Original Article

Where do the best technical football players in the world come from? Analysing the association between technical proficiency and geographical origin in elite football

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ABSTRACT

Opta seasonal sum total statistics for 1,533 professional football players representing 88 nations around the world were analysed in order to determine where the most proficient technical football players originate from. A series of Kruskal-Wallis tests were conducted and results revealed that South American players were significantly better at scoring the first goal ($p = .044$), scoring penalties ($p = .034$) and attempting shots ($p = .018$) than their European counterparts. Both European and South American players were revealed to be more adept at passing actions than their African, Asian or North American counterparts. Both South American and African players committed significantly more errors than their European, Asian or North American counterparts, with South American players more frequently apprehended by the referee than Asian players ($p = .031$), European players ($p = .020$) and North American players ($p = .034$). African players were revealed to be caught offside ($p = .039$) as well as have more unsuccessful ball touches ($p = .001$) and be dispossessed ($p = .036$) significantly more often than European players. It is concluded that a player's geographical origin can impact their technical proficiency in football and this theme needs further investigation.

Keywords: Opta; Player performance; Technical performance; Soccer; Player nationality; Performance analysis, Match analysis.

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INTRODUCTION

Recent years have seen much research focussed on factors that impact player performance in football with some research focussing upon the physical aspects of player performance (Andrzejewski et al., 2013; Di Salvo et al., 2009), technical aspects of player performance (Fernandez-Navarro et al., 2016; Jamil, McErlain-Naylor, et al., 2020; Liu et al., 2013), or both physical and technical parameters (Bush et al., 2015; Zhou et al., 2018). It has been widely acknowledged that performance in football is influenced by a combination of physiological, psychological, tactical and technical variables (Hughes et al., 2012) demonstrating the multi-faceted nature of performances in football where many parameters contribute to success (Mackenzie & Cushion, 2013).

With regards to technical variables previous literature has emphasised the importance of defensive actions (Hughes et al., 2012; Lago-Peñas et al., 2010), as well as accurate passing and shooting (Collet, 2013; Hughes et al., 2012). Metrics pertaining to the actions of passing and shooting in particular have received much attention in recent years (Hughes et al., 2012; Jamil, McErlain-Naylor, et al., 2020; Lago-Peñas et al., 2010; Liu et al., 2015, 2016; Zhou et al., 2018) and there is now a substantial body of research indicating technical skills such as passing, ball control, dribbling and shooting are the most prominent aspects of performance that are evaluated by coaches and scouts in talent identification systems when distinguishing between the skilled and less-skilled youth football players (Larkin & Reeves, 2018; Sarmento et al., 2018).

Something that has been relatively overlooked in previous research however is what influence geographical and their associated cultural factors can have on players technical abilities. Football is practiced differently in every country due to various reasons such as, differences in the technical skill levels of players, playing tactics, physical abilities, the quality of coaching and the socio-cultural aspects of each country football is played in, the influence of which vary nation to nation (Jamil, McErlain-Naylor, et al., 2020; Mitrotasios et al., 2019; Sarmento et al., 2013). Playing styles of football players can be influenced by their country of origin (Bush et al., 2015; Gai et al., 2019) meaning these geographical factors can influence and characterise the technical profiles of professional players and guide recruitment policies. In a recent study, Jamil, Littman, et al. (2020) discovered that the strategy football players adopt when taking penalty kicks varies depending upon which European league they are performing in. Further differences in playing styles across different nations were identified by Mitrotasios et al. (2019), who discovered that teams performing in the Spanish La Liga tend to possess players with high levels of technical skills but have less physicality than performers in other foreign leagues and cite how the playing style of FC Barcelona has influenced the understanding of European coaches with regards to player development. Similarly, teams performing in the English Premier League tend to recruit players that are taller and stronger than those in other leagues (Bloomfield et al., 2005). Furthermore, the cultural traditions of English football also seem to inform player recruitment as it has been evidenced that football in England is played at a higher tempo and with a more direct style which involves a greater number of aerial duels (Dellal et al., 2011; Mitrotasios et al., 2019) as well as higher levels of aggression in comparison to other leagues (Sapp et al., 2017). Trends in recruitment policies are also evident in the German Bundesliga (GB) where players also tend to be tall and strong (Mitrotasios et al., 2019), however football in Germany appears to be evolving more towards the technical development of players (Grossmann & Lames, 2015) and fast offensive and defensive transitions (Vogelbein et al., 2014) suggesting recruitment policies are evolving.

Previous research has made apparent that 1) successful execution of technical actions such as passing and shooting are key determinants of performance (Collet, 2013; Hughes et al., 2012; Jamil, McErlain-Naylor, et al., 2020; Lago-Peñas et al., 2010; Liu et al., 2015, 2016; Zhou et al., 2018) and 2) technical performance

profiles of players can be directly and indirectly influenced by socio-cultural factors unique to each country (Gai et al., 2019; Jamil, McErlain-Naylor, et al., 2020; Mitrotasios et al., 2019; Sarmento et al., 2013). As far as the author is aware, there have been no scientific studies that have examined where the most proficient technical players in the world come from, therefore the findings of this study can enable scouting resources to be allocated more efficiently, thereby enabling a club's recruitment department to make more informed and objective transfer decisions. In addition, the findings of this study can inform the youth development programs of football institutions, particularly for those institutions involved in setting up youth academies in foreign countries. Taking the above into consideration, the aims of this study are to comprehensively investigate the technical performances of 1,533 players, from 88 different nations, in order to determine where the most proficient technical football players in the world originate from, thereby offering further insights into the impacts of geographical and their associated cultural factors on the technical development of football players worldwide.

