Relative Age is Associated with Sport Dropout: Evidence from Youth Categories of French Basketball.

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Abstract

The aim of the current research was to investigate the relative age effect as a factor of basketball dropout. In order to do so, we examined the distribution of birth dates of young male (*n* = 44,498) and female (*n* = 30,147) French basketball players who have dropped out this sport during or at the end of the 2005-2006 season. Chi-square analyses showed an underrepresentation of dropouts among male players born early in the competition year and an overrepresentation among those born late in the '9-10 years old', '11-12 years old' and '13-14 years old' categories and in the first year of the '15-17 years old' category. Concerning girls, this asymmetry was observed across the same age categories. For both boys and girls, there was no biased distribution in the '7-8 years old' category. Findings of the present study confirm that the relative age effect should be taken into consideration in studies about sport dropout as a variable that may influence significantly this phenomenon.

Keywords: relative age effect, dropout, basketball, youth categories, discrimination.

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Introduction

Understanding the determinants of sport dropout is an important issue for the sport federation that wants to grow up and make itself sustainable. In the French sports system, the amount of government allowances provided to sport federations depends, among other things, on the number of their license holders. In addition to these government allowances, the dues paid by license holders represent an important source of funding. It is hence the fundamental of federations to attract new members while developing loyalty of their current members, notably in their youth categories. In order to develop loyalty, the factors of dropout need to be identified. Many studies on this topic have used motivational theories to explain dropout, such as Eccles et al.'s expectancy-value model (e.g., Fredricks & Eccles, 2005), self-determination theory (e.g., Boiché & Sarrazin, 2007), achievement goal theory (for a review see Elliot, 2005), and social exchange theory (e.g., Guillet et al., 2002). They notably showed the importance of expectations, interest and motivation in sport dropout. Sex stereotypes have been identified as a determinant of these variables (e.g., Fredricks & Eccles, 2005). Another influential factor that may lead to dropout is the relative age effect (RAE). However, as noted by Musch and Grondin (2001), despite a growing body of research on this topic, this determinant has not been mentioned in reviews of literature examining the psychological and social factors influencing sport dropout (e.g., Skard & Vaglum, 1989; Brustad et al., 2001; Nache et al., 2005).

According to Barnsley et al. (1985), relative age refers to ‘the subtle chronological age discrepancies between individuals within annually age-grouped cohorts’. For example, in a system using January 1st as the cut-off date, compared to a child born in December, a child born in January of the same year can have a benefit of up to 364 days in his/her cognitive and physical development, although these two children are in the same age category. Therefore, RAEs refer to the specific selection, participation and attainment (dis)advantages occurring as a result of physical and cognitive variability (see Musch & Grondin, 2001).

In the sports system cut-off dates are used to set up different age categories, in order to make the competitions fair. Grondin et al. (1984) were the first authors who examined the relation between birth quarter and accession at the top-level competition. They analyzed data of the National Hockey League and noticed a large overrepresentation of hockey players born at the beginning of the year and an important underrepresentation of players born at the end of the year. They suggested that this biased distribution was due to the use of a cut-off date set at January 1st to organise the age categories in minor hockey. Indeed, the unequal distribution of players observed at the professional level was explained by a mode of selection promoting an early physical development, discrediting thus players born at the end of the year. It is considered as a discriminatory effect in youth categories because it penalizes players born long after the cut-off date by strongly limiting their chances to reach the high-level (Hurley et al., 2001; Simmons & Paull, 2001; Edgar & O'Donoghue, 2005).

Since these first results, an important number of studies has been published on this effect, at the professional level and/or youth categories of many sports. In their review of the literature, Musch and Grondin (2001) concluded that it is a pervasive, yet not universal, phenomenon. Indeed, even if most of the studies revealed a significant RAE, it was not observed systematically for all sports, periods, and both sexes. These authors underlined the fact that multiple factors may account for the presence or absence of this phenomenon. In the next section, we briefly present the potential determinants of the RAE they have identified.

Determinants of the RAE

Competition. The first factor likely to enhance a RAE in sport is competition. Indeed, if competition is low, every player can belong to a team and participate to team events, because there is a place for everyone. As the authors stated, 'the larger the pool of potential players, for a given sport in a given category, the strongest the resulting relative age effect should be' (Musch & Grondin, 2001, 154). This assumption is largely supported by previous research.

