

Physical, technical, and tactical differences between continental soccer teams participating in the 2018 FIFA World Cup

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Published online: June 30, 2022

(Accepted for publication June 15, 2022)

DOI:10.7752/jpes.2022.06190

Abstract

Approach: In elite soccer, the physical, technical, and tactical variables must be analyzed in a complex and detailed way, aiming to improve the understanding of the teams' performances. However, these variables can be influenced by the playstyle of teams from the different continents. **Purpose:** This study aimed to compare the physical, technical, and tactical differences between the soccer teams from different continents (America, Europe, and Africa/Asia/Oceania) who participated in the 2018 FIFA World Cup. Forty-eight matches played during the group stage of the 2018 FIFA World Cup were analyzed. The data obtained were coded and calculated by a tracking system (GPS). The national teams were grouped according to the qualifiers for the 2018 FIFA World Cup and analyzed into three main groups (Europe: UEFA + Russia; America: CONMEBOL + CONCACAF; Africa/Asia/Oceania: CAF + AFC). Thirty-seven variables were analyzed and divided into tactical, physical, and technical parameters. **Results:** The results showed that athletes from the European teams were taller, covered a greater total distance faster (between 20 and 25 km.h⁻¹), and spent more time in the opposing field (final third and penalty area) when compared to athletes from other continents. In contrast, athletes from the American continent were older (average age) and their attacks originated more from the left side of the field. Finally, Africa/Asia/Oceania athletes recovered a greater number of balls, had fewer corners, and their attacks originated more from the right side of the field. **Conclusions:** In summary, European teams had a more intense (physical parameters) and offensive playstyle (tactical) when compared to teams from other continents participating in the 2018 FIFA World Cup.

Key Words: Performance. Football. World Cup. Match Statistics. Tracking System.

Introduction

Soccer is a global sport, practiced by people around the world. The FIFA World Cup is a competition that brings together the best teams from all the continents, with the highest-level soccer players aiming for the world championship. To reach this, the technical, tactical, and physical variables involved are extremely important and should be analyzed (Alves et al., 2019).

One of the main performance determinants measured in recent years is physical variables. Previous studies have analyzed players from the 2012/2013 Premier League. When compared with the previous cup season (2006/2007), there was a significant increase in total distance covered (10,679 ± 956m vs. 10,881 ± 885m), the distance at a high intensity (890 ± 299m vs. 1,151 ± 337m), the number of sprints performed, and maximum speed reached during the matches. These changes were found in all playing positions, especially the fullbacks, who covered longer distances faster (Barnes et al., 2014; Bush et al., 2015).

These physical variables can also vary between athletes from different continents (Tuo et al., 2019). In the study by Tuo et al. (2019), carried out with athletes from different continental federations in the 2018 World Cup, it was shown that players from the teams of Asia (AFC), Africa (CAF), and Central/North America (CONCACAF) covered a shorter total distance and spent substantially more time at low speed (< 7 km.h⁻¹) when compared to players from Europe (UEFA) and South America (CONMEBOL). Thus, despite the greater world interest in soccer in recent years and recruitment of trained players, we have found that there are still physical differences between the main teams in the world.

Although physical fitness is a determining factor in some soccer leagues and championships (Barnes et al., 2014; Bush et al., 2015), technical and tactical variables should also be considered, especially the main performance determinants in elite soccer (Alves et al., 2019; Enes et al., 2021). A previous study has shown that tactical variables influenced the result of the 2011/2012 French Championship when compared to physical fitness attributes of the players (Carling, 2013). This study showed that the winning team was among the top three in number of goals scored, ball possession, successful passes, crosses, and shots on goal. On the other hand, the same team ranked eighth for the total distance covered and ninth for the distance at high speed.

One of the recent discussions about soccer is whether ball possession influences the outcome of matches. In a previous study, 380 matches of the 2008/2009 Spanish league were analyzed; the best-ranked teams maintained a higher percentage of ball possession when compared to the lesser teams (Lago-Penas & Dellal, 2010). This positive relationship between performance and ball possession was also found in the 2018 World Cup. In addition, there was a trend for the winning teams to have greater success in passes and goal shots (Alves et al., 2019).

