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Dropout Rates and Relative Age-Effects in Male Adolescent Soccer Players in Turkey, 2009-2017

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Abstract

Introduction: The youth soccer player development program has been supported professional players from home in town. At that way, the Nationals soccer dropout rate and reasons are essential. The features of the dropping age and the role of the relative age effect on the dropout rates of soccer players were enrolled in the study.
Methods:1950 males who participated in the academy league as licensed players at the age of U (under) 14 and U15 in the 2009-2010 seasons were investigated. Dropout rates were determined for all years between 2009-2017.
Results: The findings show that the dropout rate was statistically higher ($p<0.001$) among those who were born in the first three months of the year. The mean playing duration in the Academy League was 3.1±1.9 years. Another observation was that 49.4% of the players still played soccer, and their average age was 20.6±0.7 years in the 2016-2017 seasons. The results also demonstrated that 46.9% of subjects who were born in the first quartile of 2016-2017 had stopped playing soccer. The total dropout ratio was 50.6% in the 2016-2017 seasons. There was a significant difference between the Turkish Football Federation (TFF)-1 and regional amateur league (RAL) in dropout rates within years, with reference to the super league.
Conclusions: The dropout rate was higher in Q1 and 20–years age groups. The majority of the dropouts occurred in the amateur league.

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Introduction

To monitor the development of children, they are frequently grouped into intellectual and physical growth categories in accordance to their chronological age, and it has been observed that a difference of just a year among children's ages can incur a different level of development (DeMais & Stearns, 1992). Chronological age grouping is commonly achieved to provide developmentally appropriate education, training, competition so as to support equal opportunity for success. However, chronological age grouping can lead to significant differences in physical and cognitive development (Delorme, Boiche, & Raspaud, 2010). The outcome of this difference in growth is termed as "relative age effect" (RAE) (Gil et al., 2014; Gonzalez-Villora, Pastor-Vicedo, & Cordente, 2015; Gutierrez Diaz Del Campo, Pastor Vicedo, Gonzalez Villora, & Contreras Jordan, 2010; Lemez, MacMahon, & Weir, 2016; Mulazimoglu, 2014). In soccer/football, the selection is also made according to the chronological age, and the influence of relative age effect has also been observed in various studies (Baxter-Jones, Helms, Maffulli, Baines-Preece, & Preece, 1995; Figueiredo, Goncalves, Coelho, & Malina, 2009). A survey conducted in the Basque region on Spanish League's Bilbao AC soccer players included 13,519 players, of whom 119 were professional athletes, 189 were elite youth players, 4,382 were local youth U (under) 11-U14 players, and 8,834 were U10-U11 school

youth players (Mujika et al., 2009). Examining the subgroups showed that there was a significant level of age-related effect as well as an early and biased selection as compared to the reference population. Intergroup comparison showed that as the amount of involvement in soccer increased, the RAE increased as well. It was concluded that biased and early selection caused age-related effects and loss of better, potential players. The UEFA Championship League results show that the influence of the age effect was more in younger age categories (Gonzalez-Villora et al., 2015).

