

- 1 **Futsal task constraints promote the development of soccer passing skill:**
- 2 **Evidence and implications for talent development research and practice**
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11 Abstract

12 Both anecdotal and research evidence suggests that futsal could be a key  
13 developmental activity for soccer. Futsal task constraints (e.g., equipment and  
14 playing area) have been argued to promote the acquisition of **perceptual-motor**  
15 skills that positively transfer to soccer and, in turn, improve performance in  
16 soccer. However, a lack of empirical evidence in support of this argument limits  
17 current understanding.

18 In this commentary, we discuss three studies that provide empirical support for  
19 the benefits of practicing the passing skill with futsal task constraints to enhance  
20 performance in soccer. Practicing futsal for more than 1000 h and learning the  
21 passing skill with the futsal ball promoted the development of a higher standard  
22 of passing relative to practicing with soccer constraints. Futsal task constraints  
23 promoted players' education of attention towards information specifying  
24 affordances and functional adaptability of the passing skill.

25 These results should encourage national soccer federations and coaches to  
26 strongly consider the systematic introduction of futsal in the early stages of  
27 soccer development programs to promote talent development. Future research  
28 should examine the optimal balance of soccer and futsal practice, and the timing  
29 of specialisation to soccer, adopting the underpinning principles of representative  
30 learning design.

31

32 Keywords: Skill transfer, football, constraints-led approach, modified sport,  
33 modified equipment, skill acquisition

34

## 35 **Introduction**

36 The preferred pathway(s) for developing talent/expertise in soccer (association football)  
37 is an issue of debate that draws significant attention, given that soccer is one of the  
38 richest and highest participation sports in the world (Coutinho, Mesquita, & Fonseca,  
39 2016; Sarmiento, Anguera, Pereira, & Araújo, 2018). In this context, futsal, which is 5-  
40 a-side indoor soccer (FIFA, 2012b), could be a key developmental activity to promote  
41 soccer talent. Elements of the futsal game, such as properties of the ball and dimensions  
42 of the pitch combined with a continuous change of the learning environment and  
43 sociological factors (e.g., high value of children's play time) are argued to enhance the  
44 acquisition of **perceptual-motor** skills and promote positive transfer to soccer (Araújo et  
45 al., 2010; Travassos, Araujo, & Davids, 2017; Yiannaki, Carling, & Collins, 2018a).  
46 Furthermore, it has been shown how children in Brazil, one of the highest ranked  
47 countries in soccer worldwide (FIFA, 2018), play a large amount of futsal until the age  
48 of 10 (Ford et al., 2012).

49 While the above propositions are appealing, there is a lack of empirical evidence  
50 to fully support these views. Current evidence is generally anecdotal, i.e., statements  
51 from elite soccer players and coaches (FIFA, 2012a), stories in popular books (Coyle,  
52 2010; Syed, 2010), and a survey has recently shown how high-level soccer coaches and  
53 players support futsal as developmental activity for soccer (Yiannaki, Carling, &  
54 Collins, 2018b). In this commentary, we present a series of empirical work that provides  
55 initial evidence for the benefits of practicing futsal to develop passing skill for soccer.  
56 We discuss the implications for talent development, and we conclude with some  
57 recommendations for future research.

58 *Passing skill*

59 Passing is a key skill for successful performance in soccer (Rein, Raabe, & Memmert,  
60 2017). It is the means of interaction between teammates to build offensive sequences  
61 with the aim of creating scoring opportunities (Grund, 2012), and a team's ability to  
62 create efficient passing networks is linked to successful performance (Cotta, Mora,  
63 Merelo, & Merelo-Molina, 2013; Sarmiento et al., 2017). Passing is a complex  
64 perceptual-motor skill which involves the reception of the ball and a pass towards a  
65 teammate. Spatial and temporal information about the ball and attacker-defender  
66 interactions shapes the emergence of opportunities for passing (i.e., passing  
67 affordances) during games (Travassos et al., 2012). A player's ability to adapt their  
68 perception and action to continuous changes in these relationships during a game  
69 underpins successful passing performance (Corrêa, Vilar, Davids, & Renshaw, 2014;  
70 Travassos, Araújo, Davids, Esteves, & Fernandes, 2012).

