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Universitat de les Illes Balears
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Perception of effort in minibasketball during small side games

Sebastián Feu*, Antonio Carrillo, Maite Fuentes Azpiroz***, Iñaki Refoyo Román**** and Julio Calleja-González*****

PERCEPTION OF EFFORT IN MINIBASKETBALL DURING SMALL SIDE GAMES

KEYWORDS: Basketball, Small side games, Perception of effort.

ABSTRACT: It was analyzed in what measurement the characteristics of the task in small side games influence the perception of effort (RPE) and his relation between the time of game and the RPE the type of tasks. Ten minibasketball players performed 50 tasks (10 training sessions, 450 records RPE, 5 with duration of 8, 10 or 12 minutes). Based on the description 7 variables were codified: Aim: (Assault / Defense / Compound), Duration: (8 minutes / more than 8 minutes), Space: (Track completes / 1/2 Track / 1/4 of Track), numerical Equality: (Without rival / numerical Inequality / numerical Equality), Transition: (If / Not), Player of support: (If / Not), Relation between players: (attackers[n] x defenders[n]). No parametric analysis and an analysis of the variable RPE in function of the characteristics of the task with logistic multinomial regression from the RPE were used. RPE's average in all the variables were 6.87 ± 1.76. Four variables contribute the model: Time of the task (X2 = 183.49; df= 8; $p < .001$), Relation among players (X2 = 63.71; df= 10; $p < .001$), Transition (X2 = 15.37; df= 2; $p < .01$) and the Aim (X2 = 9.68; df= 4; $p < .05$). The % of classification of the model for the group RPE (8-9), 90.1 % and for the group RPE (0-6), 71.6 %. The total percentage of classification predicted was 66.4. The tasks of 8 minutes in the group of RPE (0-6) have more possibilities of having RPE lower than those of any more 10 or 12 minutes. The tasks of attack have more possibilities of having a lower RPE. The characteristics of tasks influence the RPE. More than 8 minutes favor a very high RPE when the presence of attackers and defenders in 1x1 and 2x2 exist.

Nowadays the basketball coaches are constantly looking for new systems and ways of training to enable them to optimize the performance in the game in order to develop capabilities, tactics, techniques, psychological and conditional. Basketball games are played by 5 * 5 with a total of 12 players. However other modern systems such as small games are commonly used in training, in different formats (1 * 1, 2 * 2, 3 * 3 or 4 * 4 In this regard, it has been recently shown that should be prioritized such systems in fitness training during season (Delextrat and Martinez, 2013).

The scientific sports literature analyzing the impact that this type of exercise generates on athletes performance reports different methods for quantifying the load. Some of them, with a more objective point of view focus on monitoring external measures such as distance, workout time, rhythm, or internal physiological characteristics considered: heart rate, lactate or maximal oxygen uptake. However, other methods of quantification have a more subjective vision, such as internal measures of perceived exertion (RPE) or other psychological factors without excessive calculations or monitoring (Mujika, 2006).

Regarding to the perception of effort, is the sportsman who perceives the efforts made during training, this is because each individual is a different being, therefore the same training can produce different responses in each of them. The most common tool used by researchers is the Borg scale (Borg, 1970), which responds to psychophysiological factors and is related to the intensity of the heart rate, even with lactate concentration (Borg et al., 1987; Wallace et al., 2009; Soares-Caldeira et al., 2011). Two scales exist, one of 6-20 points (Borg, 1970) and a modified 0-10 points (Borg, 1982).

Numerous scientific evidence found convincing results to be used. However the methods used in adults appear to be suitable for use with young athletes, so children should consider other aspects for the interpretation of such scales (Fuentes et al., 2013). In this sense, a new proposal scaling to fit younger athletes has been proposed (Eston et al., 2000). Regarding the development of child specific effort that analyzes the perceived intensity, researchers have proposed pictorial scales such as a system to evaluate its validity and reliability for other modes: cycling (Robertson et al., 2004).

However, no specific pictorial scale to assess minibasketball or basketball or work except sources and collaborators with old players. We have not found any studies analyzing the response of RPE in young except the study mentioned previously, either in situations of reduced games with this type of athletes. Therefore, the aim of our study was to analyze the influence of characteristics of different games or activities (task) on the perception of the subject during training of minibasket.