First, RAEs have been observed more often in popular sports. For example, ice hockey can be considered as the most popular sport in Canada, and a significant

RAE was observed in most of the examined samples, with the percentage of players born in the first half of the year being superior to 70% (e.g., Barnsley et al., 1985). However, volleyball, a far less popular activity in this country, showed weak or only moderate RAEs (Grondin et al., 1984).

Second, several studies indicated differences in relative age effect according to the level of practice: the highest the level of practise, the biggest the RAE. This pattern was more particularly observed for ice hockey and volleyball (Grondin et al., 1984).

Physical Development. The second main factor evoked by Musch and Grondin (2001) is physical development. In a competitive context, youngest players could be disadvantaged compared to their older counterparts because their body is less developed. Indeed, they are likely to demonstrate lower stature and weight, which are considered as significant assets in some sports such as ice hockey (e.g., Barnsley & Thompson, 1988). In the same vein, an early physical development (and its associated advantages in terms of cognitive and emotional differences) could be a facilitating characteristic by increasing the chances to be selected in youth age categories. Several studies did report an advanced physical maturity among young elite athletes (e.g., Brewer et al., 1992).

Conversely, in other sports, such as gymnastics, it is not an early, but a late development, that is considered as advantaging (Malina et al., 2004). Late maturation has indeed been observed among elite gymnasts (e.g., Malina, 1994), and Baxter-Jones (1995) observed no RAE among British elite gymnasts. The same seems true of dancers, as Van Rossum (2006) reported no relative age effect in pre-professional schools.

The Question of Sex. As pointed by Musch and Grondin (2001) little is known about the role of sex in the RAE. In fact, the vast majority of this literature concerned male athletes. Baxter-Jones (1995) investigated elite British gymnasts and observed no significant RAE among males or females. The same pattern of results was reported by Van Rossum (2006) among elite Dutch dancers. The paper of Vincent and Glamser (2006) concerned 1,344 players considered by the US Olympic Development Program. Results revealed only a marginal RAE for females belonging to regional and national teams, and no effect for state team players, whereas a strong effect was found among males belonging to all teams, whatever the level considered. These mixed results can be summarized as follows: in activities where RAE appears, the effect is less important among females.

A first explanation of this difference could be a less important competition among females to gain their position in an elite team. If an activity is far more popular among boys than girls in a given country, and if similar elite structures exist with a similar selection system, it is not surprising to find higher RAEs among males than among females. The second major determinant, physical development, also deserves to be questioned with regard to potential sex differences. Baxter-Jones (1995) suggested that this sex difference in RAE is the result of an earlier maturation of girls and a higher variance in the degree of maturity among boys. During the period of selection, differences in maturity are thus probably more important among boys than among girls. Vincent and Glamser (2006, 412) argued that social pressures to conform to a socially constructed gender role (i.e., stereotyped definition of femininity) ‘could make early maturing females less motivated to achieve excellence in a competitive sport because they perceive that society does not value female athletic accomplishments as much as males’ ones’.

Despite this important work on the RAE, only one study to our knowledge has associated RAE with sport dropout. Helsen et al. (1998) investigated the influence of RAE on Belgian soccer players’ achievement. Results showed that early born youth players are more likely to be identified as talented and to be exposed to a higher level of coaching than their late born counterparts. Consequently, these players are more likely to be recruited in elite teams. Furthermore, they noticed a uniform distribution of birth dates for average male youth players (n = 493) from 6 to 10 years old and a biased distribution for participants from 12 to 16 years old. They suggested that ‘from 12 years on, there was a higher number of dropouts from those players born toward the end of the selection year’ (p.794). However, they did not provide any data about the number of dropouts during or at the end of the examined season. Hence, it is difficult to know whether this biased distribution was due to dropout or ‘self-elimination’ before engaging in the activity. Indeed, we can imagine that the biased distribution appearing from 12 years on was due to the more important number of incoming players born at the beginning of the year than those born at the end of the year.

