Article

Comparisons of ball possession, match running performance, player prominence and team network properties according to match outcome and playing formation during the 2018 FIFA World Cup

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Title: A case study of match performance during an international level futsal tournament – Implications for talent development in soccer

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Abstract

Futsal has grown in popularity globally yet additional research is necessary to enhance understanding of the technical, tactical and phyical demands of the game. Anecdotal and scientific evidence suggests that futsal can aid talent development for 11 a-side soccer owing to the potential transfer of skills and the game constraints. The aim of this study was to examine physical (internal and external loads) and technical performance characteristics in international futsal match-play and discuss potential returns for soccer talent development. Performance was investigated in players (n=16, 25.7±4.71 years) in a team during an international futsal tournament. Pre-tournament fitness testing determined maximum heart rate (MHR) via the Yo-Yo IR1 test (194.58±11.08 beats min^{-1}) whichwas then used to examine heart rate during match-play. External load (accelerations and decelerations) was also measured during match-play using an inertial movement unit. Post-tournament match-analysis of technical events was performed. Analysis reported a mean heart rate value during 'court time' of 164.77±22.30 beats min^{-1}, which as a percentage of participants' MHR was 87.69%±4.44%, with mean peak MHR of 98.30±2.47%. Results showed 2.16±0.25 accelerating () and 2.78±0.13 decelerating () events per minute, a possible key characteristic of futsal. Match analysis of technical performance showed that 77.26% of ball receptions were completed with the sole of the foot. Assessment of two-footedness showed 80.11±16.65% of individual possessions used the dominant foot to receive and 84.13±10.74% to pass the ball thereby displaying strong foot dominance. Team statistics reported substantial numbers of passing, dribbling and set play events. These results have quantified certain characteristics of elite futsal match-play thereby enhancing understanding of the game. Accordingly, the potential learning returns deriving from environmental and task constraints of

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futsal are discussed, with possible implications to skills transfer and development of soccer players.

Introduction

Futsal is a 5 a-side, indoor sport officially recognized by Fédération de Internationale de Football (FIFA), and was originally created to provide indoor soccer to children (UEFA, 2017). FIFA estimate futsal is played in 170 countries, with large participation numbers estimated around 60 million (The FA, 2018). Similar to soccer, futsal has become a contemporary research area (Beato, Coratella, & Schena, 2016; Oppici, Panchuk, Serpiello, & Farrow, 2019). Researchers are also increasingly discussing the potential of futsal as a talent development tool for soccer (Travassos, Araujo, & Davids, 2017; Yiannaki, Carling, & Collins, 2018a). Yet despite current academic (Beato et al., 2016; Oppici, Panchuk, Serpiello, & Farrow, 2018a; Yiannaki, Carling, & Collins, 2018c) and anecdotal evidence of its potential (UEFA, 2015; UEFA, 2018) soccer talent development models devote varying training time to integrating futsal arguably due to a need for additional evidence-based research (Moore et al., 2018; Oppici et al., 2019).

In contrast, research on the potential contribution of other forms of SSG has received wide coverage in the scientific literature (Aguiar, Botelho, Lago, Maças, & Sampaio, 2012; Halouani, Chtourou, Gabbett, Chaouachi, & Chamari, 2014). The benefits of reduced format games generally are recognised to condense the number of skilful actions and decisions participants make (both with and without the ball), whilst constructing realistic match-like conditions in training and preparation for soccer competition (Clemente, Couceiro, Martins, & Mendes, 2012). The specific constraints of sports and for the purposes of this article, small-sided formats of soccer, directly affect skill acquisition (Davids, Button, & Bennet, 2008; Davids, Araújo, Vilar, Renshaw, & Pinder, 2013). Recent work has sought to enhance understanding by examining technical skills acquired through futsal participation (Oppici, Panchuk, Serpiello, & Farrow, 2017; Oppici et al.,

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2018a) yet analyses of authentic match-play are relatively limited (Agras, Ferragut, & Abraldes, 2016). Analyses to quantify pertinent game characteristics should take place in authentic futsal match conditions examining elite, futsal specific populations (Yiannaki, Carling, & Collins, 2018b; Yiannaki et al., 2018c). Authenticity can enhance methodological representative design (Dhami & Hertwig, 2004), which is vital in developing impactful outcomes for practitioners (Carling, Wright, Nelson, & Bradley, 2014). Match-analysis allows researchers to quantify observed behaviours aiding understanding and consequently enhancing performance (Carling, Williams, & Reilly, 2005). For example, quantification of ball reception types and bipedalism (two-footedness) during authentic futsal match-play would be pertinent, providing novel quantitative data to inform previous qualitative observations (Yiannaki et al., 2018c). Given this, match-analysis was used in this paper, with pertinent technical events examined based on previous research (Oppici et al., 2019; Travassos et al., 2017; Yiannaki et al., 2018c), and later discussed regarding potential implications to soccer development.

