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Influence of coaches on sources of enjoyment in youth basketball

Humberto M. Carvalho*, Thiago J. Leonardi**, Carlos E. Gonçalves*** and
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INFLUENCE OF COACHES ON SOURCES OF ENJOYMENT IN YOUTH BASKETBALL

KEYWORDS: youth sports, athletes, maturation, multilevel modelling

ABSTRACT: We examined the influence of coaches on sources of enjoyment of youth basketball players accounting for differences in chronological age, biological maturity status and years of training experience. Fifty-eight male basketball players aged 9.5 to 15.5 years were considered from a youth club. Three coaches supervising yearly age group teams from under 11 to under 15 teams were considered. Variables included chronological age, estimated age at peak height velocity, years of training experience, stature, body mass and sitting height by anthropometry; Sources of Enjoyment in Youth Sport Questionnaire was used. Multilevel modelling was used to partition variance between groups and control the influence of age and maturity status on enjoyment. Variance partition coefficients derived from multilevel null models showed a substantial variation by coach for age, maturity status and body dimensions. For the sources of enjoyment dimensions it was apparent an influence of the coach mostly for positive parental involvement. Controlling separately for age and somatic maturity status category, substantial variation by coach became apparent for self-referenced competencies and affiliation with peers, and the influence of coach was removed for positive parental involvement. After controlling variation associated to the coach the influence of age and maturity status remained present. The influence of the coach in the sources of enjoyment in adolescent basketball was apparent in adolescent basketball players. Furthermore, coaches' influence became more apparent after accounting for age and biological maturity status differences between players.

The understanding of positive emotions of enjoyment, such as pleasure, liking, and experienced fun plays a critical role in youth sport participation and adherence (Scanlan, Carpenter, Lobel, and Simons, 1993; Scanlan and Lewthwaite, 1986; Weiss, Kimmel, and Smith, 2001). There has been interest in examining the sources of enjoyment in young athletes providing some understanding about the development of enjoyment in youth sports (McCarthy, Jones, and Clark-Carter, 2008; Santos & Gonçalves, 2016; Scanlan and Lewthwaite, 1986; Scanlan, Stein, and Ravizza, 1989). A positive trend of age and accumulated exposure to training and competitive sports environments with sources of enjoyment, particularly, significant adult influences, self-referenced competencies and others referenced competencies has been noted (Santos and Gonçalves, 2016; Scanlan and Lewthwaite, 1986).

However, in the context of youth sports it should be considered that adolescence is characterized by important physiological, psychological, social and behavioural changes (Sherar, Cumming, Eisenmann, Baxter-Jones, and Malina, 2010). The variation between individuals' growth and maturity status during pubertal development is considerable, even in highly selected and homogenous youth sports contexts (Malina, 1994). Adolescent players in a narrow age group range may have substantial differences in size, function, ability, perceptions and

behaviour. Thus, just as changes during pubertal growth have an influence on functional performance; it is likely that psychological and behavioural characteristics will also be influenced by maturity status.

On the other hand, coaches play a critical role in the success of youth sport programs, where creating an environment that encourages peer affiliation and personal achievement can result in the positive personal development of youth sport participants (MacDonald, Côté, Eys, and Deakin, 2011). Thus, the relation of accumulated exposure to training and competitive sports environments with sources of enjoyment may be mediated by the quality of coaches' intervention.

Youth basketball programs present a context where there is large variation in maturity status, body dimensions and functional performance (Carvalho, Silva, Eisenmann, and Malina, 2013; Carvalho et al., 2011c; Carvalho et al., 2012) and tend to be highly selective and specialized training environments generally aiming the development of expert performance (Gonçalves, Silva, Carvalho, and Gonçalves, 2011). Thus, often the role of physical growth and functional performance in youth basketball tends to be overestimated in the selection process, where late maturing boys may be systematically excluded in favour of average and early maturing boys as chronological age and sport specialization increase

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(Carvalho et al., 2013; Carvalho et al., 2011b). Thus, the identification of the influence of training environment, particularly coaches' influence, on the sources of enjoyment would provide a basis for restructuring the youth basketball sport environment and coaching interventions.

The present study used a youth basketball environment as reference and examined the influence of three coaches with different professional experience on sources of enjoyment of adolescent players, accounting for differences in chronological age, biological maturity status and years of accumulated training experience.