It is well-known that important differences in relative age may exist among young participants of a same age category. Accordingly, differences in physical (Tanner & Whitehouse, 1976; Carling et al., 2009) and cognitive (Bisanz et al., 1995; Morrison et al., 1995) development may also exist. Although studies on the North American professional championship of basketball did not report a significant RAE (Daniel & Janssen, 1987; Côté et al., 2006), the recent work of Delorme and Raspaud (2009) on the whole population of young male and female participants of the French Federation of BasketBall (FFBB) reported the existence of a significant effect in each youth category. In addition to this asymmetric distribution of birth dates, the authors found important differences between the height of participants born early in the competitive year and those born at the end of it, the former being taller than the latter. These height differences were found for both females and males and for all youth categories except for 17 years old females. Moreover, they were particularly important at the beginning of puberty, that is respectively for the '11-12 years old' category and the '13-14 years old' category.

Given that height is the most valued physical attribute in youth categories of basketball (it is the only anthropometric data required for the creation or renewal of licenses), we hypothesise that young players born a long time after the cut-off date, and therefore disadvantaged in terms of physical abilities, would be likely to be overrepresented in dropout, whereas those born early in the competitive year would be underrepresented. Indeed, several studies showed that height is a fundamental determinant of performance in basketball (e.g. Viviani, 1994; Ackland et al., 1997; Hoare, 2000; Carter et al., 2005; Ziv & Lidor, 2009). Thus, players born late in the competitive year are on average smaller than players born earlier in the competitive year (Delorme & Raspaud, 2009), and may therefore perform more poorly. These differences in performance may result in a reduced playing time, which may lead to a less positive experience of basketball. This negative experience could decrease their perceived ability, which has been shown to be a direct predictor of sports participation (e.g., Fredricks & Eccles, 2005). In other words, players born a long time after the cut-off date are likely to have a low perceived ability, leading in turn to their dropout.

To sum up, the aim of the current research was to examine the distribution of birth dates of young French basketball participants who have dropped out this sport during or at the end of the 2005-2006 season to see whether the RAE may play a role in the dropout of this sport.

Materials and methods

Data collection

At the end of the 2006-2007 season, birth dates of all the young male (n = 44,498) and female (n = 30,147) participants who were licensed during the 2005-2006 season but not during the 2006-2007 season, were collected from the database of the FFBB. We also waited for the end of the 2006-2007 season to ensure that some players did not renewed their license later during the year. Unfortunately, the database of the FFBB does not allow us to determine the practice level of each players when he/she drops out.

There are seven age categories in the FFBB: ‘less than 7 years old’, ‘7-8 years old’, ‘9-10 years old’, ‘11-12 years old’, ‘13-14 years old’, ‘15-17 years old’ and ‘over 18 years old’.

The ‘less than 7 years old’ category does not require the creation of a federal license. There is a ‘basket card’, less expensive, which allows the youngest to practice basketball in a club and to be insured in case of an accident. Most of the parents of children of this class of age prefer the basket card rather than the traditional license. However, this card does not allow the follow-up of his/her holder through a personal number remaining unchanged across the years, as this is the case with licenses. Therefore we did not take into account this category in the analyses.

Data analysis

In the literature, the RAE is identified when a significant difference is found between the expected theoretical number of players born per month or quarter (i.e., period of three consecutive months) and the observed number of players (Musch & Grondin, 2001). The cut-off date in the French basketball system is January 1st. Thus, the birth months of players are classified in four quarters beginning by the January-March period (Q1) and finishing by the October-December period (Q4). Next, a chi-square goodness-of-fit test is conducted to determine whether the observed distribution per quarter significantly differs from the expected theoretical distribution. Traditionally, the expected distribution is computed based on the actual distribution of births in the global population of the studied country for the corresponding years. This procedure underlies that the distribution of birth dates of the license holders population of the concerned sport is similar to the distribution observed in the global population of the concerned country. However, the recent work of Delorme and Raspaud (2009) showed a biased distribution in the total number of young license holders of the FFBB in all age categories. Therefore we took as the expected theoretical distribution, for each year and each sex, the licence distributions according to birth date as reported in Delorme and Raspaud (2009).

Results

*** Table 1 near here***

Table 2 near here

Tables 1 and 2 refer to the percentages of dropout per age category for male and female basketball players for the 2005-2006 season.

Globally, one third of participants dropped out during or at the end of the examined year for all age categories and for both males and females. The overall dropout rate was slightly higher for boys than for girls (29.42% vs. 28.15%). For both genders, it was in the ‘15-17 years old’ category that the dropout rate was the highest, notably during the first year of this category (36.72% and 37.14% of dropouts for male and female players respectively). The lowest dropout rate was observed in the ‘13-14 years old’ category for boys (25.32%) and in the ‘9-10 years old’ category for girls (23.42%).