METHODS

Experimental design

In this retrospective study, a total of 88 international countries in 5 continents were represented by the 1,533 players in this sample (Table 1). This study was broken up into two separate analyses. The primary analysis compared the performances of European players (n = 1,097) with African players (n = 197), South American players (n = 173), Asian players (n = 33) and North American players (n = 33). 4 player observations from the continent of Oceania were excluded due to a lack of representation (resulting in 1,533 player season observations remaining). As the continent of Europe was heavily represented with 1,097 players, a secondary analysis was conducted in which the European countries represented in this study were broken up into 4 zones (Table 2), Northern Europe (n = 204), Eastern Europe (n = 24), Southern Europe (n = 364) and Western Europe (n = 505). All countries were categorised in their continents or zones in accordance with their status on the United Nations website (www.UN.org)[1]. Information on player nationalities was obtained from the increasingly popular Transfermarkt website (Peeters, 2018). In the case a player had achieved dual nationality status, the country they had chosen to represent at senior international level was the country that player was assigned to. If a player had achieved dual nationality status but had not played international football, they were assigned to their country of birth.

Data and Variables

Technical performance data was utilised in this study and data was provided by Opta sports, renowned for having a high degree of accuracy (Jamil, 2019; Jamil, McErlain-Naylor, et al., 2020; Liu et al., 2013). The data utilised in this study consisted of seasonal statistics (sum totals) for 1,533 players performing in four elite football leagues, the English Premier League (EPL), Spanish La Liga (SLL), German Bundesliga (GB) and the French Ligue 1 (FL) in the 2017/2018 season. All 1,533 players analysed in this study were outfield players and no player was represented multiple times. This study only included players that performed regularly in 10% or more of the season. Consequently, as there are a maximum of 3,420 minutes in a 38 game season only players that had played 342 minutes or more were included in this study (306 minutes in the German Bundesliga as they only have 34 matches in a season).

Variables utilised in this study were identified by previous literature (Hughes et al., 2012; Jamil, McErlain-Naylor, et al., 2020; Lago-Peñas et al., 2010; Liu et al., 2016; Zhou et al., 2018) and therefore consisted of a total of 43 technical metrics. These variables were categorised into four areas, shooting, passing, defensive

[1] All country classifications were correct at the time of writing.

and errors. Table 3 presents a list of variable definitions; all definitions were obtained from either the official Opta F24 appendices or the Opta website*[2].

Statistical analysis

Parametric assumption tests such as the Kolmogorov-Smirnov test for normality and the Levene test for homogeneity of variance were conducted for the technical measures analysed throughout this study and many assumption violations were discovered meaning a non-parametric method was required. Consequently, Kruskal-Wallis tests were conducted to test for differences in means (mean ranks) between each of the nationality groups for each of the 45 technical measures of performance analysed in this study (Bewick et al., 2004). A 95% ($p \leq .05$) significance value was set initially, with significance values adjusted by the Bonferroni correction when conducting the pairwise comparisons (Sedgwick, 2012). Effect sizes (ES), assessed as Pearson's r, were also calculated as they provide an objective measure of the magnitude of an effect following a Kruskal-Wallis analysis analyses (Jamil, McErlain-Naylor, et al., 2020). The widely used thresholds for small (0.1 – 0.3), medium (0.3 – 0.5) and large effects (> 0.5) set by Cohen (1992) were utilised in this study. All analyses were conducted using IBM SPSS version 25 (IBM Corp. Released 2017. IBM SPSS Statistics for Macintosh, Version 25.0. Armonk, NY: IBM Corp).

RESULTS

Primary analysis

Table 4 reveals significant differences in shooting performances and players of a South American origin were revealed to be more proficient at shooting than their European or Asian counterparts. South American players scored the first goal more often than their European counterparts ($p = .044$) and they also tended to have more shots ($p = .018$). South American players also scored significantly more penalty kicks than either European players ($p = .034$) or Asian players ($p = .042$).

