

**This is an electronic reprint of the original article.
This reprint *may differ* from the original in pagination and typographic detail.**

Author(s): Forsman, Hannele; Blomqvist, Minna; Davids, Keith; Konttinen, Niiko; Liukkonen, Jarmo

Title: The role of sport-specific play and practice during childhood in the development of adolescent Finnish team sport athletes

Year: 2016

Version:

Please cite the original version:

Forsman, H., Blomqvist, M., Davids, K., Konttinen, N., & Liukkonen, J. (2016). The role of sport-specific play and practice during childhood in the development of adolescent Finnish team sport athletes. *International Journal of Sports Science and Coaching*, 11(1), 69-77. <https://doi.org/10.1177/1747954115624816>

All material supplied via JYX is protected by copyright and other intellectual property rights, and duplication or sale of all or part of any of the repository collections is not permitted, except that material may be duplicated by you for your research use or educational purposes in electronic or print form. You must obtain permission for any other use. Electronic or print copies may not be offered, whether for sale or otherwise to anyone who is not an authorised user.

The role of sport-specific play and practice during childhood in the development of adolescent Finnish team sport athletes

Hannele Forsman¹, Minna Blomqvist², Keith Davids^{3,4},
Niilo Konttinen² and Jarmo Liukkonen¹

Abstract

This study sought to understand the role of sport-specific play and practice in the development of adolescent team sport athletes in the Finnish sports development system. Participants were male, 15-year-old soccer ($n = 141$), ice hockey ($n = 204$), and basketball ($n = 96$) players, divided into three groups based on the amount of sport-specific play and practice experienced during childhood. Data were collected with sport-specific inventories of practice history, tactical skills, psychological skills, and sport-specific skill test. Results showed that athletes with more sport-specific play and practice during childhood had more sport-specific play and practice during adolescence, better technical, tactical, and psychological skills, and were more likely to be selected for national youth teams at the age of 15. Data highlighted the importance of sport-specific play and practice during childhood in the development of team sport performers in the Finnish athlete development system.

Keywords

Deliberate play, developmental model of sport participation, expertise, talent development, youth team sport

Introduction

The development of youth team sport athletes to expert levels is a major goal of performance development systems in different countries. Expertise in team sports requires mastery of a wide range of performance characteristics from very general, such as physical fitness and psychological characteristics, to very specific elements, such as technical,¹ and tactical² skills. Performance in team sports is also dependent on the cohesive interaction among team members. This multi-dimensional nature of team sports performance^{3–5} needs to be considered in the development of youth team sport athletes.

Although there are many interacting factors involved in the development of sport expertise,^{6,7} a most important factor is practice experiences during childhood and adolescence. However, there is a lack of consensus on the type of practice activities athletes should engage in during childhood and early adolescence to attain expertise in adulthood. Studies have highlighted benefits of both engaging in a large amount of practice^{8,9} and play,^{10–14} and involvement in a variety of sports^{15,16} during childhood and early adolescence.

Sport-specific practice is usually defined as a formal activity engaged in with the aim of improving performance in the specific sport, and it is close to definition of deliberate practice. Engaging in a considerable amount of sport-specific practice during childhood and early adolescence has been shown to be important in the development of team sport athletes,^{9,17} and especially the development of technical skills of the athletes.¹ Ericsson et al.⁸ argued that deliberate practice at an early age is important for future success, because when athletes start adhering to a deliberate practice program, they are more likely to enhance their

Reviewer: Karl Erickson (Michigan State University, USA)

¹Department of Sport Sciences, University of Jyväskylä, Jyväskylä, Finland

²KIHU – Research Institute for Olympic Sports, Jyväskylä, Finland

³Centre for Sports Engineering Research Faculty of Health and Wellbeing, Sheffield Hallam University, Sheffield, UK

⁴FiDiPro Programme, University of Jyväskylä, Jyväskylä, Finland

Corresponding author:

Hannele Forsman, Department of Sport Sciences, University of Jyväskylä, PL 35, Jyväskylä, 40014, Finland.

