

**Original Article**

**Skill acquisition in a professional and non-professional U16 football team: the use of playing form versus training form**

JAN FUHRE<sup>1</sup>, STIG ARVE SÆTHER<sup>2</sup>

<sup>1,2</sup>Department of Sociology and Political Science, Norwegian University of Science and Technology, NTNU.  
NORWAY

Published online: July 31, 2020

(Accepted for publication: July 22, 2020)

DOI:10.7752/jpes.2020.s3274

**Abstract:**

‘Practice makes perfect’ is a traditional statement, and practice hours, including training background, are used as an explanatory factor for success. Studies however show that hours of practice alone, are a poor predictor of future success. The content of practice sessions has been less studied, even though it naturally should be considered just as important as the amount of time spent practising. The traditional soccer practice is the more linear approach to learning, where technique and other skills are to be practised and mastered before the players are considered ready to play the game itself. The research into the field of skill development in soccer, and sports in general, is relatively coherent across different theoretical viewpoints when it comes to recommendations regarding effective practice activities. Few studies have categorized the content of practice until the concepts of training form (TF) and playing form (PF) were introduced a decade ago. The aim of this study was to compare two U16 teams, one in a professional club and one in a non-professional club, in terms of both PF and TF, including their sub-categories. We used systematic observations of soccer practice sessions to examine the type of practice activities being used. Two Norwegian U16 teams participated. Participants were systematically observed using a simple hand notation system, to provide detailed analysis of the practice activity. We evaluated these findings based on what contemporary research suggest as best to facilitate skill acquisition and development. Findings indicate that both teams use more time in Playing form activities, deemed more relevant to match performance in soccer, than training form activities who is deemed less relevant. Findings are discussed in the light of research connected to skill development, perceptual-cognitive development and expert performance. The practical implications of this study suggest that the practice activities in which coaches engage their players should create as many situations as possible where the players must make decisions and appropriate technical choices, and by that develop their perceptual-cognitive and technical skills. To do this, coaches should seek to use a high amount of PF in their daily coaching sessions and at the same time closely monitor the total mental and physical practice load of the players.

**Key words:** Talent development, skill development, practice activities, observations.

**Introduction**

Player development in soccer is a complex and composed process (Williams & Reilly, 2000). Many elements are necessary and of great importance to become an elite player, such as coaches (Cushion, 2013; Stoszowski & Collins, 2016), athletes with the capacity for further skill acquisition (Ford & Williams, 2013), and the developmental environment (Aalberg & Sæther, 2016; Larsen, Alfermann, Henriksen, & Christensen, 2013). To become a successful soccer player, one must develop and manage many different and important skills such as physiological skills (Huijgen, Elferink-Gemser, Lemmink, & Visscher, 2014), dribbling and ball control (Figueiredo, Gonçalves, Coelho e Silva, & Malina, 2009), and psychological skills, such as motivation (Forsman, Blomqvist, Davids, Liukkonen, & Kontinen, 2016), self-referential cognitions (Höner & Feichtinger, 2016) and perceptual-cognitive skills, who directly influence the performance of the player (Murr, Feichtinger, Larkin, O’Connor, & Höner, 2018). In latter years the developmental environment has got more attention when it comes to research into the developmental process in soccer, which highlights the importance of the club, coaches and significant others to reach elite level as a soccer player (Aalberg & Sæther, 2016; Flatgård, Larsen, & Sæther, 2020; Larsen et al., 2013). So, if the environment is good, the players motivation is good, then how does the player develop in a practical sense? This leads to the theme of this paper; developmental activities and the practice structure players engage in. Which type of practice is most effective to help the players develop?

‘Practice makes perfect’ is a traditional statement, and practice hours, including training background, are often used as an explanatory factor for an athletes success (Hornig, Aust, & Güllich, 2016). Studies however show that hours of practice alone, are a poor predictor of future success since there are small or no differences in accumulated practice, both organized and non-organized, between elite and non-elite soccer players (Haugaasen & Jordet, 2012; Hornig et al., 2016). The content and structure of practice sessions has on the other hand been less