Table 3 near here

Table 4 near here

Tables 3 and 4 present the distribution of dropouts depending on the birth dates of male and female basketball players for the 2005-2006 season.

Concerning boys, there was a significant biased distribution in the ‘9-10 years old’, ‘11-12 years old’ and ‘13-14 years old’ categories. In these three age categories, there was an important overrepresentation of dropouts among players born in Q4 and an underrepresentation of those born in Q1 and Q2. It is in the ‘13-14 years old’ category that this asymmetry was the most important. At the ‘7-8 years old’ and ‘15-17 years old’ levels, there was no significant difference between the observed and the expected theoretical distributions. Nevertheless, concerning the first year participants of the ‘15-17 years old’ category, there was a significant overrepresentation of dropouts among players born in Q4 and an underrepresentation of those born in Q1.

Concerning girls, there was a significant biased distribution in the ‘9-10 years old’, ‘11-12 years old’, ‘13-14 years old’ and ‘15-17 years old’ categories. In these four categories there was an important overrepresentation of dropouts among players born in Q4 and an underrepresentation of players born in Q1 and Q2. The most biased distribution was observed in the ‘11-12 years old’ category. Similar to boys, there was no significant difference between the observed and the expected theoretical distributions for the ‘7-8 years old’ category. However, among the second-year participants of this category, there was a significant underrepresentation of dropouts of players born in Q1 and Q2 and an overrepresentation of those born in Q3 and Q4. Finally, among the second-year players of the ‘9-10 years old’ and ‘15-17 years old’ categories, and the third-year players of the ‘15-17 years old’ category, there was no significant difference between the observed and the expected theoretical distributions.

Discussion

The poor consideration of the RAE as a factor of sport dropout in the literature (Musch & Grondin, 2001) led us to explore its role in basketball dropout. To our knowledge, no study has empirically investigated the RAE on sport dropout.

Helsen et al. (1998) did examine this relationship, but without providing empirical data on the dropout distribution as a function of birth quarters.

Based on the results of Delorme and Raspaud (2009), who showed that players born in Q4 were significantly smaller than those born in Q1 and Q2, we hypothesized a biased dropout distribution in youth categories of the FFBB. Given that our sample was part of the sample used in the study of Delorme and Raspaud (2009), and given its large size, we can reasonably assume that we will find the same height differences than in their study. Indeed, height is important for success in basketball performance, we may thus expect players born in Q4 to perform more poorly than their taller counterparts. This lower performance may lead in turn to reduce the time of play and the players' motivation, which will rapidly lead them to dropout.

In accordance with this hypothesis, results showed an underrepresentation of dropouts among male players born in Q1 and Q2 and an overrepresentation among those born in Q4 in the '9-10 years old', '11-12 years old' and '13-14 years old' categories and in the first year of the '15-17 years old' category. Concerning girls, the same asymmetry was observed in the '9-10 years old', '11-12 years old', '13-14 years old' and '15-17 years old' categories. These results seem to corroborate those of Delorme and Raspaud (2009). We indeed noticed that categories in which the distribution of dropout was the most biased, that is the '13-14 years old' for boys and the '11-12 years old' for girls, coincide with those where the authors found the most important height differences with respectively 11.97 and 10.01 centimeters. These results are also consistent with the suggestion of Musch and Grondin (2001) that the youngest players in relative age are more susceptible to be frustrated because of their limited ability to compete with those born just after the cut-off date, and are therefore more susceptible to give up sports competition.

Given the size of our sample, it is likely that the observed effect occurs among the “intermediate”-level players. However, the level of competition and the difficulty to have a position in the team may moderate the intensity of the RAE: the stronger the competition between players, the more likely it is that the RAE will be important (Musch & Grondin, 2001). Our results may therefore appear as unexpected. Nevertheless, there are several reasons that make us believe that this is not the case. First, based on the whole population of licensed players, Delorme and Raspaud (2009) found a significant RAE in all youth categories of French basketball. These biased distributions among licensed players could thus be partly explained by the biased distributions of dropouts.