With regards to passing ability, South American and European players were revealed to be much more proficient than their North American, Asian or African counterparts. South American players were significantly better than African players at completing passes ($p = .001$) as were European players ($p < .001$). African players completed significantly fewer passes than their European counterparts in each third of the playing field (defensive third, $p < .001$, middle third, $p = .002$, attacking third, $p = .046$) and South American players in the defensive third ($p = .005$) and middle third ($p = .002$). Asian players also completed significantly fewer passes in the defensive third than both, European players ($p = .032$) and South American players ($p = .039$). African players completed significantly fewer short passes (less than 32 metres in length) than either their European counterparts ($p = .001$) or their South American counterparts ($p = .001$). Northern American players also completed significantly fewer short passes than South American players ($p = .045$). European and South American players are revealed to be more proficient at long passing (over 32 metres in length) than either African players ($p = .001$, $p = .001$) and Asian players ($p = .043$, $p = .016$). North American players are also revealed to be less proficient than European and South American players particularly in attacking areas of the playing field. For example, North American players executed significantly fewer passes than European players in the opponent's half of the field ($p = .019$) and the final third (attacking third) of the field ($p = .039$). North American players also executed significantly less through balls than their South American counterparts ($p = .018$).

[2] * www.Optasports.com – Staff at Opta were contacted directly to clarify definitions for a select few variables.

Table 1. List of all countries represented in this study.

Europe	Albania (n=3), Austria (n=24), Belgium (n=31), Bosnia-Herzegovina (n=6), Croatia (n=15), Czechia (n=5), Denmark (n=19), England (n=127), Estonia (n=1), Finland (n=2), France (n=235), Germany (n=161), Greece (n=8), Hungary (n=2), Iceland (n=3), Ireland (n=10), Italy (n=18), Kosovo* (n=2), Luxembourg (n=2), Montenegro (n=2), Netherlands (n=33), North Macedonia (n=1), Northern Ireland (n=4), Norway (n=7), Poland (n=9), Portugal (n=27), Russia (n=2), Scotland (n=9), Serbia (n=19), Slovakia (n=3), Slovenia (n=5), Spain (n=258), Sweden (n=10), Switzerland (n=19), Ukraine (n=3), Wales (n=12)
Africa	Algeria (n=14), Angola (n=1), Benin (n=3), Burkina Faso (n=5), Burundi (n=1), Cameroon (n=13), Cape Verde (n=2), CAF (n=2), Congo (n=3), DR Congo (n=17), Egypt (n=4), Equatorial Guinea (n=1), Gabon (n=4), Ghana (n=12), Guinea (n=7), Ivory Coast (n=22), Kenya (n=2), Madagascar (n=1), Mali (n=10), Morocco (n=14), Mozambique (n=1), Nigeria (n=11), Senegal (n=30), South Africa (n=4), Togo (n=5), Tunisia (n=8)
Asia	Armenia (n=2), Israel (n=3), Japan (n=13), South Korea (n=4), Turkey (n=11)
North America	Canada (n=1), USA (n=10), Costa Rica (n=2), Curacao (n=1), Dominican Republic (n=1), Guadeloupe (n=3), Haiti (n=2), Honduras (n=1), Jamaica (n=3), Martinique (n=2), Mexico (n=7)
South America	Argentina (n=49), Brazil (n=66), Chile (n=9), Colombia (n=15), Ecuador (n=1), French Guiana (n=2), Paraguay (n=4), Peru (n=2), Uruguay (n=18), Venezuela (n=7)

*All nations are categorised according to their zoning by the United Nations (U.N). * Kosovo not listed on UN website so were recognised as being in Europe based on the classification of their neighbouring countries.*

Table 2. List of countries represented by each European Zone.

Northern Europe	Denmark (n=19), United Kingdom (n=152), Estonia (n=1), Finland (n=2), Iceland (n=3), Ireland (n=10), Norway (n=7), Sweden (n=10)
Southern Europe	Albania (n=3), Bosnia-Herzegovina (n=6), Croatia (n=15), Greece (n=8), Italy (n=18), Kosovo* (n=2), Montenegro (n=2), North Macedonia (n=1), Portugal (n-27), Serbia (n=19), Slovenia (n=5), Spain (n=258)
Eastern Europe	Czechia (n=5), Hungary (n=2), Poland (n=9), Russia (n=2), Slovakia (n=3), Ukraine (n=3)
Western Europe	Austria (n=24), Belgium (n=31), France (n=235), Germany (n=161), Luxembourg (n=2), Netherlands (n=33), Switzerland (n=19)

*All nations are categorised according to their zoning by the United Nations (U.N). * Kosovo not listed on UN website so were recognised as being in Southern Europe based on the classification of their neighbouring countries.*

Table 3. Categorisation and definitions of variables.

Shooting Metrics	
(1) Goals	All goals scored - Regarding deflections, normally a goal is awarded if the original attempt is on target.
(2) First goal	(1) the first of the match.
(3) Winning goal	(1) the match winning goal.
(4) Shots on target inc goals	Any goal or goal attempt that: - Goes into the net regardless of intent. - Is a clear attempt to score that would have gone into the net but for being saved by the goalkeeper or is stopped by a player who is the last-man with the goalkeeper having no chance of preventing the goal (last line block).