2030

studied (Ford, Yates, & Williams, 2010; Williams & Hodges, 2005). The traditional soccer practice is the more linear approach to learning, where technique and other skills are to be practised and mastered before the players are considered ready to play the game itself (Harvey, Cushion, & Massa-Gonzalez, 2010). The research into the field of skill development in soccer, and sports in general, is relatively coherent across different theoretical viewpoints when it comes to recommendations regarding effective practice activities (Davids et al., 2012; Ford & Williams, 2013; Renshaw & Moy, 2018). These recommendations are in a broad sense that the practice activities should have an open environment, with high contextual interference (Lee, 2012), and a representative learning design, so that the players themselves can make decisions and choose the most appropriate response to environmental cues (Davids, Araújo, Correia, & Vilar, 2013; Ford & Williams, 2013; Travassos, Duarte, Vilar, Davids, & Araújo, 2012; Verburch, Scherder, Van Lange, & Oosterlaan, 2016). This helps to create an interaction between the individual and the environment in practice and allows the game and its nature to be the focal starting point for the practice activities (Davids et al., 2013; O'Connor, Larkin, & Williams, 2017; Renshaw, Chow, Davids, & Hammond, 2010). Activities such as small-sided games are a much-recommended activity because of their open nature; players must make constant decisions and perform technically and physically according to the dynamic environment (Aguar, Botelho, Lago, Maças, & Sampaio, 2012; Davids et al., 2013; Jones & Drust, 2008).

Research into soccer practice activity suggests that the practice should have a holistic approach to skill development, where the whole skillset is in focus at the same time, especially the combination of perceptual-cognitive and technical skills (O'Connor et al., 2017; Larkin & O'Connor, 2017; O'Connor, Larkin, & Williams, 2018). Different theoretical frameworks have highlighted the importance of effective learning strategies when it comes to the development of perceptual-cognitive and technical skills, such as *constraints-led approach* (Renshaw et al., 2010; Renshaw & Moy, 2018), *contextual interference* (Lee, 2012), *representative learning design* (Travassos et al., 2012) and *implicit and explicit motor learning*. Differences in performance level regarding perceptual-cognitive skills are evident between elite and non-elite players (Den Hartigh, Van Der Steen, Hakvoort, Frencken, & Lemmink, 2018; Roca, Ford, & Memmert, 2020), especially regarding skills as creativity, anticipation, game-reading and decision making, which are skills essential to success in elite level soccer (Casanova, Oliveira, Williams, & Garganta, 2009; Kanekens, Elferink-Gemser, & Visscher, 2011; Roca & Ford, 2020). This highlights the importance of giving attention the development of perceptual-cognitive skills in youth soccer (Broadbent, Causer, Williams, & Ford, 2015; Williams & Ford, 2013). To develop perceptual-cognitive skills such as decision making and anticipation effectively, research points to the effect of a dynamic learning environment with a clear interaction between environmental cues and the individual performer in the field of practice (O'Connor et al., 2017; O'Connor, Wardak, Goodyear, Larkin, & Williams, 2018; Roca, Williams, & Ford, 2012; Williams & Hodges, 2005). Practice exercises where players has the possibility to make choices based on the surroundings information are shown to be superior in regard of developing underlying perceptual-cognitive skills such as decision making (Roca & Ford, 2020).