Email: hannele.forsman@eeriikka.fi

expertise levels. However, the deliberate practice theory has been criticized because of high levels of inter-individual variability in some of the original data on practice hours,¹⁸ and also because of some possibly negative consequences of undertaking such a vast number of hours of intense training during early development. These consequences include burnout, dropout, overuse injuries, and lower levels of attainment.¹⁹

It has been suggested that exposure to large amounts of sport-specific play during childhood might result in superior tactical skills compared with those who accumulate less sport-specific play activity.²⁰ Greater amounts of engagement in sport-specific play during childhood have also been shown to differentiate players who progress to professional status from those who do not.^{13,14,21} Côté et al.²² have suggested that a large amount of play activity in the early years may protect athletes against negative consequences of engaging in practice and competition in the primary sport during childhood. This may have a positive effect on an individual's general motivation to engage in practice and competition in a primary sport during adolescence.²² Enhanced motivation to engage in practice and competition of primary sport may be important for attainment of excellence by enabling athletes to invest requisite time in practice and remain committed to the expertise development process.^{23,24}

Previous research has suggested that involvement in various sports during the early years is an important factor in developing the elite athletic career.^{15,16,25,26} Involvement in different sports during childhood and adolescence is thought to lead to enhanced sport expertise because of high levels of intrinsic motivation that stems from children experiencing fun, enjoyment, and competence through sport involvement.¹⁵ It has also been suggested that the skills and physiological conditioning developed through diversified sport involvement in childhood may be transferable, and that less deliberate, sport-specific practice is necessary for expertise if athletes experience and practice a range of activities throughout development.¹⁶

One issue that has not been extensively examined is the idea that developmental activities of youth athletes may be country-specific, depending on the cultural and social constraints of sport development systems in different nations. Countries with elite development sport academies that recruit individuals at a young age are likely to have players who have engaged in a lot of practice and competition in their primary sport during childhood. Players in these kinds of countries are also expected to commence performance in the primary sport and formal training earlier than others.⁹ On the other hand, in countries with less formal recruitment systems, athletes may start formal activities later and engage in a lot of play activities of the primary

sport during childhood.^{11,12} In the Finnish sport system, a significant cultural constraint is that athletic development is based around sport clubs, rather than elite developmental sport academies or schools. There are no academies which recruit athletes at a young age, so all athletes usually compete and practice in their local sport club throughout their childhood and adolescence. In the sports club environment, athletes tend to attend local (i.e. non-specialist) schools and most of the coaches are non-specialist volunteers. Thus, play and practice times are concentrated on evenings and weekends. Four different kinds of climatic seasons makes it challenging to find suitable weather conditions to play and practice outdoors, both in team and individual settings. In winter, weather conditions can make it unsuitable for outdoor soccer and basketball practice, and in summer for outdoor ice hockey practice. These significant environmental constraints may raise the possibility that in countries like Finland, athletes may be led to engage in many different sports during their childhood.

The environmental constraints of a sports-club-based athletic development system and climatic variations on athlete development from childhood to expert levels in Finland raise questions about the generality of data on expertise pathways in different countries. Differences in socio-cultural constraints between countries suggest that more research is needed to examine how they shape effects of different types of play and practice during childhood. The aim of the present study was to examine whether the amount of sport-specific play and practice during childhood (6–12 years of age) is related to the amount of sport-specific play and practice during early adolescence (13–15 years of age). It also sought to investigate whether the amount of sport-specific practice and play during childhood is related to development of technical, tactical, and psychological skills in youth athletes (15 years of age) in three different team sports in Finland. These skills have been shown to differentiate more skilled athletes from others in previous research in other countries.^{3–5} However, there has been no previous research on the characteristics of developing athletes under the cultural and environmental constraints of the Finnish sport development system. Furthermore, based on data reported in previous studies,^{13,21} we examined whether athletes experiencing more sport-specific play and practice during childhood had better prospects of being selected for national youth teams at the age of 15 in the Finnish system.

Method

Participants

A total of 441 males born in 1995 representing 12 soccer teams, 13 ice hockey teams, and 12 basketball

teams participated in this study. All teams sampled were among the most successful in their age category in the whole of Finland. The most talented athletes of the teams had been selected for the Finnish national youth teams at the age of 15 (Table 1). The athletes were divided into tertiles based on the average amount of sport-specific play and practice reported by them during early years (6–12 years of age). A Low-Practice group comprised athletes ($n = 139$) whose amount of sport-specific play and practice was low (range 0–3.75 h/week) during the early years. A Medium-Practice group comprised athletes ($n = 156$) whose amount of sport-specific play and practice was average (range 3.75–5.5 h/week) during the early years. A High-Practice group ($n = 146$) comprised athletes whose amount of sport-specific play and practice was high (range 5.5–24.5 h/week) during the early years. Participants' mean ages and anthropometric data are presented in Table 2.

Procedure

Participants and parents/guardians were informed about the study procedures 1 week before data collection. All individuals provided informed consent prior to participation. Data collection occurred in the athletes' own practice environments. All participants completed sport-specific skill test and three sport-specific

questionnaires according to standardized instructions provided by researchers.