Technical variables are also key for high-performance soccer, as coaches and coaching staff analyze the hits and errors of their teams through statistics about players and matches. A previous study analyzed the variables that strongly contribute to winning in matches during the group phase of the 2014 World Cup and identified that shots, shots on goal, shots on the counterattack, shots inside the area, ball possession, short and middle passes, gains in aerial balls and blocks had a positive influence on the probability of winning (Liu et al., 2015).

Studies have also shown that these variables can be related and can determine, in different ways, performance in professional soccer. For example, in young soccer players, it was shown that the technical variables are associated with the athlete's physical fitness since fatigue accumulated during the game affected the ability to perform short passes (Rampinini et al., 2008). In addition, a previous study showed that external player load and anaerobic threshold determined 59.3% of the internal load (Session-RPE) in elite soccer players (Enes et al., 2021). Thus, the physical, technical, and tactical variables must be analyzed in a complex and detailed way, aiming to improve the understanding of the determinant variables of elite soccer.

Considering that elite soccer is a sport that depends on several performance variables to win (Alves et al., 2019) and that each continent has its particular playstyle (Tuo et al., 2019), our study aimed to compare the physical, technical, and tactical variables between teams and players from the different continents (America, Europe, and Africa/Asia/Oceania) in the 2018 FIFA World Cup. We hypothesized that the best teams in the world (American and European) were characterized by superior techniques and tactical aspects.

Material and Methods

Participants

The statistics of the 48 matches played during the group stage of the FIFA World Cup 2018 were analyzed. The data of these matches were coded and calculated by a tracking system (GPS), freely available on the FIFA website (www.fifa.com/worldcup/matches). The database of the tracking system of FIFA was provided by the company STATS® (Chicago, IL, USA) using a real-time that operated at 25 frames per second; each frame provides details of all players in the match (da Mota et al., 2016).

Procedure

To analyze the match variables, the teams were divided according to the participating qualifiers for the 2018 World Cup. Therefore, the teams were grouped as follows: a) European continent: participating teams from UEFA + Russia (host country); b) American continent: teams participating in the South America (CONMEBOL) and North/Central/Caribbean (CONCACAF) qualifiers; c) Africa/Asia/Oceania: teams participating in the qualifiers of Africa (CAF) and Asia (AFC). In total, 37 variables were analyzed, divided into tactical, physical, and technical variables. Table 1 shows the variables analyzed and how they were calculated. This study was carried out based on the ethical standards established by the Declaration of Helsinki (Association, 2013).

Table 1 - The continental teams' physical characteristics, ball possession, and tactical and technical variables.

Variables	Description
Stature (cm)	The average height of players
Years old	The average age of players
Distance covered (m)	The average distance covered by the team
Distance with the ball (m)	The average distance covered by the team with the ball possession
Distance without the ball (m)	The average distance covered by the team without the ball possession
Time spends opposite half (%)	Time spent on the opponent's field
Time spends final third (%)	Time spent between the opponent's intermediary and the goal line
Time spends penalty area (%)	Time spent in the opponent's penalty area
Total sprints (n)	Total sprints performed by players
Intensity 1 (%)	Time spent at intensity up to 7 km.h ⁻¹
Intensity 2 (%)	Time spent at an intensity between 7 and 14 km.h ⁻¹
Intensity 3 (%)	Time spent at an intensity between 14 and 20 km.h ⁻¹
Intensity 4 (%)	Time spent at an intensity between 20 and 25 km.h ⁻¹
Intensity 5 (%)	Time spent at an intensity above 25 km.h ⁻¹
Maximal speed (km.h ⁻¹)	Average maximum speed reached by players
Short pass efficiency (%)	(Short completed pass/short performed pass) * 100