Ford et al. (2010) introduced the concepts of training form (TF) and playing form (PF) to categorize the content of practice (Cushion, Ford, & Williams, 2012; Ford et al., 2010; O'Connor, Larkin, et al., 2018; Partington & Cushion, 2013; Roca & Ford, 2020), each consisting of three sub-categories: PF comprises small-sided games, conditioned games and phase of play, and TF comprises fitness, technical and skills (Ford et al., 2010). PF activity typically seeks to create a match-like context with match-like constraints for the practitioners (Ford et al., 2010; O'Connor, Larkin, et al., 2018), while TF activities are more in line with traditional practice activities, focusing on one skill at a time (e.g., technical training such as dribbling through cones) (Williams & Hodges, 2005). Ford et al. (2010)'s main argument, was that practice should consist of as much PF activity as possible, as it creates a complex and dynamic environment that is as close as possible to the match context. PF are therefore more relevant to the in-match performance and, as important, for the development of perceptual-cognitive skills such as decision making (O'Connor et al., 2017; O'Connor, Larkin, et al., 2018; Roca & Ford, 2020). Research also suggests that PF activities, which are random and variable with high contextual interference, are more likely to enhance long-term retention than TF activities (Lee, 2012), and therefore, with long term development and performance in mind, PF should be the main practice activity within youth teams (O'Connor et al., 2017; O'Connor, Larkin, et al., 2018; Roca & Ford, 2020). The three studies which have used the framework of Ford et al. (2010) found that English amateur, semi-professional and professional clubs showed a higher amount of TF activities across all levels (Ford et al., 2010), which was also the case among professional youth national academy coaches in England (Partington & Cushion, 2013). Conversely, it was found that among coaches of both non-professional and professional Australian clubs, there was a greater number of PF activities used (O'Connor, Larkin, et al., 2018). A newly publicized study by Roca and Ford (2020) builds further on the concept of Ford et al. (2010), and has looked into the practice structure in academies in top-division clubs from Germany, Portugal, Spain and England and has found that significant more time is spent in what they call "Active Decision-Making", which can be viewed as a further developed PF category. The differences in research findings across the years points to a potential shift in practice structure to a more open and dynamic approach to practice, with more emphasis being put on the development of psychological skills. With the use of the framework of Ford et al. (2010) the aim of the study was to compare two U16 teams, in a professional club and a non-professional club, in terms of both PF and TF, including their sub-categories.

**Methods**

*Participants*

Two Norwegian U16 soccer teams and their respective coaches participated in this study, representing a professional and a non-professional club. The participating clubs were chosen on basis of their club status (either professional or non-professional). This is meant to gain further insight into differences in the use of PF and TF practice activities across different club levels. Four practice sessions were observed for each club. The coach of the U16 team in the professional club held a UEFA B coaching license, while the coach of the U16 team in the fourth-tier club had no formal coaching education but did have extended experience as a player.

*Instrument*

To measure the structure of the practice activity, a replica of Ford et al. (2010)'s coding system was used to gain validation for the coding system Ford et al. (2010) developed in consultation with professional English coaches. This resulted in the two main categories, PF and TF, and their subcategories. A simple hand notation system was used both to describe each practice activity in intense detail (down to ten parts of a minute), and to register time-use in each activity. The type of main activity, sub-activity and each activity's duration were registered with hand notations. The category TF includes fitness, technical and skills. Fitness consists of activities that seeks to improve fitness aspects of the game (warm-up, conditioning and strength). Technical is the subcategory focused on practice of isolated technical skills unopposed, alone or in a group. Skills consists of re-enacting isolated game incidents, such as practising corners, freekicks or unopposed passing drills or patterns(Ford et al., 2010).

The category PF includes small-sided games, conditioned games and phase of play. Small-sided games consist of match play with a reduced number of players and two goals, a reproduction of the game itself on a smaller scale. Conditioned games have many of the same characteristics of small-sided games but include variations in the rules, the number of goals or areas of play. Examples of this can be possession/ball retention only games or different kinds of positional games. The last subcategory, phase of play, contains of unidirectional match play towards a single goal, such as practising attack patterns(Ford et al., 2010).

*Procedure*

The data was collected by observations of training sessions with the two teams. Hand notations were taken for each practice session, with every practice activity being described in detail and drawn up for later sorting into main categories and subcategories. Also, the time used for each activity was noted and registered. Participants were informed about the purpose of the study and assured that data would be treated confidentially beforehand. The lead observer holds a UEFA C-license and is an active youth coach. To gain further validation of the categorised observation data, a panel of experts containing of two other coaches was used, including one active coach with a UEFA B-license and one coach with a UEFA C- license, to gain a second opinion on the categories.

**Results**

The non-professional club did have a slightly greater amount of PF (63.3% vs 55.7%) than the professional club, as we can see in Table 1. Both coaches used their style of play and development of their players' skillset according to their tactical approach as the reasoning behind their choice of practice activities.

There was also a slight difference between the use of the different subcategories. Both teams performed approximately the same amount of fitness activity (18.3% vs. 13.4%); most of it was contained during warm up activity. The non-professional club spent a lot more time on technical activity (23.3% vs. 13%); most of it consisted of passing drills, whereas in the professional club, this subcategory contained mostly activities focusing on ball control. The non-professional club did not perform any activities in the skills category, while the professional club spent 13% of training on a pre-determined scheme of play without any opposition.