Method

Participants

The sample included 58 male basketball players aged 9.5 to 15.5 years were from a youth club from Campinas region, Brazil, with an established youth basketball program which competed at highest level of youth state competitions supervised by the Federação Paulista de Basketball (FPB). Thus, the present study adopts a cross-sectional design and represents a case study of a youth basketball training environment. As the present study considers a youth basketball environment as reference we considered the influence of the coach considering the contrasting professional experience in the observed context. Thus, coaches considered were: coach A – novice, physical education graduate student, coach of the under 12 team; $n = 16$; coach B – novice, physical education graduate, coach of the under 13 and under 15 teams, $n = 19$; coach C – experienced, physical education graduate, coach of the under 11 and under 14 teams, $n = 23$). Although the age range in the study represents the period of pubertal growth, coaches supervised players across different age groups and age- and maturity-related variation were controlled in the analysis.

The study was approved by the *Research Ethics Committee of the University of Campinas*. and was conducted in accordance with recognized ethical standards (Harriss & Atkinson, 2009). Participants were informed about the nature of the study, that participation was voluntary and that they could withdraw from the study at any time. Players and their parents or legal guardians provided informed written consent.

Instrumentation and Procedure

Anthropometry. All measurements were taken by a single experienced observer following standardized procedures (Lohman, Roche, and Martorell, 1988). Reliability estimates for the observer are published elsewhere (Carvalho et al., 2011a; Carvalho et al., 2011b). Stature and sitting height were measured with a portable stadiometer (Seca model 206, Hanover, MD, USA) to the nearest 0.1 cm. Leg (subischial) length was estimated as stature minus sitting height. Body mass (BM) was measured with a calibrated portable balance (Seca model 770, Hanover, MD, USA) to the nearest 0.1 kg.

Chronological age, maturity status and training experience. Chronological age was calculated to the nearest 0.1 year by subtracting birth date from date of testing. Years of training and competitive training experience was obtained by interview. Age at peak height velocity (PHV) was estimated with the maturity offset protocol (Mirwald, Baxter-Jones, Bailey, and Beunen, 2002). The protocol predicts time before or after PHV based on chronological age, stature, body mass, sitting height and

estimated leg length (stature minus sitting height). There are possible limits of the offset equation to predict biological age in ethnically diverse cohorts (Moore et al., 2015), and errors of estimation tend to be higher with higher in early- or late-maturing children (Malina et al., 2006; Malina and Koziel, 2014). As the protocol may not be a sufficiently sensitive indicator or in the present sample, we grouped players into three maturity status categories for analysis: pre-PHV (PHV $\leq - 1.00$ year; $n = 25$), circum-PHV ($-1.00 < \text{PHV} < +1.00$ year; $n = 18$), and post-PHV (PHV $\geq + 1.00$; $n = 15$). However, the limitations of the method are recognized in the present study, thus it should be noted that a player may have been assigned to the wrong maturity status category.

Sources of Enjoyment in Youth Sport Questionnaire. Participants were required to complete the Sources of Enjoyment in Youth Sport Questionnaire (Wiersma, 2001) before practice sessions, in the presence of one of the researchers. The Portuguese version of the Sources of Enjoyment in Youth Sport Questionnaire has 28 items and examines five dimensions: self-referenced competencies, others-referenced competencies, effort expenditure, affiliation with peers and positive parental involvement. Each questionnaire item is rated on a 5-point Likert scale (1 = completely disagree to 5 = completely agree). The questionnaire showed good reliability in previous studies (Santos and Gonçalves, 2012).

Statistical analysis

Descriptive statistics for chronological age, anthropometric dimensions, maturity offset, estimated age at PHV, and sources of enjoyment dimensions were calculated. Subsequently, a series of multilevel linear regression models were fitted to explore the players' body dimensions and sources of enjoyment dimensions by coach, as well as examining the influence of age and estimated somatic maturity.

Initially, we explored the influence of chronological age and estimated maturity status category on sources of enjoyment dimensions. The influence of estimated maturity status category was aligned for age, as the age range within each group was considerable (data not presented), consistent with age variation between players within maturity status categories in young basketball players (Silva et al., 2010; Silva, Figueiredo, Carvalho, and Malina, 2008).

To explore whether sources of enjoyment dimensions were clustered by coach we assumed players (level-1) nested by coach (level-2). Thus we examined null models, i.e., the simplest two level model which includes only the random parameters, to measure the proportion of total variance which fell between-maturity status (i.e., variance partition coefficient).