(5) Shots off target inc woodwork	Any clear attempt to score that: - Goes over or wide of the goal without making contact with another player. - Would have gone over or wide of the goal but for being stopped by a goalkeeper's save or by an outfield player. - Directly hits the frame of the goal and a goal is not scored.
(6) Goals open play	(1) scored from open play rather than a set play.
(7) Goals from set play	(1) scored from a set play rather than open play.
(8) Goals from penalties	(1) scored from a penalty situation.
(9) Attempts open play on target	On target shot during open play as opposed to from a set play.
(10) Attempts from set play on target	On target shot resulting from a set play as opposed to from open play.
(11) Big chances	A situation where a player should reasonably be expected to score, usually in a one on one scenario or from very close range when the ball has a clear path to goal and there is low to moderate pressure on the shooter. Penalties are always considered big chances.
(12) Big chances scored	(11) scored.
Passing Metrics	
(13) Total successful passes	Any intentional played ball from one player to another (successfully received by the intended recipient without a touch from an opposing player). Passes include open play passes, goal kicks and free kicks played as a pass.
(14) Assists	The final touch (pass, pass-cum-shot or any other touch) leading to the recipient of the ball scoring a goal. If the final touch is deflected by an opposition player, the initiator is only given a goal assist if the receiving player was likely to receive the ball without the deflection having taken place. Own goals, directly taken free kicks, direct corner goals and penalties do not get an assist awarded.
(15) Key passes	The final pass or pass-cum-shot leading to the recipient of the ball having an attempt at goal without scoring.
(16) Successful passes opponent half	(13) played in an opposing team's half.
(17) Successful passes defensive third.	(13) played in the subject team's defensive third.
(18) Successful passes middle third	(13) played in the middle third of the playing field.
(19) Successful passes final third	(13) played in the final third of the playing field (attacking third).
(20) Successful short passes	(13) under 32 metres in distance.
(21) Successful long passes	(13) over 32 metres in distance.
(22) Through ball	A pass splitting the defence for a team-mate to run on to.
(23) Big chance created	(11) created.
Defensive Metrics	
(24) Aerial duels won	50/50 when the ball is in the air – Won.
(25) Aerial duels lost	50/50 when the ball is in the air – Lost.
(26) Tackles won	Tackle = dispossesses an opponent of the ball, Won = gained possession.
(27) Tackles lost	Tackle = dispossesses an opponent of the ball, Lost = unsuccessful attempt at gaining possession.
(28) Last man tackle	(26) by the last person between the opponent and the goal (excluding goalkeeper).
(29) Total clearances	Player under pressure hits ball clear of the defensive zone or/and out of play.

(30) Blocks	Outfield player blocks an opposition shot.
(31) Interceptions	When a player intercepts any pass event between opposition players and prevents the ball reaching its target.
(32) Recoveries	When a player takes possession of a loose ball.
Error Metrics	
(33) Total fouls conceded	All fouls committed that have resulted in a free kick.
(34) Penalties conceded	(33) committed in the subject's penalty area.
(35) Offsides	Player was in an offside position when pass was made by a teammate.
(36) Yellow cards	A booking received for one of several infringements resulting in a yellow card being awarded.
(37) Red cards	A booking received for one of several infringements resulting in a red card being awarded (includes red cards awarded for a player receiving 2 yellows card).
(38) Error leading to goal	A player error (mistake which loses the ball) which leads to an opponent scoring a goal.
(39) Error leading to attempt	A player error (mistake which loses the ball) which leads to an opponent shot on goal.
(40) Unsuccessful ball touch	When a player makes a bad touch on the ball and loses possession.
(41) Take-ons overrun	Take on where the player attempting overhits the ball and it runs away from them out of play or to an opponent
(42) Dispossessed	Player is successfully tackled and loses possession of the ball.
(43) Big chances fluffed	(11) missed.

Table 4. Differences in Technical Performance (Primary Analysis) – Shooting.

Technical Measure	H	p - value	Pairwise difference (Median Values)	Mean Analysis (Mean Rank Values)	p – value (post-hoc)	Effect Size (r)
Goals	14.975	.005**	Nil after Bonferroni adjustment	-	-	-
First goal	14.267	.006**	E (0) – SA (0)	E (748.98) – SA (838.63)	.044*	0.08 (small)
Winning goal	9.275	.055+	-	-	-	-
Shots on target inc goals	8.694	.069+	-	-	-	-
Shots off target inc woodwork	14.426	.006**	E (7) – SA (9)	E (742.92) – SA (855.98)	.018*	0.09 (small)
Goals open play	18.360	.001**	Nil after Bonferroni adjustment	-	-	-
Goals from set play	3.699	.448+	-	-	-	-
Goals from penalties	12.463	.014*	As (0) – SA (0)	As (690.5) – SA (815.55)	.042*	0.20 (small)
			E (0) – SA (0)	E (760.36) – SA (815.55)	.034*	0.08 (small)
Attempts open play on target	10.545	.032*	Nil after Bonferroni adjustment	-	-	-
Attempts from set play on target	6.414	.170+	-	-	-	-
Big chances	8.913	.063+	-	-	-	-
Big chances scored	11.050	.026*	Nil after Bonferroni adjustment	-	-	-

*** = Significant at 99% CI, * = Significant at 95% CI, + = Non-significant.*

Table 5. Differences in Technical Performance (Primary Analysis) – Passing.