Moreover, the study of Delorme and Raspaud (2009) is to our knowledge the first that investigated the whole population of licensed players of a particular sport. It is thus possible that in the previous studies, the absence of a RAE observed among low- and intermediate-level players was due to the small sizes of the samples. This hypothesis seems to be supported by the study of Delorme, Boiché and Raspaud (2009), which also found a systematic RAE for all of the young French female soccer players.

Next, in order to determine the presence of the effect, most of the studies on the RAE investigating high-level athletes used the observed distribution of the corresponding national population as the expected theoretical value. However, a study aiming at demonstrating this effect with certainty should use as theoretical distribution the one of the population of licensed players, instead of the national corresponding statistics (Delorme et al., 2010). Indeed, one could hastily conclude that an asymmetrical distribution of birthdates among elite players results from a RAE, whereas in reality it is only representative of the distribution observed in the population of licensed players. The over-representation of players born at the beginning of the competitive year, and the under-representation of those born at the end, may not be a consequence of the selection system valuing physical development of young players, which may put at advantage children and adolescents born during the first months of the year, but could simply be the mimetic expression of the mass of licensed players.

Based on these two assumptions (i.e., small sample sizes and biased method of RAE determination), we argue that the relation between the level of competition (or the competition between the players of the same team) and the occurrence of the RAE is less systematic than we first believed.

Our hypothesis of a biased distribution of dropouts has nevertheless not been observed for all of the age categories.

For both boys and girls, there was no biased distribution in the '7-8 years old' category. This uniform distribution may be explained by the fact that there is no competition in this age category (i.e., no games). Consequently, children do not have to struggle with their counterparts in order to play in a team. This absence of games is also beneficial for children with poor athletic attributes because there is less unfavorable comparison with their peers born earlier during the year, and no differences in playing time. Their motivation to play may thus be less affected than in the other age categories, explaining in part why our hypothesis has not been corroborated.

An absence of biased distribution of dropouts has also been observed among 16 and 17-years-old girls and boys. This finding is consistent with the study of Delorme and Raspaud (2009) showing that at this age, height differences between individuals born in Q1 and those born in Q4 are weak, not to say inexistent among 17-years-old girls. The stronger physical attributes of players born in Q1 may therefore be inefficient. Furthermore, sport psychologists argue that conflicts of interest arise with development, between sport and other domains (e.g., Weiss & Chaumeton, 1992). In this vein, older players have to assume educational (or professional/familial) responsibilities that might take them uniformly away from playgrounds. However, this latter interpretation remains speculative given that this dimension was not directly assessed.

In addition to influencing dropout, the RAE has also an influence on the decision to engage in basketball by dissuading players born in Q4 to participe in this activity because of their weak physical abilities. Indeed, the study of Delorme and Raspaud (2009) showed an overrepresentation of male and female players born in Q1 and Q2 and an underrepresentation of those born in Q4 among the ‘7-8 years old’ category. However, this study showed that players of this category gave up this activity uniformly. The asymmetric distribution reported by Delorme and Raspaud (2009) was thus the result of a ‘self-elimination’ of children born in Q4 who did not engage in this sport *a priori*. The same observation was made for the ‘15-17 years old’ category. The RAE has thus a dual influence: First, it may dissuade the children born in Q4 from engaging in basketball. Second, those who decide nevertheless to participate in this sport are finally those who drop out the most.

As shown in tables 1 and 2, there is a noticeable turnover, of about one third, in youth categories. This turnover is very important during the first year of the ‘15-17 years old’ category for males (36.72%) and females (37.14 %), probably because this age category lasts three years, accentuating thus the relative age effect. For both boys and girls, results showed a biased distribution of dropouts during the first year of this category whereas the distributions of the two following years were unbiased. Thus, a player born in December who enters into this category may potentially be opposed to a player who was born 35 months before him/her. It is the suppression of the ‘17-18 years old’ that led the FFBB to set up a ‘15-17 years old’ category lasting three years.

Accordingly, this suppression increased the gaps between participants in terms of RAE.

