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## ORIGINAL

### CHARACTERISTICS OF ATTACK PHASES IN BOYS' 14- AND-UNDER BASKETBALL COMPETITION

### CARACTERÍSTICAS DE LAS FASES DE ATAQUE EN CATEGORÍA INFANTIL MASCULINA

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#### ABSTRACT

The aim of this study was to describe the characteristics of the boys' 14-and-under competitions, to analyse if basketball is adapted to children's capacities and needs. The study sample comprised 2,252 attack phases. The variables

studied were number of attack phases, type of each attack phase, duration of each attack phase, and number of passes of each attack phase. This research was made by means of observational methodology. All variables showed significant differences between teams. The findings of the present study suggest that boys 14-and-under competitions may be likely to improve if some of the values obtained in the analysed variables are modified.

**KEYWORDS:** Match analysis, observational methodology, competition, youth sport.

## RESUMEN

El objetivo de este estudio fue describir las características de la competición de baloncesto de categoría infantil masculina, para analizar si se adapta a las capacidades y necesidades formativas de los jugadores. La muestra estuvo compuesta por 2252 fases de ataque. Las variables analizadas fueron número de fases de ataque, tipo de fase de ataque, duración de la fase de ataque y número de pases por fase de ataque. El estudio se realizó mediante metodología observacional. En todas las variables se encontraron diferencias significativas entre equipos. Los datos muestran que la competición podría ser susceptible de mejorar si se modificasen algunos de los valores obtenidos en las variables analizadas.

**PALABRAS CLAVE:** Análisis del juego, metodología observacional, competición, iniciación deportiva.

## INTRODUCTION

Basketball in boys' 14-and-under competitions is based on minibasket, which was born with the pedagogical aim of adapting basketball to the capabilities of boys between 8 and 11 years of age. These adaptations were made in an effort to adapt the competition to the participants' needs, which would help in turn to provide them significant formative experiences in competition (Committee on Sports Medicine and Fitness & Committee on School Health, 2001). They were not made in a coordinated manner with the rest of categories, and that has prevented the sport planning process to take place in its entirety (Ortega, 2010), therefore not meeting the progressive teaching criteria advocated by several experts (Cárdenas, 2003; Ortega, 2006). Furthermore, the adaptations done in the different categories may not have achieved the objective of adapting the competition to the physical, psychological and motor skills capabilities of the players (Arias, Argudo y Alonso, 2008; Cárdenas, 2006; Piñar, 2005, Piñar, Cárdenas, Alarcón, Escobar and Torre, 2009). That is why experts and coaches in the boys' 14-and-under category believe it is necessary to modify the normative (Ortega, Piñar, Salado, Palao and Gómez, 2012).

In order to know which are the features in the boys 14-and-under competition category in basketball we may employ a perspective that analyses the game by means of valid, reliable and objective observations (Hughes, 1996), such as

those provided by observational methodology (Anguera, 2003). In basketball, these types of studies are usually undertaken using the winners/losers paradigm in professional or semi-professional teams. Not many studies deal with the variables related to the formative needs of young players who are taking their first steps in competition.

The information obtained by means of the analysis of the game undertaken by observational methodology may allow us to: 1) adapt training tasks to the needs of the competition and 2) adapt the competition to the formative abilities and the needs of the players. This analysis may be done by means of observable variables that have been previously studied, such as: number of attack phases, type of attack phase, duration of the attack phase and number of passes by attack phase (Arias, 2009; Arias, Argudo and Alonso, 2009a, 2009b, 2009c; Cárdenas, Pintor, Ortega and Alcalá, 2000; Lorenzo, Gómez, Ortega, Ibáñez and Sampaio, 2010; Ortega, Cárdenas, Sainz de Baranda and Palao, 2006; Ortega, Palao, Gómez, Lorenzo and Cárdenas, 2007; Ortega, Piñar and Cárdenas, 1999; Piñar, 2005; Tavares and Gomes, 2001).