Practice histories. A sport-specific questionnaire recorded the amount of sport-specific play, sport-specific practice, and play and practice of other sports. Sport-specific play was defined as sport-specific play undertaken alone or with friends, which resulted in informal practice of skills and tactical behaviors. Sport-specific practice was defined as sport-specific practice with the team. Play and practice of other sports were defined as all practice and playing activities in a range of other sports. To improve the reliability of practice estimates, our methods for collecting practice data were based on those of Ward et al.⁹ Rather than requiring individuals to recall estimates from the start of practice to the present date, practice data were obtained using estimates from the most recent 3 years initially, and from then on, recorded in 3-year intervals. To ensure validity of practice estimates, questionnaires were completed after standardized instructions provided by researchers. Additionally, the questionnaire was pilot tested with a sample of non-participating athletes of the same ages and from the same sports, with no issues of clarity reported.

The first section of the questionnaire was designed to elicit information on birthdates and the age that participants first engaged in sport-specific practice in a club. The second section of the questionnaire was designed to elicit information on participants' engagement in sport-specific play, sport-specific practice, and play and practice of other sports at the age between 6 and 15. The average hours per week during 10 months of active play and practice per year spent in each of the activities were recorded.

Technical skills. A sport-specific technical skill test was used to assess the athletes' technical skills in their own sport. Standardized tests developed and used by the Finnish National Federations of different sports

Table 1. Distribution of athletes in different sports and level.

Sports	Players		National youth team athletes		Other athletes	
	N	%	N	%	N	%
Soccer	141	32	30	21	111	79
Ice hockey	204	46	33	16	171	84
Basketball	96	22	17	18	79	82
Total	441	100	80	18	361	82

Table 2. General characteristics (means, SDs) of youth team athletes specified by amount of sport-specific play and practice during early years.

Groups	High ($n = 146$)	Medium ($n = 156$)	Low ($n = 139$)	High vs. low	High vs. medium	Medium vs. low
Age (years)	15.34 (0.29)	15.32 (0.27)	15.26 (0.29)	0.28*	0.05	0.24
Height (cm)	175.07 (7.89)	177.28 (8.07)	175.96 (7.26)	0.12	0.28*	0.17
Weight (kg)	66.11 (9.47)	65.90 (9.07)	65.70 (9.46)	0.04	0.02	0.02
Starting age for sport-specific training (years)	5.46 (1.64)	5.65 (1.52)	6.70 (2.36)	0.61***	0.12	0.53***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Cohen's d (see next to the asterisk).
SD: standard deviation.

were related to observations of athletes' dribbling, passing, and ball manipulation skills.

Tactical skills. A Tactical Skills Inventory for Sports (TACSIS),²⁷ with subscales of declarative and procedural knowledge, was used to assess athletes' perceived tactical skills. As this was the first time the TACSIS was used in Finland, it was translated into Finnish by a panel of experts in team sport, and later back into English by a native British translator whose first language was English and who understood Finnish. The re-translated English version was compared with the original version for consistency. Items revealed to have a number of possible meanings in Finnish were discussed by the panel of experts to redraft them to be as accurate as possible. The TACSIS consists of 22 items representing four dimensions: Positioning and Deciding (9 items), Knowing about Ball Actions (4 items), Knowing about Others (5 items), and Acting in Changing Situations (4 items). Knowing about Ball Actions and Knowing about Others were related to declarative knowledge. Positioning and Deciding and Acting in Changing Situations were related to procedural knowledge. These 22 items were responded to on a 6-point Likert scale regarding sport performance, from 1 (very poor or almost never) to 6 (excellent or always). Participants were asked to compare themselves with the top Finnish athletes in the same age category.

In previous research, the TACSIS has been revealed as a reliable psychometric instrument with internal consistency coefficients of all four scales. Cronbach's alpha coefficients have been reported, ranging from .72 to .89.²⁷ In the current study, the internal consistencies of the four TACSIS sub-scales indicated satisfactory levels, with Cronbach's alpha coefficients ranging from .76 to .91.

Psychological skills. A Psychological Skills Inventory for Sports (PSIS-R-5)²⁸ was used to assess the athletes' perceived psychological skills. As this was the first time the PSIS-R-5 was used in Finland, the same translation process was undertaken as for the TACSIS (see above). The scale consists of 29 items, representing four dimensions: Motivation (8 items), Confidence (8 items), Concentration (7 items), and Mental Preparation (6 items). These 29 items were responded to on a 5-point Likert scale, from 1 (almost never) to 5 (almost always). Items worded negatively were transformed by reversing the aforementioned 1–5 format. In this way, a high score on each scale corresponds to a proposed high value for a psychological skill.

