Original Article (short paper)

Relative age effect and dropout causes in a multisport club setting. Is there a special reason to give up?

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Abstract — **Aims:** The aim of the present study was 1) compare the drop-out rates between athletes born in different trimesters of the competitive year from different sports and 2) identify the causes pointed by the dropped-out athletes born in different selection year trimesters to disengage from the competitive sports environment. **Methods:** Data from 966 athletes who left the competitive sports context were analyzed under the Relative Age Effect (RAE) theoretical framework during 3 consecutive seasons. The drop-out rate and the reason to quit the competitive environment were analyzed by a routine club questionnaire. **Results:** An expected reverse RAE on drop-out rates was identified, in which the early born athletes were overrepresented ($p<0.001$). Regarding the reasons to disengage from competitive sports environment, no reason emerged as the main cause to dropout between athletes born in different selection year trimester. **Conclusion:** It was concluded that despite the common assumption that personal psychological issues related to RAE in late born athletes are important factors influencing sports disengagement, the relationship between drop-out and RAE is more complex and multifactorial.

Keywords: relative age effect; dropout; sport psychology.

Introduction

In the sports context, age group categories are often determined according to the participants´ birth dates with the purpose of providing a fair competition and equal opportunities for all athletes. However, in recent years research has shown that even this system can create advantages for some athletes. In the past two decades, it has been identified that athletes who are born early (first or second trimester) in competition year have been overrepresented in elite teams in young and senior age brackets (for a review, see[1, 2]). The possible advantaged presented by those early born athletes has been frequently called the relative age effect (RAE), and this effect is observable in team sports like basketball[3], soccer[4], rugby[5], volleyball[6], and in induvial sports like tennis[7], track and field[8] and Judo[9] and in different levels ranging from young amateurs[10] to super-elite athletes[11].

The possible advantages of the selective process bias rely not only on biological aspects, like early maturation and higher physical fitness levels from young ages[12, 13], but also on the interaction of these biological aspects with psychosocial and environmental factors[14]. It is believed that, as the athletes born nearer the beginning of the selection year are more likely to be selected by the better teams, they would benefit from a better structure for their development[15]. Consequently, these athletes will have better training and competitive experiences[16], as well improved perceptions of self-esteem and self-efficacy[17], which are important psychological constructs for athletic development.

Even though the literature suggests that different personal cognitive or psychological variables such as motivation, self-efficacy, and self-esteem can be influenced by the relative age effect[2, 18], only one study was identified that assessed a cognitive variable under the RAE theoretical framework. In this investigation, no difference in reaction (processing) time was observed in young soccer players born in different semesters of the competitive year[19]. Hence, although personal psychological and cognitive factors being commonly pointed out as an important factor to explain the RAE in different sports, until the present there are only a few data available to confirm this hypothesis. Furthermore, despite the clear pattern of overrepresentation of those early born athletes in a wide range of sports, the available data of associations between RAE and dropout are conflicting and could be related to factors as expectations, interest and motivation[20]. In youth French basketball, this association was demonstrated[20], as well as in the French[21] and Belgium[15] male soccer players. However, in the German context, the association between RAE and dropout was not as clear as hypothesized[14]. This lack of association could be associated to specific contexts and sports types[14].

Consequently, more importantly than determining the relationship between RAE and dropout, that is, if there is an

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overrepresentation of dropout in sports of those born late in the year or if those athletes supposedly under disadvantage were "self-eliminated" from sport and then engaged in other activities such as refereeing[20, 22], it is to figure out the reasons which led this athlete under disadvantage to quit the competitive sport activity, and if this reason is related to any personal psychological factor such as demotivation or low self-stem or self-determination or if it is rather related to a lower physical or technical performance.

The purpose of the present study was to examine the birth dates distribution of dropout athletes and the reason for the disengagement from competitive sports by the athletes born at different quarters (i.e., a period of 3 consecutive months) of the year in one multi-sport club center. It was hypothesized that late-born athletes disengage from sport due mainly to psychological factors while advantaged athletes would disengage due to non-specific multiple factors related to the sports context.

Material and Methods

Participants

The present study was conducted in a multi-sports club with more than 1500 active athletes in the young and professional basketball, futsal, gymnastics, trampoline gymnastics, judo, swimming, tennis and volleyball teams. The club provided data from 966 male and female athletes in young teams (< 18 years) who dropped out from competitive sports between 2014 and 2016. These athletes' ages ranged from 6 to 18 years, more specifically from 6 to 10 years (n=92), 11 to 15 years (n=364) and from 16 to 18 years (n=510). They were basketball (n=107), futsal (n=176), gymnastics (n=36), trampoline gymnastics (n= 28), judo (n=73), swimming (n=324), tennis (n=35) and volleyball (n=187) athletes. The data from 952 active athletes (athletes who remained in the club during the 3 seasons evaluated) were also registered and categorized.

