore, the First team were found to generate a significantly smaller percentage of shooting opportunities than both of the younger counter parts (*z=-2.198, p=0.028, z=-3.079, p=0.002 respectively*). There were no difference in the shot outcomes or on/off target results of the shots at goal between age groups.

There was a difference in shooting location between the groups (Figure 2), however only in the B4 zone (H_2*=13.228, p=0.001*). U16s performed a significantly greater percentage of their shots from this zone compared to both First team (*z=-2.202, p=0.028)* and U18s (*z=-3.213, p=0.001*). No differences were found in the percentage of shots taken from either inside, or outside the penalty area (H_2*=2.908, p=0.234*).

*** FIGURE 2 NEAR HERE ***

Discussion

The present study aimed to examine the differences in playing styles between age groups at different stages of footballing development. The findings identified significant differences between First teams, U18s and U16s in different variables within build-up play, directions, pitch utilisation ball recovery methods and location, assist methods, possession outcome and where on the pitch assists happened.

First team performances exhibited significantly more possessions leading to final third entries (1,189), compared to the younger squads (U18 = 1138; U16 = 984). This equates to an average of 79.3 final third entries per match, compared to 75.7 and 65.6 per match for the U18s and U16s, respectively. The same significant difference is not replicated in the total number of shots, number of shots on or off target, or goals scored. This shows that whilst the First team have greater capacity in creating penetrating attacks, with fewer shots occurring, perhaps the (oppositions) defensive capacity increases with experience (age).

The build-up play however does comprise of different aspects. There is more passing, more crosses, and fewer dribbles in first team games than U18 and U16. The First teams produced significantly more passes (4.0 ± 1.5 passes per attack) compared to the U18s (3.1 ± 1.0) and U16s (3.2 ± 1.2). The number of passes performed by each team during an offensive sequence gives an insight into their playing style. A higher frequency of passes, is considered to reflecting a possession-based patterns of play (Lago-Peñas & Dellal 2010), while conversely, fewer passes are representative of a more direct method of attack (Tenga & Larsen 2003). This would indicate a reduction of an individual focus and more team dynamic with experience.

This observation is supported by Sevil Serrano et al. (2017) who reported decision-making and successful execution of both passing and dribbling actions are observed to increase progressively with age, which is confirmed in this work. In line

with the findings of Sevil Serrano et al. (2017), each were found to be statistically significant when compared across the age groups. In this respect, it can be noted that the First team used a more possession-based approach when in the offensive phase compared to both the U18s and U16s.

The first team produced a significant decrease in backward movement which could indicate an increase in confidence in getting past other players which is further exemplified with less direct forward movement and more forward-diagonal movement which means they are showing confidence to move forward utilising more space which is further evidenced with less use of defensive zones and more use of wide zones as players develop.

The average area used within the attack showed some differences. The defensive zone saw significantly more actions performed by the U16s (1.40% ± 1.4) compared to the First team (0.50% ± 0.5). As suggested above by the number of crosses, it was also observed that the First team utilised the wide channels significantly more (30.10% ± 4.1) than the U16s (24.2% ± 5.7), while U18s were also seen to utilise wide zones more (27.8% ± 4.7) compared to the U16s. Previous research has identified that younger players are more reliant on using the length of the space available and resultingly neglect the width of the pitch (Folgado et al., 2014; Olthof et al., 2015). This could be as a result of the physical, technical and psychological ability of the players, with older players further developed than those at younger ages and therefore have an increased capability to recognise and exploit these positions (Olthof et al. 2015). There is also a link to the assist method changing over age with more crosses used by older age groups. This could identify a natural relationship where the development of technique and strength allow players to cross from wider areas of the pitch thus the pitch utilization naturally develops alongside.

Regaining possession of the ball is just as important as maintaining it (Almeida et al. 2014) and as a result, ball recoveries have been used to decipher a team's defensive approach. To date, literature has not looked at the different ball recovery methods used across age groups. The study found that U16s performed statistically more regains through the action of a tackle (16.4% ± 10.1) compared to both U18s (11.5% ± 7.1) and First team (9.9% ± 5.4). While the First team were able to obtain possession via loose balls (20.9 ± 6.4) more readily than the U16s (15.0 ±7.5). The findings show that open-play regains are more frequent than those from set-pieces at all ages (First team=37.2% ± 8.6, U18=38.5% ± 8.4, U16=36.1% ±11.8). This is similar to Barreira et al. (2013) who analysed the 2010 World Cup and reported 77.3% of recoveries to occur via open-play versus 22.3% through set-pieces.

The increased use of tackles by the U16s correlates to the findings found regarding the number of dribbles. With a higher dependency on individual actions such as dribbling, the number of 1v1 situations is likely to increase the number of tackles performed. While older age groups limit their reliance on individual actions, the percentage of loose ball regains are seen to increase at each stage. As a consequence, it can be suggested that loose balls are a result of superior defensive positioning by First teams, when compared to the U16s. This is coherent with the findings of Almeida et al. (2016) who identified that as players increase in age, teams evolve structurally to flattened shapes, opposed to the elongated shapes displayed at younger ages. There is also a tactical advantage, learnt with age and coaching experience, that not utilising tackles would mean a reduction in chances of creating a foul.