In previous research, the Psychological Skills Inventory for Sports has been shown to be a psychometrically reliable instrument with internal consistency coefficients of all four sub-scales, with Cronbach's

alpha coefficients ranging from .67 to .84.²⁹ In the current study, the four PSIS-R-5 scales indicated good internal consistency, with Cronbach's alpha coefficients ranging from .67 to .86.

Data analysis

One-way analysis of variance (ANOVA) was applied to: (a) examine group differences in terms of age, height weight, and starting age for sport-specific practice; (b) compare practice histories between groups during childhood (6–12 years of age); (c) compare practice histories during early adolescence (13–15 years of age); and (d) investigate group differences in technical skills. A post-hoc Tukey HSD test was applied to follow up on statistically significant differences observed between different groups. Multivariate analysis of variance (MANOVA) was applied to investigate group differences in terms of tactical and psychological skills. Chi-square goodness-of-fit tests were used to compare national youth team athlete distributions between the three groups. Effect size (ES) values were calculated to determine the meaningfulness of the differences between groups, classified according to Cohen's³⁰ suggestion of ESs around .20 being small, around .50 as moderate, and around .80 evidencing a large effect.

Results

Practice history of athletes specified by amount of sport-specific play and practice during childhood

Play and practice during childhood (6–12 years of age). The overall group effect was significant for the amount of sport-specific play [$F(2,440) = 175.090$, $p = .000$], and sport-specific practice [$F(2,440) = 126.613$, $p = .000$], undertaken. The amount of sport-specific play and the amount of sport-specific practice were significantly higher in High-Practice group compared with Low- and Medium-Practice groups, and in Medium-Practice group compared with Low-Practice group. The overall group effect marginally failed to achieve conventional levels of statistical significance for the amount of play and practice reported in other sports ($p = .056$). However, a post-hoc Tukey HSD test showed that the amount of play and practice of other sport was significantly higher in the High-Practice group compared with the Low-Practice group (Table 3).

Play and practice during early adolescence (13–15 years of age). The overall group effect was significant for the amount of sport-specific play [$F(2,407) = 45.938$, $p = .000$], and sport-specific practice [$F(2,406) = 20.411$, $p = .000$], reported. The amount of

Table 3. The amount of sport-specific play, sport-specific practice, and play and practice of other sports (hours/week) during childhood (means, SDs) of youth team sport athletes specified by amount of sport-specific play and practice during childhood.

Groups	High (n = 146)	Medium (n = 156)	Low (n = 139)	High vs. low	High vs. medium	Medium vs. low
Sport-specific play	4.36 (3.18)	1.27 (0.85)	0.45 (0.04)	1.78***	1.33***	1.39***
Sport-specific practice	3.95 (1.25)	3.31 (0.79)	2.18 (0.73)	1.73***	0.61***	1.49***
Play and practice of other sports	6.00 (4.51)	5.63 (3.58)	4.81 (4.51)	.26*	0.09	0.20

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Cohen's d (see next to the asterisk).
SD: standard deviation.

Table 4. The amount of sport-specific play, sport-specific practice, and play and practice of other sports (hours/week) during adolescence (means, SDs) of youth team sport athletes specified by amount of sport-specific play and practice during childhood.

Groups	High (n = 146)	Medium (n = 156)	Low (n = 139)	High vs. low	High vs. medium	Medium vs. low
Sport-specific play	6.48 (3.33)	4.44 (2.59)	3.20 (2.43)	1.13***	0.69***	0.49**
Sport-specific practice	8.74 (2.11)	7.94 (2.15)	7.09 (2.01)	0.80***	0.38**	0.41**
Play and practice of other sports	2.60 (2.21)	2.89 (2.37)	3.20 (2.59)	0.25	0.13	0.12

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Cohen's d (see next to the asterisk).
SD: standard deviation.

Table 5. Sport-specific technical skills (means, SDs) of youth team sport athletes specified by amount of sport-specific play and practice during childhood.

Groups	High (n = 146)	Medium (n = 156)	Low (n = 139)	High vs. low	High vs. medium	Medium vs. low
Technical skills	37.41 (19.87)	40.81 (23.74)	49.19 (31.42)	0.45**	0.16	0.30*

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Cohen's d (see next to the asterisk).
SD: standard deviation.

sport-specific play and the amount of sport-specific practice was significantly higher in the High-Practice group compared with Low- and Medium-Practice groups, and in the Medium-Practice group compared with the Low-Practice group (Table 4). The overall group effect was not statistically significant for the amount of play and practice in other sport.