Middle pass efficiency (%)	(Middle completed pass/middle performed pass) * 100
Long pass efficiency (%)	(Long completed pass/long performed pass) * 100
Total pass efficiency (%)	(Total completed pass/total performed pass) * 100
Pass performed (n)	Total passes performed in the field of play (n)
Pass concluded (n)	Total passes completed in the field of play (n)
Ball possession defense (%)	Ball possession in the defense field
Ball possession Middlefield (%)	Ball possession in the midfield
Ball possession attack (%)	Ball possession in the attack field
Total ball possession (%)	Ball possession across the playing field
Left Attack Origin (%)	Origin of attack from the left side of the field
Center Attack Origin (%)	Origin of attack from the middle of the field
Right Attack Origin (%)	Origin of attack from the right side of the field
Shots on goal (n)	Total shots on goal
Shots off goal (n)	Total shots off goal
Shots Blocked (n)	Total shots blocked by the opposing defense
Faults (n)	Total fouls performed during the game
Recovered balls (n)	Total balls recovered by the team
Balls cleared (n)	Total balls cleared by the team
Tackles (n)	Total number of balls tackled by the team
Blocks (n)	Total balls blocked by the team
Corners (n)	Total corners performed during the match

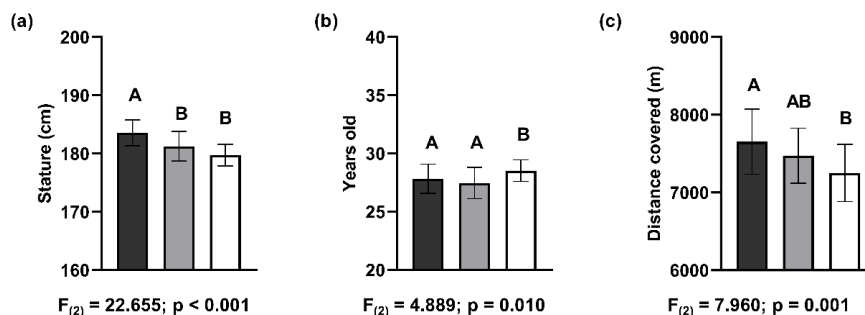
Statistical analysis

Data were reported as mean and standard deviation. The assumptions of normality and equality of variances were evaluated by the Kolmogorov-Smirnov and Levene tests ($p > 0.05$). One-way ANOVA was used to compare physical, technical, and tactical variables between America, Europe, and Asia/Africa/Oceania soccer teams. Bonferroni's post hoc test for multiple comparisons was used to identify differences when necessary. All analyses were performed using the Statistical Package for the Social Sciences (SPSS) (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp). Statistical significance was considered when $p < 0.05$.

Results

Figure 1 shows the anthropometric and physical variables (distance covered) of the continental soccer teams participating in the 2018 FIFA World Cup. The results showed that the average height of the European teams was highest ($F_{(2)} = 22.655$; $p < 0.001$). The American teams had a higher average age when compared to other continents ($F_{(2)} = 4.889$; $p = 0.010$).

In addition, European teams covered a greater total distance covered when compared to American teams ($F_{(2)} = 7.960$; $p = 0.001$). Finally, the European teams showed greater time spent in the final third ($F_{(2)} = 3.150$; $p = 0.048$) and the penalty area ($F_{(2)} = 5.889$; $p = 0.004$) when compared to the Africa/Asia/Oceania and American teams, respectively.



