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**Original Article**

# ANALYSIS OF YOUTH SOCCER PLAYERS' DEVELOPMENT IN AMAZONAS STATE

## ANÁLISE DA FORMAÇÃO DE JOVENS FUTEBOLISTAS DO ESTADO DO AMAZONAS

**João Cláudio Machado [1], Luiz Felipe Brasil De Souza Mello[1], Alberto Góes Júnior[2], Israel Teoldo[3], Larissa Galatti[2], Donna O'connor[4]** and **Alcides José Scaglia[2]**

[1]Federal University of Amazonas, Manaus-AM, Brazil.
[2]State University of Campinas, Campinas-SP, Brazil.
[3]Federal University of Viçosa, Viçosa-MG, Brazil.
[4]University of Sydney, Sydney, Australia.

**RESUMO**

O objetivo desse estudo foi investigar o processo de formação de jovens futebolistas amazonenses. Participaram do estudo 53 jovens futebolistas (15,3±1,27 anos) recrutados a partir de escolas e clubes futebol do Amazonas. Foi utilizado o Questionário do Histórico de Participação para identificar os contextos de prática em que os futebolistas mais estiveram engajados durante o seu processo de formação (macro-estrutura de prática) e foram filmadas três sessões de treino, visando contabilizar o tempo destinado para cada uma das categorias de tarefas utilizadas pelo treinador (*training form, playing form* and *inactivity*) (micro-estrutura de prática). Foi possível identificar diferenças estatisticamente significativas entre os diferentes contextos de prática, onde os jogadores permaneceram um maior tempo engajados em uma prática deliberada, quando comparado com o jogo deliberado ($p<0.001$) e competição ($p<0.001$). Quanto às análises das sessões de treino, foi possível constatar que os jogadores tendem a ter mais contatos com tarefas descontextualizadas. Com essas informações, é possível concluir estes jogadores seguiram um percurso formativo caracterizado por uma iniciação esportiva precoce, bem como não tiveram acesso à contextos de treino representativos, de modo a potencializar a formação de jogadores inteligentes e criativos.
**Palavras-chave**: Futebol. Processo de formação. Treino. Amazonas.

**ABSTRACT**

The present study aimed to investigate youth soccer players' development in Amazonas state. Fifty-three young soccer players participated in this study (15,3±1,27 years). *Participation History Questionnaire* was used to investigate the different practice contexts that Amazonas soccer players were engaged during their development process (macro-structure of practice). We also observed three training sessions and calculated the time allotted for each type of training tasks used by the coach (*training form*, *playing form* and *inactivity*) (micro-structure of practice). It was possible to observe that soccer players from Amazonas state accumulated more time engaged in deliberate pratice than deliberate play ($p<0.001$) and competition ($p<0.001$). We also observed that players had higher contact with decontextualized tasks (*training form* activities) during their training sessions. With this information, it can be concluded that these soccer players followed an early specialization pathway and didn't have contact with a more representative learning environment, in an attempt to improve the development of intelligent and creative players.
**Keywords**: Soccer. Development process. Soccer training. Amazonas.

## Introduction

Soccer players development is a highly complex process influenced by several constraints (individual, environmental and task)[1,2]. Researchers seek to investigate this from two distinct structures of practice, i.e. macro-structure (the volume of practice accumulated by soccer players over development years) and micro-structure (the quality of practice experienced by them, e.g. analyzing training sessions and coaches behaviors)[1-4]. During their development process, young soccer players engage in different practice contexts, such as: deliberate practice, play practice and competition[3]. Therefore, previous researchers aimed to investigate the different pathways to achieve excellence in soccer through the amount of time engaged in such different contexts of practice[1,3,4]. Davids et al.[1]. highlights there are two different pathways to achieve expertise in sports domain, i.e. early specialization and early diversification. In the early specialization pathway, athletes engage in high amounts of deliberate practice (coach-led

and structured practice) in one main sport (such as soccer)[1]. However, this high concentration and intensified volume of deliberate practice in one sport may also impact on physical health, enjoyment and intrinsic motivation, such as increasing the players risk of injury[1,5,6]. Alternatively, soccer players have achieved expertise through an early diversification pathway, engaging in high amounts of non-organized peer-lead soccer play (deliberate play) during childhood[1,3,7]. The early diversification pathway is characterized by an extensive volume of play during sampling years, either in the primary sport (soccer) or in different sports (involvement in various sports)[1,7].