The location of ball recovery has been well documented to reflect the pressure applied by a team (Fernandez-Navarro et al. 2016). Results found that U18s displayed a significantly greater percentage of ball recoveries in the midfield zone (23.2% ± 6.7)

compared to the First team (17.9% ± 6.9) and U16s (16.7% ± 9.4). This would indicate the different defensive styles used to regain possession, with First team and U16s utilising a higher press, whereas U18s use a defensive block that is likely to engage at the halfway line.

The U18s ball recoveries can be explained by the competitive nature of the league, with performances being results orientated and therefore more likely to utilise a deeper block in order to reduce space for opposition to exploit and limit oppositions ability to penetrate. Whereas U16s displayed an aggressive approach, which as Partridge et al. (1993) suggests, younger teams use an aggressive approach when out of possession, with younger players not to falling back into their own half in order to defend. This is represented in our findings with U16s showing the highest percentage of attacking zone regains. Similarly, to the U16s, the First team were likely to have exhibited a higher press than the U18s in an attempt to take advantage of the notion that ball regains higher up the pitch are more likely to result in a goal (Tenga et al. 2010a).

The penultimate action leading up to a shot at goal is a valuable variable that enables the differentiation of how goals are scored. The results showed that there were significant differences in both crossing and dribbling assist actions. U16s (26.04% ± 33.22) and U18s (18.67% ± 29.84) performed significantly more self-assisted goals via the use of dribbling with the ball than the First Team (4.35% ± 14.41). The First team produced significantly more crossed assists (40.57% ± 35.03) than both U18s (19.07% ± 33.16) and U16s (16.79% ± 29.32). These findings are very similar to the findings of Smith et al. (2013), who reported that the First team age group achieved 42.2% of goals via crosses, with U18s achieving 16.4% and U16s 20.8%. It should be noted that the English Football Association (The FA 2019b) encourage those coaching between U13 through to U16 to prioritise ball mastery and creativity when on the ball. This could

partially explain the increased number of dribbles at this age; accompanied by the increase demand for positive results at First team and U18 levels.

This vast disparity in goal scoring methods suggests that First team are more likely to use a team-play approach when attacking, utilising a combination of passing and crossing to interlink and score a goal (Carling et al., 2006). This has also been evidenced in Basketball where younger players are reliant on individual actions such as dribbling opposed to the team approach of passing (Ortega et al., 2006).

Considering both the assist location and the assist method, the findings of the current study are concurrent with Olthof et al. (2015), whereby it can be suggested that as players develop, their physical, technical and psychological abilities improve, and their aptitude for utilising team mates becomes a priority in which their tactical and spatial awareness are superior.

Initially, it was be predicted that Senior teams would achieve a higher percentage of shots that resulted on-target, especially given the superior skill level and experience (Partridge et al. 1993) given that technical ability is seen to improve with age (da Costa et al. 2010). However, the results revealed no significant difference in shooting accuracy with age where we would expect that the percentage of shots on-target would rise with age, experience and technique.

This finding could be due to fewer shooting opportunities and lower success in shooting can be explained by the enhanced defensive capacity of their opposition (Folgado et al. 2014; Olthof et al. 2015), which restricts the opportunities for Senior teams to generate a shot at goal. Given that it has been identified that decision-making and successful execution of shooting opportunities gradually decreased with age (Sevil Serrano et al. 2017), it is comparable with Blomqvist et al. (2005) who reports that

younger players have a better understanding of offensive responsibilities than the defensive aspects of performance.

Conclusion

This paper has provided some new insights and reference information for the playing styles of different age groups. Playing styles vary with age with, as players develop, their physical, technical and psychological abilities improve.

There are fewer attacking plays starting with a tackle as the age groups develop with experience. This likely shows that skill levels to evade tackles has developed, or simply that there are more efficient means to get the ball such as a loose ball. Space utilisation improves with age with more use of wings and crosses likely as they develop in strength and technique. Younger players are more reliant on individual actions such as dribbling opposed to the team approach of passing and crossing.

These results are seen to highlight the deficient tactical understanding of younger players, despite previous research reporting similar levels of cognitive-perception across similar ages (Schumacher et al. 2018). In fact, these similar levels of cognitive ability, suggest that coaches should address the tactical needs of the players, educating them on various playing styles and tactics (Keller et al. 2018). Ultimately, providing an insight into the necessary training methodologies required to improve tactical and strategical ability of academy players.

Disclosure statement

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

This study has received no funding.

ORCID

Andrew Callaway https://orcid.org/0000-0003-0987-9608

Shelley Ellis https://orcid.org/0000-0001-9771-8008

Andrew Butterworth https://orcid.org/0000-0002-2885-2796

References

Almeida, C. H., Ferreira, A. P., & Volossovitch, A. (2014). Effects of match location, match status and quality of opposition on regaining possession in UEFA Champions League. *Journal of Human Kinetics*, *41*, 203.

Altman, D. G. (1990). *Practical statistics for medical research*. CRC press.

Andrade, M. T. D., Espirito Santo, L. C., Andrade, A. G. P., & Oliveira, G. G. A. (2015). Analysis of the goals scored in the 2008 Brazilian Championship-A Series. *Revista Brasileira de Ciências do Esporte*, *37*(1), 49-55.