Analysing the amount of attack phases that happen per game will lead to opportunities to practise the contents typical of the game's offensive phase that each team has had in the competition, amongst them the scoring of points. This piece of info must be greater, so that the motivation of young players goes up as well (Biddle, 2001; Chase, 2001; Piñar, 2005; Piñar *et al.*, 2003), as well as their sensation of being competitive and self-sufficient (Chase, Ewing, Lirgg and George, 2004; Williams, 1998). The type and duration of each attack phase will provide us information regarding whether the game style of boys 14-and-under competition favours quick attacks that imply defensive imbalances that give the opportunity to attack with numerical superiority, and that several experts have advocated (American Sport Education Program, 2001; Cárdenas, 2003; Ortega, 2004; Ortega, Piñar, Ortega and Palao, 2004). The amount of passes done in each attack phase allows analysing the players' participation level. Active and direct participation with the ball is a requisite to improve the abilities related to the handling of the ball (Piñar *et al.*, 2009). A reduced amount of passes in attack phases would mean that the majority of players on the court do not have any contact with the ball, which might be due to the fact that the conditions of practice are not ideal for the characteristics of the players (Arias, Argudo and Alonso, 2012). On the contrary, with an adequate participation level an improvement in learning will be achieved, which will allow as well the adherence to the practice of basketball (Ommundsen, Roberts, Lemyre and Miller, 2005).

The goal of this study was to describe the characteristics of boys' 14-and-under competitions in basketball regarding the number of attack phases, the type of attack phase, the duration of the attack phase and the number of passes per attack phase, in order to verify whether it is suited to the formative abilities and needs of the players.

## EQUIPMENT AND METHODS

### *Participants*

In this study took part all teams that competed in the boys 14-and-under regular competition (12-13 years) organized by the Basketball Federation of Andalucia in the province of Granada during the 2008/2009 season, in total seventy two players (age: M=13.44 years, SD=0.59) belonging to six teams. Players had an average previous experience in competition of 3.29 years (SD=0.54) and had played 2.32 days (SD=0.43) and 2.54 hours per week (SD=0.68).

All players took part in a championship organized on the occasion of this research. The sample included 2,252 attack phases from eleven matches, with a complete sample of all actions of the match (Anguera, 2003).

Two inclusion criteria were established: a) in the championship only those who had already taken part in the regular championship of the boys 14-and-under competition organized by the Basketball Federation of Andalucia in the province of Granada could participate, and b) the players that participated had to be able to take part in all the matches their team competed in during the two days in which the championship took place.

Before undertaking the empirical part of the research, the Basketball Federation of Andalucia was informed, through the Basketball Federation of Granada, about the objectives of the study, and obtained its approval. Furthermore, the parents of the players and the coaches of the teams were informed, and they all agreed on the voluntary participation of all players.

### *Design*

The study was done by means of observational methodology (Anguera and Blanco, 2003), with an idiographic, isolated and one-dimensional observational design (Anguera, Blanco, Hernández and Losada, 2011) in order to analyze variables related to the collective game: a) the number of attack phases, b) the type of attack phase, c) the duration of the attack phase and d) the number of passes per attack phase. All these variables were registered for each team in order to make comparisons between them.

These variables meet the inclusiveness and mutual exclusivity criteria of observational methodology, defined as follows:

**a) Number o attack phases.** Number of the phase of the game in which the analysed team had the possession of the ball.

**b) Type of attack phase**

a. *Counter-attack.* All kinds of quick transitions between the defensive and the attacking phases were considered, done at maximum speed and in which a numerical, positional or tactical

advantage had been obtained (Cárdenas, Piñar, Llorca-Miralles, Ortega and Courel, *newspapers*). Only first-wave counter-attacks were analysed.

- b. *Positional attack*. All transitions done against an organized defence after the defending team had hindered the possibility of an effective counter-attack were considered.
  - c. *Attack after an attack rebound with immediate shot*. The instance where an attacking player captured the ball that had rebounded off the hoop or the backboard and performed a shot right after.
  - d. *Attack with immediate ending without shot*. The attack phase which began and ended immediately due to a personal foul, a loss or an interception of the ball.
- c) Duration (s) of the attack phase.** Registered in seconds (s), the duration of each attack phase. We consider an attack phase to begin when a team obtained the possession of the ball and ended when the possession of the ball finished, as described in rule 14 of the official basketball rules (International Basketball Federation, 2010).
- d) Number of passes.** Number of times the players from a team passed the ball amongst themselves during each attack phase.

### ***Procedure and instruments***

The first step was to prepare the observation and register instruments. The criteria were determined from the work of Piñar (2005) and a previous observation with a universe sample. As observation instrument we used a system of categories (Anguera and Blanco, 2003). The registry instrument was prepared by adapting a spreadsheet (Microsoft Excel 2007, Microsoft Corporation, USA) and was an adaptation of the one used by Piñar (2005) and Ortega *et al.* (2006, 2007).