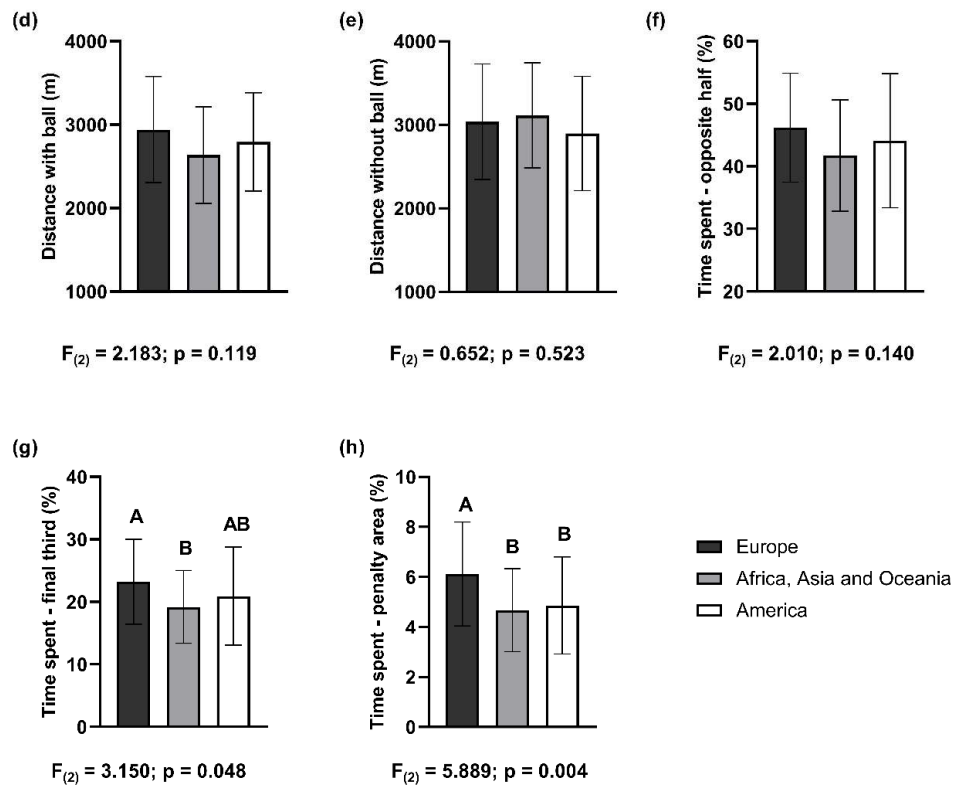
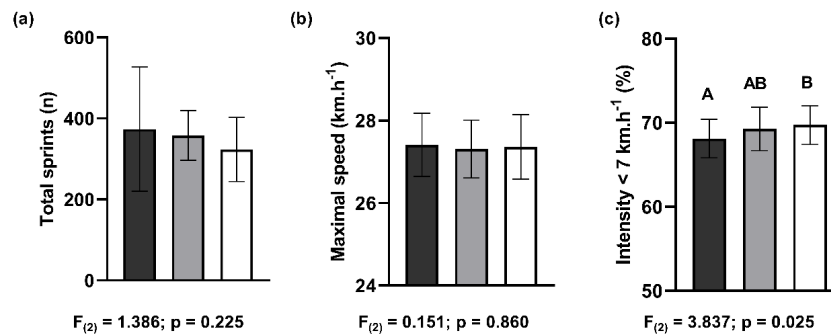


Fig. 1 - Anthropometric and physical variables: (a) height, (b) age; (c) total distance covered; (d) distance with possession; (e) distance without possession; (f) time spent on the opposite half; (g) time spent in the final third; (h) time spent in the penalty area. Dark gray bars: Europe; Light gray bars: Africa/Asia/Oceania; White bars: America. Different letters indicate a significant difference between continental teams ($p < 0.05$).

Figure 2 shows the physical variables related to different match speeds (sprints, maximum speed, and intensity zones) among the continental teams. The results showed that the American teams spent more time at intensity 1 (up to 7 km.h^{-1}) ($F_{(2)} = 3.837$; $p = 0.025$), however, they tended to spend less time at intensity 4 (between 20 and 25 km.h^{-1}), when compared to the European teams ($F_{(2)} = 2.940$; $p = 0.058$).