Analysis of covariance (random effect ANCOVA) was performed to control for variation between players in chronological age and estimated maturity status on sources of enjoyment dimensions in the present sample. We included separately chronological age and interaction term between chronological age of the players (centred at the grand mean) and somatic maturity category to the null models (allowing for the intercept to vary randomly at both level-1) (Snijders and Bosker, 2012).

Multilevel models were derived using "nlme" package (Pinheiro and Bates, 2000), available as a package in the R statistical language (<http://cran.r-project.org>).

Results

The descriptive statistics of youth basketball players for the total sample and grouped by coach are summarized in Table 1. Variance partition coefficients derived from multilevel null models (i.e., variance partition coefficient >.05) indicate a substantial variation by coach for age, maturity status and body dimensions. These results describe the variability between players by each coaches' teams. For the sources of enjoyment dimensions it was apparent an influence of the coach mostly for positive parental involvement.

Chronological age had a positive influence on self-referenced competencies (fixed effect = .11, standard error = .05, level-2 standard deviation = .55, level-1 standard deviation = .21), effort expenditure (fixed effect = 0.14, standard error = .05, level-2 standard deviation = .59, level-1 standard deviation = .22) and affiliation with peers (fixed effect = .15, standard error = .05, level-2 standard deviation = .59, level-1 standard deviation = .22). As for positive parental involvement chronological age had a negative influence (fixed effect = -.14, standard error = .06, level-2 standard deviation = .66, level-1 standard deviation = .25), and no influence for others-referenced competencies. A positive somatic maturity status associated variation was observed for affiliation with peers and effort expenditure, were

pre-PHV players had, on average, .30 (standard error = .10) and .26 (standard error = .10) higher values compared with players from circum- and post-PHV groups, respectively. Also, a negative influence of somatic maturity status associated variation was observed for positive parental involvement, where post-PHV players had, on average .33 (standard error = .12) lower values compared to pre- and circum-PHV players.

Table 2 summarizes the multilevel models where chronological age and estimated somatic maturity status category, aligned for age within each maturity category, were added separately as a fixed explanatory variable to the null models with sources of enjoyment dimensions and dependent variables. Controlling separately the influence of chronological age and somatic maturity status on sources of enjoyment considering nesting by coach at level-2, we observed changes in the variation partition correlations compared with null models. Substantial variation by coach became apparent for self-referenced competencies and affiliation with peers (Table 2). The influence of the coach was removed for positive parental involvement when age and somatic maturity status were accounted. On the other hand, after controlling variation associated to the coach the influence of age and maturity status remained present.

	All sample (n = 58)	Coach A (n = 16)	Coach B (n = 19)	Coach C (n = 23)	Variance partition coefficient
Chronological age, yrs	13.13 (1.56)	11.8 (.9)	14.6 (.8)	12.5 (1.1)	.42
Maturity offset, yrs	-.93 (1.65)	-2.04 (0.60)	1.24 (.86)	-.97 (1.09)	.35
Estimated age at PHV, yrs	13.5 (.6)	13.8 (.6)	13.4 (.5)	13.4 (.6)	.01
Stature, cm	167.7 (14.8)	151.6 (5.0)	180.8 (7.9)	165.3 (11.7)	.28
Body mass, kg	60.0 (17.0)	42.5 (6.0)	74.0 (10.3)	57.8 (14.9)	.19
Sitting height, cm	83.5 (7.3)	76.1 (3.3)	90.2 (4.0)	81.5 (5.4)	.26
<i>Sources of enjoyment</i>					
Self-referenced competencies	4.49 (.61)	4.61 (.58)	4.59 (.30)	4.25 (.84)	.03
Others referenced competencies	3.43 (.78)	3.61 (.86)	3.57 (.66)	3.12 (.78)	.04
Effort expenditure	4.65 (.66)	4.75 (.47)	4.81 (.28)	4.36 (.99)	.02
Affiliation with peers	4.48 (.66)	4.42 (.59)	4.67 (.44)	4.28 (.88)	.00
Positive parental involvement	4.11 (.74)	4.48 (.62)	3.95 (.73)	4.01 (.76)	.13

Table 1. Descriptive statistics (mean and standard deviation) of adolescent basketball players, grouped by coach (coach A – novice, physical education graduate student; coach B – novice, physical education graduate; coach C – experienced, physical education graduate), and variance partition correlations based on random effects analysis of variance model to account nesting by coach.