Evidence examining physical performance in futsal is more established with a review in 2016 providing a base of information (Beato et al., 2016). Research has reported high-intermittent physical demands experienced by futsal players which are linked to environmental and task constraints with participants performing multiple sprints and changes of direction (Castagna, D'Ottavio, Vera, & Álvarez, 2009; Dogramaci, Watsford, & Murphy, 2011). However, when futsal is compared to soccer, a broad lack of scientific evidence that has examined physical demands remains evident (Beato et al., 2016; Beato, Coratella, Schena, & Hulton, 2017). Studies of SSG are again more common than futsal and have comprehensively examined the physical and physiological demands of play, thus further examination of futsal is warranted (Castellano, Casamichana, & Dellal, 2013; Halouani et al., 2014). Regarding futsal, research is necessary to

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investigate and identify physical skills of futsal, supporting coaches and practitioners. For example, one study sought to include an examination of internal and external loads, however, the study included Italian 2nd division female players, and utilised an outdoor synthetic surface due to methodological constraints (Beato et al., 2017). The present study has sought to separate other forms of 5v5 or SSG, instead analysing match characteristics indoors, with UEFA approved surface/equipment/laws, thus including authentic futsal constraints, whilst also utilising international level male players. This data will be of interest to futsal practitioners in the preparation and recovery protocols for players. Meanwhile analysis could also be informative to practitioners in soccer considering potentially transferable physical skills to soccer, (Yiannaki et al., 2018a; Yiannaki et al., 2018c) whilst also accounting for the evolution of running load demands at elite levels in the latter, allowing comparisons (Barnes, Archer, Hogg, Bush, & Bradley, 2014; Bush, Barnes, Archer, Hogg, & Bradley, 2015). Considering these external loads, the execution of rapid acceleration and deceleration manoeuvres make up a substantial part of the high-intensity workload (Carling, 2013) and is a critical quality required in soccer (Little & Williams, 2005). Therefore, identifying alternative means to train and develop these motor skills is consequently of interest to practitioners, with the examination of external loads in this paper representing a novel methodology.

This case study analysed an international futsal team during a four-team international tournament, using internal and external match data to quantify physical performances during competition. Additional analyses sought to quantify technical behaviours including ball reception, passing and bipedalism observed during competitive futsal matches. It is hoped that in addition to increasing knowledge in coaches and physical conditioning practitioners of futsal team performance, data will also provide knowledge to help inform soccer player development processes.

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Methodology

Context and Participants

An international futsal tournament was chosen for this case study reflecting the competitive elite nature of participants. Four international teams competed in this tournament with performance data collected on players in a single team (N=16) aged 25.7±*4.71* years. Teams were ranked between the top 50-100 teams internationally, with fixtures played at a single venue consecutively over a three-day period. All fixtures were officiated in keeping with the rules for competition set by FIFA, and played on a 20 x 40 m, seamless sprung floor surface suitable for international level futsal. During official futsal matches, duration is actively controlled, with the chronometer only running when the ball is in play with two equal 20minute halves.

Materials and Procedures

Data Collection. Ethical approval was granted from the local university research ethics committee (Reference Number: BAHSS 372) and informed consent was obtained from all participants prior to the commencement of the study. All participants were reassured that their data would remain confidential.

Experimental Design Pre-Tournament Physical Testing

Fitness testing data was collected during a training camp 1 month prior to the tournament. Participants had a mean body mass of 74.16±*9.76*kg and percentage body fat of 11.11±*5.78*%

(estimated using a four-site method (Jackson & Pollock, 1978)). Repeated high intensity running capacity was determined via the Yo-Yo Intermittent Recovery test (Level 1) (Bangsbo, Iaia, & Krustrup, 2008) and mean performance was 1878±*438 m*. Heart rate was concomitantly recorded using chest worn monitors (Polar, Finland) and the peak value attained by each participant was taken as their maximum heart rate (MHR). The average heart rate across the group was 194.58±*11.08* beats min $^{-1}$ (beats per minute).