71         It has been argued that practicing the passing skill with futsal task constraints  
72 can promote a player's ability to functionally couple perception and action, and to adapt  
73 to the dynamic changes of informational constraints that occur in a soccer game  
74 (Travassos, et al., 2017; Yiannaki, et al., 2018a). Relative to soccer, passing in futsal is  
75 performed in a smaller area, with shorter time to act, and with a ball that is relatively  
76 easier to control. The landscape of passing affordances in futsal is highly unpredictable  
77 (Corrêa, Alegre, Freudenheim, Dos Santos, & Tani, 2012) and changes continuously  
78 due to the high-intensity movements of players (Corrêa, et al., 2014). In theory, these  
79 futsal specific constraints should encourage players to quickly channel their attention to  
80 the key information that specifies passing affordances at every moment, and to quickly  
81 adapt to sudden changes during a game relative to soccer.

82           The similarity of the information that guides action promotes skill transfer  
83 between tasks (Pinder, Davids, Renshaw, & Araújo, 2011; Snapp-Childs, Wilson, &  
84 Bingham, 2015), and consequently the relative similarity of information that guides the  
85 passing action in futsal and soccer should promote skill transfer. Therefore, the  
86 enhanced ability of futsal players to perform accurate passes and to quickly adapt to  
87 game scenarios should positively transfer to soccer. While the above claims are  
88 intuitive, to date, no research has examined futsal-soccer differences in passing skill and  
89 whether the skill transfers from futsal to soccer. Here, we discuss the main results and  
90 the implications of a series of three studies that examined this issue.

91 **Futsal practice influences perceptual behaviour supporting passing skill**

92 Oppici, Panchuk, Serpiello, & Farrow (2017) showed how youth futsal players and  
93 soccer players (13.5 years old on average), who practiced futsal or soccer for more than  
94 1000 h, oriented their attention differently when performing passes during modified  
95 games (study 1). Futsal and soccer players performed 5-vs-5 plus goalkeeper games  
96 with their respective task constraints, i.e., futsal players performed a modified futsal  
97 game with a futsal ball on a wooden pitch and with an individual playing area of  
98 36m<sup>2</sup>/player, and soccer players performed a modified soccer game with a soccer ball  
99 on a synthetic-grass pitch with an individual playing area of 86m<sup>2</sup>/player. These  
100 modified games have been designed to be representative of the passing skill in futsal  
101 and soccer (for a full explanation see Oppici, Panchuk, Serpiello, & Farrow, 2019).  
102 During these games, the players' orientation of attention was assessed using the scene  
103 camera of an eye tracking device. Futsal players oriented their attention towards other  
104 players' behaviour primarily during ball reception and control, while soccer players  
105 primarily oriented their attention to other players when they were not performing passes

106 but their team was in possession of the ball. These results do not imply that futsal or  
107 soccer players' perceptual behaviour is more desirable than the other group, but 'simply'  
108 indicate that practicing the passing skill in futsal or soccer influences how players  
109 perceive their environment.

### 110 **Futsal practice promotes transfer of passing skill to soccer task constraints**

111 Oppici, Panchuk, Serpiello, & Farrow (2018a) showed that futsal players positively  
112 transferred their passing skill to the modified soccer game (study 2). In this study, the  
113 same cohort of futsal players performed the modified soccer game following the same  
114 procedure of study 1, and their passing performance was compared to soccer players'  
115 performance. Futsal players performed more accurate passes than soccer players, which  
116 indicates positive skill transfer from futsal to soccer. Furthermore, the futsal players  
117 modified their perceptual behaviour from the futsal (in study 1) to the soccer modified  
118 game and oriented their attention towards the ball and other players at critical phases,  
119 which, combined with the superior passing performance, indicates that futsal players  
120 functionally adapted their perceptual behaviour and passing skill to the affordances that  
121 emerged in the modified soccer game.