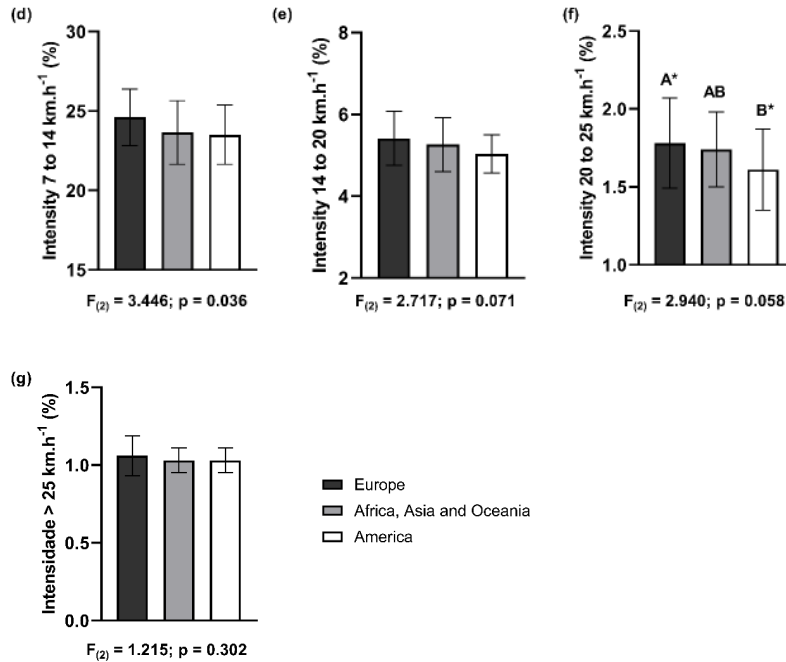


Fig. 2 - Physical variables: (a) total sprints, (b) maximum speed; (c) intensity < 7km.h⁻¹; (d) intensity between 7 and 14km.h⁻¹; (e) intensity between 14 and 20km.h⁻¹; (f) intensity between 20 and 25km.h⁻¹; (g) intensity above 25km.h⁻¹. Dark gray bars: Europe; Light gray bars: Africa/Asia/Oceania; White bars: America. Different letters indicate significant difference between continental teams ($p < 0.05$).

Figure 3 shows the pass efficiency variables (total, short, medium, and long pass), performed, and completed pass of the continental teams. The results showed that the continental teams did not show a significant difference in these variables.

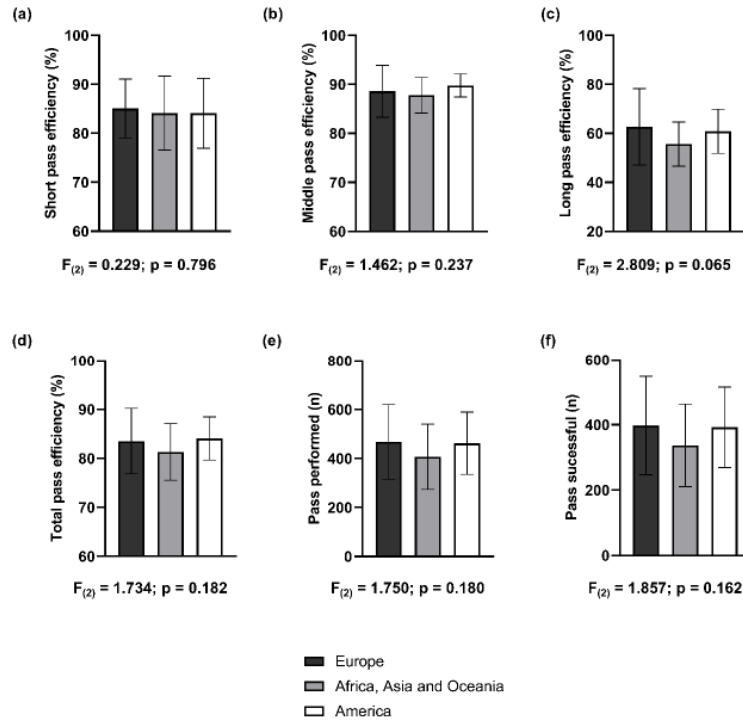


Fig. 3 – Tactical variables (pass): (a) short pass efficiency, (b) medium pass efficiency; (c) long pass efficiency; (d) total pass efficiency; (e) passes performed; (f) passes completed. Dark gray bars: Europe; Light gray bars: Africa/Asia/Oceania; White bars: America. Different letters indicate significant difference between continental teams ($p < 0.05$).

Figure 4 shows the tactical variables of ball possession and attack origin among the continental teams. The results showed that the American teams didn't differ in the ball possession. However, the teams from the American teams originated their attack from the left side of the field ($F_{(2)} = 4.339$; $p = 0.016$), while the Africa/Asia/Oceania originated their attack from the right side ($F_{(2)} = 4.127$; $p = 0.019$).