Experimental Design Match Analysis

During physical analysis the chronometer used for internal and external measures ran from the commencement to the completion of each half, allowing for data to be collected, with a mean total chronological game time of 1:20:52±*4:50* across the three matches, as opposed to the 40minutes of active playing time used in futsal. To obtain data based on *'court time'* all data was filtered to exclude any time players were on the bench as substitutes, time-outs, and the half time break for both internal (heart rate) and external load measures.

Heart rate was used to measure internal load responses to competition and was recorded using the Team Polar system (Polar, Finland). Peak heart rate was the highest value achieved during match-play. External load was measured using Optimeye S5 devices (Catapult Sports) which incorporate an accelerometer, gyroscope and magnetometer all sampling at 100 Hz. Collectively this technology is referred to as an inertial movement unit (IMU). During competition each player wore the same IMU harnessed securely between the scapulae. Propriety software (Catapult Sprint, version 5.1) filtered the raw data using Kalman techniques and quantifies specific micro-movements referred to as Inertial Movements Analysis (IMA). IMA acceleration and deceleration

events were segregated into four categories defined by the manufacturer's software; Low (1.5-2.5 $m \cdot s^2$), Medium (2.5-3.5 $m \cdot s^2$), High (>3.5 $m \cdot s^2$), and Total (>1.5 $m \cdot s^2$). During indoor court-based training sessions, IMA counts demonstrated good reliability (CV 1.8-2.1%, SWD 2.5%) suggesting this variable is sensitive to real differences in performance (Luteberget, Holme, & Spencer, 2018). As a global measure of external load, Player Load (PL) was reported which is a modified vector magnitude expressed as the square root of the sum of instantaneous rate of acceleration in each vector (X, Y and Z axes) divided by 100. PL is also presented as PlayerLoad per minute ($PL \cdot min^{-1}$). Both measures demonstrate good reliability during team sport activity (Barrett, Midgely, & Lovell, 2014; Luteberget et al., 2018). In addition, PlayerLoad (PL) and PlayerLoad per minute (PL·min-1) were shown to be reliable indicators of global external load (CV 0.9%, SWD 0.8-1.1%).

To analyse technical skills during matches, a review of related literature in soccer (Liu, Gómez, Gonçalves, & Sampaio, 2016; Sarmento et al., 2014), and futsal (Agras et al., 2016; Sturgess, 2017) was completed in the selection of relevant variables, with research suggesting an absence of scientific evidence in futsal contexts (Agras et al., 2016). Following this review, two UEFA licensed international futsal managers were consulted in finalizing the variables, with operational definitions provided in the appendices. Data was generated from three matches using the SportsCode software package (v.11.2.15, Hudl, Lincoln, NE, United States).

Data Analysis

Data analyses were completed using SPSS (version 21, SPSS, Chicago, USA) with descriptive data presented as mean±SD. Effect sizes (ES) were calculated using Cohen's *d* to determine the

meaningfulness of any differences in mean values, corrected for bias using Hedges formula and presented with 90% confidence intervals (CI) (Batterham & Hopkins, 2006; Cohen, 1988). The ES magnitudes were classified as trivial (<0.2), small (>0.2-0.6), moderate (>0.6-1.2), and large (>1.2).

Results

Table 1 and figure 1 present the data collected on total chronological game time (1:20:52±*4:50*) and internal workload measures (heart rate) of performance. Internal measures show a mean HR of 164.77 beats min-1 (±*22.30*), which equates to a mean heart rate max percentage (MHR%) of 87.69%±*4.44*%). Mean peak MHR values of 98.30%±*2.47%* can be seen across the tournament for a reference futsal team.