On the other hand, another study has demonstrated that late maturing players are at higher risk of dropout compared to regional selected, and non-selected U14 players (Coelho et al., 2010). Delorme et al. have shown RAE for all age categories in the French Soccer Federation with a higher number of dropouts in players born in the third and fourth quarter of the same year (Delorme N., 2010). The studies on children and youth dropouts were conducted for short time influence (Salguero, Gonzalez-Boto, Tuero, & Marquez, 2003), and thus, very little is known about long-term dropout figures and influence of RAE (Delorme et al., 2010; Figueiredo et al., 2009; Molinero, Salguero, Tuero, Alvarez, & Marquez, 2006). There are no more studies that provide the dropout rate in one, two, or five years interval (Mollerlokken, Loras, & Pedersen, 2015). It has been reported that the dropout rate was 17.1% in 11, 20.5% in 13, 21.7% in 15, and 25.5% in 18-year-old, and higher in birth quartiles in the last quarter of U9 and U18 age categories in male soccer players in France (Delorme et al., 2010), and 12.7% in 12, and 10.4% in 14 year old males in Portugal (Figueiredo et al., 2009). The RAE has been observed in most of these studies (Gil et al., 2014; Gonzalez-Villora et al., 2015; Gutierrez Diaz Del Campo et al., 2010; Lemez et al., 2016; Mulazimoglu, 2014), but in most studies, its impact on the long-term effect on the dropout rate has been neglected. RAE is a global issue having adverse effects. More national studies are required to identify the consequences of RAE. That is the reason why despite soccer being one of the most popular sports in Turkey, like in other countries, there has been no observed study conducted to show the dropout rate percentages according to the chronological ages in adolescent male soccer players. Therefore, in this study, U14 and U15 players in academy league were examined concerning RAE, and its influence on dropout was investigated in Turkish soccer between 2009 and 2017.

Material and Methods

This cross-sectional study was planned with 1950 male players who participated when they were U14 and U15 years of chronological age category in 2009-2010. The Academy League intends to support the holistic development of the young football players, and thus, has established the infrastructure of super league, TFF1, TFF2, and TFF3 league clubs of the Turkish Football Federation (TFF). The dropout rate was calculated according to RAE from 2009 to 2017 between 11-22 years of age and 1-8 years of duration. During these years, the numbers of players who were active and the league in which they played soccer were investigated within the recorded data from the Turkish Football Federation's (TFF) official website. Istanbul University Ethical Committee approval (IRB Number:2017/204) and TFF permissions were obtained for the study. The chronological age of those who were still active was calculated as to 01.01.2017, and those who dropped out in January of that year were taken as the dropout chronological age. Those who were born between January-March were assigned as 1st (Q1), April-June as 2nd (Q2), July-September as 3rd (Q3), and

October-December as 4th quartiles (Q4), and their ages were calculated accordingly (Gil et al., 2014; Gonzalez-Villora et al., 2015; Gutierrez Diaz Del Campo et al., 2010; Lemez et al., 2016; Mulazimoglu, 2014).

The SPSS 21.0 statistical package program for Windows was used for data analysis. In descriptive statistics, numbers and percentages (%) were used for categorical variables and mean (X), standard deviation (±SD), minimum, and maximum terms were used for numerical variables. The Mann Whitney U test was used to compare independent samples since the data distributions were not normal. For skewed data, the differences between more than two independent categories were examined by the Kruskal-Wallis (KW) test. The group differences (%) between the categorical variables were analyzed by the Chi-Square analysis. Factors that might influence the dropout, including the risk factors, were analyzed by the Cox regression analysis. The playing duration, dropout state, and dropout league were used as dropout risk factors in the regression model. In the 1st year, the dropout risk in age quartiles was analyzed by univariate regression analysis. The results of the regression analysis were displayed as odds ratio (OR) with 95% confidence interval (CI). A p-value of <0.05 was considered as statistically significant.