Technical Measure	H	p - value	Pairwise difference (Median Values)	Mean Analysis (Mean Rank Values)	p – value (post-hoc)	Effect Size (r)
Total successful passes	27.258	.000**	Af (417) – E (571)	Af (648.15) – E (787.18)	.000**	0.11 (*small*)
			Af (417) – SA (560)	Af (648.15) – SA (829.68)	.001**	0.20 (*small*)
Assists	8.783	.067+	-	-	-	-
Key passes	6.372	.151+	-	-	-	-
Successful passes opponent half	22.212	.000**	Af (220) – E (275)	Af (665.09) – E (784.62)	.005**	0.10 (*small*)
			Af (220) – SA (290)	Af (665.09) – SA (818.68)	.009**	0.17 (*small*)
			E (275) – NA (186)	E (784.62) – NA (556.95)	.036*	0.09 (*small*)
			NA (186) – SA (290)	NA (556.95) - SA (818.68)	.019*	0.22 (*small*)
Successful passes defensive third	28.191	.000**	Af (54) – E (91)	Af (643.34) – E (791.89)	.000**	0.12 (*small*)
			Af (54) – SA (84)	Af (643.34) – SA (804.12)	.005**	0.18 (*small*)
			As (36) – E (91)	As (561.61) – E (791.89)	.032*	0.09 (*small*)
			As (36) – SA (84)	As (561.61) - SA (804.12)	.039*	0.20 (*small*)
Successful passes middle third	24.167	.000**	Af (219) – E (283)	Af (557.66) – E (785.38)	.002**	0.10 (*small*)
			Af (219) – SA (298)	Af (557.66) – SA (829.21)	.002**	0.19 (*small*)
Successful passes final third	15.972	.003**	Af (97) – E (125)	Af (686.35) – E (783.47)	.046*	0.08 (*small*)
			E (125) – NA (76)	E (783.47) – NA (557.89)	.039*	0.09 (*small*)
Successful short passes	26.880	.000**	Af (384) – E (495)	Af (648.99) – E (786.63)	.001**	0.11 (*small*)
			Af (384) – SA (516)	Af (648.99) – SA (830.90)	.001**	0.20 (*small*)
			NA (341) – SA (516)	NA (592.09) - SA (830.90)	.045*	0.20 (*small*)
Successful long passes	28.025	.000**	Af (20) – E (32)	Af (652.95) – E (787.24)	.001**	0.11 (*small*)
			Af (20) – SA (34)	Af (652.95) – SA (829.38)	.001**	0.20 (*small*)
			As (25) – E (32)	As (563.83) – E (787.24)	.043*	0.08 (*small*)
			As (25) – SA (34)	As (563.83) - SA (829.38)	.016*	0.22 (*small*)
Through ball	13.016	.11*	NA (0) – SA (1)	NA (596.18) - SA (831.37)	.018*	0.22 (*small*)
Big chance created	11.480	.022*	Nil after Bonferroni adjustment	-	-	-

*** = Significant at 99% CI, * = Significant at 95% CI, + = Non-significant. Af = Africa, As = Asia, E = Europe, NA = North America, SA = South America.*

Table 6. Differences in Technical Performance (Primary Analysis) – Defensive Actions.

Technical Measure	H	p - value	Pairwise difference (Median Values)	Mean Analysis (Mean Rank Values)	p – value (post-hoc)	Effect Size (r)
Aerial duels won	4.304	.366+	-	-	-	-
Aerial duels lost	5.569	.234+	-	-	-	-
Tackles won	11.492	.022*	Nil after Bonferroni adjustment	-	-	-
Tackles lost	8.342	.080+	-	-	-	-
Last man tackle	4.969	.290+	-	-	-	-
Total clearances	14.834	.005**	Nil after Bonferroni adjustment	-	-	-
Blocks	14.588	.006**	Nil after Bonferroni adjustment	-	-	-
Interceptions	12.034	.007**	Nil after Bonferroni adjustment	-	-	-
Recoveries	10.759	.029*	Nil after Bonferroni adjustment	-	-	-

*** = Significant at 99% CI, * = Significant at 95% CI, + = Non-significant. Af = Africa, As = Asia, E = Europe, NA = North America, SA = South America.*

Table 7. Differences in Technical Performance (Primary Analysis) – Errors.