Table 2 presents the data collected on external measures of performance. Results suggest that players performed, on average, 2.16±*0.25* accelerations per minute, of which the most frequent was 1.5-2.5 m·s-2 (*1.32±0.10* per minute), followed by 2.5-3.5 m·s-2 (*0.51±0.09* per minute) and > 3.5 m·s-2 (0.33±0.09 per minute). Analysis of decelerations showed that players performed on average 2.78±*0.13* per minute with most frequent 1.5-2.5 m·s-2 (1.64±*0.13* per minute), followed by 2.5-3.5 m·s-2 (0.72±*0.04* per minute) and > 3.5 m·s-2 (0.43±*0.13* per minute). Table 3 and figure 2 present the data collected utilizing match analysis. A difference in ball reception was observed with players utilizing the sole of the foot more (total=1279±*20.08*, 77.26%) when compared with other parts of the foot such as the instep (total=343±*5.02*, 22.74%). Effect sizes were calculated for frequency of reception types (sole vs other) with a large difference reported (*d*=1.87, CI:1.21, 2.30), and the percentage difference also showing a large difference (*d*=4.42, CI=3.52, 5.22). Furthermore, the frequency of receptions was collated with 578 events using the left foot versus 1052 using the right foot showing a moderate difference (*d*=0.71, CI: 0.23, 1.18). When considering individual players foot dominance as a percentage of ball receptions, 80.11% occurred utilising the dominant foot compared to 19.89% using the non-dominant foot, with a large difference between groups (*d*=3.62, CI: 2.83, 4.32).

Table 4 and figure 3 present data analyzing passing during match-play. Means were calculated for foot dominance, with left footed players passing with their dominant foot on 76.56% of occasions whilst similarly right-footed players pass with their dominant foot 87.47%, with a combined total of 84.13% passes made using the dominant foot, compared to 15.87% with the weaker foot. Effect sizes for passing between groups (dominant vs non-dominant foot) showed a large difference (*d*=6.36, 5.16, 7.41) towards preference towards the use of players' dominant foot. Pass completion was also compared between dominant (89.69%) and non-dominant foot (84.28%) showing trivial differences (*d*=0.40, CI, 0.07, 0.86).

Discussion

This study aimed to provide a holistic analysis on characteristics of international standard futsal match-play in a reference team. Analysis also allows inferences to be made regarding futsal and its potential for informing existing theories on player development via transfer of skills between futsal and soccer.

Technical performance

Ball receptions

Futsal task constraints, and notably the interaction between the playing surface and the weighted ball (Peacock, Garofolini, Oppici, Serpiello, & Ball, 2017) is associated with specific ball reception skills (Travassos et al., 2017). To our knowledge, this is the first-time research has quantified ball reception types during authentic elite futsal match-play. The results suggest that a high proportion of ball receptions are completed utilising the sole of the foot (~77%), a possible adaptation compared to soccer due to unique futsal task constraints of both the surface and ball. This result partly supports previous research which assessed player scanning behaviours concluding that futsal participation develops attention orientation as a consequence of the interaction between the ball and the surface (Oppici et al., 2017). This research suggested that perceptual skills are developed through futsal, with participants' using scanning behaviours immediately prior to, and upon ball reception. Skill acquisition through futsal practice especially during ball reception events could therefore develop enhanced spatial orientation and perceptual-motor skills as a consequence of task constraints with positive consequences for skill acquisition.

Bipedalism

Previous research has suggested that the task constraints of futsal practice could promote technical proficiency (Travassos et al., 2017). Indeed, a survey of elite soccer coaches showed that they believed that futsal develops multifunctional players capable of performing a multitude of different technical actions (Yiannaki et al., 2018c) associated with bipedalism. Results here suggest that a high proportion of players used their dominant foot to receive (~80%) and pass the ball (~84%). These results suggest bipedalism was not evident here, which is similar to the limited, but comparable research in soccer (Carey et al., 2001). In Carey & co-workers' study (Carey et al., 2001), analysis of the soccer World Cup 1998 showed dominant foot 'touches' ranged from ~82-84%, outlining foot dominance. However, it is noteworthy that one of the present futsal participants showed anomalous data in both receptions (dominant foot=~34%, non-dominant foot=~66%) and passing (dominant foot=~56%, non-dominant foot=~44%) with a unique practice history a possible causal factor. Indeed, this particular participant has a significant amount of futsal specific practice in a South American country where futsal and soccer are often 'twin tracked' (Moore et al., 2018) potentially developing enhanced bipedalism. Furthermore, as an experienced futsal international, ~12 years of domain specific practice (substantially more than other players in the present reference team) had been accumulated which unquestionably enhanced these skills, alongside contextual variables (individuality, stature & position) potentially explaining this individual uniqueness and the lack of bipedalism observed in other players.