Afterwards, the championship was organized, and the six teams were distributed into two groups. The championship system was all against all in a group phase, after which the third teams from each group played against each other (fifth and sixth places), the first of each group against the second from the other group (semifinal), and finally a match between the semifinal losers (third and fourth places) and the winners (first and second places). Therefore, eleven matches were played in total. Each team played four matches, except the fifth and sixth-ranked teams, which played three.

All matches were recorded with digital video cameras (DCR-HC19E, SONY, London, United Kingdom), each placed transversally in each of the halves of the court at a height of 1.5 m. During the championship the following intersessional constancy requisites were complied with: a) the players were the same in each team in all matches, b) all matches took place in the same indoor facility (28x15

m), c) each match consisted of four 10-min periods, d) none of the teams played two matches in a row, which implied a minimum rest time between matches of 60 min, e) the ball was a number 7 (diameter: 76 cm; weight: 600 gr) and f) the height of the basket was 3.05 m. The recordings were analyzed with a specific video analysis program, SportCode® (V7.5.6, Sportstec, Sydney, Australia) and a MacBook Pro® computer (5.1, Apple, Cupertino, California, USA).

In order to guide the training process of two researchers, a training manual was prepared, which described: a) the objective of the training process, b) basic concepts of observational methodology, c) the phases of the training follow-up and d) the structure of the training sessions. The researchers' training followed the training phases indicated by Anguera (2003); this process was undertaken in eight sessions during 15 days. As a result of this process and the one followed by Piñar (2005), an instruction manual was prepared for the researchers, which included: a) the system of categories, b) the codes for categories and c) the registry process by means of the instrument prepared to that end. Once this training process ended, the registry reliability was obtained by means of the assessment of the performance in relation to each expert researcher. This was calculated by means of the Kappa concordance coefficient, reaching a value over 0.95.

Finally, data collection was done by means of a systematic registry of active, non-participative and direct observations (Anguera and Blanco, 2003). In order to increase the reliability of the observation, a strategy was followed to watch each possession of the ball three times (Arias *et al.*, 2009a). The first time, possession was watched at real speed. Afterwards, the same possession was looked at, twice at least, at a 25 frames/s speed in order to identify clearly the results to be obtained.

### ***Statistical analysis***

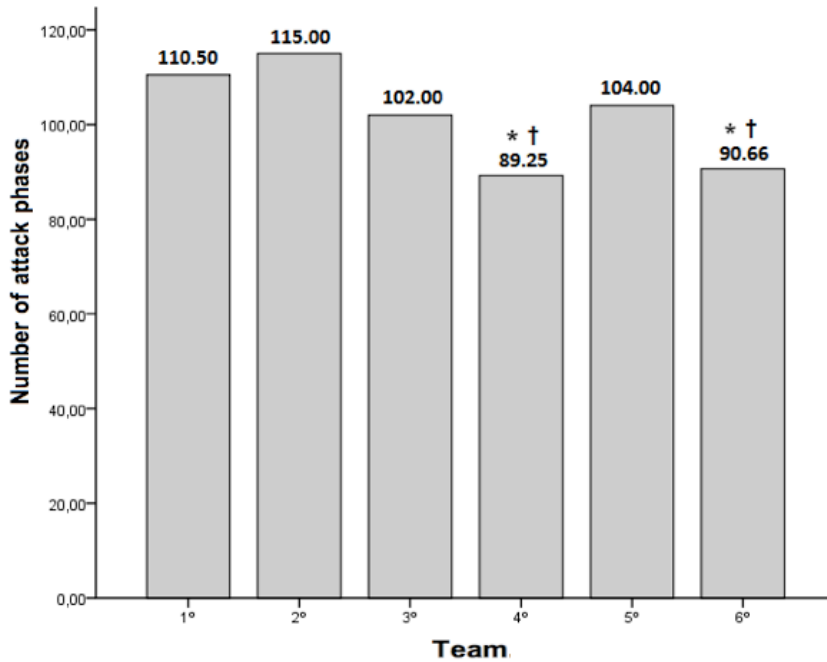
A descriptive analysis of the variables was made (average and typical deviations). In order to determine whether there were any significant differences between the results of the teams an ANOVA was performed. If there appeared to be significant differences between teams, a multiple comparisons test was done to know between which teams these significant differences happened.

To make these calculations the SPSS data analysis software was used (version 17.0). All statistical analysis were done with a  $p < 0.05$  significance level.