Previous research highlighted the importance of an early diversification during sampling years to achieve expertise in soccer[1,6,7]. For example, street soccer is an important and relevant activity in the development of players' perceptual, decision making and motor skills[8,9]. This is due to it having a high level of task representativeness which assists player learning[9]. Davids et al[1]. highlight that world class adult athletes showed high volume of practice in non-organized sports setting during childhood and adolescence. Gullich et al.[10]. observed that youth soccer players who reported high involvement in non-organized practice contexts (street soccer) or in different sports setting showed greater improvement in their competitive performance after 24 months of soccer practice. Therefore, early diversification sports experiences seems to be very important for players' development.

To gain a better understanding of soccer player development, previous research has investigated the quality of practice accumulated by players throughout their training process (micro-structure of practice), as well as how coaches plan their training sessions (e.g. training tasks frequently provided) and how they interact with their players through instructions and feedback[11-13]. Ford et al.[11]. highlighted that coaches tend to use too much training form activities (physical and technical decontextualized tasks) and provide direct instructions to their players, regardless of age and competitive level of players. O`Connor, Larkin and Williams[12] observed that Australian coaches spent more time in their training sessions on representative tasks (playing form activities such as small-sided games). However, although O'Connor, Larkin and Williams[13] highlighted that coaches are aware of the importance of using playing form activities and questioning as strategies to improve players decision making skills, they find it challenging to apply these strategies during their training sessions.

Emerging soccer countries such as Australia have demonstrated their youth coaches are now providing greater playing form opportunities in training sessions to develop player decision making and game intelligence, rather than predominantly focusing on developing isolated technical skills. In the Brazilian context, research in Amazonas soccer is limited, so gaining a better understanding of youth soccer player's history of participation in sport and of the quality of the practice that they had access to may support future directions of better long-term training programs. Thus, the present study aimed to investigate youth soccer players' development in Amazonas state.

## Methods

*Participants*

Fifty-three youth male soccer players (15.3±1.27 years) were recruited from three soccer clubs/schools in the state of Amazonas. All players were from a similar standard of competition, e.g. they participated of local competitions promoted by the local organizations, and were recruited by convenience. Following approval from the Institutional Research Ethics Committee (CAE 31081614.6.0000.5020), an explanation of the study aim and procedures was provided and participants provided informed consent.

*Procedures*

This study was conducted in two stages: i) Application of a Participation History Questionnaire (macro-structure of practice); and ii) Observation of training sessions (micro-structure of practice).

*Macro-structure of practice - Player's history of participation in sport*

We used the Participation History Questionnaire[14] to investigate the practice contexts that players were engaged during their developmental years. This questionnaire was already used and adapted to Brazilian soccer players[3,15]. The questionnaire is divided into three sections.

In the first and second sections, we aimed to identify the amount of time players engaged in deliberate practice, play practice and competition[14]. Deliberate practice has been defined as structured and coach-led practice that aims to improve players performance, while play practice is unstructured and peer-led activities with the intention of enjoyment [3,4]. Competition is a formal activity in which teams aim to achieve succsess[14].

In the third section, we verified if the players, throughout their childhood, were also engaged in other sports. Players reported which sport they regularly engaged in for at least three months[3]. Players could not record sports activities performed in physical education classes.

*Micro-structure of practice – Observation of players training sessions*

For each club and / or school that participated in the study, three training sessions were observed, according to the protocol applied in a previous study[11]. We calculated the time allotted for each type of training tasks which players had completed during training sessions. Those tasks used in training sessions were classified into *training form*, *playing form* and *inactivity*, according to the characteristics highlighted in Table 1[11]. The type of tasks and their duration were recorded using a manual notation created specifically for this study. Percentage of training session for each task type was then calculated.

**Table 1**. Description of activities experienced by the players during their training sessions, adapted from Ford, Yates and Williams[11] and O`Connor, Larking and Williams[12]

| Categories | Activities | Definitions |
|---|---|---|
| ***Training Form*** | Physical capacity | Tasks which aimed to improve players physical capacity without ball presence. |
| | Skills | Decontextualized tasks that aimed to improve players skills in isolated way. |
| ***Playing Form*** | Small-Sided Games | Games played in smaller pitch, with smaller number of players, aimed to improve players performance. |
| | Match-play | Full games (i.e., 11vs11) played during training session. |
| ***Inactivity*** | Inactive time | Moments during the training session where players do not actively participate in any kind of activity. |

**Source:** The authors

*Statistical analysis*

We used Shapiro-Wilk and Levene tests to verify the normality and homogeneity of the variances of the data, respectively. From player's history of sports participation data, a descriptive statistics was used to characterize their participation in different types of practice context throughout their development (deliberate practice, play practice and competition).