Technical Measure	H	p - value	Pairwise difference (Median Values)	Mean Analysis (Mean Rank Values)	p – value (post-hoc)	Effect Size (r)
Total fouls conceded	13.127	.011*	E (20) – SA (23)	E (747.74) – SA (858.61)	.022*	0.09 (small)
Penalties conceded	4.182	.382+	-	-	-	-
Offsides	16.055	.003**	Af (2) – E (1)	Af (837.52) - E (740.77)	.039*	0.08 (small)
Yellow cards	25.459	.000**	As (2) – Af (3)	As (507.95) – Af (751.87)	.031*	0.19 (small)
			As (2) – E (3)	As (507.95) – E (764.51)	.009**	0.10 (small)
			As (2) – SA (4)	As (507.95) – SA (875.30)	.000**	0.31 (medium)
			E (3) – SA (4)	E (764.51) - SA (875.30)	.020*	0.09 (small)
			NA (2) – SA (4)	NA (631.24) – SA (875.30)	.034*	0.20 (small)
Red cards	16.627	.002**	E (0) – SA (0)	E (752.51) – SA (826.30)	.005**	0.10 (small)
Error leading to goal	6.130	.190+	-	-	-	-
Error leading to attempt	5.815	.213+	-	-	-	-
Unsuccessful ball touch	21.158	.000**	Af (24) – E (18)	Af (878.31) – E (739.85)	.001**	0.12 (small)
Take-ons overrun			-	-	-	-
Dispossessed	12.813	.012*	Af (17) – E (14)	Af (847.60) – E (748.05)	.036*	0.09 (small)
Big chances fluffed	1.649	.800+	-	-	-	-

*** = Significant at 99% CI, * = Significant at 95% CI, + = Non-significant. Af = Africa, As = Asia, E = Europe, NA = North America, SA = South America.*

Table 8. Differences in Technical Performance (Secondary Analysis) – Shooting.

Technical Measure	H	p - value	Pairwise difference (Median Values)	Mean Analysis (Mean Rank Values)	p – value (post-hoc)	Effect Size (r)
Goals	0.859	.835+	-	-	-	-
First goal	3.388	.336+	-	-	-	-
Winning goal	0.067	.996+	-	-	-	-
Shots on target inc goals	2.082	.556+	-	-	-	-
Shots off target inc woodwork	3.006	.391+	-	-	-	-
Goals open play	2.626	.453+	-	-	-	-
Goals from set play	1.545	.672+	-	-	-	-
Goals from penalties	1.397	.706+	-	-	-	-
Attempts open play on target	1.342	.719+	-	-	-	-
Attempts from set play on target	4.173	.243+	-	-	-	-
Big chances	2.419	.490+	-	-	-	-
Big chances scored	1.055	.788+	-	-	-	-

*** = Significant at 99% CI, * = Significant at 95% CI, + = Non-significant. EE = Eastern Europe, NE = Northern Europe, SE = Southern Europe, WE = Western Europe.*

Table 9. Differences in Technical Performance (Secondary Analysis) – Passing.

Technical Measure	H	p - value	Pairwise difference (Median Values)	Mean Analysis (Mean Rank Values)	p – value (post-hoc)	Effect Size (r)
Total successful passes	2.105	.551+	-	-	-	-
Assists	1.174	.759+	-	-	-	-
Key passes	1.061	.786+	-	-	-	-
Successful passes opponent half	0.987	.804+	-	-	-	-
Successful passes defensive third	2.427	.489+	-	-	-	-
Successful passes middle third	2.294	.514+	-	-	-	-
Successful passes final third	1.980	.577+	-	-	-	-
Successful short passes	2.084	.555+	-	-	-	-
Successful long passes	3.811	.283+	-	-	-	-
Through ball	4.790	.188+	-	-	-	-
Big chance created	0.792	.851+	-	-	-	-

*** = Significant at 99% CI, * = Significant at 95% CI, + = Non-significant. EE = Eastern Europe, NE = Northern Europe, SE = Southern Europe, WE = Western Europe.*

Table 10. Differences in Technical Performance (Secondary Analysis) – Defensive Actions.

Technical Measure	H	p - value	Pairwise difference (Median Values)	Mean Analysis (Mean Rank Values)	p – value (post-hoc)	Effect Size (r)
Aerial duels won	11.388	.010*	NE (24.5) – SE (18)	NE (595.27) – SE (507.86)	.010*	0.13 (small)
Aerial duels lost	20.890	.000**	NE (29.5) – SE (21)	NE (624.72) – SE (500.33)	.000**	0.19 (small)
Tackles won	8.339	.039*	NE (18.5) – WE (24)	NE (502.42) – WE (574.70)	.036*	0.10 (small)
Tackles lost	2.270	.518+	-	-	-	-
Last man tackle	4.053	.256+	-	-	-	-
Total clearances	6.307	.098+	-	-	-	-
Blocks	4.999	.172+	-	-	-	-
Interceptions	1.708	.635+	-	-	-	-
Recoveries	8.330	.040*	EE (50.5) – NE (91)	EE (383.98) – NE (572.61)	.033*	0.18 (small)

*** = Significant at 99% CI, * = Significant at 95% CI, + = Non-significant. EE = Eastern Europe, NE = Northern Europe, SE = Southern Europe, WE = Western Europe.*

Table 11. Differences in Technical Performance (Secondary Analysis) – Errors.