. Julio Calleja-González, Phd. Departamento de Educación Física y Deportiva. Facultad de Ciencias de la Actividad Física y el Deporte. Universidad del País Vasco (UPV/EHU). Lasarte Ataria, 7101007 VITORIA. E-mail a: julio.calleja@ehu.es
*Universidad de Extremadura
**Club Viladecans de baloncesto
***Universidad del País Vasco (UPV/EHU)
****Universidad Politécnica de Madrid
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Method

Participants

Have been ten players minibasketball male CB-UE Sant Gabriel Vilamoura (Vilamoura, Barcelona), who participated in the study, 2013/2014 season in the competition organized by the Catalan Basketball Federation, in LevelA-1, group participated 01; the highest in the pre-mini category in Barcelona. They were all born in 2004 except for two in 2005, and at the time of the study they had the following descriptive characteristics: age = 8.83 ± 0.37 years; Mass = 39.1 ± 6.87kg, height = 1.44 ± 0.06cm; Experience in MB: 3.4 ± 0.66 years. Participants performed 50 tasks in 10 training sessions, finally 450 records of RPE were obtained.

Variables

Regarding to the basic, basquetball many studies have attempted to categorize the training tasks (Cañadas, Ibáñez, Feu, García and Parejo, 2011; Cañadas, Ibáñez, García, Parejo and Feu, 2012). Based on these studies a proposal for those variables that could influence the decrease or increase of the intensity in the game was made: type goal of the task (Offense/Defense/Joint), task duration (8 minutes / over8 minutes), Space Game (Full court/half court /Court 1/4), numerical equality (no clear / numerical Inequality /Equality numerical), Transition (Yes / No), player support (Yes /No), Relationship between players (Nº Offense players x Nº Defense players).

Instrument

To record the RPE scale pictorial Eston and Parfitt (2007) was used, this scale has been used in a study of minibasketball in Spain (Fuentes, Feu, Jiménez, and Calleja-González, 2013). For analysis of the tasks were coded by two observers, the same taking into account the variables described.

Procedure

Ten training sessions with five tasks (duration = 8, 10 and 12 min) in each session were analyzed. At the end of the task the players showed a pictorial RPE scale. Starting the task of the tasks description coding performed by two experts, according to the seven variables described. Data quality (Anguera and Hernández-Mendo, 2013) was monitored by analyzing the correlation intra and inter-rater by Cohen's kappa, obtaining a value of 1.00.

Statistical Analysis

A basic descriptive analysis was performed. Normality assumptions were not met, therefore an analysis of the RPE was performed depending on the characteristics of the task by nonparametric mathematical models Also a multinominal logistic regression model was implemented from the classified into three groups depending on the characteristics of the task RPE.

Results

The mean RPE taken in all tasks was 6.87 ± 1.76, while the value of the median (Me) and mode (Mo) was 7. Through the test of Kruskal-Wallis an analysis was performed of RPE records depending on the characteristics of the task finding significant differences in all variables except for the variable presence of supporting players. In Table 1 one can see no difference between that group.

One taking into account all the characteristics of the task with the intention of predicting a less biased pattern for this RPE was classified into three groups matched the percentiles 33 and 66, in the table of the distribution of presents analysis was performed variables between groups.

A multinomial logistic regression model with all variables categorized using a method in the model input variables step forward was implemented. The value of the model has a significant likelihood ratio so the null hypothesis that the coefficients are zero is rejected ($X2 = 272.26$, $df = 16$, $p < .001$) is rejected. The analysis found four variables that contribute to the model in the following order: Time task ($X2 = 183.49$, $df = 8$, $p < .001$), Relationship between players ($X2 = 63.71$, $df = 10$, $p < .001$) Transition in the task ($X2 = 15.37$, $df = 2$, $p < .01$) and the target of the task ($X2 = 9.68$, $df = 4$, $p < .05$). The percentage of model classification model is very high for the RPE group (8-9), 90.1%, and high for the RPE group (0-6), 71.6%, however for the RPE group (7-8) drops to 49.7%. The overall classification rate was 66.4% predicted.

To determine the model estimates the RPE group (9-10) was used as the reference category. The analysis indicated that in the group of low perceptions (0-6) with reference to the top of the perceptions (9-10), intasks1x0, 1x2 / 2x1and3x3are more likely to have a low RPE in2x2. On the other hand in the middle group of the sample (7-8) are more likely to have a lower perception of the RPE in the tasks of1x11x2/ 2x1compared to2x2. The tasks with a duration of eight minutes in both the RPE (0-6) (OR =80.33) and the RPE group (7-8) (OR =63.06), are more likely to have a lower RPE taskslasting10 to 12 minutes more.

Tasks with targets exclusive offense more likely to have lower RPE compared in the two groups (OR (0-6) =. 43, OR (0-6) =. 06) with RPE group (9-10), which is working with mixed objectives. This is consistent with the results in terms of the relationship with players as the offense tasks correspond to 1x0 and 2x0. The same happens in the RPE group (7-8) when working only defensive objectives.

