One-on-One Situation Decision-Making according to Equipment in Youth Basketball

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Abstract

The goal of this study was to help resolve conflicting findings and interpretations regarding attackers' decision-making in one-on-one situations in the study of Arias et al. (2012). The participants included 88 elementary school-aged students from eight basketball teams (ages between 9-11 years-old). We organized a 3-day tournament consisting of 12 games, in which four games were played with each ball among all the teams, repeating the experimental set-up from Arias et al. The videos filmed were observed with reference to the dependent variables of the present work (number of appropriate and inappropriate decisions made in one-on-one situations) by two observers trained. The results yielded statistically significant differences for appropriate decisions, $\chi^2(2, N = 1,113) = 43.41$, $P = .000$, but not for the inappropriate ones, $\chi^2(2, N = 1,113) = 8.45$, $P = .150$. The attackers improved their decisions in one-on-one situations with the 440-g ball. This result confirmed the theoretical argument defended in the prior study with which the authors explained the increase of one-on-one situations with the 440-g ball.

Keywords: rule modification, team sport, decision-making, games for understanding, game contexts

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Recently, Arias, Argudo, and Alonso (2012) confirmed that a modified ball of lower weight contributes to increasing one-on-one game situations in youth basketball. These authors report that the increase in the number of one-on-one situations was due to the fact that the decrease of ball weight facilitated its handling, and this allowed the attackers to focus their attention on aspects related to game perception and interpretation (i.e., decision-making). The attackers decided to directly face their opponent more frequently because they found it was easier to destabilize him. However, to corroborate their argument, the authors did not verify whether the reduction of ball weight allowed the attacker to make better decisions in one-on-one game situations.

The teaching game for understanding (TGfU) approach determines that learning in team sports depends on adapting the practice context to the decision-making skill of the children in each stage of their development (Thorpe, Bunker, & Almond, 1984). As a relevant element, practice has to allow children to learn how to adapt their decisions to the game while they are playing. A large number of opportunities to practice in adapted conditions help players acquire more experiences to add to their store so they will make decisions that are the most appropriate to the demands of the context (Graça, 1998; Memmert & Harvey, 2008; Thomas, 1994). Nevertheless, if children do not make many successful decisions, they will not enhance their motor skills. The problem is that, due to inadequate conditions, children have few opportunities for successful practice during the game play (Pellett, Henschel-Pellett, & Harrison, 1994; Siedentop, Doutis, Tsangaridou, Ward, & Rauschenbach, 1994).

One of the most important strategies to achieve practice that leads to success is to adapt the conditions to the context. TGfU suggests that game conditions can be adapted to children's size, age, and ability (Thorpe et al., 1984). These authors introduced two fundamental pedagogical principles to be considered for modifying game play conditions (i.e.,

the principle of modification-representation and modification-exaggeration). Arias, Argudo and Alonso (2011) suggest that modification of the rules may be a strategy to adapt the game to the needs and possibilities of youth players. In this sense, Arias et al. (2011) reviewed the rule modifications carried out in basketball to adapt it to youth players and concluded that adaptation of the rules can be considered a pedagogic variable. The prevalence of game conditions adapted to players' possibilities can provide more enjoyable experiences for the children, so that they choose to continue practising basketball.

The goal of the present study is to verify whether the lighter ball will improve the attackers' decisions in one-on-one game situations. Specifically, we examined whether the lighter ball led to the increase of attackers appropriate decisions in one-on-one situations. Based on previous findings, we hypothesized more appropriate decisions in one-on-one situations with the lighter ball and more inappropriate decisions with the heavier ball.

Method

Participants

The participants were 88 boys from eight basketball teams, ages between 9-11 years (mean = 10.72, s = 0.32 years). They had practiced basketball on official, federated teams for 2.64 years (s = 0.54). Each week, they practiced an average of 3.67 (s = 0.45) days for a total of 5.24 hours (s = 0.65). The selection of the teams and players was deliberate, because were selected the teams from the league that had the highest playing level and were the most homogeneous in age, previous experience, and game level. The parents of the participants and the coaches completed an informed consent form to participate in the study. The Research Ethics Committee of the university approved the study.

Experimental set-up

We organized a 3-day tournament consisting of 12 games in which the eight teams were randomly matched, repeating the experimental set-up from which we aim to resolve

conflicting interpretations (Arias et al., 2012). Four games were played with each ball among all the teams. The balls differed only in their weight (lighter ball: 440 g, regulation ball: 485 g, and heavier ball: 540 g). Each day, the teams played one game. The ball for each game was randomly chosen. Each team played one game with each ball. The rest of the data about experimental set-up were as in Arias et al. (2012).