Technical Measure	H	p - value	Pairwise difference (Median Values)	Mean Analysis (Mean Rank Values)	p – value (post-hoc)	Effect Size (r)
Total fouls conceded	8.070	.045*	NE (17.5) – WE (20)	NE (493.02) – WE (566.06)	.033*	0.10 (small)
Penalties conceded	2.953	.399+	-	-	-	-
Offsides	2.227	.527+	-	-	-	-
Yellow cards	20.622	.000**	NE (2) – SE (3)	NE (504.61) – SE (605.53)	.001**	0.15 (small)
			WE (3) – SE (3)	WE (531.65) – SE (605.53)	.004**	0.12 (small)
Red cards	2.447	.485+	-	-	-	-
Error leading to goal	7.157	.067+		-	-	-
Error leading to attempt	33.890	.000**	NE (0) – SE (0)	NE (581.17) – SE (491.09)	.000**	0.18 (small)
			WE (0) – SE (0)	WE (580.22) – SE (491.09)	.000**	0.18 (small)
Unsuccessful ball touch	7.845	.049*	EE (13) – WE (17)	EE (378.08) – WE (569.15)	.031*	0.19 (small)
Take-ons overrun	11.823	.008**	NE (2) – WE (3)	NE (496.53) – WE (581.18)	.007**	0.12 (small)
Dispossessed	2.333	.506+	-	-	-	-
Big chances fluffed	4.209		-	-	-	-

*** = Significant at 99% CI, * = Significant at 95% CI, + = Non-significant. EE = Eastern Europe, NE = Northern Europe, SE = Southern Europe, WE = Western Europe.*

From a defensive perspective, the results reveal no variation between each of the 5 continent groups suggesting that with regards to defensive ability, players from around the world are of relatively equal ability. When assessing errors, Table 7 reveals that South American players conceded significantly more fouls than European players ($p = .022$) and consequently picked up significantly more red cards than European players ($p = .005$). Perhaps due to persistent fouling, South American players were also revealed to pick up more yellow card cautions than either Asian players ($p = .031$), European players ($p = .020$) and North American players ($p = .034$). African players also committed some errors and were revealed to be offside significantly more than European players ($p = .039$) as well as have more unsuccessful ball touches ($p = .001$) and be dispossessed more frequently than European players ($p = .036$).

Secondary analysis

Tables 8 and 9 reveal no significant variation in shooting or passing ability between players from the 4 European zones, suggesting shooting and passing ability is relatively equal across Europe. When assessing defensive actions, Table 10 reveals that Northern European players won ($p = .010$) and lost ($p < .001$) significantly more aerial duels than Southern European players. Western European players were revealed to be more proficient than Northern European players at tackling ($p = .036$) and Northern European players were more adept at performing recoveries than Eastern European players ($p = .033$).

When analysing differences between erroneous actions, Table 11 reveals that Western European players conceded significantly more fouls than Northern European players ($p = .033$) and also over-ran significantly more take-on attempts ($p = .007$). Both Western European ($p < .001$) and Northern European players ($p < .001$) committed significantly more errors that led to goal scoring attempts than Southern European players. Southern European players however acquired significantly more yellow card cautions than Northern European players ($p = .001$) and Western European players ($p= .004$). Western European players also had significantly more unsuccessful ball touches than Eastern European players ($p = .031$). Almost all significant differences discovered in both the primary and secondary analyses were revealed to have *small* ES, however this is to be expected due to the multifaceted nature of football where a combination of variables contribute to overall performance (Mackenzie and Cushion, 2013).

DISCUSSION

The aims of this study were to investigate where the most technically proficient football players in the world originate from. The results of the primary analysis revealed that South American players were more proficient than either their European or Asian counterparts at shooting. Results have also revealed that both South American and European players were significantly more proficient passers of the ball than their African, Asian or North American counterparts. Both South American and African players were discovered to commit significantly more errors than their European, Asian or North American counterparts, with South American players more frequently apprehended by the referee and African players guilty of errors such as being caught offside, being dispossessed or unsuccessfully controlling the ball. The results of the secondary analysis revealed that Western European players were guilty of committing more errors than their Northern, Southern or Eastern counterparts, however they were also more capable of winning tackles.

The results of the primary analysis revealed that players of a South American origin were particularly proficient at performing actions pertaining to shooting and passing. One potential reason explaining why South American players may be more proficient at successfully executing these actions more frequently than their foreign counterparts could be because of their increased exposure to the sport of futsal which is still hugely popular in South America (Berdejo-del-Fresno, 2014). Futsal which translates to "*hall football*" is

considered the sister sport of football and its origins can be traced back to the 1930's in South America (Moore et al., 2014). Previous research has revealed that futsal can be particularly effective at enhancing passing efficacy (Travassos et al., 2012) as well as spatial awareness (Corrêa et al., 2012) perhaps explaining why futsal is becoming more commonly adopted by football institutions worldwide as a development tool in order to improve youth footballers' technical and tactical behaviours (Moore et al., 2014). Another potential reason explaining these results could be due to youth athletes of a Latin[3] origin having a lack of interest in sports other than football (Hoffmann et al., 2019). In a study on international football performances, Hoffmann et al. (2019), discovered that an increase in population size in a Latin country by 1% relative to the rest of the world would result in a substantial improvement in their FIFA World ranking. No such results were discovered for non-Latin countries with Hoffman et al. (2019) stating that this could be due to football competing with too many rival sports for population increases to have a significant impact.