Bate, R., 1988. Football chance: tactics and strategy. In, Reilly, et al. (eds.), *Science and football: Proceedings of the First World Congress of Science and Football*, Liverpool, 12-17th April 1987, p.293-301

Barreira, D., Garganta, J., Guimaraes, P., Machado, J., & Anguera, M. T. (2014). Ball recovery patterns as a performance indicator in elite soccer. *Proceedings of the Institution of Mechanical Engineers, Part P: Journal of Sports Engineering and Technology*, *228*(1), 61-72.

Blomqvist, M., Vänttinen, T., & Luhtanen, P. (2005). Assessment of secondary school students' decision-making and game-play ability in soccer. *Physical Education and Sport Pedagogy*, *10*(2), 107-119.

Bostanci, Ö., Mayda, M. H., Ceylan, L., Kaplan, A., Satici, A., & Yazici, Ö. F. (2018). 2016 UEFA European Championship: Pass and shot association. *Journal of Human Sport and Exercise*, 13(2), 319-327.

Carling, C., Williams, A. M., & Reilly, T. (2005). Handbook of soccer match analysis: A systematic approach to improving performance. Psychology Press.

Casal, C. A., Andujar, M. Á., Losada, J. L., Ardá, T., & Maneiro, R. (2016). Identification of defensive performance factors in the 2010 FIFA World Cup South Africa. *Sports*, *4*(4), 54.

Castellano, J., Casamichana, D., & Lago, C. (2012). The use of match statistics that discriminate between successful and unsuccessful soccer teams. *Journal of Human Kinetics*, *31*, 139.

Collet, C. (2013). The possession game? A comparative analysis of ball retention and team success in European and international football, 2007–2010. *Journal of Sports Sciences*, *31*(2), 123-136.

da Costa, I. T., Garganta, J., Greco, P. J., Mesquita, I., & Afonso, J. (2010). Assessment of tactical principles in youth soccer players of different age groups. *Rev Port Cien Desp*, *10*(1), 147-157.

Djaoui, L., Wong, D. P., Pialoux, V., Hautier, C., Da Silva, C. D., Chamari, K., & Dellal, A. (2014). Physical activity during a prolonged congested period in a top-class European football team. *Asian Journal of Sports Medicine*, 5(1), 47.

FA, T., 2019a. Laws of The Game & Fa Rules [online]. Available from: http://www.thefa.com/football-rules-governance/lawsandrules/laws/football-11-11/law-1---the-field-of-play [Last Accessed: 12/4/21]

FA, T., 2019b. The future England player: Age-phase priorities [online]. Available from: https://thebootroom.thefa.com/resources/england-dna/how-we-play/in-possession [Last Accessed: 12/4/21]

Fernandez-Navarro, J., Fradua, L., Zubillaga, A., Ford, P. R., & McRobert, A. P. (2016). Attacking and defensive styles of play in soccer: analysis of Spanish and English elite teams. *Journal of Sports Sciences*, *34*(24), 2195-2204.

Folgado, H., Lemmink, K. A., Frencken, W., & Sampaio, J. (2014). Length, width and centroid distance as measures of teams tactical performance in youth football. *European Journal of Sport Science*, *14*(sup1), S487-S492.

Harley, J. A., Barnes, C. A., Portas, M., Lovell, R., Barrett, S., Paul, D., & Weston, M. (2010). Motion analysis of match-play in elite U12 to U16 age-group soccer players. *Journal of Sports Sciences*, *28*(13), 1391-1397.

Hughes, M., & Franks, I. (2005). Analysis of passing sequences, shots and goals in soccer. *Journal of Sports Sciences*, *23*(5), 509-514.

Jones, P. D., James, N., & Mellalieu, S. D. (2004). Possession as a performance indicator in soccer. *International Journal of Performance Analysis in Sport*, *4*(1), 98-102.

Keller, B. S., Raynor, A. J., Iredale, F., & Bruce, L. (2018). Tactical skill in Australian youth soccer: Does it discriminate age-match skill levels?. *International Journal of Sports Science & Coaching*, *13*(6), 1057-1063.

Lago-Peñas, C., & Dellal, A. (2010). Ball possession strategies in elite soccer according to the evolution of the match-score: the influence of situational variables. *Journal of Human Kinetics*, *25*, 93-100.

Mahony, L. E., Wheeler, K. W., & Lyons, K. (2012). Analysis of Factors Determining Invasion into Attacking Areas and the Creation of Goal-Scoring Opportunities in the Asian Cup Football Competition. *Asian Journal of Exercise & Sports Science*, *9*(1).

Michailidis, Y., Mandroukas, A., Vardakis, L., & Metaxas, T. (2018). Evaluation of the goals scoring patterns and the relation between time and goal scoring of four UEFA champions league tournaments. *Facta Universitatis, Series: Physical Education and Sport*, 329-336.

O'Donoghue, P., & Holmes, L. (2014). *Data analysis in sport*. Routledge.

Olthof, S. B., Frencken, W. G., & Lemmink, K. A. (2015). The older, the wider: On-field tactical behavior of elite-standard youth soccer players in small-sided games. *Human Movement Science*, *41*, 92-102.

OPTA, 2019. Opta's Event Definitions [online]. https://www.statsperform.com/opta-event-definitions/ [Last Accessed 12/4/21].

Ortega, E., Cárdenas, D., Saiz de Baranda, P., & Palao, J. M. (2006). Analysis of the final actions used in basketball during formative years according to player's. *Journal of Human Movement Studies*, *50*, 427-431.