## **RESULTS**

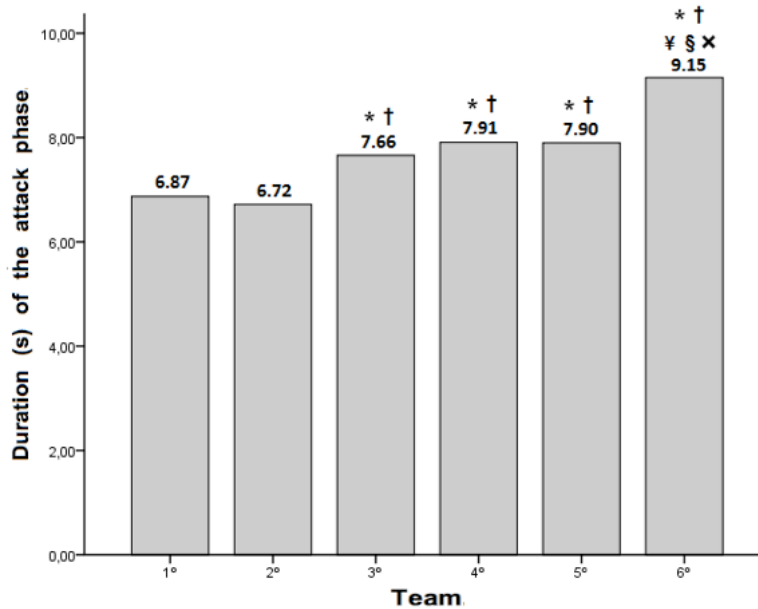
The results show that teams, on average, undertake 102.32 attack phases per match (SD=13.85), with a duration of 7.57 s (SD=5.38), making 1.63 passes per attack phase (SD=1.55), and in all these variables there are significant differences between teams (Figures 1, 2 and 3 respectively). Regarding the type of attack phase, in all teams positional attack is the most used (60.9%),

followed by counter-attack (22%), attack after rebound with immediate shot (9%) and attack with immediate ending without shot (8.1%).



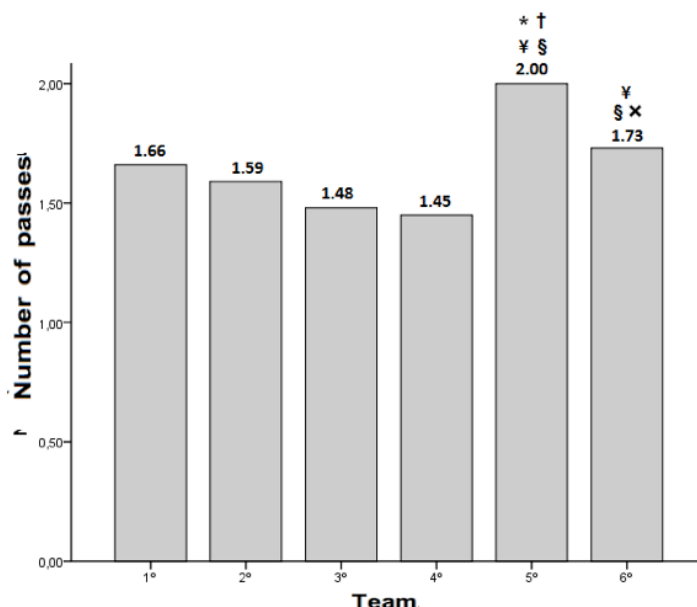
\* First team vs. fourth ( $p=0.01$ ) and sixth teams ( $p=0.03$ ); second team vs. fourth ( $p=0.00$ ) and sixth ( $p=0.01$ ) teams.

**Fig. 1.** Descriptive measurements of the number of attack phases per team variable.



\* First team vs. third ( $p=0.03$ ), fourth ( $p=0.01$ ), fifth ( $p=0.01$ ) and sixth ( $p=0.00$ ) teams; †second team vs. third ( $p=0.01$ ), fourth ( $p=0.00$ ), fifth ( $p=0.00$ ) and sixth ( $p=0.00$ ) teams; ¥ third team vs. sixth team ( $p=0.00$ ); § fourth team vs. sixth team ( $p=0.00$ ); × fifth team vs. sixth team ( $p=0.01$ ).

**Fig. 2.** Descriptive measurements of the duration of attack phase per team variable.



\* First team vs. fifth team ( $p=0.00$ ); second team vs. fifth team ( $p=0.00$ ); ¥ third team vs. fifth team ( $p=0.00$ ) and sixth ( $p=0.04$ ) teams; § fourth team vs. fifth ( $p=0.00$ ) and sixth ( $p=0.02$ ) teams; x fifth team vs. sixth team ( $p=0.04$ ).