Results

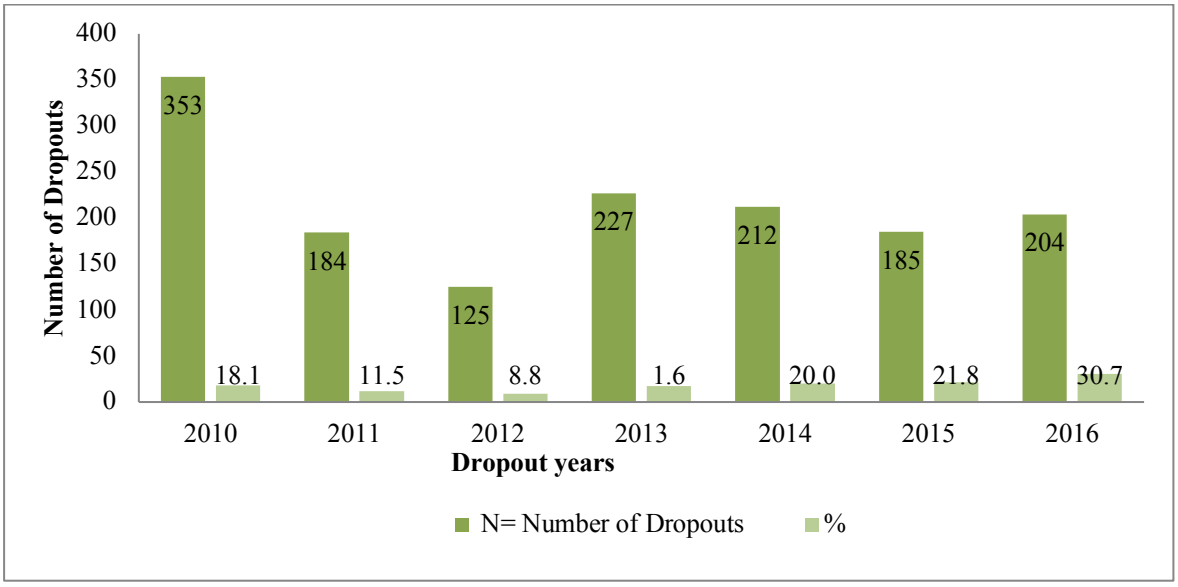
Table 1. Demographic features of the dropout academy league players,

Variables	N	%	Variables	N	%
Active (2017)	964	49,40	**Dropout league**		
Passive (2017)	986	50,60	Super	212	10,90
Age Quartiles			TFF1,	181	9,30
Q1	912	46,80	TFF2,	193	9,90
Q2	489	25,10	TFF3,	211	10,80
Q3	364	18,70	RAL	237	12,20
Q4	185	9,50	Amateur	916	47,00
Birth months			**Dropout age (years)**		
January	475	24,40	11,00	1	0,10
February	230	11,80	12,00	9	0,50
March	207	10,60	13,00	181	9,30
April	176	9,00	14,00	245	12,60
May	156	8,00	15,00	163	8,40
June	157	8,10	16,00	150	7,70
July	132	6,80	17,00	244	12,50
August	133	6,80	18,00	250	12,80
September	99	5,10	19,00	208	10,70
October	83	4,30	20,00	270	13,80
November	61	3,10	21,00	212	10,90
December	41	2,10	22,00	17	0,90
			Number of years played		
			≤5	1101	56,50
			>5	849	43,50

TFF: Turkish Football Federation, RAL: Regional Amateur League

In the academy league in 2009-2010, 52.1% (n=475) of the Q1 participants were born in January, 36.0% (n=176) of the Q2 were born in April, 36.5% (n=133) of the Q3 were born in June, and 44.9% (n=83)

of the Q4 were born in October. Those who were born in the 1st half of the year comprised 71.8% (n=1401) and 28.2% (n=549) in the 2nd half of the year as shown in Table1.