	Self-referenced competencies		Others referenced competencies		Effort expenditure		Affiliation with peers		Positive parental involvement	
	Age	Age and maturity status	Age	Age and maturity status	Age	Age and maturity status	Age	Age and maturity status	Age	Age and maturity status
<i>Fixed effects (standard error)</i>										
Intercept	4.50 (.11)**	4.52 (.16)**	3.45 (.14)**	3.41 (.17)**	4.65 (.11)**	4.79 (.14)**	4.49 (.12)**	4.63 (.16)**	4.12 (.10)**	4.34 (.15)**
Age, years	.11 (.05)**	-	.02 (.07)	-	.15 (.06)**	-	.17 (.06)**	-	-.14 (.06)*	-
Pre-PHV x age	-	.14 (.10)	-	.01 (.13)	-	.26 (.10)*	-	.28 (.10)*	-	.04 (.11)
Circum-PHV	-	.04 (.21)	-	-.40 (.25)	-	.04 (.21)	-	.27 (.22)	-	-.33 (.23)
Post-PHV	-	.12 (.10)	-	.14 (.12)	-	.03 (.10)	-	.00 (.11)	-	-.33 (.11)**
<i>Random effects</i>										
Level-2 variance	.02	.02	.03	.00	.01	.00	.02	.02	.00	.00
Level-1 variance	.34	.36	.60	.59	.39	.39	.38	.37	.50	.49
Variance partition coefficient	.06	.05	.04	.00	.04	.00	.06	.06	.00	.00

Nota: **p<.01, *p<.05

Table 2. Multilevel regression models for analysis of covariance (random effect ANCOVA) considering nesting by coach (at level-2) and controlling chronological age (grand mean centered at 11.7 years) and estimated maturity status category aligned with age.

Discussion

Studies examining the relations of growth and biological maturity status with young athletes' psychological characteristics are limited (Cumming, Battista, Martyn, Ewing, and Malina, 2006; Monsma, Malina, and Feltz, 2006), even more when accounting for contextual influences. Thus, to our best knowledge, this study is the first to consider coach-associated variation for sources of enjoyment in youth basketball, controlling growth and biological maturation. Although the present study represents a case study with players from yearly age groups teams (under 11 to under 15) within a basketball club grouped by three coaches supervision, the results showed a trend of influence by the coach on sources of enjoyment in the adolescent basketball players. Furthermore, coaches' influence became more apparent after accounting for age and biological maturity status differences between players.

The mean values of sources of enjoyment dimensions in the present sample compare favourably to those of adolescent male athletes engaged in team sports (McCarthy et al., 2008; Santos and Gonçalves, 2016; Scanlan et al., 1993). With exception of others referenced competencies, we observed a trend for high values the dimensions of sources of enjoyment. Some observations appear to suggested that as youth athletes' chronological age increases, their sport enjoyment decreases (McCarthy et al., 2008; Scanlan and Lewthwaite, 1986). In contrast, the present results are consistent with observations that older adolescent athletes experienced greater enjoyment compared with younger athletes (McCarthy et al., 2008; Santos & Gonçalves, 2016). It has been suggested that maturation (McCarthy et al., 2008) may contribute to understanding of the competitive process (Coakley, 1986), attributional ability and their capacity for self-evaluation (Passer and Wilson, 2002). The present results support these observations as between-players variation in estimated biological maturity status influenced substantially variables of enjoyment, in particular dimensions of enjoyment based on intrinsic factors such as self-referenced competencies and effort expenditure. Also, the negative relation of both age and somatic maturity status on positive parental involvement support the may be interpreted as a consequence of personal development of independence of the youngsters. Overall, the results highlight the need to consider growth-related changes to understand for young players' sources of enjoyment in sport.