**Table 1. Percentage of session duration spent in training form activities and playing form activities and subcategories.**

		<i>Training form</i>				<i>Playing form</i>			
		<i>Fitness</i>	<i>Technical</i>	<i>Skills</i>	<i>Total</i>	<i>Small-sided games</i>	<i>Conditioned games</i>	<i>Phase of play</i>	<i>Total</i>
Professional club (total)		<b>18.3%</b>	<b>13%</b>	<b>13%</b>	<b>44.3%</b>	<b>14.3%</b>	<b>28.7%</b>	<b>12.7%</b>	<b>55.7%</b>
Session 1		15.2%	0%	20.2%	15.2%	31.7%	32.9%	0%	84.8%
Session 2		24.3%	45.7%	0%	70%	0%	30%	0%	30%
Session 3		12.7%	0%	32.4%	45.1	0%	54.9%	0%	54.9%
Session 4		21.3%	8.7%	0%	30%	22.5%	0%	47.5%	70%
Non-professional club (total)		<b>13.4%</b>	<b>23.3%</b>	<b>0%</b>	<b>36.7%</b>	<b>26.9%</b>	<b>36.4%</b>	<b>0%</b>	<b>63.3%</b>
Session 1		12.7%	29.1%	0%	41.8%	38%	20.3%	0%	58.2%
Session 2		20%	57.1%	0%	77.1%	0%	22.9%	0%	22.9%
Session 3		12.5%	10%	0%	22.5%	30%	47.5%	0%	77.5%
Session 4		9.2%	0%	0%	9.2%	36.8%	54%	0%	63.2%

When it comes to the PF subcategories, both the non-professional club and the professional club spent the most time on conditioned games activities (28.7% vs 36.4%), closely connected with the match context but with slightly different rules or constraints than small-sided games (Ford et al., 2010). There was a quite big gap in between the two clubs when it comes to time spent in small-sided games: 14.3% for the professional club and 26.9% for the non-professional club. In the last subcategory of PF, phase of play, the non-professional club spends zero time in this sort of activity, and the professional club spends 12.7% of the total practice time on this activity category.

### **Discussion**

The aim of the study was to use of the framework of Ford et al. (2010) to compare two U16 teams, one in a professional club and one in a non-professional club, in terms of the main categories PF and TF, including their subcategories, to gain insight into which practice activities are used by a professional and a non-professional coach to develop their players' skills.

The findings in this study indicate that both clubs spend more time on PF than on TF activity. This is consistent with the recommendations made by Ford et al. (2010) and others regarding the type of practice category that should be emphasised when a coach seeks to develop important skills, such as perceptual-cognitive and technical skills, in a functional environment (O'Connor et al., 2017; O'Connor, Larkin, et al., 2018; Partington & Cushion, 2013; Roca & Ford, 2020). Interestingly, the professional club did spend less time on PF activity than a non-professional club at the U16 level, according to the observation data in this study. The differences between the two clubs are quite small in the main categories, but if we take a closer look at the split in time between the six subcategories, it shows differences in the categories that are most used and which practice activities players are engaged in.

According to Ford et al. (2010) and Partington and Cushion (2013), the amount of PF should be as high as possible because of the alleged benefits of PF activities when it comes to skill development and long-term retention. Ford and Williams (2013), however, point to the fact that the activities must be adjusted to the total practice load, and since PF activities are closely related to high-intensity match play, the coach must take this into consideration. That said, the coach should, and must, regulate the intensity of the activity by placing appropriate constraints on match-like activities (Ford & Williams, 2013). Therefore, we can argue that PF activities can also be done at low intensity, but that raises the question of whether the activity has the right amount of challenge and output.