Technical, tactical, and psychological skills of athletes specified by amount of sport-specific play and practice during childhood

Technical skills. The overall group effect was significant for technical skills development [$F(2,418) = 7.758$, $p = .000$]. The High-Practice and the Medium-Practice groups had significantly better technical skills than the Low-Practice group (Table 5).

Tactical skills. A group main effect for tactical skills was significant [$F(8,854) = 4.050$, $p = .000$, partial eta

square = .037]. Univariate tests revealed statistically significant differences between groups in Positioning and Deciding [$F(2,430) = 10.026$, $p = .000$, partial eta square = .045], Knowing about Ball Actions, [$F(2,430) = 10.221$, $p = .000$, partial eta square = .045], Knowing about Others [$F(2,430) = 13.214$, $p = .000$, partial eta square = .058], and Acting in Changing Situations [$F(2,430) = 4.124$, $p = .017$, partial eta square = .019]. The High-Practice group outscored the Low-Practice group in all sub-scales of tactical skills, and Medium-Practice group in Knowing about Ball Actions and Knowing about Others. The Medium-Practice group outscored Low-Practice group in Positioning and Deciding (Table 6).

Psychological skills. A group main effect for psychological skills was significant [$F(8,834) = 4.324$, $p = .000$, partial eta square = .040]. Univariate tests revealed statistically significant differences between groups in Motivation [$F(2,420) = 14.136$, $p = .000$, partial eta square = .063],

Table 6. Tactical skills (means, SDs) of youth team sport athletes specified by amount of sport-specific play and practice during childhood.

Groups	High (n = 146)	Medium (n = 156)	Low (n = 139)	High vs. low	High vs. medium	Medium vs. low
Positioning and Deciding	4.29 (0.66)	4.12 (0.58)	3.94 (0.71)	0.51***	0.27	0.28*
Knowing about Ball Actions	4.38 (0.72)	4.13 (0.69)	4.00 (0.77)	0.52***	0.36**	0.18
Knowing about Others	4.10 (0.75)	3.81 (0.61)	3.68 (0.80)	0.55***	0.44**	0.18
Acting in Changing Situations	4.30 (0.73)	4.15 (0.69)	4.06 (0.77)	0.33*	0.22	0.12

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Cohen's d (see next to the asterisk).
SD: standard deviation.

Table 7. Psychological skills (means, SDs) of youth team sport athletes specified by amount of sport-specific play and practice during childhood.

Groups	High (n = 146)	Medium (n = 156)	Low (n = 139)	High vs. low	High vs. medium	Medium vs. low
Motivation	4.13 (0.62)	3.93 (0.58)	3.73 (0.66)	0.62***	0.33*	0.32*
Confidence	3.58 (0.66)	3.47 (0.60)	3.37 (0.62)	0.33*	0.18	0.16
Concentration	3.95 (0.54)	3.83 (0.49)	3.72 (0.53)	0.44**	0.24	0.22
Mental preparation	3.05 (0.77)	2.82 (0.79)	2.80 (0.80)	0.32*	0.30*	0.03

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, Cohen's d (see next to the asterisk).
SD: standard deviation.

Confidence [$F(2,420) = 3.811$, $p = .023$, partial eta square = .018], Concentration [$F(2,420) = 7.023$, $p = .001$, partial eta square = .032], and Mental preparation [$F(2,420) = 4.388$, $p = .013$, partial eta square = .020]. The High-Practice group outscored the Low-Practice group in all sub-scales of psychological skills, and the Medium-Practice group in Motivation and Mental preparation. The Medium-Practice group outscored the Low-Practice group in Motivation (Table 7).

Distribution of national youth team athletes specified by amount of sport-specific play and practice

There were significant differences in distribution of national youth team athletes of three groups at 15 years [$\chi^2 = 14.702$; $df = 2$; $p = .001$] (Figure 1). Almost half of the players selected to national youth teams at the age of 15 were from the High-Practice group.

Discussion

The aim of this study was to examine the influence of cultural and social constraints on play and practice data from athletes in the Finnish sport development system. The findings were based on their experiences in local community sports clubs, to understand whether

amounts of sport-specific practice and play during childhood were related to the amount of practice and play experienced during adolescence, and expression of technical, tactical, and psychological skills of the youth athletes in three different team sports. We observed that in the Finnish sport development system, the amounts of sport-specific play and practice undertaken during childhood were related to the time spent in sport-specific play and practice during early adolescence, and the level of technical, tactical, and psychological skills exhibited by the athletes at 15 years of age in three different team sports. We also observed that athletes with more experience of sport-specific play and practice during childhood had better prospects of being selected for national youth teams at 15 years. Our data suggested that early engagement and experience of sport-specific play and practice during childhood are important in the athlete development within the specific socio-cultural constraints of the Finnish sport developmental system.