Sport is a context in which youth encounter positive and negative experiences (MacDonald et al., 2011). Early adolescent players, within the range of the present study, are frequently exposed to specialization in basketball programs, where athletes are oriented towards competitive success and exhibit a strong motivation to become expert players, being exposed to standards of training intensities and volume required by excellence performance (Gonçalves et al., 2011). The coach is responsible for creating environments that foster the perceptions of enjoyment

and promotes experiences that contribute for the positive development of the young athlete. Thus, coaches play a crucial role in the success of youth sports programs (Bengoechea, Streat, and Williams, 2004). Based on a case study, the results add to the observations that coaches have an influence of enjoyment in youth sports (Bengoechea et al., 2004). Furthermore, the present results suggest that coaches' influence on enjoyment may need to consider between players differences in growth and maturity status. Overall, the complex interpretation of behavioural characteristics among adolescent players should consider both growth and maturation-related influences on behavioural changes with pubertal development, as well as the influence of the environments of youth sports, particularly the coach's influence.

The results of this study are important for understanding the sources of enjoyment of young basketball players; however limitations exist. The results of this study are limited to the context it represents. Variation in body dimensions associated with contrasting maturity status, considering chronological age alignment, in the youth basketball players in the present study was similar to that for basketball adolescents (Carvalho et al., 2013; Carvalho et al., 2011b; Silva et al., 2008) and higher to that for adolescent males in general (Malina, Bouchard, and Bar-Or, 2004). The present study may be a reference for future research needed to understand how enjoyment across individual and youth team sports is influenced by both biological and contextual variation. Other limitation of the present study resides in the use of the maturity offset equation that may be an insufficiently sensitive indicator of maturity status. Nevertheless, based on standard deviations for age at PHV in this study (see Table 1), slightly lower than values reported in studies where the protocol was used and reassessed (Mirwald et al., 2002; Moore et al., 2015), lower than standard deviations derived from longitudinal studies which modelled individual stature data (Malina, Bouchard, and Beunen, 1988), range of estimated age at PHV within the ranges for age at PHV reported in studies where the protocol was used and longitudinal data for individual stature records modelled, the relative accuracy of the adolescent basketball players' maturity status was assumed.

In summary, the influence of the coach in the sources of enjoyment in adolescent basketball was apparent in the present sample of adolescent basketball players. Furthermore, coaches' influence became more apparent after accounting for age and biological maturity status differences between players. The present study raises the need to further analysis of the interaction of growth-related changes and contextual influences mediated by coaches that may be relevant for players' sources of enjoyment in youth sport. Finally, youth sports coaches need to consider growth related influence not only on functional performance development, but also that their influence on youngsters' feelings and perceptions of competence, fun, and relations with their peer in the team and with significant adults may be mediated by the young athletes' individual growth and biological development .

INFLUENCIA DE LOS ENTRENADORES COMO FUENTES PARA DISFRUTAR EN EL BALONCESTO JUVENIL

PALABRAS CLAVE: Deporte joven, atleta, maduración, modelos multinivel

RESUMEN: El presente estudio investiga la influencia de los entrenadores en la satisfacción con la práctica deportiva en baloncesto juvenil, considerando las diferencias en la edad cronológica, maduración biológica y años de experiencia de entrenamiento. Los participantes ($n = 58$) de 9.5 a 15.5 años de un club de baloncesto juvenil participaron en el estudio. Tres entrenadores del club que conducirán equipos de sub-11 a sub-15 fueron considerados. Las variables incluyen la edad cronológica, edad estimada en el pico de crecimiento en la pubertad, años de experiencia de entrenamiento; estatura, masa corporal e altura sentado por antropometría; y el cuestionario *Sources of Enjoyment in Youth Sport*. Modelos multinivel fueron utilizados para investigar la variancia entre grupos y controlar el efecto de la edad y del estado de maduración en la satisfacción con la práctica deportiva. Los coeficientes de partición de la variancia resultantes de los modelos multinivel (modelos nulos) muestran una variación substancial cuando los jugadores están agrupados por entrenador para la edad, maduración biológica y tamaño corporal. En las dimensiones del *Sources of Enjoyment in Youth Sport* fue aparente una influencia del entrenador, sobretudo en el involucramiento parental positivo. Controlando separadamente para la edad y de la maduración biológica, la influencia del entrenador se observa para las competencias auto referenciadas y para la afiliación con los pares, siendo removida la influencia del entrenador para el involucramiento parental positivo. Después de controlar la variación asociada al entrenador la influencia de la edad e de la maduración biológica se mantenía. La influencia del entrenador en la satisfacción con la práctica deportiva en baloncesto juvenil fue aparente en lo presente estudio, más cuando se controla la variación entre jugadores en la edad cronológica y la maduración biológica.

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