It is vitally important that these practice activities take place in an open environment with a representative learning design, so the players themselves can make decisions and choose the most appropriate response to environmental cues (Davids et al., 2013; Ford & Williams, 2013; Travassos et al., 2012; Verburgh et al., 2016). The game and its nature should be the focal starting point for the practice activities (O'Connor et al., 2017; Renshaw & Moy, 2018), especially in regard to the development of the highly important perceptual-cognitive skills such as anticipation, decision making and game reading (Broadbent et al., 2015; Den Hartigh et al., 2018; O'Connor et al., 2017; Roca & Ford, 2020; Roca et al., 2020). Activities such as small-sided games are a much-recommended activity because of their open nature, in which players need to make constant decisions and perform technically and physically, and therefore contain, if organised well, all the necessary skills in soccer (Aguiar et al., 2012; Davids et al., 2013; Jones & Drust, 2008). This indicates that the game itself should be the focal learning point, because of the changing environment and complex dynamics, which, in a broader sense, enhance the development of functional technical skills, decision making and tactical behaviour in the field (Ford et al., 2010; O'Connor et al., 2017). Travassos et al. (2012) points out that this also develops technical skills because the player must make choices based on his or her ability to perform the chosen decision in an appropriate way. Ford et al. (2010), O'Connor et al. (2018) and Roca and Ford (2020) make the same argument for the use of PF as the main practice context in soccer, largely based on seeking development of underlying perceptual-cognitive skills, in which practice activities with active decision making from the performers has shown to be superior (O'Connor et al., 2017; Roca & Ford, 2020).

This should not, however, be misinterpreted to mean that it is only to let the players play and that the development would be enhanced by itself in organised practice. It is also highly important to put on the right constraints, both to the activity by itself, and by feedback given to the players (Ford & Williams, 2013; Ford et al., 2010; Renshaw & Moy, 2018). This highlight the importance of the coach in the developmental process, but as Renshaw et al. (2018) argues it also shows how players engaging in unorganized playing activities, containing many of the same characteristics as PF activities, should be encouraged.

### **Practical implications**

Because of the need for fast and accurate thinking and processing of information, studies stress the fact that practice activities should enhance these kinds of processes (Ford et al., 2010; Williams & Hodges, 2005), preferably as close to the match environment as possible, in which players need to observe and gain information at high speed and to be able to process the information in order to make the most appropriate choice (Davids et al., 2013; Ford & Williams, 2013; O'Connor et al., 2017). This, in combination with technical performance, is vital for the development of perceptual-cognitive skills, one of the most important skills to succeed at the highest levels of soccer (Casanova et al., 2009; Den Hartigh et al., 2018; Roca et al., 2020; Williams & Ford, 2013).

Therefore, the practice activities in which coaches engage their players should create as many situations as possible where the players must make decisions and appropriate technical choices, and by that develop their perceptual-cognitive and technical skills (Broadbent et al., 2015; O'Connor et al., 2017; Williams & Hodges, 2005). To do this, coaches should seek to use a high amount of PF in their daily coaching sessions and at the same time closely monitor the total mental and physical practice load of the players (Ford & Williams, 2013; Ford et al., 2010; O'Connor, Larkin, et al., 2018).

#### **Limitations**

This study naturally has limitations. The introduction to the categories, PF and TF, is quite new, and needs further investigations and confirmation. The study only includes two clubs, though at different performance levels, and should be done in other environments and levels of performance. Furthermore, when it comes to the distribution between the different subcategories, the existing studies that have used the same categorising model do not say anything about how the model should be used to optimise skill development. Another obvious limitation of this study is that the observation data was registered using hand notations and not, for example, video. This could lead to wrong interpretations of the activities, since the panel of experts could not get direct footage of the practice observed.

#### **Conclusion**

The findings in this study indicate that both clubs spend more time on PF than on TF activity. This is consistent with the recommendations made by Ford et al. (2010) and others regarding the type of practice category that should be emphasised when a coach seeks to develop important skills, such as perceptual-cognitive and technical skills, in a functional environment (O'Connor et al., 2017; O'Connor, Larkin, et al., 2018; Partington & Cushion, 2013; Roca & Ford, 2020). Interestingly, the professional club did spend less time on PF activity than a non-professional club at the U16 level, according to the observation data in this study. The differences between the two clubs are quite small in the main categories, but if we take a closer look at the split in time between the six subcategories, it shows differences in the categories that are most used and which practice activities players are engaged in. Findings indicate that both teams use more time in Playing form activities, deemed more relevant to match performance in soccer, than training form activities who is deemed less relevant. Findings are discussed in the light of research connected to skill development, perceptual-cognitive development and expert performance.