Discussion

To our knowledge, this is the first study to examine the extent to which characteristics of the task in different games reduced influence the perceived effort of young players under 12, when performing the exercise in basketball and relationship between playtime and perceived exertion, as well as the type of task that is reflected. There is response in the RPE reduce games has already been studied in other team sports such as football (Dellal et al., 2011), but not yet in basketball specifically.

Our results show that space and time influence the intensity of effort. Tasks have a lower RPE offense that targets defense tasks or joint. The tasks with duration of 8 minutes has lower than those last 10 or 12 minutes RPE. The full court task shave a higher than half court tasks RPE and a 1/4 court on the other tasks to ¼ court have a higher than half court RPE.

In the relationship between players on the task was found that the tasks and tasks without defender exhibited inferior 3x3, 1x1 and 2x2 to the RPE tasks. Tasks 1x1, 2x1 and 1x2 have less tan 2x2 tasks ($p < .001$) RPE. On this line it can be seen that no opponent tasks RPE have a lower numerical equality tasks. Finally, the tasks transition from one field to another, on defense or fast break have a higher RPE counterattack.

Finally tasks with a support player showed no significant differences in RPE ($p = .53$) but within tasks with support player the highest percentage of valuations RPE is greater than 6.

		RPE	*% MAX HR*	*RPE (0-6)*	*RPE (7-8)*	*RPE (9-10)*
	n	X^2	*U*	*(n=176) %*	*(n=183) %*	*(n=91) %*
Objetive		.000 **				
a. Offense	148			47.2%	26.2%	18.7%
b. Defense	37	.000 / b>a		3.4%	13.1%	7.7%
c. Joint	265	.001 / c>a		49.4%	30.7%	73.6%
Time			.000 **			
a. < 9 min.	297			88.6%	72.7%	8.8%
b. > 9 min.	153		b>a	11.4%	27.3%	91.2%
Spacing		.000 **				
a. 1/4 court	75	.000 / a>b		14.8%	23.5%	6.6%
b. 1/2 court	175	.000 / b>c		63.6%	32.2%	4.4%
c. Full court	200	.001 / c>a		21.6%	44.3%	89.0%
Relationship players		.000 **				
a. 1x0 / 2x0	103	.000 / a<b; .000 /		38.10%	14.8%	9.90%
b. 1x1	229	.002 / b<d		19.90%	38.80%	14.30%
c. 1x2 / 2x1	27	.005 / c<d		7.4%	6.6%	2.2%
d. 2x2	156			19.9%	34.4%	73.6%
e. 3x3	36	.000 / e<b; .000/e<d		72.2%	27.8%	0.0%
Are there equal num-		.000 **				
a. Unopposed	103			38.1%	14.8%	9.9%
b. Unequal	27			13.1%	19.1%	14.3%
c. Equal	320	.000 / c>a		48.9%	66.1%	75.8%
Fast-break activity			.000 **			
a. Yes	180		a>b	12.5%	43.2%	86.8%
b. No	270			87.5%	56.8%	13.2%
Is there support pla-			.053			
a. Yes	17			1.7%	4.4%	6.6%
b. No	433			98.3%	95.6%	93.4%

Table 1. Relative frequency distribution of the variable studied in RPE levels.

		RPE	
Task characteristics	***n***	**RPE (0-6)**	**RPE (7-8)**
Relationship players			
1x0 /2x0	75	25.92 *(1.65-407.53)	12.56(.81 - 93.47)
1x1	119	4.44(.624-28.86)	10.28 *(1.59 - 66.55)
1x2 /2x1	27	19.88 **(3.20-124.24)	6.78 *(1.23 - 37.13)
3x3	36	423258820.4 *** (160962961.0 - 1112976724)	245150331.1 (245150331.1 - 245150331.1)
2x2	165	1	1
Time	297		
8 minutes	153	72.82 **(16.95 - 312.86)	59.15 **(13.92 - 251.45)
10 o 12 minutes		1	
Objetive	148		
Offense	37	.045 *(.01 - .37)	.06 **(.01 - .45)
Defense	265	.199(.02 - 1.62)	.11 *(.01 - .81)
Joint		1	1
Fast-break activity			
No	270	2.54(.33 - 19.47)	.42 (.05 - 3.15)
Yes	180	1	1

The reference category is RPE (9-10).

Table 2. Estimates of the multinomial logistic regression model.