Partridge, D., Mosher, R. E., & Franks, I. M. (1993). A computer assisted analysis of technical performance-a comparison of the 1990 World Cup and intercollegiate soccer. *Science and football II*, 221-231.

Premier League, 2021. Elite Player Performance Plan [online]. https://www.premierleague.com/youth/EPPP [Last Accessed 12/4/21]

Reep, C., & Benjamin, B. (1968). Skill and chance in association football. *Journal of the Royal Statistical Society. Series A (General)*, *131*(4), 581-585.

Robinson, G., & O'Donoghue, P. (2007). A weighted kappa statistic for reliability testing in performance analysis of sport. *International Journal of Performance Analysis in Sport*, *7*(1), 12-19.

Rosenbloom, C. A., Loucks, A. B., & Ekblom, B. (2006). Special populations: The female player and the youth player. *Journal of Sports Sciences*, *24*(07), 783-793.

Schumacher, N., Schmidt, M., Wellmann, K., & Braumann, K. M. (2018). General perceptual-cognitive abilities: Age and position in soccer. *PloS one*, *13*(8), e0202627.

Sevil Serrano, J., Praxedes Pizarro, A., García-González, L., Moreno Dominguez, A., & del Villar Álvarez, F. (2017). Evolution of tactical behavior of soccer players across their development. *International Journal of Performance Analysis in Sport*, *17*(6), 885-901.

Smith, S., Callaway, A. J., & Broomfield, S. A. (2013). Youth to Senior Football: A season long case study of goal scoring methods between under 16, under 18 and first team. *International Journal of Performance Analysis in Sport*, *13*(2), 413-427.

Stølen, T., Chamari, K., Castagna, C., & Wisløff, U. (2005). Physiology of soccer. *Sports Medicine*, *35*(6), 501-536.

Tenga, A., Holme, I., Ronglan, L. T., & Bahr, R. (2010). Effect of playing tactics on goal scoring in Norwegian professional soccer. *Journal of Sports Sciences*, *28*(3), 237-244.

Tenga, A., & Larsen, Ø. (2003). Testing the validity of match analysis to describe playing styles in football. *International Journal of Performance Analysis in Sport*, *3*(2), 90-102.

Williams, A. M., Ward, P., Bell-Walker, J., & Ford, P. R. (2012). Perceptual-cognitive expertise, practice history profiles and recall performance in soccer. *British Journal of Psychology*, *103*(3), 393-411.

Yue, Z., Broich, H., & Mester, J. (2014). Statistical analysis for the soccer matches of the first Bundesliga. *International Journal of Sports Science & Coaching*, *9*(3), 553-560.

Appendix

(Appendix) Table 4. Variable definitions

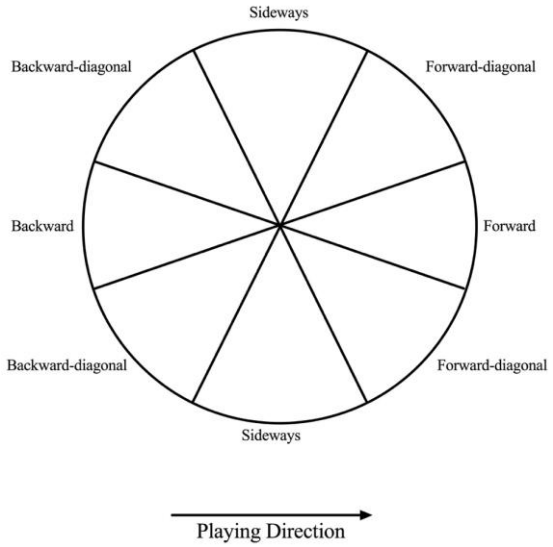
Category		Action Variable	Definition
Ball Recovery Method	*Open-play*	Tackle	When a player successfully takes the ball away from the player in possession and maintains possession (Liu et al. 2013; OPTA 2019).
		Duel	When a player successfully takes the ball in a contested ball, these include aerial duels (OPTA 2019).
		Interception	When a player intentionally intercepts a pass by moving into the line of the ball (Liu et al. 2013; OPTA 2019).
		Recovery/Loose Ball	When a player regains possession from a loose ball or the ball has been played directly to them (Liu et al. 2013; OPTA 2019).
		Defensive error/Turnover	When a defensive player makes a mistake to give the opposition possession of the ball (Liu et al. 2013; OPTA 2019).
		Goal-keeper	When the goal keeper is regains possession in open-play through a save, catch (Liu et al. 2013) or smother (OPTA 2019).
		Restart	When open-play has resumed following a stoppage made by the referee or a goal.
		Other	Unaccounted for initial actions, and/or rebounds for shots.
	Set-piece	Corner	When open-play has resumed following the ball leaving the field of play at the opposition's touch-line after touching an opposition player.
		Throw-in	When open-play has resumed following the ball leaving the field of play at the side-line after touching an opposition player.
		Free-kick	When open-play is resumed following an illegal action by the opposition team, outside the defending team's penalty area.
		Penalty	When open-play is resumed following an illegal action by the opposition team, inside the defending team's penalty area.