Graphic 1. Dropout years and number of dropouts

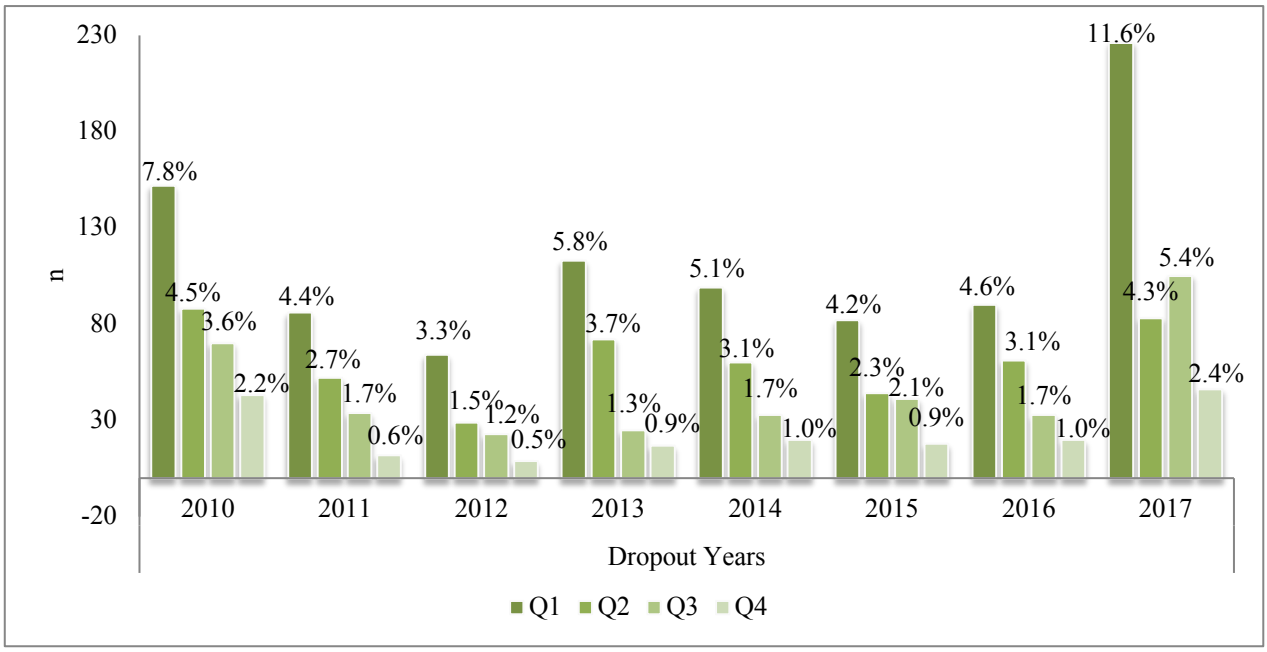
The mean age of the participants was 13.4±0.6 years, and they were registered as U14 and U15 in 2010. Of the participants, 935 (47.9%) were in the U15, while 1015 (52.1%) were in the U14 group. In the 11-22-years age group, the mean dropout age was 17.2±2.6 years. The total dropout rate was 50.9% (n=993) < age 18, and 49.1% (n=957) ≥ age 18 (p<.001). The mean age of dropout below 18 years was 15.0 (11-17), and it was 19.5 (18-22) years for age 18 and above. Those who dropped out at age 18 played soccer for an average of 2.5 (1.0-6.0) years and those who dropped out at age 18 and above played for an average of 7.0 (4.0-8.0) years; The difference between the two groups was statistically significant (z=-37.822, p<.001). The dropout rate was 18.1% (n=353) in the 1st, 9.4 % (n=184) in the 2nd, 6.4% (n=125) in the 3rd, 11.6% (n=227) in the 4th, 10.9% (n=212) in the 5th, 9.5% (n=185) in the 6th, 10.5% (n=204) in the 7th, and 23.6% (n=460) in 8th year after the athletes started playing. The highest dropout (18.1%, n=353) was observed in the year 2010 (Graphic 1).

The mean active participation duration was 4.7±2.5 years between 1st and 8th years. Furthermore, it was observed that those who played soccer until the 2016-2017 season and became dropout, played soccer for 3.1±1.9 years on average. Of those who continued playing soccer in the 2016-2017 season, 71.7% (n=691) were >5 years, and 28.3% (n=273) were ≤5 years; the dropout rate was 84.0% (n=828) for ≤5 years and 16.0% (n=158) for >5 years. The difference between the two figures was statistically significant (χ^2=614.214, p<.001). However, among those who played soccer for ≤5 years, the mean dropout age was 15.3 (11-19) years, and among those who played soccer for >5 years, the mean dropout rate was 19.6 (16-22) years. A significant difference was observed between the two groups (z=-37.050, p<.001). Those players who did not drop out at the age of 13-14 continued playing soccer and reached the professional level. It was found that for Q1 (n=912) the mean age was 17.3 (12-22) years, for Q2 (n=489) 16.9 (12-21) years, for Q3 (n=364) 17.2 (13-21) years, for Q4 (n=185) 17.1 (11-21) years when they became dropouts, and the difference