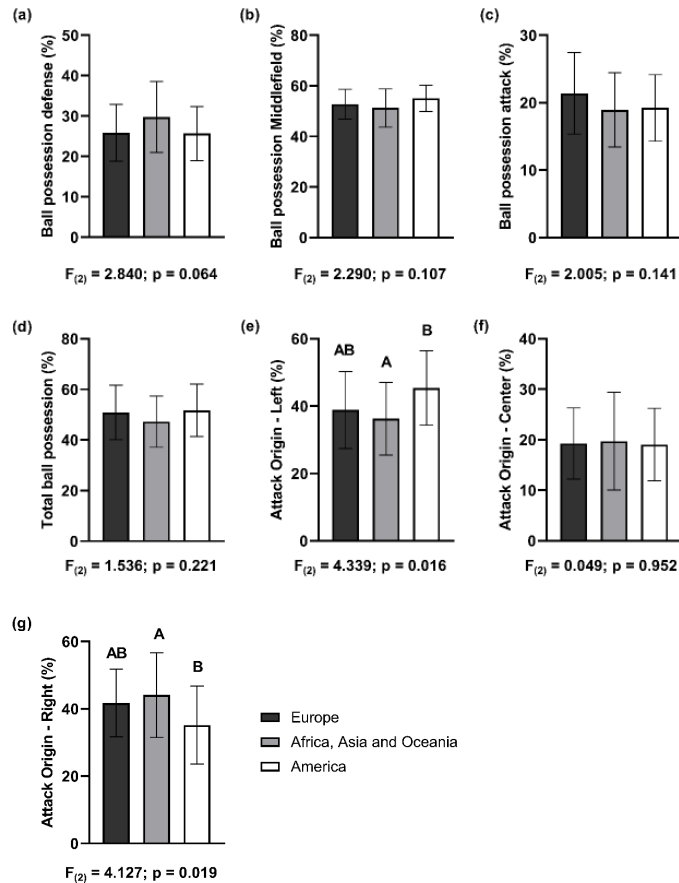
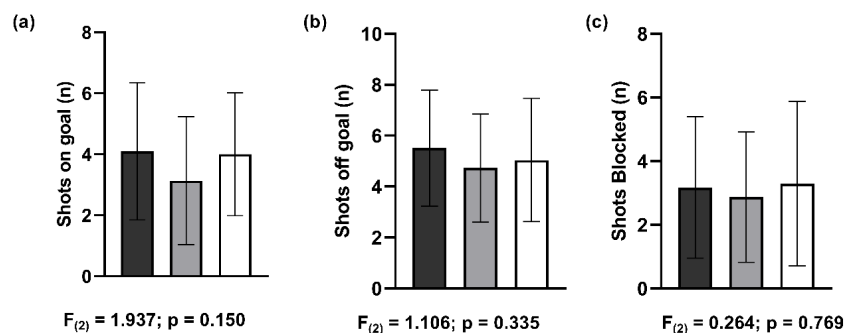


Fig. 4 - Tactical variables (ball possession and attack origin): (a) ball in defence, (b) ball possession in midfield; (c) ball possession in attack; (d) total ball possession; (e) origin of attack from the left side; (f) origin of attack from the center; (g) origin of attack from the right side. Dark gray bars: Europe; Light gray bars: Africa/Asia/Oceania; White bars: America. Different letters indicate a significant difference between continental teams ($p < 0.05$).

Figure 5 demonstrates the technical variables among the continents analyzed. The results indicate that the Africa/Asia/Oceania teams moved away from a greater number of balls when compared to the European teams ($F_{(2)} = 3.482$; $p = 0.035$). In contrast, European teams took more corners compared to Africa/Asia/Oceania ($F_{(2)} = 3.394$; $p = 0.038$).