Design and Procedures

As a regular practice in this club, each athlete who quit from the competitive sports environment is invited to fulfill a multiple-choice questionnaire containing questions related to the reasons to quit and the perceptions of each athlete. The questionnaire presents a specific question about the general reason for quitting (personal or performance) followed by a specific reason (for example, time management) which the athlete should mark. During three consecutive seasons, data from these questionnaires were categorized and analyzed under the relative age effect theoretical framework [16]. Reasons for dropout were divided into personal or performance reasons. Since all the sports analyzed used the same cut-off date (January, 1st), the birth dates were categorized into groups. Q1 grouped the athletes born in January to March, Q2 the athletes born in April to June, Q3 July to September and Q4 October to December.

While approval to conduct the study and access to the data was granted by the referred club, the present data arose as a regular practice of the club routine[23]. Therefore, because of a *posteriori* nature of the analyses, the signature of the informed consent form was not required. Nevertheless, to ensure athletes confidentiality, all data were anonymized prior to data analysis.

Statistical Analysis

The chi-square test ($X2$) was used to analyze the differences between the group's distributions in the dropout athletes and the group dropout reasons during the last three seasons. A subsequent 2x2 pairwise proportion comparisons with Bonferroni's correction was made. The data are presented in absolute frequency and relative frequency. The SPSS 18.0 software was used and a significance level of $p < 0.05$ was adopted.

Results

Table 1 presents the active youth players and dropout rates during the seasons 2014, 2015 and 2016. The chi-square analysis showed an overrepresentation of early-born athletes when compared to those later born during the competitive year. In this multi-sport analysis, a significant RAE was observed. A reverse relative age effect was observed, as athletes born early during the competitive year (Q1) were overrepresented when compared to the other groups (X^2= 77.21, df=3, p<0,001).

Table 1 presents the reasons for quitting from competitive sports within the different groups. No reason achieved significance level, which means that across those born in different seasons of the year, there was no specific identifiable reason to disengage from the competitive environment.

Table 1. Active athletes and total dropout distribution rates from youth teams in 2014, 2015 and 2016 seasons

	Q1	Q2	Q3	Q4	Total	X²	p
Active athlete's	312[a] (32,43%)	246 (25,57%)	230 (23,91%)	174 (18,09%)	962 (100%)	40,23	0.001
Dropout rates	354[b] (36,64%)	238 (24,3%)	198 (20,52%)	176 (18,24%)	966 (100%)	77,21	0.001

Legend: a – Higher than Q4 (p<0.0083), b – higher than Q2, Q3 and Q4 (p<0.0083)

Table 2. Reason for disengagement from competitive sport

Quitting Reason		Group								Total	X^2	p
		Q1		Q2		Q3		Q4				
Personal Reasons	Time management	41	(38,31%)	25	(23,36%)	19	(17,75%)	22	(20,56%)	107 (100%)	0,867	0,833
	Demotivation	18	(25%)	19	(26,38%)	15	(20,83%)	20	(27,77%)	72 (100%)	6,377	0,094
	Change of sport	3	(20%)	5	(33,33%)	4	(26,66%)	3	(20%)	15 (100%)	1,901	0,593
	Lack of will to compete	3	(25%)	3	(25%)	4	(33,33%)	2	(16,66%)	12 (100%)	1,427	0,699
	Study priority	69	(35,02%)	57	(28,93%)	37	(18,78%)	34	(17,25%)	197 (100%)	2,001	0,572
	Logistics Problems (problems to go to club, move to another city, etc.)	34	(44,73%)	19	(25%)	13	(17,1%)	10	(13,15%)	76 (100%)	2,855	0,414
	Performance (dismissed by the club)	43	(36,13%)	30	(25,21%)	24	(20,16%)	22	(18,48%)	119 (100%)	0,036	0,998
Performance Reasons	End of contract (not renewed)	43	(39,44%)	19	(17,43%)	29	(26,6%)	18	(16,51%)	109 (100%)	4,69	0,196
	Moved to other club	14	(46,66%)	7	(23,33%)	5	(16,66%)	4	(13,33%)	30 (100%)	1,45	0,693
	Returned to non-competition sport (club choice)	5	(31,25%)	4	(25%)	3	(18,75%)	4	(25%)	16 (100%)	0,557	0,906
	Indiscipline	13	(56,52%)	5	(21,73%)	4	(17,39%)	1	(4,34%)	23 (100%)	5,095	0,165
	Health Problems	6	(40%)	4	(26,66%)	2	(13,33%)	3	(20%)	15 (100%)	0,473	0,924
Other Reasons	The athlete chose not to respond	62	(35,42%)	41	(23,42%)	39	(22,28%)	33	(18,85%)	175 (100%)	0,489	0,921
	Total	354	(36,64%)	238	(24,63%)	198	(20,49%)	176	(18,21%)	966 (100%)	-	-