In Minibasketball sport, rational planning through training load and implementation of a program of sports training, adapted to the stage of biological development of children 11 and 12 years old, improves levels functional adaptation and performance of the members in it, allowing an improvement of physiological variables that influence the development of physical abilities of strength, aerobic and anaerobic endurance, and speed, as opposed to groups of children participating in general sports training programs without adequate adaptation and control thereof (Ramirez, 2001). Similarly expressed French and Thomas (1987), indicating that the players with the most experience and highest number of hours of weekly training in basketball, showed better performance than those specific accumulated fewer hours of practice, may explain why throughout the season improvements in aerobic capacity occur, indicating that the effect of adaptation of the physical demands required by basketball (Drinkwater et al., 2008) exists.

These observations show relevant because, through the analysis of the results, we observed that there were four variables that contribute to the model in the following order: Time homework, relationship between players, transition task and objective task associated with a change in the percentage RPE. Classification model is very high for the RPE group (8-9), 90.1%, and high for the RPE group (0-6), 71.6%, however for RPE (7-8) group falls to 49.7%. These four variables predicted 66.4% of the total classification. Taking as reference category RPE group (8-9) analysis indicated that in the group of low perceptions (0-6) tasks 1x0, 1x2 / 2x1 and 3x3 were more likely to have a lower RPE than in the 2x2. On the other hand in the middle group of the sample (7-8) are more likely to have a lower perception of the RPE in the tasks of 1x1 1x2 / 2x1 compared to 2x2.

Faulkner et al. (2008) studied the RPE in competition racing, finding evidence that there is a linear relationship between the RPE and the time involvement of athletes. Analyzed the evolution of the RPE during different reduced in our study games, we can see that those tasks that involve more than 8 minutes total duration, a subjective perception of high effort is favored, in this case tasks with the presence of attackers and defenders 1x1 2x2. In this context, the field of application, have been used PSE scales to determine exercise intensity during different JR in which manipulated variables such as the training regimen (Hill-Haas et al., 2009), number of players and rules change (Hill-Haas et al., 2010), individual interaction space (Casamichana and Castilian, 2010), the competitive level of the players (Dellal et al., 2011a), the allowed number of ball touches (Dellal et al., 2011b), among others, the researchers concluded that it is valid for quantifying training load tool.

In short, the characteristics of certain tasks influence perception of minibasketball player effort if these exceed a volume plus 8 minute favoring subjective perception of high stress, when there is presence of attackers and defenders specifically 1x1 2x2.

PERCEPCION DE ESFUERZO EN BALONCESTO DE FORMACION DURANTE JUEGOS REDUCIDOS

PALABRAS CLAVES: Baloncesto, Juegos reducidos, Percepción de esfuerzo.

RESUMEN : Con el objetivo de analizar en qué medida las características de las tareas en los juegos reducidos influyen en la percepción de esfuerzo (RPE), y su relación entre el tiempo de juego y la RPE de los diferentes tipos de tareas, diez jugadores de minibasket desarrollaron 50 tareas (10 sesiones de entrenamiento, 450 registros de RPE, 5 registros de 8, 10 o 12 minutos). Basado en la descripción de 7 variables codificadas: objetivo (ataque / defensa /transición), duración: (8 minutos / más de 8 minutos), espacio: (campo completo / medio campo, 1/4 de campo), igualdad numérica: (sin rival / igualdad numérica/ superioridad numérica), transición: (si / no), ayuda del jugador: (si /no), relación entre jugadores: (atacantes[n] x defensores[n]). El análisis no paramétrico y el análisis de la variable RPE en función de las características de la tarea, se aplicó con una regresión logística multinomial. La media de RPE en todas las variables fue de 6.87 ± 1.76. Cuatro de ellas, contribuyeron al modelo: El tiempo de la tarea ($X2 = 183.49$; $df = 8$; $p < .001$), relación entre jugadores ($X2 = 63.71$; $df = 10$; $p < .001$), transición ($X2 = 15.37$; $df = 2$; $p < .01$) y el objetivo ($X2 = 9.68$; $df= 4$; $p < .05$). El % de clasificación del modelo para el grupo RPE (8-9) fue del 90.1 % y para el grupo RPE (0-6), 71.6 %. El porcentaje total de clasificación fue un predictor del 66.4. Las tareas de 8 minutos tuvieron más posibilidades de presentar una RPE más baja que las de más de 10 o 12 minutos. Las tareas de ataque tuvieron más posibilidades de presentar una RPE más baja. Las características de las tares influyeron en la RPE. Más de 8 minutos favorecen una RPE más alta con presencia de atacantes y defensores en situaciones de 1x1 y 2x2.

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