	Goal-kick	When open-play has resumed following the ball leaving the field of play at the defensive touch-line, after touching an opposition player.
Build-up actions	Pass	An intentionally played ball from one player to another (Taylor et al. 2008; Williams 2012; Liu et al. 2013; Wallace and Norton 2014; OPTA 2019).
	Cross	A pass from a wide position to a specific area in front of goal (Liu et al. 2013; Smith and Lyons 2017; OPTA 2019).
	Dribble	The intentional movement of the ball, in order to travel or beat an opponent (Liu et al. 2013; OPTA 2019). A dribble is recognised when a player takes two or more touches of the ball.
Outcome actions	Interrupted	The attack has been stopped through interference, but not loss of possession (da Costa et al. 2010) or a turnover of possession (da Costa et al. 2010).
	Shot	An attempt directed to the goal, in the intention of putting the ball into the net (Liu et al. 2013; OPTA 2019).
	Rebound shot	A consecutive attempt directed to the goal.
	Own goal	Any action made by a defending player to result in the ball crossing the goal-line (OPTA 2019).
Shot outcome	On-target	Any attempt at goal where the ball does, or would, crossing the goal-line, without the intervention of the goal keeper (OPTA 2019).
	Goal	Any attempt at goal that crosses the goal-line (Liu et al. 2013; OPTA 2019).
	Saved	Any attempt at goal where the ball is stopped by the goal keeper to prevent the ball crossing the goal-line (Liu et al. 2013; OPTA 2019).
	Off-target	Any attempt at goal where the ball goes wide of the target, missing the goal or hitting the woodwork (OPTA 2019).
	Missed	Any attempt that goes wide of the goal (Liu et al. 2013; OPTA 2019).
	Post/Woodwork	Any attempt that hits the woodwork and does not result in a goal (OPTA 2019).
	Blocked	Any attempt that at goal that is blocked by a defender – excluding the goalkeeper (Liu et al. 2013; OPTA 2019).
Direction (Figure 3)	Forward	The direction of the ball following an action that results in vertical

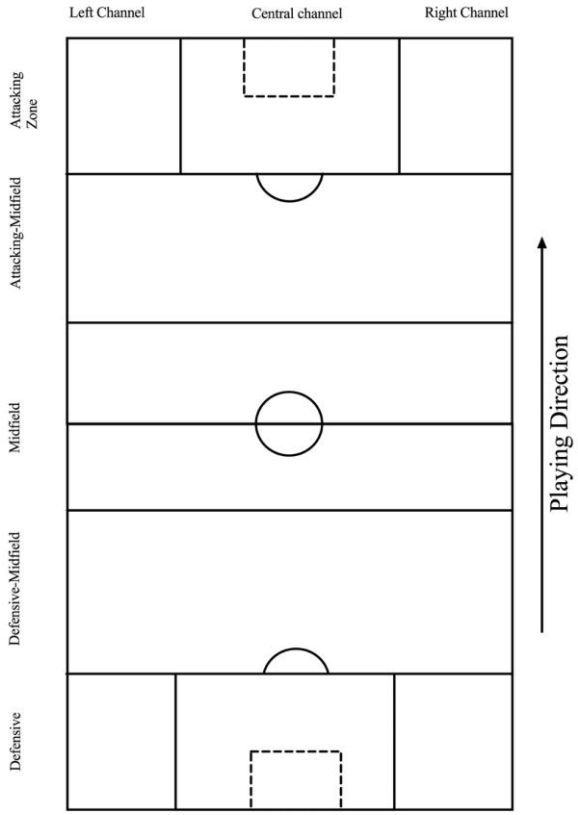
			movement directly towards the opposition's goal
		Forward-diagonal	The direction of the ball following an action that results in a vertical and lateral movement indirectly towards the opposition's goal
		Sideways	The direction of the ball following an action that results in lateral movement
		Backward-diagonal	The direction of the ball following an action that results in a vertical and lateral movement indirectly away the opposition's goal
		Backward	The direction of the ball following an action that results in vertical movement directly away from the opposition's goal
Ball Recovery Location, and Build-up action (Figure 4)	Using the dissection of the pitch (10x7) the pitch was recatagorised into the following areas	Defensive zone	Actions that occur in the defensive zone
		Defensive-midfield zone	Actions that occur in the defensive-midfield zone
		Midfield zone	Actions that occur in the midfield zone
		Attacking-midfield zone	Actions that occur in the attacking-midfield zone
		Attacking zone	Actions that occur in the attacking zone
		Left channel	Actions that occurring in the left channel
		Central channel	Actions that occurring in the central channel
		Right channel	Actions that occurring in the right channel
Assist action (Figure 5)			Assist action that occurs in the corresponding zone. Specifically, where the assist (i.e. final pass or cross) leading to the recipient of the ball scoring a goal (Liu et al. 2013; OPTA 2019).
		Inside the box	Assist actions that occur inside the penalty area (A1, A2, A3, A4, A5, A6).
		Outside the box	Assist actions that occur inside the penalty area (B1, B2, B3, B4, B5, B6).
		Own half	Assist actions that occur inside their own half (C1).

	Central areas	Assist actions occurring in areas A1-A6, B3, B4.
	Wide areas	Assist actions occurring in areas B1, B2, B6 and B5.