between the groups was not significant (KW=6.650, p=.084). The mean playing duration according to the age quartiles was 4.8 (1-8) years for Q1 (n=912), 4.5 (1-8) years for Q2 (n=489), 4.9 (1-8) years for Q3 (n=364), and 4.7 (1-8) years for Q4 (n=185); there was no statistical difference between the groups (KW=6.450, p=.092). Of those who continued playing soccer in the 2016-2017 season, 450 (46.7%) were Q1, 228 (23.7%) were Q2, 187 (19.4%) were Q3, and 99 (10.3%) were Q4.

Table 2. Age quartiles and dropout years

Dropout years	Q1		Q2		Q3		Q4		Total		p
	n	%	n	%	n	%	n	%	n	%	
2010	152	7,80	88	4,50	70	3,60	43	2,20	353	18,10	
2011	86	4,40	52	2,70	34	1,70	12	0,60	184	9,40	
2012	64	3,30	29	1,50	23	1,20	9	0,50	125	6,40	
2013	113	5,80	72	3,70	25	1,30	17	0,90	227	11,60	
2014	99	5,10	60	3,10	33	1,70	20	1,00	212	10,90	**0,006**
2015	82	4,20	44	2,30	41	2,10	18	0,90	185	9,50	
2016	90	4,60	61	3,10	33	1,70	20	1,00	204	10,50	
2017	226	11,60	83	4,30	105	5,40	46	2,40	460	23,60	
Total	**912**	**46,80**	**489**	**25,10**	**364**	**18,70**	**185**	**9,50**	**1950**	**100,00**	



Graphic 2. Age Quartiles and Dropout years

Age quartiles and dropout years are shown in Table 2. Graphic 2 gives the dropout rates in quartiles and the dropout years. Of those who continued playing soccer in the 2016-2017 season, 50.2% (n=484) were in the amateur league, 16.2% (n=156) in the regional amateur league (RAL), 10.7% (n=103) were in the TFF3, 8.4% (n=81) were in the TFF2, 4.5% (n=43) were in the TFF1, and 10.1% (n=97) were in the super-league. Of the dropouts, 565 (61.7%) <18 years were in the Amateur League, and most of the dropout were ≥18 years of age (n=170, 71.7%). On the other hand, most of the dropout players were from RAL, and this difference was statistically significant (χ^2=110.879, p<.001).

Table 3. Dropouts in years and leagues

Years	Super		TFF1		TFF2		TFF3		RAL		Amateur		Total		p
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
2010	36	1,80	38	1,90	41	2,10	17	0,90	14	0,70	207	10,60	353	18,10	
2011	7	0,40	14	0,70	9	0,50	29	1,50	14	0,70	111	5,70	184	9,40	
2012	9	0,50	12	0,60	12	0,60	13	0,70	19	1,00	60	3,10	125	6,40	
2013	23	1,20	27	1,40	19	1,00	15	0,80	12	0,60	131	6,70	227	11,60	
2014	16	0,80	16	0,80	14	0,70	10	0,50	9	0,50	147	7,50	212	10,90	**0,001**
2015	14	0,70	17	0,90	8	0,40	13	0,70	7	0,40	126	6,50	185	9,50	
2016	18	0,90	14	0,70	15	0,80	15	0,80	14	0,70	128	6,60	204	10,50	
2017	89	4,60	43	2,20	75	3,80	99	5,10	148	7,60	6	0,30	460	23,60	
Total	**212**	**10,90**	**181**	**9,30**	**193**	**9,90**	**211**	**10,80**	**237**	**12,20**	**916**	**47,00**	**1950**	**100,00**	

TFF: Turkish Football Federation, RAL: Regional Amateur League

Dropout years and leagues are shown in Table 3. those who played ≤5 years comprised 71.6% (n=656) and dropped mostly in the Amateur League, and those who played >5 years, mainly played in the RAL (71.3% n=169); the difference between these figures was significant (χ^2=204.154, p<.001).