Team Statistics

One of the most remarkable elements of futsal pertains to the ability of players to perform dribbles (Corrêa et al., 2016) and this creativity is a skill often revered by practitioners and spectators (Memmert, Baker, & Bertsch, 2010). The present analysis showed a mean of ~27 successful dribbles and ~11 unsuccessful dribbles per team per game. In contrast, previous futsal research in Brazil (Corrêa et al., 2016) showed an average of 12 successful dribbles and ~7 unsuccessful dribbles per futsal game. The lower number of dribbles reported could be explained by the reduced pitch dimensions used in the Brazilian study. Research suggests an association between technical skills and success in soccer with superior dribbling in youth correlating with high achievement in adulthood (Huijgen, Elferink-Gemser, Post, & Visscher, 2010). As such, Futsal may facilitate the development of dribbling skills due to game constraints, notably the balls' interaction with the surface, which could be useful when considering long-term player development (Stafford, 2005).

Passing is also a factor which characterizes team sports such as futsal (Mohammed, Shafizadeh, & Platt, 2014) and is considered a complex perceptual-motor skill. Futsal players must combine reception and passing skills during dynamic match-play with the pitch markings/boundaries impacting upon playing behaviours (Corrêa, Vilar, Davids, & Renshaw, 2014). The present data reported a successful pass percentage of ~90% using the dominant foot, and ~84% using the non-dominant foot, which is comparable to previous research in futsal showing ~90% successful passes albeit without distinguishing foot dominance (Mohammed et al., 2014). Comparatively elite soccer data shows a lower figure of ~76% success rate in passing actions (Dellal et al., 2011) which may support the perceptions of coaches in recent survey-based research who suggested that passing accuracy is a key skill that can be enhanced through futsal practice due to game constraints (Yiannaki et al., 2018c). This result is of potential interest to researchers interested in skill acquisition in futsal and the possible transfer of such actions to soccer. Indeed, preliminary data

suggest positive transfer regarding passing actions (Oppici et al., 2018a; Oppici, Panchuk, Serpiello, & Farrow, 2018b). The implications of this could lead to a greater inclusion of futsal, and its constraints, in soccer talent development programs. Meanwhile, the contemporary trends in soccer may align closer to futsal match behaviours with a 7-year evolution in the English Premier league (EPL) showing increases in technical actions such as the number of passes (~40%), pass success rates (~84%), and more passes played over shorter and medium distances (Bush et al., 2015).

In futsal, pitch markings are used similarly to other indoor sports, and also replicating the boundaries used in soccer, with restarts in play when the ball goes 'off-court'. The game constraint of boundaries appears to have an impact on passing types and success rates, potentially supporting previous work showing that coaches perceive that this constraint, along with smaller pitch sizes, can aid development of passing skills and accuracy (Yiannaki et al., 2018c). However, the present paper also quantified, through match analysis, frequencies of play restarts (corners, kick-ins), showing mean values (per team/game) for kick-ins (~43), corners (~10), and set pieces which resulted in the successful creation of a shot (~8). A mean of ~6 freekicks per futsal game was recorded compared to a mean of 14 during elite soccer games (Carling et al., 2005), with differences possibly caused by the laws of futsal with punishments for teams accumulating fouls. Restarts in play are therefore condensed in elite futsal compared to soccer competition, with teams in the latter recording an average of 14 free kicks, 17 throw-ins and 5 corner kicks (Carling et al., 2005). Therefore, futsal may provide participants with opportunities to practice and develop certain set piece skills (e.g., ball delivery, movement off the ball) or choreographed routines enhancing this element of talent development.

Physical performance

Research shows that futsal is a high intensity intermittent sport, requiring multiple sprints (Beato et al., 2017). These physical demands are directly related to the environmental and task constraints of futsal and are explored in this section.

Heart Rate

The present results show a mean heart rate during '*court time'* (across the whole tournament) of ~165 beats min^{-1} with similar heart rate data reported in previous futsal research: mean=174 beats min^{-1} (Barbero-Alvarez, Soto, Barbero-Alvarez, & Granda-Vera, 2008). When considering our values as a percentage of their maximum heart rate (MHR) players showed a mean of ~88%. Comparable research reports similar mean MHR values of ~90%, also reported based on *'court time'* (Barbero-Alvarez et al., 2008). Previous work analysing physical activity and heart rates (Ekelund et al., 2001) suggests values >80% MHR should be considered *'very vigorous'*, a possible reflection of the high intensity nature of futsal when *'on-court'* requiring high fitness levels (Beato et al., 2017; Castagna et al., 2009). Furthermore, results show a mean peak MHR of ~98% during *'court time'* reflecting the intense nature of futsal. When compared to other SSG, 5v5 soccer produced mean MHR % ranges of 82-87% suggesting futsal may be towards the upper limit of ranges found in SSG (Hill-Haas, Rowsell, Dawson, & Coutts, 2009; Little & Williams, 2006; Rampinini et al., 2007), although variable pitch sizes/surfaces are utilised in SSG based study design rendering direct comparisons a challenge (Aguiar et al., 2012). Comparable data in soccer has estimated mean MHR values at ~85% [76, 77] and peak MHR values ~98% (Bangsbo, Mohr, & Krustrup, 2006), signifying comparable internal loads to soccer, reflecting the high intensity,