Sample size was calculated using GPOWER software (version 3.0.1) with a target effect size = 0.267, αlpha = 0.05, actual power = 0.978. The Kruskal–Wallis test and a post hoc Dunn's test were used to compare the different types of practice contexts. The partial eta squared was used to measure effect size, and was calculated and classified as: small effect ($0.01 \leq \eta^2_p \leq 0.059$), intermediate effect ($0.01 \leq \eta^2_p \leq 0.139$) and large effect ($\eta^2_p \leq 0.140$)[16].

Regarding training sessions, as these data violate the statistical assumption of independence[11], we used only descriptive statistics to characterize the percentage of training time used for each activity category (*training form*, *playing form* and *inactivity*). A significance level of 5% ($p < 0.05$) was adopted and we used SPSS 20.0 software for statistical procedures.

## Results

Regarding the results of player's history of sports participation, we found significant differences between the time engaged in different practice contexts. It was possible to observe that youth soccer players from Amazonas State accumulated more time engaged in deliberate practice than play practice ($p<0.001$ and $\eta^2_p=1.023$) and competition ($p=0.001$ and $\eta^2_p=0.98$). We also highlighted players' average hours per year engaged in different practice contexts throughout their development process (Figure 2). This information revealed that players spend more hours in deliberate practice at all stages of their development. Also, only one soccer player (≅1.89%) fits the criteria established for involvement in other sports activities, i.e. he practiced another sport regularly for a minimum of three months.

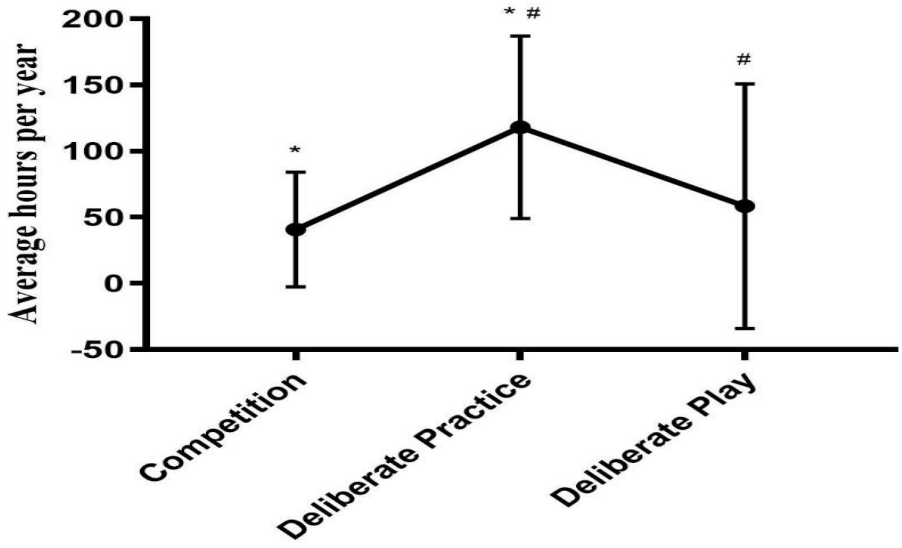


**Figure 1.** Average hours per year of different types of practices contexts engaged by Amazonas soccer players

**Note:** # Significant differences between deliberate practice and deliberate play
* Significant differences between deliberate practice and competition.