### 122 **Futsal ball usage enhances the acquisition of soccer passing skill**

123 While the previous studies examined the effect of futsal in relatively experienced  
124 players, a third study focused on the influence of the futsal ball on the learning of soccer  
125 passing skill (Oppici, Panchuk, Serpiello, & Farrow, 2018b). The futsal ball has a lower  
126 coefficient of restitution than a soccer ball which facilitates the execution and (likely)  
127 acquisition of the kicking action (Peacock, Garofolini, Oppici, Serpiello, & Ball, 2017).  
128 Following a randomised controlled design, two groups of adult novices practiced 300  
129 passes in response to video stimuli (i.e., 2v2, 3v3, and 4v4 soccer simulations) using

130 either a futsal ball (experimental group) or a soccer ball (control group). Both groups  
131 performed a pre-test and post-test using a soccer ball. The experimental group improved  
132 their passing performance – passing and decision-making accuracy – to a greater extent  
133 than the control group. Changes in gaze behaviour and attunement to key environmental  
134 information that specified passing affordances (e.g., free teammate and free space)  
135 underpinned the experimental group’s superior performance.

136 Collectively, these three studies demonstrate how practicing futsal and learning  
137 the passing skill with the futsal ball promoted the development of higher passing and  
138 decision accuracy which positively transferred to soccer. Education of attention towards  
139 key information and adaptability of the passing skill underpinned the transfer process. **It**  
140 **must be acknowledged that these studies did not consider how participants’ skill level**  
141 **and potential skill level differences between the futsal and soccer groups may have**  
142 **influenced the results (which represent an avenue for future research). Despite this**  
143 **limitation, these studies** empirically suggest that futsal can be a key activity to promote  
144 **learning of soccer skill and** development of soccer talent.

#### 145 **Implications for skill learning and talent development**

146 Providing a suitable learning environment is critical to promoting talent development  
147 and expertise (Baker and Farrow, 2015; Williams and Reilly, 2000), and, based on these  
148 findings, soccer organisations are encouraged to introduce futsal in the early stages of  
149 their pathway programs to promote the development of the passing skill. National  
150 soccer federations already scale the pitch dimensions, number of players and ball size to  
151 the children’s age (e.g., Italian Football Federation, 2018), and the introduction of futsal  
152 might seem superficial. However, futsal is not a scaled form of soccer, and different  
153 elements, such as ball properties, pitch surface, style of play, and contextual variability  
154 set futsal and mini-soccer apart (Corrêa, et al., 2012; Travassos, et al., 2017; Yiannaki,

155 et al., 2018a). The findings of the studies discussed indicate that this difference in  
156 constraints needs to be faithfully represented to optimise the development of soccer  
157 passing skill. For example, study 3 showed how the futsal ball's coefficient of  
158 restitution promoted the learning of passing skill. Practicing 300 kicks with the futsal  
159 ball was sufficient to elicit greater improvement than using the soccer ball.

160       The implementation of futsal may seem costly and logistically challenging for  
161 soccer clubs (building a futsal facility is indeed costly), especially for non-professional  
162 clubs (some professional clubs have the economic potential to and already are  
163 implementing futsal facilities; e.g., Barcelona football club). However, futsal can be  
164 played in any school gym and soccer clubs can build partnerships with local schools and  
165 implement futsal sessions in their gym. While the potential logistical issue of  
166 implementing a futsal program is beyond the scope of this article, the key message for  
167 soccer clubs is to find a way to introduce futsal for at least two main reasons: as the  
168 studies discussed have shown, futsal can accelerate the learning of soccer skill in  
169 novices (study 3) and promote the enhanced development of soccer skill in skilled  
170 players (study 2), and in turn contribute to the development of talent. Furthermore,  
171 while the studies discussed here did not examine this issue, futsal could prove valid in  
172 increasing variability of the learning environment and promote skill adaptability, which  
173 underpins expert performance (Seifert, Button, & Davids, 2013). Soccer play activities,  
174 whereby contextual variability is increased via a continuous and random change of rules  
175 and equipment promote the development of children's psychological, interpersonal, and  
176 soccer-specific skills, especially in the early stages of their career (Ford, Ward, Hodges,  
177 & Williams, 2009; Hornig, Aust, & Gullich, 2016; Roca, Williams, & Ford, 2012). Play  
178 activities typically occur outside of a soccer-club context, e.g., in the street and  
179 courtyard (Araújo, et al., 2010). Following the general decline of outdoor play time

180 (Hallal et al., 2012), children are reducing the time spent playing unstructured soccer  
181 (Güllich, Kovar, Zart, & Reimann, 2017). In this context, futsal can represent a suitable  
182 solution for soccer clubs to increase the variability of the learning environment to foster  
183 talent development.