Discussion

The objective of the present study was to analyze if athletes born later in the competitive year present higher dropout levels and which are the main reasons for disengagement from competitive sports presented by quitting athletes born in the different times of the year. Contradicting our hypothesis, results showed that athletes born early in the competitive year had higher rates of dropout when compared to the relatively younger peers and when the reasons declared by the athletes born in different trimesters of year for disengaging from the competitive environment were analyzed, no specific reason (or group of reasons) has been identified.

The entire group comprising all active athletes (table 1) in this club setting presented a higher number of players born early in the selection year (Q1 and Q2). This corroborates the predominantly observed multi-sports analysis in different contexts at competitive level[1,2]. In fact, the overrepresentation of early-born individuals from young ages on at competitive sport environments reflects a biased selection process, as coaches and scouts select more frequently athletes who have a higher chance to present early biological maturation characteristics and a hypothetical better performance since young ages[24–26].

Regarding the dropout rates (table 1), our results suggest a reverse relative age effect, which demonstrates that early-born athletes had an overrepresentation among those who quit participation in competitive sport. This is an expected result as the higher dropout rates in Q1 can be explained by the higher

number of early-born athletes in the entire club sample (table 1). Consequently, when all sports where analyzed together, it seems that for the evaluated sample, no dropout pattern related to the birth date can be identified, considering that the group with more active athletes showed higher dropout rates. Even though dropout rates and RAE were related in Canadian hockey[27] and French football and basketball[20, 21] other findings[14] failed to identify a strong relationship between dropout rates and season of birth. Collectively, these results could point that the biased selection of early-born athletes, rather than dropout from the late born athletes during the formation process play a major role to the observation of RAE, especially when multiple contexts are evaluated.

Regarding the reasons for dropout pointed by the athletes born in different times of the competitive year (table 2), in the best of our efforts, this was the first study that actually attempted to provide an objective measure of the perceived effects in the RAE framework in young athletes, with special consideration of the disadvantaged ones. Despite our hypothesis of late-born athletes (Q3 and Q4) dropout from competitive sports due personal reasons (low motivation, self-esteem etc.), and this is usually pointed in studies as one of the possible reasons for the observation of RAE[2, 17, 20, 22], our data do not sustain this common assumption, considering that no main reason could be identified as a major reason for dropout from the competitive sports´ environment, when the different birth date groups were compared. Hence, the eventual physiological disadvantage experienced by those late-born

athletes can possibly induce a "psychological advantage" specifically related to adversity-related experiences and high levels of challenge during the formative stages of development[28].

Furthermore, our data do not sustain the hypothesis of "self-elimination" reasons in early-born athletes due to poorer performances when compared to their late-born peers[20, 22], as performance reasons did not emerge as a major reason for dropout. Other results[29] corroborate this idea, in which no differences in technical skills were identified in young German early and late born handball players. Collectively, these results indicate that the relationship between RAE and dropout is more complex than the often-reported simple cause and effect relationship, especially when personal (psychological) and performance reasons are pointed as major causes to dropout under the RAE framework. This fact is important to the understanding of the general RAE framework and highlight that the simple and reductionist analysis of physical and psychological variables to explain the main effects of RAE can be fragile.

It is important to highlight the limitations of this study. First, despite the number of athletes interviewed, the fact that all of them were members of the same club is a limitation. The club culture and the limited context are variables that limit the interpretation of our results. Furthermore, although athletes were enrolled in different sports and this allows the analysis of a higher number of athletes; this fact may underestimate the particularities of each sport separately.

Conclusion

In summary, the present data demonstrate that in a general analysis of a multi-sport club setting, no relationship between late-born athletes and dropout rates during 3 consecutive seasons could be identified. Furthermore, there was no main reason highlighted by the athletes born in different trimesters of the year for dropout, refuting the hypothesis that late-born athletes disengage from competition due to personal reasons such as low motivation.

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