This important turnover is an indicator of the current incapacity of the FFBB to develop the loyalty of its young license holders. In an interview given to the French national sports journal *L'Equipe* on December 14th 1992, the current president of the FFBB, Yvan Mainini, who had recently been elected, said: 'We have today about 400,000 license holders. But according to me, 800,000 in 2000 is not an unrealistic goal. We will reach it if we work together and it is you, at the base, who will have the knowledge to tell us which buttons we have to push to succeed'. We can notice that Mainini was not a visionary: at the end of the 2000-2001 season, the FFBB counted only 426,898 (+ 6.72%) license holders and totaled up 457,034 (+ 14.26%) at the end of the 2006-2007 season (FFBB).

The stagnation of the number of license holders probably indicates that the leaders of the FFBB have difficulties to identify and reduce the factors of basketball dropout. The results of this study, as those of Delorme and Raspaud (2009), suggest that the RAE is one of these factors, and that it should be taken into account by the decision-making services. Unfortunately, the FFBB has just began an operation named 'L'Avenir en Grand' [The Future in Large] that aims at detecting and value tall players to 'enhance the quality of [their] basketball at the national level and to enhance [their] rank at the international level'. One of the stages of this project consists in distributing measures to all the clubs that have to be fixed in their gymnasiums. On these measures the minimal height required at the beginning of the season is marked, so that young players can ‘measure themselves’ against the tallest, along with the height of emblematic French basketball players when they were in youth categories. The flyer created for this operation explains that one of the stakes is to ‘make this project a national action mobilizing all the actors (leaders, coaches, players, parents) and all the structures (Leagues, Comities, Clubs)’. On this document, the FFBB also specifies that ‘[their] system of spotting of detection (network) and formation of players […], should favor the expression of potential good players, in particular the tall ones’. This operation is the object of an important publicity through the sending of flyers and measures to the clubs, but also through the web site of the FFBB (www.basketfrance.com/dtn, ‘l’avenir en grand’ section).

Based on our results, we believe that this project could be counterproductive: as shown earlier, players born in Q4, because of their less developed physical attributes in the youth categories, self-eliminate themselves before engaging in the activity or dropout more easily. However, by (over)valuing the tall players through a very media-related operation in the clubs, the FFBB stigmatizes a little more the small players through a sort of proselytism preaching a positive correlation between height and achievement in basketball. This approach might catalyze the intensity of the RAE and increase a turnover already important in the youth categories.

It would be interesting in the future to articulate research on the RAE with motivational theories, in order to have a deeper understanding of this phenomenon. For example, according to the Eccles et al.’s expectancy-value model (Eccles et al., 1983), perceived ability is an important factor of sports participation. One may expect that because of their weaker physical abilities, players born at the end of the year may have a lower perceived ability than those born early in the year. In turn, this lower perceived ability may explain why they dropout more often. Perceived ability may also be determined by coach's expectations of performance. Indeed, it is possible that these expectations are lower for players with weaker physical abilities. In turn and based on the self-fulfilling prophecy theory (Rosenthal & Jacobson, 1968; Rosenthal, 1974), these lower expectations may decrease players' perceived ability and lead to dropout.

Perspectives

Results of the present study confirm that the RAE may influence sport dropout. This effect should thus be taken into consideration in studies on sport dropout as a variable that may influence this phenomenon.

The RAE is seen as a discriminatory effect in youth categories because it disadvantages players born late after the cut-off date by strongly compromising their chances to reach the high-level. Future research should thus analyse the selection systems used in youth sport (i.e., their mechanisms and logic that makes people build them). Facing this reality and arguing that the sports system should allow fulfilment of all the children, several authors proposed solutions to alleviate this effect and maintain the motivation of each participant (Musch & Grondin, 2001). Concerning the particular case of French basketball, reinstalling the ‘17-18 years old’ category would probably result in a decrease of the important turnover noticed in the first year of the ‘15-17 years old’ category. Raising coaches’ awareness about this phenomenon could be another solution so that they can deal with the concerned children, notably during puberty, by explaining them that their current deficit in terms of physical abilities is only temporary and that it will be compensated.

Finally, it would be interesting to examine the RAE on other variables, such as the decision to practice a sport, and to investigate whether this effect differs depending on the number of years and/or the level of practice before dropout occurs. For example, is the RAE more important for players who drop out after only one season than for players who withdraw after several years? This would help us to understand more deeply the effect of relative age on dropout in youth categories.

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Table 1.
Dropouts in male players (2005-2006).