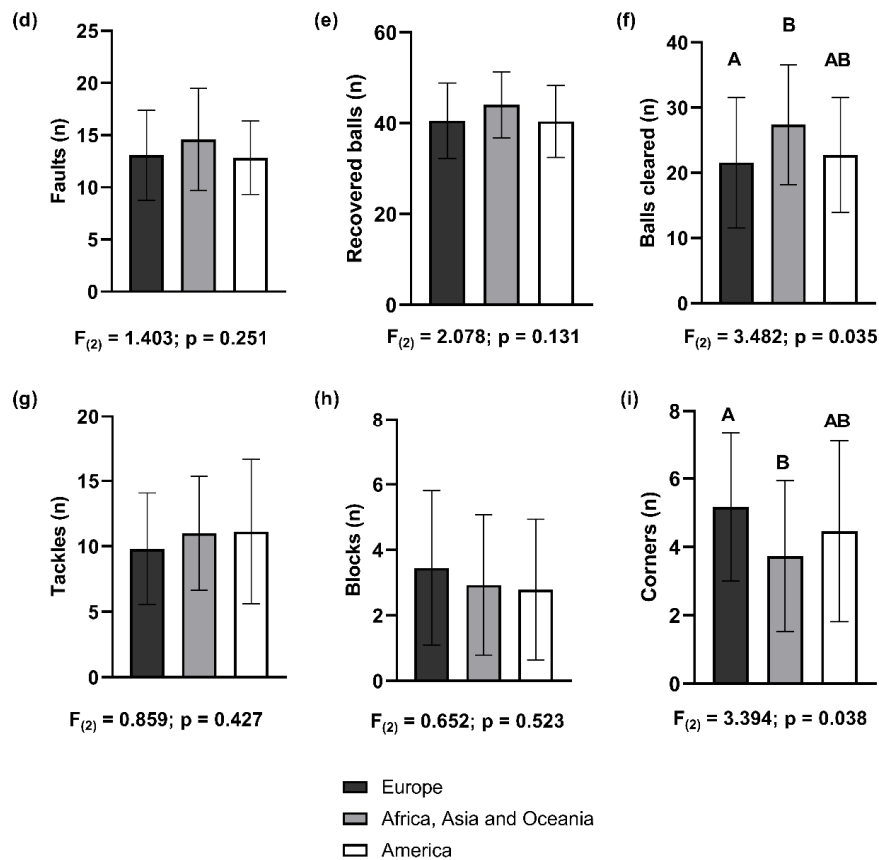


Fig. 5 - Technical variables: (a) shots on goal; (b) shots off goal; (c) blocked shots; (d) faults; (e) retrieved balls; (f) balls away; (g) trips; (h) blocks; (i) corners. Dark gray bars: Europe; Light gray bars: Africa/Asia/Oceania; White bars: America. Different letters indicate significant difference among continental teams ($p < 0.05$).

Discussion

Our main findings showed that athletes from the European teams were taller and covered a greater total distance and at high intensity (between 20 and 25 $\text{km} \cdot \text{h}^{-1}$) and remained longer in the opposing field (final third and penalty area) when compared to athletes from other continents. In contrast, the American teams were older (average age) and their attacks originated more from the left side of the field. Finally, athletes from the Africa/Asia/Oceania continents repelled a greater number of balls, took fewer corners and originated their attacks more from the right side of the field.

According to our findings, we can highlight those athletes from the American teams spent more time in the low-intensity zone ($< 7 \text{ km} \cdot \text{h}^{-1}$), while European teams spent more time in the high-intensity zone (between 20 and 25 $\text{km} \cdot \text{h}^{-1}$). These results showed a greater physical fitness of the European teams, ability to regain ball possession and increased opportunity for goals. A previous study showed that in 12 championships the European teams showed the highest level of physical intensity, while in the American championships, such as Argentina, Brazil, and United States, these held the 13th, 26th, and 28th positions, respectively (Nolasco, 2018). It has been suggested that running intensity is of high importance and is directly related to winning performance in professional soccer (Tuo et al., 2019). Thus, we can safely say that physical variables are one of the determining factors of performance in soccer teams.