Table 4. Age quartiles and dropout leagues

Age Quartiles	Super		TFF1		TFF2		TFF3		RAL		Amateur		Total		p
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	
Q1	101	5,20	89	4,60	99	5,10	96	4,90	119	6,10	408	20,90	912	46,80	
Q2	45	2,30	42	2,20	49	2,50	49	2,50	52	2,70	252	12,90	489	25,10	
Q3	41	2,10	33	1,70	29	1,50	42	2,20	54	2,80	165	8,50	364	18,70	**0,215**
Q4	25	1,30	17	0,90	16	0,80	24	1,20	12	0,60	91	4,70	185	9,50	
Total	**212**	**10,90**	**181**	**9,30**	**193**	**9,90**	**211**	**10,80**	**237**	**12,20**	**916**	**47,00**	**1950**	**100,00**	

TFF: Turkish Football Federation, RAL: Regional Amateur League

There was not any statistical difference between the age quartiles and dropout leagues (Table 4). In the univariate regression analysis, Q4 showed a higher risk of dropout compared to Q1 [(Beta=0.415, CI=1.032-2.221, p=.034)] in 2010, when the dropout was taken as dependent and age quartiles as independent variables.

Dropout Leagues	Exp(β)	95,0% CI for Exp(β)		p
		Lower	Upper	
TFF1	1,63	1,272	2,088	<,001
TFF2	1,142	0,88	1,481	0,317
TFF3	0,926	0,712	1,204	0,567
RAL	0,562	0,423	0,747	<,001
Amateur	1,125	0,915	1,384	0,262

TFF: Turkish Football Federation, RAL: Regional Amateur League

In the regression model, soccer playing time (years) was the dependent variable, dropout was the state variable, and leagues played were entered as categorical variables. TFF1 and RAL significantly affected the dropout duration (Table 5).