Both South American and African players tended to commit more errors than their European, Asian or North American counterparts. South American players have been discovered to commit more fouls and therefore receive significantly more yellow and red card cautions than their foreign counterparts. This result could also be linked to cultural influences as a coach interviewed by Sarmento et al. (2013, p. 778), stated that players of a Latin origin "*are more emotional, much warmer, but also much less rational*" and although this is the opinion of a coach, the results obtained in this study suggest that this particular theme merits further investigation. African players are also revealed to commit more errors than their European counterparts as they are caught offside more often, are dispossessed more frequently and have more unsuccessful touches of the ball. This could be partly explained by the lower standard of football played in the African continent at both grassroots and professional levels (Ferrari, 2017). According to Ferrari (2017), the inaccessibility of technological equipment as well as the instability of internet connections severely hamper their performance analysis capabilities which are required to improve technical and tactical skills at grassroots and professional levels of football in Africa.

European players were also significantly more proficient at executing passing actions than their African, Asian and North American counterparts. This could be partly due to cultural influences dictating a player's or team's style of play. European football has long held a fascination with what is known as "*Total Football*" which encourages all players to be comfortable with the ball at their feet, look for passes and exploit space opened up by the fluid movement and inter-changing of positions (Ingersoll et al., 2017). An evolutionary branch of total football commonly referred to as "*tiki-taka*" is performed by the likes of FC Barcelona (Lopez Frías, 2015) and due to their recent success, other European teams have adopted their style of play (Ingersoll et al., 2017) and their playing style has influenced the understanding of many European coaches with regards to player development (Mitrotasios et al., 2019). Another factor that could explain why European players are particularly proficient at passing are the heightened levels of support mechanisms available to European players, particularly at the youth academy and pre-academy levels where the focus is largely on early specialisation of skills (Larkin & Reeves, 2018). The demand for highly skilled youth players is such that professional academies are being established around the world from the well-developed in European countries such as England and Germany to the less-well developed in non-European footballing territories such as Australia, USA, China and India (Larkin & Reeves, 2018). Considering up to 75% of on the ball actions in a football match can relate to passing (Bransen & Van Haaren, 2019), the passing results obtained in this study help explain why all of the FIFA World Cup tournaments held since the first one in 1930 have had winners from either South America or Europe (Hoffmann et al., 2019).

[3] In this study the "*Latin*" variable included players from Latin American countries as well as Portugal and Spain.

North American players were also revealed to be less proficient at passing than either European or South American players particularly in attacking areas of the field. These results could also be partly explained by the less-well developed professional youth academies in countries such as the USA (Larkin & Reeves, 2018). Furthermore these results could also be influenced by socio-cultural and economic influences as despite having high levels of youth participation, football is considered to be a second tier participation sport by many in North America (Jewell, 2014). Furthermore, the best athletes in countries such as the USA are often lured by more lucrative sports (Jewell, 2014) such as baseball, American football, basketball and ice hockey, with which football struggles to compete in terms of popularity (Strutner et al., 2014). As stated by Jewell (2014), the recent successes of the female USA football team have further restricted the development of men's football in the USA as many sports fans in this region of the world now perceive football to be a sport for females and children.

The results of the secondary analysis revealed no significant differences between passing and shooting metrics suggesting passing and shooting ability is relatively equal across the European continent. The results obtained for defensive and error metrics, however, offer some insight into the technical differences that exist within European football. Results revealed that Northern European players were involved in significantly more aerial activities than Southern European players reaffirming the findings of (Dellal et al., 2011) and further reiterating the notion that Northern European nations such as England are more accustomed to a direct style of play (Mitrotasios et al., 2019). Somewhat surprisingly, Western European players including those from the last two FIFA World Cup winning nations, Germany and France were revealed to commit more errors than players from Northern Europe, Southern Europe or Eastern Europe and further research is required to ascertain why.

This study has shed more light on the technical abilities of elite football players and specifically on the association between player nationality and player performance however this study was limited in the main by an absence of physical parameters which may influence some of the trends discovered in this study. Future research therefore could expand on this investigation and incorporate physical performance data from elite leagues enabling them to further inform football clubs where they should be allocating their player recruitment resources.

CONCLUSION

Evidence has been discovered confirming that South American players are more adept than European players at shooting whilst both South American and European players are more proficient than their African, Asian and North American counterparts at performing actions pertaining to passing. From a defensive perspective no variation was discovered between the performances of players from all 5 continents suggesting that with regards to defensive ability at least, players from around the world are of relative equal ability. Both South American and African players are guilty of committing more errors than players from other continents, with South American players more often reprimanded by the referee whilst African players are caught offside more often, dispossessed more often and have a greater number of unsuccessful ball touches. A secondary analysis focussing specifically on Europe revealed that European players are of relative equal ability when it comes to shooting and passing. Although players from Western Europe are revealed to be the better at tackling than players from other European zones they also seem to commit significantly more errors than players from Northern Europe, Southern Europe or Eastern Europe. The author concludes that the impact of geographical factors on player performance is evident and this particular theme needs further investigation moving forward.

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