**Fig. 3.** Descriptive measurements of the number of passes per attack phase per team variable.

## DISCUSSION

The goal of this study was to describe the features of boys' 14-and-under competitions in basketball regarding the number of attack phases, the type of attack phase, the duration of the attack phase and the number of passes per attack phase, in order to verify whether it is suited to the formative abilities and needs of the players. Data show that boys 14-and-under competitions in basketball might be improved if some of the values obtained in the analysed variables were modified. By doing this, the competition could be adapted to the formative characteristics and needs of players in this category.

### ***Number of attack phases***

The analysed teams have an average of 102.32 attack phases per match ( $SD=13.85$ ), quite similar to the 105.32 attack phases obtained by Ortega *et al.* (1999) in this same category. In studies of other categories we find 191.45 attack phases per match in the boys 14-and-under minibasket category (Piñar, 2005), 96.89 (Ortega, 2004), 81.19 (Ortega *et al.*, 2007) and 78.20 (Lorenzo *et al.*, 2010) in 14-15 year-old boys. We find that as we move upwards along the categories the number of attack phases diminishes, which may be indicative of an increase in the structuring and systematization of the game.

During the competition, the complexity of the game in its offensive phase may be reduced by means of reglamentary modifications, for instance reducing the number of players on the court (Piñar, 2005) or the weight of the ball (Arias, 2009). As a consequence of these adaptations the number of attack phases



teams perform in their matches might be increased without increasing the number of mistakes made by the players. The result would be a more quick and dynamic game, better adapted to the characteristics of young players (American Sport Education Program, 2001; Cárdenas, 2003; Ortega, 2004; Ortega *et al.*, 2004). This increase in the number of attack phases might increase the possibility of scoring points, which would in turn increase the motivation of young players (Chase, 2001; Piñar, 2005; Piñar *et al.*, 2003) and their sense of competence and self-efficiency (Chase *et al.*, 2004; Williams, 1998).

### ***Type of attack phase***

Results show that the types of attacks repeated more often are positional attacks (60.9%) and counter-attacks (22%). In similar descriptive studies in other categories such as male minibasket (Piñar, 2005), male cadet (Ortega, 2004; Ortega *et al.*, 2007) and male juvenile (Tavares y Gomes, 2001), we also find positional attack to be the most frequent, and also that it tends to increase its percentage as the players' ages increase.

By means of the modification of rules and equipment the frequency of positional attack in competition may be reduced, favouring in this manner quick attacks following the established recommendations (American Sport Education Program, 2001; Cárdenas, 2003; Ortega, 2004; Ortega *et al.*, 2004). In the male minibasket category reducing the weight of the ball to 440 g (Arias, 2009) or a set of adaptations to regulations, amongst them the reduction in game situations from 5x5 to 3x3 (Piñar, 2005), result in a reduction of the frequency of positional attacks and an increase of counter-attacks.

On the other hand, the results show clearly the high percentage of attacks after a rebound with an immediate shot (9.00%) and attacks with immediate ending without shot (8.10%). These data show that players in the boys' 14-and-under category make constant mistakes both when controlling the ball and when shooting. These errors may be due to the overcrowding of players that happens in positions near the hoop and the ball (Piñar, 2005). In these types of attack phases, either there is no shot, as there is an immediate interruption, or the shot happens after a failed shot, resulting in a lesser adherence to minibasket (Arias *et al.*, 2009b; Piñar, 2005; Piñar *et al.*, 2003).

These data, taken as a whole, may be considered as an indication that the conditions in the competition could be better adapted to the abilities and formative needs of the players.

### ***Length of the attack phase***

Results show that the average duration of the attack phases is 7.57 s (SD=5.38). In the minibasket male category the duration of attack phases goes down to 5.73 s (Piñar, 2005), in the cadet male category we find that between 54.12% (Cárdenas *et al.*, 2000) and 51.8% (Ortega, 2004) of attack phases have a duration equal to or below 10 s, in the male juvenile category 75% of

positional attack phases are between 13 and 18 s long, whereas in counter-attacks 70% of phases take between 4 and 6 s (Tavares and Gomes, 2001).