**Source:** The authors

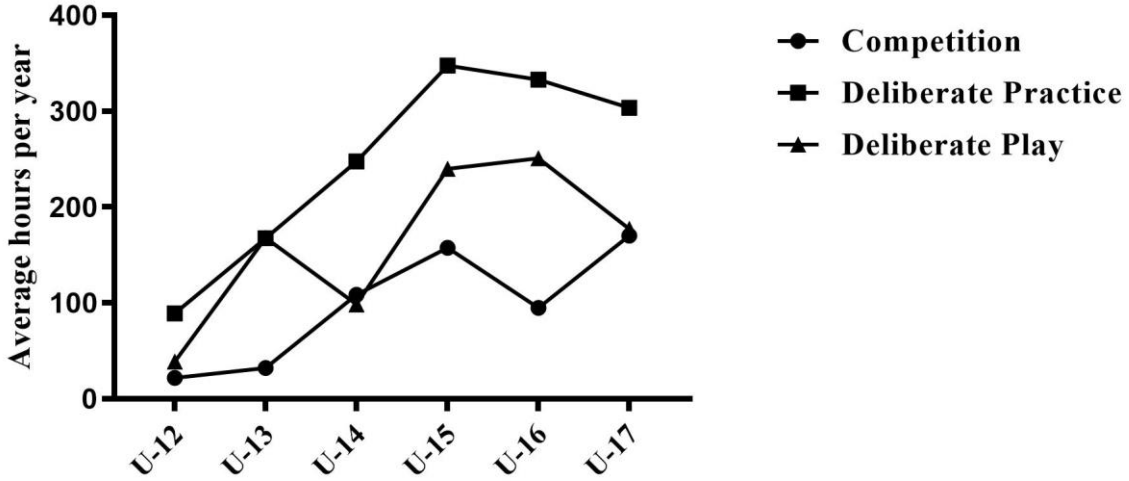


**Figure 2.** Average hours per year of different types of practices contexts engaged by Amazonas soccer players throughout years
**Source:** The authors

Regarding the micro-structure of practice (Figure 3), we found that players were mainly engaged in *training form* activities during their training sessions (36.24±22.66%), i.e. decontextualized tasks which aimed to improve players' physical capacity and skills in an isolated way. We also found players spent 32.40±14.98% of the training session without actively participating in any kind of soccer activity. Moreover, only 31.35±18.31% of the training session time reflected representative training tasks (i.e. *playing form*).

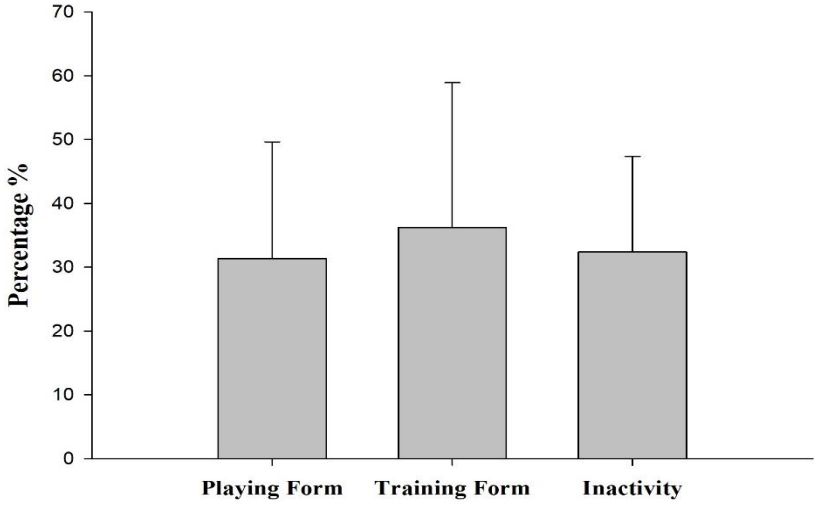


**Figure 3**. Percentage of the training session duration spent in the *training form*, *playing form* and *inactivity*
**Source:** The authors

## Discussion

This study aimed to investigate youth soccer players' development in Amazonas State. We found the soccer players investigated used an early specialization pathway, since they present higher time engaged in deliberate practice during their childhood and didn't present any history of practice in other sports activities. Moreover, soccer players who participated in the

study presented a higher average hours of deliberate practice per year when compared to time engaged in deliberate play contexts. With this information, this study highlights that soccer players in Amazonas completed less hours of deliberate play activities, such as street soccer. Several researchers indicated that the learning context provided by deliberate play (e.g., street soccer) was extremely important for the development of intelligent and creative players[4,8,9]. Besides, a higher amount of deliberate practice can increase *dropout* and *burnout*, as well as decrease players' enjoyment, negatively affecting their late engagement in systematic training process[6].

Several researchers also indicate that an early diversification pathway positively contributes to players' perceptual-motor skills development, promotes prolonged engagement in sports practice and contributes to the players' selection of the main sport he/she is most talented at[1,10,17,18]. Davids et al.[1] reviewed 20 studies which compared players with different skill level regarding their participation histories of participation in sport and highlighted that world class adult athletes presented more time engaged in non-organized activities in their main sport activities (such as street soccer for soccer) and higher amounts of practice in others sports activities. However, if coach wants to achieve peak performance early, an early specialization pathway might be used[1]. Therefore, we found that youth soccer players investigated in this study didn't report rich sports experiences during their childhood, i.e. high amount of practice on non-organized activities in main sport (deliberate play – street soccer) and the engagement in others sports activities.