(Appendix) Figure 3. Direction



(Appendix) Figure 4. Ball recovery location and build up action



(Appendix) Figure 5. Assist action location

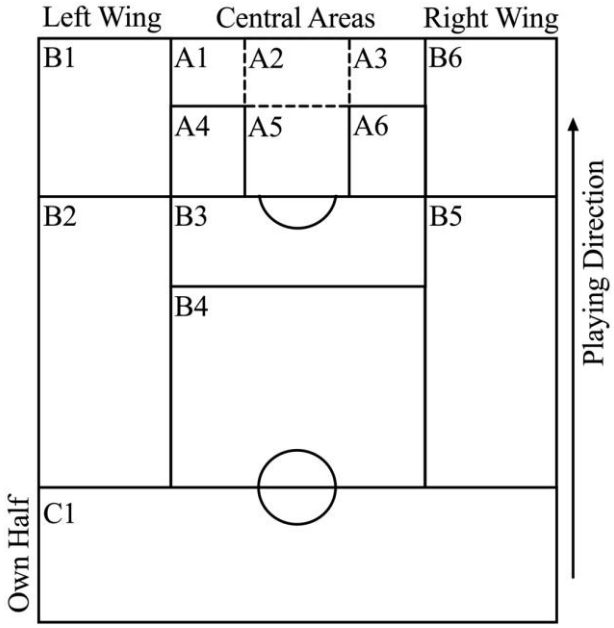


Table 1. Summary of sample

	Unique Teams	Games	Final Third Entries	Number of Shots	Number of Goals
First Team	16	15	1189	391	46
U18s	16	15	1138	429	59
U16s	10	15	984	410	76
Total	42	45	3311	1230	181

Table 2. Reliability results

Variable	Intra-observer
Possession Duration	4.02%
Total Distance	3.10%
Average Action Distance	3.29%
Number of Actions	3.83%
Number of Passes	2.34%
Number of Crosses	1.47%
Number of Dribbles	2.55%
Ball Recovery Method	0.97
Ball Recovery Location	0.80
Build-Up Action	0.97
Build-Up Location	0.81
Build-Up Direction	0.87
Assist Action	1.00
Possession Outcome	1.00
Possession Outcome Location	0.83
Shot Outcome	1.00
On-Target Outcome	1.00
Off-Target Outcome	0.99

Table 3. Average of each teams play. † = significant difference within all ($p<0.05$). Post Hoc tests: a = significant difference with U18, b = significant difference with U16. c = significant difference with First team. ($p < 0.05$)

		First team	U18s	U16s
Descriptive	Games	15	15	15
	Final Third Entries†	**1189[b]**	**1138[b]**	984
	Number of Shots	391	429	410
	Number of On-Target Shots	145	176	189
	Number of Off-Target Shots	246	253	221
	Number of Goals	46	59	76
Ball recovery	**Tackle (%)†**	**9.9 ± 5.4[b]**	**11.5 ± 7.1[b]**	16.4 ± 10.1
	Duel (%)	9.2 ± 4.7	9.8 ± 3.9	10.0 ± 4.8
	Interception (%)	11.5 ± 5.5	13.3 ± 7.4	11.0 ± 6.5
	Loose Ball (%)†	**20.9 ± 6.4[b]**	18.1 ± 6.4	15.0 ±7.5
	Defensive Error (%)	2.3 ± 3.5	2.1 ± 2.2	3.0 ± 2.7
	Goal Keeper (%)	5.1 ± 3.6	4.4 ± 3.8	4.8 ± 3.8
	Set Play (%)	37.2 ± 8.6	38.5 ± 8.4	36.1 ±11.8
	Other (%)	4.0 ± 4.4	2.4 ± 3.1	3.8 ± 4.0
Ball recovery location	Defensive Zone (%)	7.6 ± 5.2	6.8 ± 5.2	7.9 ± 5.9
	Defensive-Midfield Zone (%)	14.7 ± 7.8	14.2 ± 7.4	12.7 ± 9.5
	Midfield Zone (%)†	**17.9 ± 6.9[a]**	**23.2 ± 6.7[c]**	**16.7 ± 9.4[a]**
	Attacking-Midfield Zone (%)	33.3 ± 9.6	32.5 ± 8.7	34.3 ± 13.0
	Attacking Zone (%)	26.3 ± 6.3	23.3 ± 7.8	28.6 ± 1.7
	Wide Zones (%)	46.0 ± 12.3	44.5 ± 9.0	44.3 ± 10.0
Build-up play	Duration (s)	15.3 ± 4.1	14.1 ± 2.6	14.4 ± 4.3
	Total Distance (m)	90.0 ± 25.9	77.3 ± 16.2	81.2 ± 27.0
	Average Distance (m)	1.9 ± 0.2	2.0 ± 0.2	2.0 ± 0.2
	Total Number of Actions	5.5 ± 1.6	4.6 ± 1.2	4.8 ± 1.6
	Number of Passes†	**4.0 ± 1.5[ab]**	3.1 ± 1.0	3.2 ± 1.2
	Number of Dribbles†	**1.0 ± 0.3[b]**	**1.0 ± 0.2[b]**	1.3 ± 0.5
	Number of Crosses†	**0.9 ± 0.3[ab]**	0.5 ± 0.5	0.4 ± 0.5
Directio	**Backward (%)†**	**6.7 ± 2.5[b]**	7.3 ± 3.2	9.0 ± 3.5
	Backward Diagonal (%)	8.7 ±3.9	8.1 ± 3.6	8.6 ± 4.2