Past research has shown that practice is a major feature for the development of technical skills in sport.^{1,17} Better players have been shown to have more developed technical skills than other players.^{1,4,5} In the present study of the Finnish system, the prominence of play was noted in the reports of developing athletes who experienced a higher amount of sport-specific practice during childhood. In the less formal Finnish sport

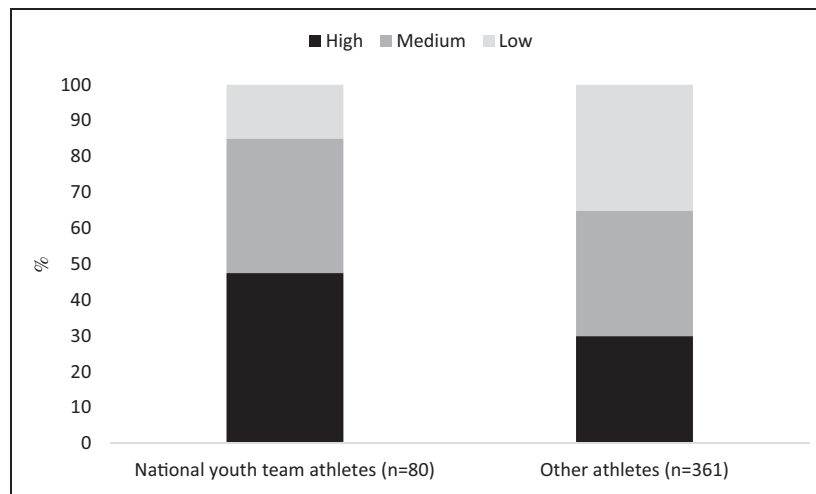


Figure 1. Distribution of national youth team athletes at the age of 15 specified by amount of sport-specific play and practice during childhood (6–12 years of age).

development system, these athletes revealed better technical skills in their primary sport, suggesting that sport-specific play and practice during childhood is important in developing technical skills in team sports.

Sport-specific play has been found to be an important factor in the development of game intelligence and creative tactical responses.³¹ It appears that the most creative players tend to spend more time playing their primary sport.³² In line with previous work,^{31,32} data from the present study suggested that athletes reporting a higher amount of sport-specific play and practice during childhood displayed better tactical skills. The present findings suggest that sport-specific play and practice during childhood are important in the development of tactical skills in team sports in the Finnish system based around participation in local community sports clubs. Previous studies have shown that elite players tend to have better tactical skills than other players,^{33,34} and that these skills may even predict future performance levels.² Considering the importance of tactical skills in team sports environments, athletes with better tactical skills in the present study may have greater potential to attain expertise later in their careers than other athletes.

Past research has shown that psychological skills play an important role in both the acquisition and manifestation of expertise.³⁵ It has been argued that motivation^{23,24} and confidence^{23,36} might be necessary factors for attainment of excellence by enabling athletes to invest requisite time to practice and to remain committed to the expertise development process. In line with these ideas, the present study showed that Finnish adolescent athletes reporting higher amounts of sport-specific play and practice during childhood had higher motivation and confidence levels than other athletes. Finnish developing athletes who reported higher

amounts of sport-specific play and practice during childhood, also practised their primary sports more during adolescence. This finding supports data from Côté et al.,²² suggesting that a large amount of play activities in the early years may have a positive effect on players' motivation to engage in sport-specific practice later. The Finnish, community-based sports club system seemed to foster an emphasis on play as well as practice. Higher levels of motivation and confidence in athletes with more sport-specific play and practice during childhood may be explained by better developed technical and tactical skills of these athletes.

Development of future elite athletes is a goal of athlete development systems of different countries, but there is a lack of consensus on the activities that they should engage in during childhood and early adolescence to attain expertise in the primary sport in adulthood. The present study suggested that sport-specific play and practice during childhood is important to the development of team sport athletes in the Finnish athlete development system. The socio-cultural constraints of this system are somewhat unique, being based around community sport clubs with involvement of non-specialist volunteer coaches, rather than elite developmental academies or schools. However, the present findings display some similarities with those reported by Ford et al.^{13,21} in academic settings. The current data show that athletes with more sport-specific play and practice during childhood had better prospects of being selected for national youth teams at 15 years of age. Almost half of the players selected to national youth teams at the age of 15 were from the group that had played and practiced most their primary sport during childhood.