These data show that the difficulty to overcome the defense increases as we move up categories. We also find that amongst the teams in the boys' 14-and-under category, there are significant differences in the duration of provoked attack phases (Figure 2), possibly due to differences in their game level. In the male minibasket category the duration of attack phases was successfully reduced by applying a set of adaptations to the rules (Piñar, 2005). The results show that, for the majority of teams analysed, in boys 14-and-under competitions there are no quick attacks that would provoke more defensive imbalances and would facilitate the success of the attack phase (American Sport Education Program, 2001; Cárdenas, 2003; Ortega, 2004; Ortega *et al.*, 2004).

### ***Number of passes per attack phase and per team***

The results obtained show an average of 1.63 passes per attack phase (SD=1.55). This implies that, generally, only two or three players at most of the five attackers in the court participate in the game with the ball. In the male minibasket category there are 1.26 passes per attack phase (SD=1.22) for the 5x5 modality and 1.29 (SD=1.18) for 3x3, and in 87.1% of attack phases there were between zero and two passes (Piñar, 2005). In the male cadet category, Ortega *et al.*, (2007) found an average of 2.6 passes per attack phase, and Ortega (2004) found that in 51% of the attack phases between two to four passes were done, in 32% of them either one or none was made, and in 16% there were between five and eight.

This low number of passes may be due to practice conditions not being the most adequate for the characteristics of the players (Arias *et al.*, 2012). For players it is hard to pay attention to a high level of stimuli in constant movement, four team mates and five defenders, and therefore to decide when, how and to whom to make the pass (Piñar, 2005). In any case, the amount of passes per attack phase is not the adequate so that all attacking players in the court have an acceptable participation level, as in most attack phases only two or three players have contact with the ball.

Increasing the participation of players with the ball during the attack phase might help the player with the ball to acquire personal responsibilities in the game, as he has to solve the problems that are presented (Maxwell, 2006). Thomas (1994) points out that a high participation with the ball does not ensure the development of related abilities, but its absence does ensure that those abilities will not be developed. On the other hand, it has been proved that the fact of actually touching the ball implies a certain motivation for players, as it allows them to be prominent in the game (Piñar, Cárdenas, Conde, Alarcón and Torre, 2007).

In previous studies it has been proved that only a few players obtain possession of the ball frequently (Arias, 2009; Piñar, 2005; Piñar *et al.*, 2009), which implies

an important limitation, from a formative point of view, for the rest of the players who see themselves limited to perform defensive actions of attacking actions without the possession of the ball (American Sport Education Program, 2001; Ortega *et al.*, 2006). In the male minikbasket category the number of passes per attack phase was successfully kept constant by reducing the number of players on the court, which implies a greater participation with the ball for players (Piñar, 2005) and a significant increase in the number of attack phases in which 3-4 passes are done playing with a ball of less weight than the one established in the rules (Arias, 2009). In the female minibasket category, modifying the placement of the three-point line has reduced the frequency of attack phases in which 0-1 passes were done, and increased at the same time the percentage of attack phases in which 2-3 and 4-5 passes were made (Arias *et al.*, 2009c).

Taking these findings into account, we conclude that participation in the game in relation to the possession of the ball is insufficient, or at least may be increased. This improvement might satisfy the kids' formative needs, helping them to develop abilities related to the handling of the ball (Thomas, 1994) and accept personal responsibilities (Maxwell, 2006), all of which allows them to adhere to the practice of basketball (Ommundsen, Roberts, Lemyre and Miller, 2005).

## CONCLUSIONS

After analysing the results obtained we conclude that boys' 14-and-under basketball competitions might be improved if, by means of a modification in the rules of the game, some of the values obtained in the analysed variables were changed. By doing this, the competition could be adapted to the formative characteristics and needs of players in this category. This modification of the rules of the game must reduce the complexity of the game in its offensive phase in order to achieve the following specific objectives:

1. Reducing the duration of attack phases.
2. Increasing the number of attack phases that teams perform during games.
3. Reducing the frequency of positional attacks.
4. Increasing individual participation with the ball.

Reaching these objectives would mean that boys' 14-and-under basketball would be characterised by: a) quick attacks that would provoke more defensive imbalances and would facilitate the successful culmination of the attack phase and b) a reduction in the number of errors by players with the ball, as they would be paying attention to less stimuli. Thus, the game would be adapted to the characteristics of the players, and the psychoevolutive needs of kids would be attended to, which might imply a greater adherence to its sport practice.

The main limitation of this study is due to the fact that the sample is from a single province in Spain, which might result in a certain bias. These data must be corroborated by similar studies in other provinces in order to verify whether similar data are found or not in all boys' 14-and-under competitions. In future

studies rule modifications must be applied in order to achieve the objectives listed in this section.

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