In addition, European teams spent more time in the final third of the field and penalty area when compared to teams from the other continents (America, Asia, Africa, and Oceania). These data indicated that European teams played more aggressively and on the opposing field, increasing the chances of reaching the goal. Previous studies have shown that anaerobic fitness and the permanence/exchange of passes in the attacking zone are one of the determining factors for the success of professional soccer teams (Formigoni & Añon, 2021; Sienkiewicz-Dianzenza et al., 2009). Previous research also found similar results to our study, where Asia and

Oceania teams had less play in the attack zone compared to teams from the other continent in the 2010 FIFA World Cup (Braz & Marcelino, 2014).

Our findings also indicate that the European teams were taller, which is consistent with a previous study (da Silva & Rombaldi, 2020), which showed a superior height of goalkeepers from the European and Oceania teams when compared to participants from other continents in the World Cup matches from 2002 to 2014. In contrast, we showed a higher average age of players from the American teams. This result can be justified by the historical and cultural characteristics of the American teams, where players have a high technical and skill level, but fewer physical and tactical variables. Consequently, the longevity of athletes from the American teams is greater than compared to European players (Nolasco, 2018), working professionally up to almost 40 years old. Regarding the tactical variables, there were no significant differences in the number and efficiency of performed and completed passes (short, medium, and long). In contrast to our findings, a previous study showed that completed passes increase the performance of a professional team by 12% (Liu et al., 2015). Another study indicated that teams that performed a greater number of launches passes decreased the number of ball possessions and the shots to the goal (Reis et al., 2017). This discrepancy between the studies can be explained by the characteristics of the analyses carried out in a previous study, which compared winning and losing teams (Liu et al., 2015). In the present study, we chose to compare teams from different continents and not consider the influence of performance in the group phase. Our results also suggest a balanced possession among the continents analyzed. In contrast, previous studies showed that ball possession was negatively associated with the success of professional soccer teams in the 2001-2002 Premier League (Jones et al., 2004).

There were differences between the origins of the attacks performed: American teams originated most of their attacks from the left side and Africa/Asia/Oceania teams from the right side. This differentiated attack origin can be justified by the preferences of the regions where the main players of the national teams came from. In contrast, European teams varied their moves more, which showed a higher tactical level and less dependence on the individual quality of the main players.

Regarding the technical variables, we had interesting results. There was no significant difference among the teams with respect to shots out of the goal, on goal, and blocked. In contrast, a previous study showed that shots on goal were important statistics to differentiate winning from losing teams in the 2006 World Cup (Moura et al., 2014). Previous studies have shown that the variables differentiating winning teams were shots/shots on goal and ball possession, in competitions such as the Spanish Soccer League (La Liga) and Soccer World Cup (Clemente et al., 2015; Lago-Peñas et al., 2010). The discrepancy among these findings can be explained by the player level of the soccer teams (national vs. Spanish) and by the competitive format (scored points vs. playoffs). Another intriguing result was the lower number of balls away and higher number of corners in the European teams when compared to teams from Africa/Asia/Oceania. This result found can be justified by the high score and the time spent in the final third and in the penalty area of these European teams, which presents greater opportunity for goals. A previous study carried out with UEFA Champions League teams showed that the winning team statistics showed significantly higher average values over a series of matches, such as total shots, shots on goal, effectiveness, passes performed, passes completed, and ball possession. In contrast, losing teams had significantly higher numbers of yellow and red foul cards (Lago-Peñas et al., 2011).

This study has some limitations that need to be highlighted. Firstly, we did not consider the influence of the opponents and the match results on the measured parameters, as we believe that this is irrelevant in the group stage. Second, we grouped teams with different levels of performance on the same continent, which may have reduced the relevance of the findings. In general, this study indicates a significant physical, technical, and tactical difference between teams from the different continents, and that these variables determine, in different ways, their performances in the 2018 FIFA World Cup (Alves et al., 2019; Lago, 2007).

Conclusions

In summary, European teams had a more intense (physical parameters) and offensive playstyle (tactical) when compared to teams from other continents participating in the 2018 FIFA World Cup. We believe that this study can add to the knowledge of physical, technical, and tactical characteristics, providing information for professional coaching staff who seek to improve the training level and the performance of their athletes.

Conflicts of interest - The authors declare no conflict of interest.

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