It should be noted, however, all athletes in this study, had also engaged in a considerable amount of

hours in play and practice in other sports during childhood. Along with the Finnish athlete development system, this finding can partly be explained by specific environmental weather constraints in Finland. Previous research has suggested that involvement in a variety of different sports during the early years could be an important factor in developing the elite athletic career.^{25,26} Playing involvement in a variety of sports during childhood has been shown to be advantageous in developing and refining fundamental movement skills, which are considered to be the building blocks that lead to specialized movement sequences, including sport-specific skills. At the same time, more varied play experiences allows children to experience various physical, cognitive, affective, and psychosocial constraints, which provide children with the foundation required to specialize in one sport during adolescence.^{37,38}

Some limitations of the present study included use of self-reported questionnaires, in which the players were asked to retrospectively recall their practice histories. There may have been some bias in the reported amounts of different practice types, especially in the early years, possibly distributed across groups. Follow up research on the community-based, Finnish athlete development system needs to include longitudinal designs, and analyses of practice diaries. Previous studies have raised issues regarding early specialization and early selection as a determinant of adult sport expertise.^{39,40} According to Barreiros and Fonseca,³⁹ national youth team membership may not be prerequisite for future progression to senior national team and long-term expertise development, particularly in team sports. Because of that, it also needs to be clarified whether Finnish development athletes, with higher amounts of sport-specific play and practice during childhood, eventually reach professional status in adulthood.

Conclusion

Together, these results provide important insights into the discussion concerning expertise pathways and athletic development systems in different countries. In the Finnish athlete developmental system, which is based around involvement in local sports clubs, the results clearly highlighted the importance of early engagement and sport-specific play and practice during childhood in the development of youth team sport athletes.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by a grant from the Ministry of Education and Culture of Finland.

References

- Huijgen BC, Elferink-Gemser MT, Post W, et al. Development of dribbling in talented youth soccer players aged 12–19 years: A longitudinal study. *J Sports Sci* 2010; 28: 689–698.
- Kannekens R, Elferink-Gemser MT and Visscher C. Positioning and deciding: Key factors for talent development in soccer. *Scand J Med Sci Sports* 2011; 21: 846–852.
- Elferink-Gemser MT, Visscher C, Lemmink KAPM, et al. Relation between multidimensional performance characteristics and level of performance in talented youth field hockey players. *J Sports Sci* 2004; 22: 1053–1063.
- Reilly T, Williams AM, Nevill A, et al. A multidisciplinary approach to talent identification in soccer. *J Sports Sci* 2000; 18: 695–702.
- Vaeyens R, Malina RM, Janssens M, et al. A multidisciplinary selection model for youth soccer: The Ghent youth soccer project. *Br J Sport Med* 2006; 40: 928–934.
- Abbott A, Button C, Pepping GJ, et al. Unnatural selection: Talent identification and development in sport. *Nonlinear Dyn Psychol Life Sci* 2005; 9: 61–88.
- Davids K and Baker J. Genes, environment, and sport performance: Why the nature-nurture dualism is no longer relevant. *Sports Med* 2007; 37: 961–980.
- Ericsson KA, Krampe RT and Tesch-Römer C. The role of deliberate practice in the acquisition of expert performance. *Psychol Rev* 1993; 100: 363–406.
- Ward P, Hodges NJ, Williams AM, et al. The road to excellence in soccer: A quasi-longitudinal approach to deliberate practice. *High Ability Stud* 2007; 18: 119–153.
- Ford PR, Carling C, Garces M, et al. The developmental activities of elite soccer players under-16 years from Brazil, England, France, Ghana, Mexico, Portugal and Sweden. *J Sport Sci* 2012; 30: 1653–1663.
- Salmela JH, Marques MP and Machado M. The informal structure of football in Brazil. *Insight* 2004; 7: 17–19.
- Salmela JH and Moraes LC. Development of expertise: The role of coaching, families, and cultural contexts. In: Starkes JL and Ericsson KA (eds) *Expert performance in sports: Advances in research on sport expertise*. Champaign, IL: Human Kinetics, 2003, pp.275–294.
- Ford PR, Ward P, Hodges NJ, et al. The role of deliberate practice and play in career progression in sport: The early engagement hypothesis. *High Ability Stud* 2009; 20: 65–75.
- Hornig M, Aust F and Güllich A. Practice and play in the development German top-level professional football players. *Eur J Sport Sci* 2014; 2: 1–10.
- Côté J and Hay J. Children's involvement in sport: A developmental perspective. In: Silva JM and Stevens D