	Sideways (%)	33.1 ± 8.0	34.0 ± 16.7	30.1 ± 10.1
	Forward Diagonal (%)†	**28.4 ± 5.9**[b]	25.1 ± 10.3	25.2 ± 7.6
	Forward (%)†	**23.1 ± 5.3**[b]	25.4 ± 6.6	27.3 ± 7.4
Pitch utilisation	**Defensive Zone (%)†**	**0.5 ± 0.5**[b]	1.0 ± 1.2	1.4 ± 1.4
	Defensive-Midfield Zone (%)	6.2 ± 2.7	6.6 ± 3.4	6.9 ± 3.6
	Midfield Zone (%)	11.7 ± 4.1	10.9 ± 3.6	10.2 ± 3.6
	Attacking-Midfield Zone (%)	34.5 ± 5.6	34.0 ± 5.4	34.4 ± 6.5
	Attacking Zone (%)	47.2 ± 8.8	47.6 ± 8.8	47.2 ± 10.00
	Wide Zones (%)†	**30.1 ± 4.1**[b]	**27.8 ± 4.7**[b]	24.2 ± 5.7
Assist method	Pass (%)	32.3 ± 39.1	36.6 ± 38.2	44.6 ± 38.5
	Cross (%)†	**40.6 ± 35.0**[ab]	19.1 ± 33.2	16.8 ± 29.3
	Dribble/*Self Assist* (%)†	**4.4 ± 14.4**[ab]	18.7 ± 29.8	26.0 ± 33.2
	No Assist Action (%)	22.8 ± 29.6	25.6 ± 34.8	12.5 ± 17.9
Possession	**Interrupted/Lost (%)†**	**67.4 ± 6.1**[ab]	62.0 ± 9.7	59.0 ± 12.3
	Shooting Opportunity (%)†	**31.2 ± 5.9**[ab]	36.8 ± 9.5	39.6 ± 12.1
	Rebound Created (%)	1.3 ± 2.0	1.2 ± 2.1	1.4 ± 2.2
	Own-Goal (%)	0.1 ± 0.4	0.0 ± 0.0	0.1 ± 0.4
Shot	On-Target (%)	37.8 ± 16.0	39.6 ± 15.4	44.6 ± 12.4
	Off-Target (%)	62.2 ± 16.0	60.4 ± 15.4	55.4 ± 12.4
On	Scored (%)	31.2 ± 24.99	40.6 ± 26.58	35.6 ± 28.63
	Saved (%)	68.9 ± 25.04	59.4 ± 26.58	64.4 ± 28.63
Off Target	Missed (%)	61.0 ± 21.8	63.6 ± 16.3	60.3 ± 20.3
	Blocked (%)	36.9 ± 20.6	33.7 ± 16.5	37.4 ± 19.5
	Post (%)	2.2 ± 4.8	2.7 ± 7.5	2.5 ± 6.1