Procedure and data collection

From the definition of the one-on-one situation and of the circumstances that determine its beginning and its end (Arias et al., 2012) and based on game performance assessment instrument (Oslin, Mitchell, & Griffin, 1998), the dependent variables recorded and compared were: (a) Number of appropriate decisions made and (b) Number of inappropriate decisions made in the one-on-one situation. Both variables were defined according to the principles of moving towards the basket and scoring a basket (Bayer, 1979). The appropriate decisions made were those that allowed the attacker: (a) to overcome the opponent who was hindering his progress towards the basket and to continue this progress, (b) to shoot with a chance to score a basket, (c) to receive a personal foul from the defender, and/or (d) to fix the odd player (i.e., attract the attention of another teammate's defender) and pass the ball to another teammate who was better placed to score a basket. The inappropriate decisions made were the ones in which the attacker: (a) did not overcome the opponent who hindered his progress, (b) did not manage to shoot, and/or (c) did not pass the ball to another teammate who was better placed to shoot, after fixing the odd opponent. On the basis of the proposal of Oslin et al. (1998), in which they determined the decision made index, we used the formula (Number of appropriate decisions made / Number of inappropriate decisions made) to analyze the relation between appropriate and inappropriate decisions in one-on-one game situations.

Two observers were trained until they reached inter-observer reliability values higher than .95. During this period, the observers accumulated a minimum of 100 hours of experience in observation of games filmed, different from the ones in the study. The reliability of the observation was calculated by means of the intra-class correlation coefficient (measured through an inter-observer evaluation at the end of the observation process) and reached values higher than .96.

Four collaborators recorded the games, each one with a video camera. The camera was situated transversally to the basketball court, on the opposite side from the scoring table. The two observers recorded the data to the dependent variables of the present work utilizing a systematized register from the observation of the game videos. The register technique consisted of indicating the number of times that the variable appeared per ball possession on the register instrument. The observers analysed the one-on-one situations that occurred on the frontcourt. They collected data for all one-on-one game situations after the first three minutes of each game. This was done to avoid the effects of the initial disturbance in the participants' adaptation to each ball. All the one-on-one situations were analyzed, because after reviewing the influence of the moment when the participants performed the one-on-one situation (i.e., because a one-on-one situation performed at the beginning of a match could have a different result from that performed at the end, due to the result of the game, personal fouls and opponents' fouls, minutes of play of each one of the players who attack and defend, repetition of the confrontation with certain opponents) there were no statistically significant differences ($P > .05$). This means with these participants and in the present work, the moment of the match and game conditions did not affect the result of the appropriate and inappropriate decisions in one-on-one situations. The sample consisted of 352 one-on-one situations from games played with the regulation ball, 497 from games played with the lighter ball, and 264 from games played with the heavier ball.

Data analysis

The normality of the data was determined with the Kolmogorov-Smirnov test, which showed that the data were nonparametric. The Kruskal-Wallis H test was used to compare the data of all the games played with the same ball and to verify whether the results were influenced by the effect of the randomization of the matches between teams and of the balls. Subsequently, the Kruskal-Wallis H was also used to assess whether there were significant differences between balls. Then, post hoc comparisons were performed using the Mann-Whitney U to determine with which balls these differences occurred. Statistical significance was set at $P \leq .05$. The effect sizes (*ES*) for significant differences in the compared variables among different ball weights were also determined.

Results

The results yielded statistically significant differences for appropriate decisions, $\chi^2(2, N = 1,113) = 43.41$, $P = .000$, but not for inappropriate decisions, $\chi^2(2, N = 1,113) = 8.45$, $P = .150$. The attackers made more appropriate decisions with the 440-g ball in comparison to the regulation ball (mean = 0.48, $s = 0.61$ vs. mean = 0.20, $s = 0.45$; $U = 205213$, $P = .000$, $ES = 0.610$) and the 540-g ball (mean = 0.48, $s = 0.61$ vs. mean = 0.20, $s = 0.43$; $U = 199772.5$, $P = .000$, $ES = 0.622$). The attackers made a similar number of inappropriate decisions with the 440-g ball in comparison to the regulation ball (mean = 0.32, $s = 0.58$ vs. mean = 0.24, $s = 0.56$) and the 540-g ball (mean = 0.32, $s = 0.58$ vs. mean = 0.32, $s = 0.55$). The decision made index was higher when the attackers played with the 440-g ball (1.21) in comparison to when they played with the regulation ball (0.89) and the 540-g ball (0.60). Data from games played with the same ball were not influenced by the effect of the randomization of the matches between teams and of the balls ($P > .05$). The ESs for significant differences found in the compared variables was between medium and large.