- (eds) *Psychological foundations of sport*. Boston: Allyn and Bacon, 2002, pp.484–502.
16. Baker J, Côté J and Abernethy B. Sport specific training, deliberate practice and the development of expertise in team ball sports. *J Appl Sport Psychol* 2003; 15: 12–25.
 17. Helsen WF, Starkes JL and Hodges NJ. Team sports and the theory of deliberate practice. *J Sport Exerc Psychol* 1998; 20: 12–34.
 18. Hambrick D, Oswald F, Altmann E, et al. Deliberate practice: Is that all it takes to become an expert? *Intelligence* 2014; 45: 34–45.
 19. Baker J, Cobley S and Fraser-Thomas J. What do we know about Early Sport Specialization? Not much!. *High Ability Stud* 2009; 20: 77–89.
 20. Williams AM, Bell-Walker J, Ward P, et al. Perceptual-cognitive expertise, practice history profiles and recall performance in soccer. *Br J Psychol* 2012; 103: 393–411.
 21. Ford PR and Williams AM. The developmental activities engaged by elite youth soccer players who progressed to professional status compared to those who did not. *Psychol Sport Exerc* 2012; 13: 349–352.
 22. Côté J, Baker J and Abernethy B. Practice and play in the development of sport expertise. In: Tenenbaum G and Eklund RC (eds) *Handbook of sport psychology*. New Jersey: Wiley, 2007, pp.184–202.
 23. Durand-Bush N and Salmela JH. The development and maintenance of expert athletic performance: Perceptions of world and Olympic champions. *J Appl Sport Psychol* 2002; 14: 154–171.
 24. Ward P, Hodges NJ, Williams AM, et al. Deliberate practice and expert performance: Defining the path to excellence. In: Williams AM and Hodges NJ (eds) *Skill acquisition in sport: Research, theory and practice*. London: Routledge, 2004, pp.231–258.
 25. Soberlak P and Côté J. The developmental activities of professional ice hockey players. *J Appl Sport Psychol* 2003; 15: 41–49.
 26. Baker J. Early specialization in youth sport: A requirement for adult expertise? *High Ability Stud* 2003; 14: 85–94.
 27. Elferink-Gemser MT, Visscher C, Richart H, et al. Development of the Tactical Skills Inventory for Sports. *Percept Motor Skills* 2004; 99: 883–895.
 28. Mahoney MJ, Cabriel TJ and Perkins TS. Psychological skills and exceptional athletic performance. *Sport Psychol* 1987; 1: 181–199.
 29. White SA. The relationship between psychological skills, experience, and practice commitment among collegiate male and female skiers. *Sport Psychol* 1993; 7: 49–57.
 30. Cohen J. *Statistical power analysis for the behavioural sciences*, 2nd ed. New York: Lawrence Erlbaum Publishers, 1988.
 31. Bell-Walker J and Williams AM. The effect of memory recall on perceptual-cognitive skill in elite soccer: Development of long term working memory. In: Reilly T, Korkusuz F and Ergen E (eds) *Science and football VI*. London: Taylor & Francis, 2008, pp.340–343.
 32. Memmert D, Baker J and Bertsch C. Play and practice in the development of sport-specific creativity in team ball sports. *High Ability Stud* 2010; 21: 3–18.
 33. Elferink-Gemser MT, Kannekens R, Lyons J, et al. Knowing what to do and doing it: Differences in self-assessed tactical skills of regional, sub-elite, and elite youth field hockey players. *J Sports Sci* 2010; 28: 521–528.
 34. Kannekens R, Elferink-Gemser MT and Visscher C. Tactical skills of world-class youth soccer teams. *J Sport Sci* 2009; 27: 807–812.
 35. Baker J and Horton S. A review of primary and secondary influences on sport expertise. *High Ability Stud* 2004; 15: 211–228.
 36. MacNamara Á, Button A and Collins D. The role of psychological characteristics in facilitating the pathway to elite performance, Part 1: Identifying mental skills and behaviours. *Sport Psychol* 2010; 24: 52–73.
 37. Gallahue D and Ozmun J. *Understanding motor development: Infants, children, adolescents, adults*, 5th ed. New York: McGraw-Hill Companies, 2002.
 38. Abbott A, Collins D, Sowerby K, et al. *Developing the potential of young people in sport*. Edinburgh: SportsScotland, 2007.
 39. Barreiros AN and Fonseca AM. A retrospective analysis of Portuguese elite athletes' involvement in international competitions. *Int J Sports Sci Coach* 2012; 7: 593–600.
 40. Vaeyens R, Güllich A, Warr CR, et al. Talent identification and promotion programmes of Olympic athletes. *J Sport Sci* 2009; 27: 1367–1380.