#### **References**

- Aalberg, R. R., & Sæther, S. A. (2016). The Talent Development Environment in a Norwegian top-level football club. *Sport Science Review*, 25(3-4), 159-182.
- Aguiar, M., Botelho, G., Lago, C., Maças, V., & Sampaio, J. (2012). A review on the effects of soccer small-sided games. *Journal of human kinetics*, 33, 103-113.
- Broadbent, D. P., Causer, J., Williams, A. M., & Ford, P. R. (2015). Perceptual-cognitive skill training and its transfer to expert performance in the field: Future research directions. *European Journal of Sport Science*, 15(4), 322-331.
- Casanova, F., Oliveira, J., Williams, M., & Garganta, J. (2009). Expertise and perceptual-cognitive performance in soccer: a review. *Revista Portuguesa de Ciências do Desporto*, 9(1), 115-122.
- Cushion, C. (2013). Coaching and coach education. In A. M. Williams (Ed.), *Science and soccer: Developing elite performers* (3 ed., pp. 199-217): Routledge.
- Cushion, C., Ford, P. R., & Williams, A. M. (2012). Coach behaviours and practice structures in youth soccer: Implications for talent development. *Journal of sports sciences*, 30(15), 1631-1641.
- Davids, K., Araújo, D., Correia, V., & Vilar, L. (2013). How small-sided and conditioned games enhance acquisition of movement and decision-making skills. *Exercise and sport sciences reviews*, 41(3), 154-161.
- Davids, K., Araújo, D., Hristovski, R., Passos, P., & Chow, J. Y. (2012). Ecological dynamics and motor learning design in sport. In N. J. Hodges & A. M. Williams (Eds.), *Skill acquisition in sport: Research, theory and practice* (pp. 112-130): Routledge.
- Den Hartigh, R. J., Van Der Steen, S., Hakvoort, B., Frencken, W. G., & Lemmink, K. A. (2018). Differences in game reading between selected and non-selected youth soccer players. *Journal of sports sciences*, 36(4), 422-428.
- Figueiredo, A. J., Gonçalves, C. E., Coelho e Silva, M. J., & Malina, R. M. (2009). Characteristics of youth soccer players who drop out, persist or move up. *Journal of sports sciences*, 27(9), 883-891.
- Flatgård, G., Larsen, C. H., & Sæther, S. A. (2020). Talent development environment in a professional football club in Norway. *Scandinavian Journal of Sport and Exercise Psychology*, 2, 8-15.
- Ford, P. R., & Williams, A. M. (2013). The acquisition of skill and expertise. In A. M. Williams (Ed.), *Science and soccer: Developing elite performers* (3 ed., pp. 122-138): Routledge.
- Ford, P. R., Yates, I., & Williams, A. M. (2010). An analysis of practice activities and instructional behaviours used by youth soccer coaches during practice: Exploring the link between science and application. *Journal of sports sciences*, 28(5), 483-495.