#### 184 **Recommendations for future research**

185 There is a need to investigate the optimal dose of futsal practice and the timing of a  
186 player's specialisation in soccer. Ford, et al. (2012) have shown how youth soccer  
187 players from different countries of South America and Europe played different amounts  
188 of soccer play activities (one of which is futsal) in their childhood. For example,  
189 Brazilian players played almost exclusively futsal until the age of 10, while Portuguese  
190 players balanced soccer practice and play. Considering that an optimal mix of domain-  
191 specific practice and play underpins the development of soccer talent (Ford, et al., 2009;  
192 Hornig, et al., 2016; Sieghartsleitner, Zuber, Zibung, & Conzelmann, 2018), future  
193 research should examine how to appropriately balance the volume of soccer and futsal  
194 activities, and when players should specialise in soccer. Furthermore, the empirical  
195 work reviewed here focused on the passing skill and future research should examine  
196 other soccer skills, such as kicking and defending.

197 This and previous commentaries have discussed the various benefits that  
198 participating in futsal could offer to soccer performance. However, it must be  
199 acknowledged that futsal may also be detrimental for some aspects of soccer. For  
200 example, there is no offside rule in futsal, and players may initially struggle when  
201 transferring their movement behaviour to soccer. Furthermore, it is known that expertise  
202 level influences how individuals transfer their skills (e.g., Orth, Davids, & Seifert,  
203 2018) and a prolonged participation in futsal may interfere with transfer. Therefore,

204 future research should investigate the negative aspects that futsal may induce to soccer  
205 performance and how these pitfalls may be prevented.

206 We recommend the principles of the representative learning design (RLD) (i.e.,  
207 coupling perception and action, and sampling perceptual information from the  
208 environment towards which the behaviour is generalised [i.e., game]) be used to shape  
209 future research (Davids, Araújo, Hristovski, Passos, & Chow, 2012; Pinder, et al.,  
210 2011). While methodologies used to date in soccer research have often lacked  
211 representativeness (e.g., Serpiello, Cox, Oppici, Hopkins, & Varley, 2017; Vaeyens,  
212 Lenoir, Williams, & Philippaerts, 2007), adoption of RLD would ensure stronger  
213 generalisation of the results to players' behaviour in the game. Furthermore, it is  
214 important that transfer is evaluated on performance achievement – the degree of success  
215 when performing a task (Araújo and Davids, 2015). We evaluated transfer using passing  
216 accuracy as a criterion measure to assess participants' achievement of the passing skill  
217 in the experimental transfer tasks. Furthermore, performance achievement should be  
218 coupled with some process measure (e.g., gaze behaviour) to evaluate how changes in a  
219 participant's behaviour underpins transfer. Therefore, we recommend future research  
220 use a similar criterion measure that provides information on participants' functional  
221 behaviour and goal achievement in the transfer task, and use a process measure to  
222 evaluate the mechanisms that promote transfer.

## 223 **Conclusions**

224 This commentary discussed three studies that have shown how practicing with futsal  
225 task constraints (i.e., using a ball with a low coefficient of restitution, on a hard surface,  
226 and with high pressure from opponents) accelerated the learning and promoted transfer  
227 of passing skill to soccer. Futsal constraints encouraged players' attunement to key

228 information that specifies passing affordances. This empirical evidence should provide  
229 researchers and practitioners with greater impetus to continue to explore the direct value  
230 of manipulating futsal task constraints to promote the enhanced development of soccer  
231 skill. In turn, this should encourage national soccer federations to introduce the practice  
232 of futsal in the early stage of their development programs.

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