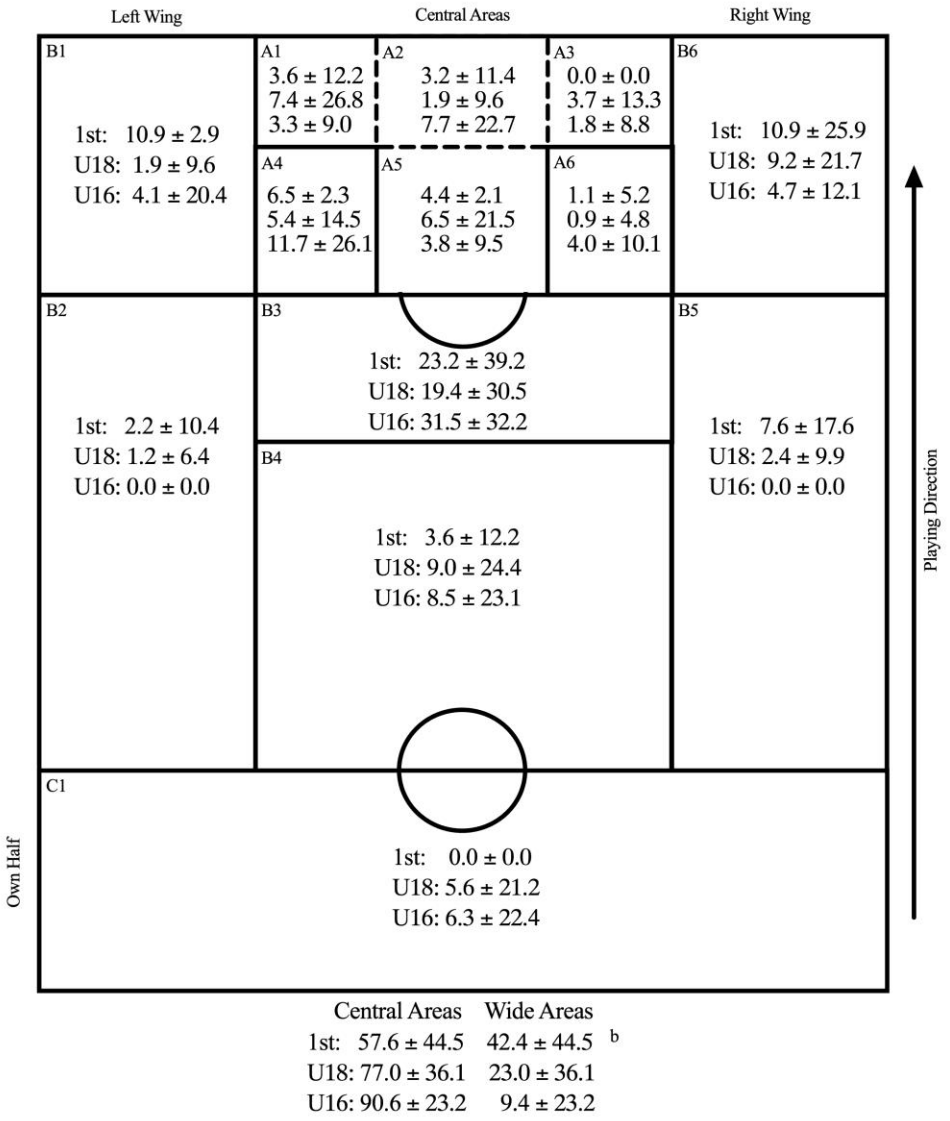


Figure 1. Assist location displayed as a mean percentage (± SD) per zone across age groups, whereby † = significant difference from Kruskal Wallace ($p<0.05$), [a] = significant difference with U18 ($p<0.05$), [b] = significant difference with U16 ($p<0.05$).

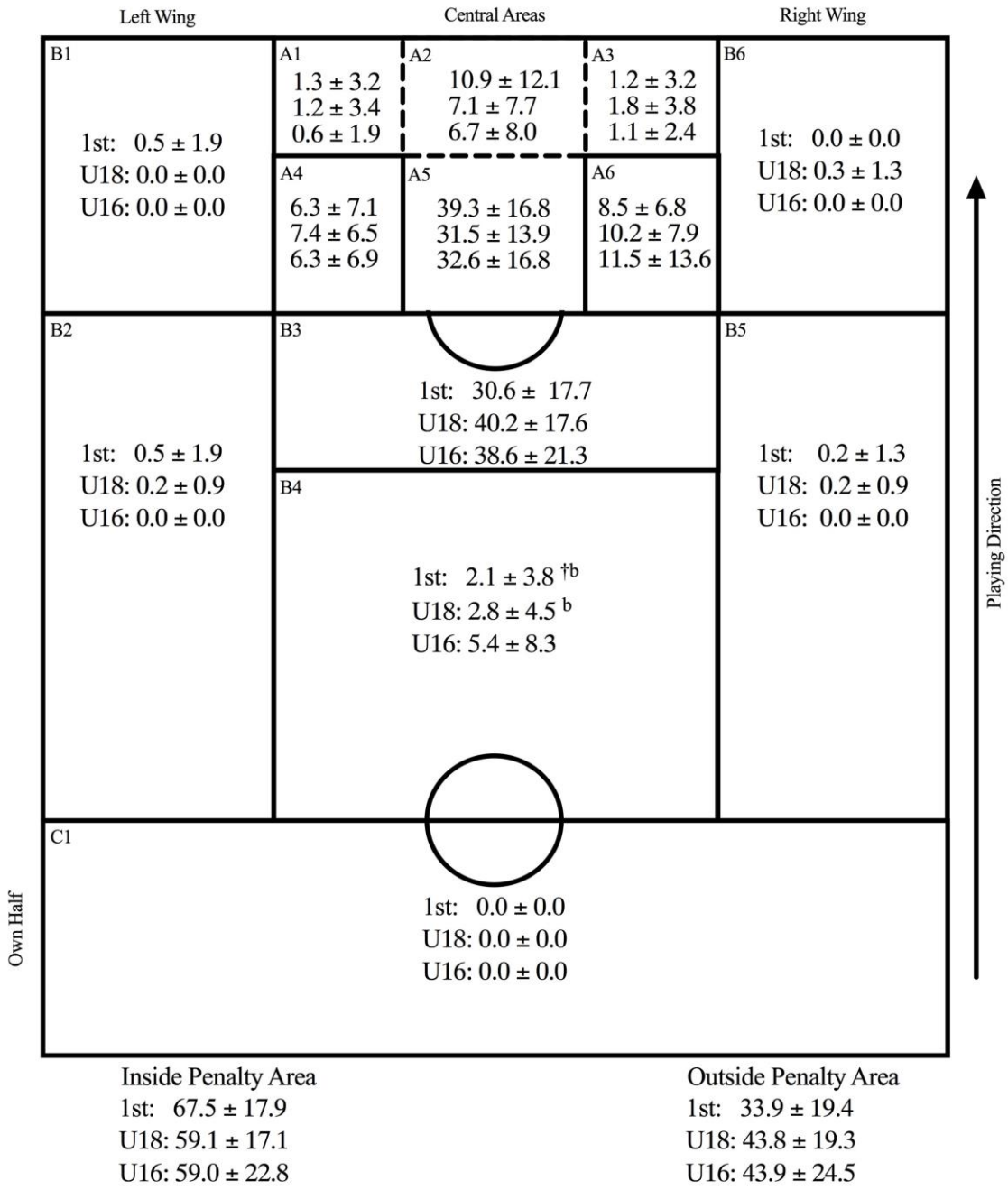


Figure 2. Shot location displayed as a percentage (mean ± SD) per zone across age groups, whereby †= significant difference across all groups ($p<0.05$), a = significant difference with U18 ($p<0.05$), b = significant difference with U16 ($p<0.05$)