- Forsman, H., Blomqvist, M., Davids, K., Liukkonen, J., & Kontinen, N. (2016). Identifying technical, physiological, tactical and psychological characteristics that contribute to career progression in soccer. *International Journal of Sports Science & Coaching*, 11(4), 505-513.
- Harvey, S., Cushion, C. J., & Massa-Gonzalez, A. N. (2010). Learning a new method: Teaching Games for Understanding in the coaches' eyes. *Physical Education and Sport Pedagogy*, 15(4), 361-382.
- Haugaasen, M., & Jordet, G. (2012). Developing football expertise: a football-specific research review. *International Review of Sport and Exercise Psychology*, 5(2), 177-201.
- Hornig, M., Aust, F., & Güllich, A. (2016). Practice and play in the development of German top-level professional football players. *European Journal of Sport Science*, 16(1), 96-105.
- Huijgen, B. C., Elferink-Gemser, M. T., Lemmink, K. A., & Visscher, C. (2014). Multidimensional performance characteristics in selected and deselected talented soccer players. *European journal of sport science*, 14(1), 2-10.
- Höner, O., & Feichtinger, P. (2016). Psychological talent predictors in early adolescence and their empirical relationship with current and future performance in soccer. *Psychology of Sport and Exercise*, 25, 17-26
- Jones, S., & Drust, B. (2008). Physiological and technical demands of 4 v 4 and 8 v 8 games in elite youth soccer players. *Kinesiology: International journal of fundamental and applied kinesiology*, 39(2), 150-156.
- Kannekens, R., Elferink-Gemser, M., & Visscher, C. (2011). Positioning and deciding: key factors for talent development in soccer. *Scandinavian journal of medicine & science in sports*, 21(6), 846-852.
- Larkin, P., & O'Connor, D. (2017). Talent identification and recruitment in youth soccer: Recruiter's perceptions of the key attributes for player recruitment. *PLoS one*, 12(4), e0175716.
- Larsen, C. H., Alfermann, D., Henriksen, K., & Christensen, M. K. (2013). Successful talent development in soccer: The characteristics of the environment. *Sport, Exercise, and Performance Psychology*, 2(3), 190.
- Lee, T. D. (2012). Contextual interference - Generalizability and limitations. In A. M. Williams & N. J. Hodges (Eds.), *Skill acquisition in sport: Research, theory and practice* (2 ed., pp. 79-93): Routledge.
- Murr, D., Feichtinger, P., Larkin, P., O'Connor, D., & Höner, O. (2018). Psychological talent predictors in youth soccer: A systematic review of the prognostic relevance of psychomotor, perceptual-cognitive and personality-related factors. *PLoS One*, 13(10), e0205337.
- O'Connor, D., Larkin, P., & Williams, A. M. (2017). What learning environments help improve decision-making? *Physical Education and Sport Pedagogy*, 22(6), 647-660.
- O'Connor, D., Larkin, P., & Williams, A. M. (2018). Observations of youth football training: How do coaches structure training sessions for player development? *Journal of sports sciences*, 36(1), 39-47.
- O'Connor, D., Wardak, D., Goodyear, P., Larkin, P., & Williams, M. (2018). Conceptualising decision-making and its development: a phenomenographic analysis. *Science and Medicine in Football*, 2(4), 261-271.
- Partington, M., & Cushion, C. (2013). An investigation of the practice activities and coaching behaviors of professional top-level youth soccer coaches. *Scandinavian journal of medicine & science in sports*, 23(3), 374-382.
- Renshaw, I., Chow, J. Y., Davids, K., & Hammond, J. (2010). A constraints-led perspective to understanding skill acquisition and game play: A basis for integration of motor learning theory and physical education praxis? *Physical Education and Sport Pedagogy*, 15(2), 117-137.
- Renshaw, I., & Moy, B. (2018). A Constraint-Led Approach to Coaching and Teaching Games: Can going back to the future solve the «they need the basics before they can play a game» argument? *Agora para la Educación Física y el Deporte*, 20(1), 1-26.
- Roca, A., & Ford, P. R. (2020). Decision-making practice during coaching sessions in elite youth football across European countries. *Science and Medicine in Football*(just-accepted).
- Roca, A., Ford, P. R., & Memmert, D. (2020). Perceptual-cognitive processes underlying creative expert performance in soccer. *Psychological Research*. doi:10.1007/s00426-020-01320-5
- Roca, A., Williams, A. M., & Ford, P. R. (2012). Developmental activities and the acquisition of superior anticipation and decision making in soccer players. *Journal of Sports Sciences*, 30(15), 1643-1652.
- Stoszkowski, J., & Collins, D. (2016). Sources, topics and use of knowledge by coaches. *Journal of Sports Sciences*, 34(9), 794-802.
- Travassos, B., Duarte, R., Vilar, L., Davids, K., & Araújo, D. (2012). Practice task design in team sports: Representativeness enhanced by increasing opportunities for action. *Journal of sports sciences*, 30(13), 1447-1454.
- Verburgh, L., Scherder, E., Van Lange, P., & Oosterlaan, J. (2016). The key to success in elite athletes? Explicit and implicit motor learning in youth elite and non-elite soccer players. *Journal of Sports Sciences*, 34(18), 1782-1790.
- Williams, A. M., & Ford, P. R. (2013). «Game intelligence» Anticipation and decision making. In A. M. Williams (Ed.), *Science and soccer: Developing elite performers* (3 ed., pp. 105-121): Routledge.
- Williams, A. M., & Hodges, N. J. (2005). Practice, instruction and skill acquisition in soccer: Challenging tradition. *Journal of sports sciences*, 23(6), 637-650.
- Williams, A. M., & Reilly, T. (2000). Talent identification and development in soccer. *Journal of Sports Sciences*, 18(9), 657-667.