Discussion

The goal of this study was to verify the argument defended by Arias et al. (2012) that, when reducing the weight of ball, the attackers decided to face the opponent more frequently in one-on-one situations because they found it easier to be successful. This implies assuming that the attacker's decisions were more appropriate in the game situations analyzed. The results confirmed the hypothesis, because there were more appropriate attackers' decisions with the lighter ball used in the present study, but the inappropriate decisions did not increase with the heavier ball. Nevertheless, the relation between the attackers' appropriate and inappropriate decisions showed that the decision made index was higher with the lighter ball. These results seem to be in line with the studies consulted about facilitation of ball handling when reducing ball weight (Burton & Welch, 1990; Pellett et al., 1994). These results do not ensure that a ball lighter than the 440-g ball will lead to more improvement in decision-making.

Arias (2012) assessed the suitability of the decisions of the attacker with the ball on 1,565 one-on-one situations from 16 games and found a mean of 0.22 ($s = 0.50$) successful decisions. This result was similar to that obtained in the present study with heavier balls. This reaffirms, along with the rest of the literature consulted, that the 440-g ball leads to more appropriate decisions in the one-on-one situation. The game conditions promoted by the 440-g ball may be the most adequate for attackers to be more successful in one-on-one situations. That is, in the present work, the reduction of ball weight seems to have led to a better quality practice context that allowed the children to go from attending aspects related to handling the ball to aspects of game perception and interpretation, as hypothesized by Arias et al. (2012).

Attending to the index calculated from Oslin et al. (1998), the attackers' decisions became less appropriate as the weight of the ball increased. Arias (2012) also calculated this index and obtained a similar result (0.89) to that found in the present work when the participants played with the regulation ball. Being the attacker in this game situation implies

possessing the ball and, to some extent, taking the initiative in the game, and it may contribute to the fact that children have to face a high number of stimuli and it is harder for them to focus on perception and interpretation aspects of the game, in contrast to when they are the defender (Duarte et al., 2012). This suggests that the attacker involved in the one-on-one situation would not have managed to break the period of stability that characterizes this game situation (Cordovil et al., 2009; Passos et al., 2008) when using heavier balls. That is, the player with ball would not have discovered his decision possibilities with regard to the context (Cordovil et al., 2009; Turvey, 1992), and the defender would have been capable of anticipating him or of countering his decision. However, only when the participants played with the lighter ball was the decision made index positive for the attacker. This indicates that the lighter ball contributed to simplifying the game situation for the attacker.

According to Graça (1998), children focus on the context when the game is suited to them. However, it seems that the one-on-one situation is complex for children and more complex when they are less skilled children, which makes appropriate decision making more difficult. Chen, Rovegno, Todorovich and Babiarz (2003) found that in a complex dribbling task, like a one-on-one situation, higher skilled children maintained heads up and looking around, whereas the less skilled children did not look up. The complexity of the situation may be a relevant explanation of why the situation is unusual during the game in youth basketball in comparison to senior basketball (Arias, 2012; Arias et al., 2009, 2012). However, diverse authors who have attempted to adapt the game to increase the number of one-on-one situations have normally obtained a favourable result (Arias et al., 2009, 2012). This makes one think that the practice conditions of habitual basketball playing are not very well suited to the characteristics of the youth players who were the object of study. The development of the players' decision-making skills should not be impaired because practice conditions are not adapted to their possibilities, and more so in team sports, where decision-making is just as or

more relevant than skill execution for successful performance (Chen et al., 2003; MacPhail, Kirk, & Griffin, 2008).

To conclude, the attackers' participants of this study improved their decisions in the one-on-one situation with the 440-g ball. A modification that allows achieving these results is very important in such a complex sport as basketball. If, in studies like this one, the investigators obtain indications that the modification of equipment allows adapting the practice contexts to children, then physical educational teachers and youth sport coaches should act responsibly and attempt to design game conditions that allow students and youth players to improve.

The cost and dedication involved in studying decision-making across the elementary years and in game play settings is prohibitive for most researchers. In spite of this, the present work contributes three important achievements: (a) it helps to resolve conflicting findings and interpretations regarding the study of Arias et al. (2012), (b) it contributes useful results for physical education teachers and youth sport coaches to design practice conditions suited to children, and (c) it generates a knowledge base from which the results can be corroborated in future studies.

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