Ford et al.[3] compared soccer players' history of sports participation from seven different countries (macro-structure of practice). It was reported that the 50 Brazilian players who were recruited from three elite academies had followed an early engagement pathway, since they reported high amounts of soccer specific play activities (such as street soccer) and low amounts of deliberate practice. This differs to the findings of this study where the Amazonas players followed an early specialization path. These differences may be explained partly as the players in our study are located in a State that does not have a large representation in national football and young players are encouraged to be engaged in high amounts of coach-led and structured practice (deliberate practice) in one main sport. Also, we need to carefully analyze Ford et al.[3] results, thus it isn't possible to generalize the pathway used by Brazilian soccer players, since they investigated only 50 players and this might not represent the different specific regional contexts of the country.

Regarding the micro-structure of practice, we found that players had small contact with representative training tasks (*playing form*) during their training sessions. Ford et al[11]. and Partington and Cushion[19] also found that training form tasks were predominantly used by coaches during their training sessions. However, recent studies are beginning to show that coaches tend to prioritize more representative training tasks during their training sessions[12]. These changes may be due to the large amount of studies conducted in recent years that highlighted the importance of a representative learning design for players perceptual-motor skills acquisition and development[1,20,21]. Although coaches in recent years better understand the need to provide their players representative learning environments, they still have great difficulty implementing a player-centered and game-based approach[13].

Côté, Erickson and Abernethy[22] highlight that athletes experience different learning contexts during their development process. Some important variables are the location and the coaches' approach for structuring the learning environment (coach-centred or learner-centred) and the personal values associated with the practice (intrinsic or extrinsic values), such as: *rational*, *emotional*, *informal* and *creative* learning contexts. In this sense, in a formal learning environment (such as clubs and soccer academies), the authors suggest two possible learning contexts to be enhanced: the r*ational* or the *emotional.* The *rational* learning context is characterized by a highly structured practice, with the aim of improving the players'

performance through a deliberate practice, while the *emotional* learning context is characterized by a game-based approach, in order to enhance learning through a pleasant and representative practice environment for the learner. Thus, depending on how the coach will structure the practice context, he or she may provide a more *rational* context (looking for performance through less representative tasks) or a more *emotional* context (to enhance learning through representative practice). In this sense, Machado et al.[9] support the idea that, since Brazilian children have less spaces for informal practices (such as street soccer), nowadays, soccer clubs and academies have an even greater role in the current contexts in soccer players' development. These soccer clubs and academies must provide contexts of practice that encourage the players' development of perceptual-motor skills, intelligence and creativity, respecting key elements of soccer, that children used to but thought street soccer in the past[9].

Therefore, in addition to the fact that Amazonas soccer players have not experienced a high number of non-organized and child-led activities, such as street soccer, and a rich and diverse sports experience throughout their developmental process, they seem to have less access to representative training tasks during training sessions which could stimulate their perceptual-motor skills acquisition, thus contributing negatively to their learning. In this sense, it is important that the State clubs, as a learning organization, not only concern themselves with their players development process, but also exert their role as facilitator, creating learning contexts that better contribute to their coaches development, since these processes (player and coach development) are directly related[23,24]. However, we also highlight study's limitations, such as: i) the non-control of maturational status of the players, players' tactical skills and other individual constraints on micro-structured of practice, since these players' intrinsic dynamics might affect on how coaches structure and design their training tasks and sessions; ii) the application of the questionnaire to quantify the volume of practice during players' development, in retrospect way, may be a limiting factor, since they must remember events that occurred some years ago.

## Conclusion

We conclude that Amazonas soccer players developmental process, investigated in this study, is characterized by an early specialization pathway, with higher amount of coach-led and structured practice (deliberate practice) in one main sport domain (soccer). Therefore, the less diversification during their development (i.e. participation in other sports activities) and less engagement in play activities (i.e. deliberate play), coupled with poor contact with representative tasks during training sessions can negatively contribute to the development of perceptual-motor skills that are important for achieving expertise in soccer. With the information presented in this study, it is necessary that clubs and sports organizations in Amazonas can provide appropriate learning environments for their youth soccer players in an attempt to improve their development process, and also provide learning situations for their coaches and staffs, since they have a crucial role in players' development.

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Authors´ **Orcid**
João Cláudio Machado: https://orcid.org/0000-0001-9827-5296
Alberto Góes Júnior: https://orcid.org/0000-0002-7421-3901
Israel Teoldo: https://orcid.org/0000-0001-9780-3456
Larissa Galatti: https://orcid.org/0000-0003-1743-6356
Donna O'Connor: https://orcid.org/0000-0003-1825-2727
Alcides José Scaglia: https://orcid.org/0000-0003-1462-1783

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**Correspondance address**: João Cláudio Machado. Av. Gen. Rodrigo Octávio , n.6200, Coroado I, Campus Universitário. CEP 69080-900. Manaus – AM. E-mail: jclaudio@ufam.edu.br