intermittent nature of both sports (Beato et al., 2016; Dogramaci et al., 2011). Thus, with equivalent profiles to soccer, futsal represents an alternative and effective method to train soccer players physically, which is relevant for practitioners considering futsal as a developmental tool.

IMU Analysis

To our knowledge, this paper is the first to quantify the external load demands of international competitive futsal using IMU. While sprinting is an important element of soccer (Barnes et al., 2014), in futsal the capacity to accelerate is potentially of greater significance given the limited playing area dimensions (Beato et al., 2017). During the present tournament, players performed, on average, 2.2 accelerations per minute, of which the most frequent was 1.5-2.5 m·s-2 (1.3 per minute), followed by 2.5-3.5 m·s-2 (0.5 per minute) and >3.5 m·s-2 (0.3 per minute). These findings are similar to observations in SSG where the number of moderate accelerations (2-3 $m \cdot s^{-2}$) was more common on smaller pitches (5v5>7v7>10v10) (Gaudino, Alberti, & Iaia, 2014). This data is also higher than reported in professional 11 a-side soccer players (Dalen et al., 2019; Vigh-Larsen, Dalgas, & Andersen, 2018). However, caution is necessary when comparing due to differences in methodologies. In the absence of similar data from futsal, it is difficult to interpret the data from this study, but results nevertheless highlight that the capacity to accelerate is important during match-play. Decelerations were also analysed with players performing on average 2.8 actions per minute with most frequent 1.5-2.5 m·s-2 (1.6 per minute), followed by 2.5-3.5 m·s-2 (0.7 per minute) and >3.5 m·s-2 (0.4 per minute). Thus, players decelerated more frequently than they accelerated; 2.8 vs. 2.2 events per minute, respectively, and is contrary to soccer-based research which reported a higher number of accelerations than decelerations (Vigh-Larsen et al., 2018). It is unclear why this disparity exists, but we can speculate that the limited

space and requirement to manipulate interpersonal distances may require these micromovements. Thus, given the potential importance of decelerations to match-play, further research is warranted. Overall, from a soccer player athletic development perspective, futsal participation would it seems able to provide a means to train acceleration and deceleration ability.

Limitations and Recommendations

It is important to mention that despite playing for a national futsal team, many of the present players had both futsal and soccer practice histories, thereby futsal specific characteristics could to a certain extent be limited. A previous paper analysed 82 participants from soccer and futsal, concluding that most futsal subjects used were '*failed footballers'* neglacting to show domain-specific characteristics (Jovanovic, Sporis, & Milanovic, 2011). This means behaviours observed may not display key differences between futsal and soccer and crucially implies that future work should analyse only futsal specific populations (Jovanovic et al., 2011), for example full-time professional futsal players. Meanwhile research comparing the rankings of countries in both sports concluded a positive correlation exists between success in futsal and soccer, suggesting a twin-tracked philosophy in those countries (Moore et al., 2018), presenting a challenge to researchers seeking to examine domain-specific sample groups. A further limitation is the standard of participating teams, although international, as research has shown that higher ranking teams play differently both collectively and individually (Bueno et al., 2018; Mohammed et al., 2014), which could be a limiting factor to the generalisability of behaviors observed in this piece. Also, despite recognising the benefits of case study type reports (Carling, 2017; Flyvbjerg, 2006), future papers could seek to compare additional and larger populations, over more matches, and a longer period of time. Local positioning technology now exists that should be included in future studies allowing

the collection of more work load comprehensive data indoors, facilitating direct comparisons to oudoor sports. Finally, further research should seek to examine further the transferal of specific skills to soccer, with this paper identifying common behaviors in futsal play. This research could support existing evidence (Oppici et al., 2018a) and inform contemporary debates in this regard (Travassos et al., 2017; Yiannaki et al., 2018a; Yiannaki et al., 2018c).

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