Age category	Total	Dropouts	%
17 years old	9,662	3,063	31.70
16 years old	11,442	3,502	30.61
15 years old	12,751	4,682	36.72
Total	33,855	11,247	33.22
14 years old	15,964	3,970	24.87
13 years old	15,596	4,022	25.79
Total	31,560	7,992	25.32
12 years old	14,655	4,535	30.95
11 years old	14,734	4,648	31.55
Total	29,389	9,183	31.25
10 years old	16,108	4,581	28.44
9 years old	15,263	3,907	25.60
Total	31,371	8,488	27.06
8 years old	13,244	4,229	31.93
7 years old	11,840	3,359	28.37
Total	25,084	7,588	30.25
Overall Total	151,259	44,498	29.42

Table 2.
Dropouts in female players (2005-2006).

Age category	**Total**	**Dropouts**	**%**
17 years old	6,123	1,956	31.95
16 years old	7,522	2,310	30.71
15 years old	8,780	3,261	37.14
Total	22,425	7,527	33.57
14 years old	10,701	2,901	27.11
13 years old	10,832	2,867	26.47
Total	21,533	5,768	26.79
12 years old	10,613	3,108	29.28
11 years old	11,078	3,548	32.03
Total	21,691	6,656	30.69
10 years old	12,734	2,993	23.50
9 years old	11,613	2,710	23.34
Total	24,347	5,703	23.42
8 years old	9,518	2,659	27.94
7 years old	7,587	1,834	24.17
Total	17,105	4,493	26.27
Overall Total	107,101	30,147	28.15

Table 3.

Distribution of dropouts in male players (2005-06).

	Q1 (%)	Q2 (%)	Q3 (%)	Q4 (%)	Total	χ^2	*P*
17years old	783 (25,56)	812 (26,52)	794 (25,92)	674 (22,00)	3,063	3.557	< 0.313
Δ	+ 4	- 13	+ 39	- 30			
16 years old	866 (24,73)	938 (26,78)	889 (25,39)	809 (23,10)	3,502	1.078	< 0.782
Δ	- 18	- 11	+ 21	+ 8			
15 years old	1,112 (23,75)	1,250 (26,70)	1,181 (25,22)	1,139 (24,33)	4,682	11.763	< 0.008
Δ	- 87	+ 5	+ 6	+ 76			
Total	2,761 (24,55)	3 000 (26,67)	2,864 (25,47)	2,622 (23,31)	11,247	6.312	< 0.097
Δ	- 101	- 19	+ 66	+ 54			
14 years old	955 (24,06)	973 (24,51)	985 (24,81)	1,057 (26,62)	3,970	42.234	< 0.0001
Δ	- 61	- 91	- 14	+ 166			
13 years old	923 (22,95)	1,046 (26,01)	1,026 (25,51)	1,027 (25,53)	4,022	45.226	< 0.0001
Δ	- 144	- 33	+ 33	+ 144			
Total	1,878 (23,50)	2,019 (25,26)	2,011 (25,16)	2,084 (26,08)	7,992	81.623	< 0.0001
Δ	- 205	- 124	+ 19	+ 310			
12 years old	1,032 (22,76)	1,197 (26,39)	1,147 (25,29)	1,159 (25,56)	4,535	38.128	< 0.0001
Δ	- 123	- 25	- 8	+ 156			
11 years old	1,162 (25,00)	1,133 (24,38)	1,203 (25,88)	1,150 (24,74)	4,648	13.125	< 0.004
Δ	+ 20	- 104	+ 22	+ 62			
Total	2,194 (23,89)	2,330 (25,37)	2,350 (25,59)	2,309 (25,15)	9,183	34.670	< 0.0001
Δ	- 103	- 129	+ 14	+ 218			
10 years old	1,059 (23,12)	1,143 (24,95)	1,163 (25,39)	1,216 (26,54)	4,581	24.443	< 0.0001
Δ	- 81	- 63	+ 15	+ 129			
9 years old	909 (23,27)	1,013 (25,93)	988 (25,29)	997 (25,51)	3,907	16.355	< 0.001
Δ	- 96	- 2	+ 19	+ 79			
Total	1,968 (23,19)	2,156 (25,40)	2,151 (25,34)	2,213 (26,07)	8,488	39.398	< 0.0001
Δ	- 177	- 65	+ 34	+ 208			
8 years old	1,016 (24,02)	1,110 (26,25)	1,063 (25,14)	1,040 (24,59)	4,229	2.913	< 0.405
Δ	- 38	- 5	+ 4	+ 39			
7 years old	845 (25,16)	882 (26,26)	834 (24,83)	798 (23,75)	3,359	1.077	< 0.783
Δ	- 12	+ 20	- 17	+ 9			
Total	1,861 (24,53)	1,992 (26,25)	1,897 (25,00)	1,838 (24,22)	7,588	3.059	< 0.383
Δ	- 50	+ 15	- 13	+ 48			
Overall Total	10,662 (23,96)	11,497 (25,84)	11,273 (25,33)	11,066 (24,87)	44,498	116.034	< 0.0001
Δ	- 636	- 322	+ 120	+ 838			