Discussion and Conclusions

Soccer is the most popular sport in the world, including Turkey. A large number of children, especially boys, are involved in soccer in different sports clubs. Many of these desire to play at a professional level but most drop out along the way. Soccer is characterized by high-intensity activities, which need to be developed from a young age and depend on maturation. However, the timing and tempo of maturation vary between adolescent peers. Maturity at that period creates advantages in high-intensity activities and leads to selection, which refers to RAE. It is known that those who were born in the 1st half of the year have the advantage over those who were born in the 2nd half (Augste & Lames, 2011; Calvo, Cervello, Jimenez, Iglesias, & Murcia, 2010; Gil et al., 2014; Mujika et al., 2009). In this study, 935 (47.9%) players were U15, and 1015 (52.1%) players were in the U14 group and in both age groups, those born in the Q1 were higher than the other quartiles. Further analysis showed that those who were born in January were statistically more than the other months. Thus, those who were born in the 1st half of the year comprised 71.8% (n=1401), and only 28.2% (n=549) were born in the 2nd half of the year. Our findings show that there was an RAE on the selection for the competition-level league teams in the 2009-2010 Academy Players' selection. Furthermore, a medium-size RAE on professional soccer players has been shown in the Turkish Super league with the others like that in Santander League (Spain), Bundesliga (Germany), Bundesliga (Austria), and Eredivisie (Netherlands) (Yague, de la Rubia, Sanchez-Molina, Maroto-Izquierdo, & Molinero, 2018). The result is not surprising as those who are born earlier in the same year have physical advantages over those born later. That has also been demonstrated in several age categories of national and international soccer (Sierra-Diaz, Gonzalez-Villora, Pastor-Vicedo, & Serra-Olivares, 2017). At U15, U16, U17, and U18 age categories from ten European countries, 43.3% were in Q1, and 9.3% were in Q4 (Muller, Gehmaier, Gonaus, Raschner, & Muller, 2018). Soccer also favors early maturation for a better performance. At the 2013 U-17 World Cup competition, it was shown that 38.7% of the players were born in the Q1 of the selection year and 10.5% were born in Q4 (Ridha Sallaoui, 2014). The most essential point inferred by the results is to reflect on whether immediate success is more important in promoting players into the professional league. These results show that RAE is beneficial for team selection and need to think about how impact on duration of playing football. The annual mean dropout rate in youth soccer has been reported as 23.9% in the ages 10-18 years (Mollerlokken et al., 2015). Among the subjects who dropped out in our study, 46.9% (n=912) were born in the Q1, 25.1% (n=489) in Q2, 18.7% (n=364) in Q3, and 9.5% (n=185) in Q4. However, there was no difference in the number of years they played soccer between the quartiles. In the 2016-2017 seasons, 49.4% were at the age of 20.6±0.78 and playing soccer in various leagues. In this study, it was found that there was no influence of RAE on the dropout rate in quartiles, as well as in the half years. In the present study, it was found that the dropout rate in a year was 9.3% for age 13, 12.6% for age 14, 8.4% for age 15, 7.7% for age 16, 12.5% for age 17, 12.8% for age 18, 10.7% for age 19, 13.8% for age 20, 10.9% for age 21, and 0.9% for age 22. The highest dropout was observed at the age of 20(n=270), and it was as low as 8.3% for each year. It is difficult to determine the number of dropouts for each year through the literature. There is an obvious heterogenic dropout rate in the existing publications. It is apparent that there is a difference in dropout figures between countries. It was reported by Calvo et al. (Calvo et al., 2010) that for age 15 the dropout rate was

36.1% in Spain, which was reported as 90% among 10-19 year olds in Norway (Mollerlokken et al., 2015). In France, the dropout rate for 14 years old boys in one year period was 8.7% (Nache C. M., 2005). There was a study on Spanish dropouts in which they studied 269 male and 292 female athletes with a mean age of 15.2±1.6 years, involved in athletics, basketball, gymnastics, handball, karate, soccer, indoor soccer, judo, tennis, swimming, and volleyball (Molinero et al., 2006). The studies show that the reasons for dropout from soccer are common between communities and devoting a lot of time to training and competition is important to support youth football player talent identification programs. In the literature, subjects were asked to fill in a Likert type of questionnaire and among the attrition reasons, the high rated answers included "dislike the coach," "not enough team spirit," "no teamwork," "not as good as wanted to be," "not enough recognition," "hard training," and "not enough competition." It is stated that there was not enough evidence and controlled studies in long-term athlete development programs (Bakera, Cobleyb, & Fraser-Thomas, 2009; Ericsson, Krampe, & Tesch-Römer, 1993; Ford, Ward, Hodges, & Williams, 2009). It was recommended that athletes of a younger age should participate in several sports to benefit from activities and should avoid the physical, physiological, and psychological hazards of one sport for early specialization (Ford et al., 2009; Pediatrics, 2000). The American Academy of Pediatrics (Pediatrics, 2000) suggests that early practice and specialization should be avoided at a young age, but it was suggested that early practice of skills is important for better development and expert performance in soccer (Ford et al., 2009). It was also suggested that some modification was needed for the selection of talented soccer players for the Olympic Athlete Development Programs, meaning that there was a need for a different approach in long-term athlete development programs (Glamser & Vincent, 2004).

The Academy Players who were registered in 2009-2010, 50.6% were dropouts. Most of the dropouts occurred in the Q1, and in the Amateur league. The dropout rate was highest among subjects aged 20 years. Those players who did not drop out at the age of 13-14 years continued playing soccer and reached a professional level improving the talent selection. Prevention programs might help to decrease early dropout of young players and increase engagement of the talented young soccer players.

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