Note. Δ is the difference between observed distribution and theoretical expected distribution.

Table 4.

Distribution of dropouts in female players (2005-06).

	Q1 (%)	Q2 (%)	Q3 (%)	Q4 (%)	Total	χ^2	*P*
17 years old	532 (27,20)	521 (26,64)	482 (24,64)	421 (21,52)	1,956	4.790	< 0.188
Δ	+ 15	- 42	+ 6	+ 21			
16 years old	614 (26,58)	607 (26,28)	570 (24,68)	519 (22,46)	2,310	4.433	< 0.218
Δ	+ 7	- 43	+ 10	+ 26			
15 years old	794 (24,35)	846 (25,94)	826 (25,33)	795 (24,38)	3,261	23.340	< 0.0001
Δ	- 44	- 59	- 6	+ 109			
Total	1,940 (25,77)	1,974 (26,23)	1,878 (24,95)	1,735 (23,05)	7,527	27.195	< 0.0001
Δ	- 22	- 144	+ 10	+ 156			
14 years old	739 (25,48)	719 (24,78)	754 (25,99)	689 (23,75)	2,901	19.191	< 0.001
Δ	- 41	- 72	+ 44	+ 69			
13 years old	753 (26,26)	704 (24,56)	751 (26,19)	659 (22,99)	2,867	15.199	< 0.002
Δ	- 48	- 49	+ 28	+ 69			
Total	1,492 (25,87)	1,423 (24,67)	1,505 (26,09)	1,348 (23,37)	5,768	33.961	< 0.0001
Δ	- 89	- 121	+ 72	+ 138			
12 years old	749 (24,10)	821 (26,41)	761 (24,49)	777 (25,00)	3,108	35.327	< 0.0001
Δ	- 88	- 35	- 4	+ 127			
11 years old	850 (23,96)	955 (26,92)	927 (26,12)	816 (23,00)	3,548	14.568	< 0.01
Δ	- 85	- 18	+ 49	+ 54			
Total	1,599 (24,03)	1,776 (26,68)	1,688 (25,36)	1,593 (23,93)	6,656	43.437	< 0.0001
Δ	- 173	-53	+ 45	+ 181			
10 years old	738 (24,66)	796 (26,60)	739 (24,69)	720 (24,05)	2,993	5.560	< 0.135
Δ	- 36	- 7	- 7	+ 50			
9 years old	644 (23,76)	666 (24,58)	714 (26,35)	686 (25,31)	2,710	32.252	< 0.0001
Δ	- 69	- 72	+ 46	+ 95			
Total	1,382 (24,23)	1,462 (25,64)	1,453 (25,48)	1,406 (24,65)	5,703	29.809	< 0.0001
Δ	- 105	- 79	+ 39	+ 145			
8 years old	653 (24,56)	698 (26,25)	699 (26,29)	609 (22,90)	2,659	9.265	< 0.05
Δ	- 43	- 31	+ 54	+ 20			
7 years old	504 (27,48)	472 (25,74)	457 (24,92)	401 (21,86)	1,834	3.273	< 0.351
Δ	+ 26	- 30	-2	+ 6			
Total	1,157 (25,75)	1,170 (26,04)	1,156 (25,73)	1,010 (22,48)	4,493	6.105	< 0.107
Δ	- 17	- 61	+ 52	+ 26			
Overall Total	7,570 (25,11)	7,805 (25,89)	7,680 (25,48)	7,092 (23,52)	30,147	119.977	< 0.0001
Δ	- 406	- 458	+ 218	+ 646			

Note. Δ is the difference between observed distribution and theoretical expected distribution.