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The examination of relative age effect in Turkey female's first football league and place in success

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Abstract

Objective: to examine relative age effect and its effect on league ranking in Turkish female's first football league. **Method:** the data of 2684 players, who participated in the league between 2012 and 2019 was gathered from the official website of The Turkish Football Federation and their birth-dates were divided into quarters by month. To test the extent of the relative age effect in each season, a chi-square test was used to assess the observed and expected birth distribution across the sample of players. Chi-square values were followed up by calculating Odds Ratios (OR) and 95% Confidence Intervals (95%CI) for the quartile distributions in order to examine subgroup differences. Significance level was accepted as 0.05. **Results:** it has been found that there is the relative age effect among all season birth-quarters distributions (X^2=90.858, p<0.05). Each season evaluate separately, it was found significant differences in five season which include 2012-2013, 2014-2015, 2016-2017, 2017-2018 and 2018-2019 seasons (respectively: X^2=15.309, 11.347, 24,285, 19.260, 19.168, p<0.05). It has been found that there are significant differences among teams' birth-quarter distributions according to league ranking in each season (p<0.05). **Conclusion:** this study was presented that there is relative age effect in Turkish woman soccer players. Even though all season league ranking assessment for the relative age effect was found statistically differences, it is difficult to say that the relative age effect is an important factor for success.

Keywords: relative age effect, female football, success.

Introduction

The differences in cognitive, physical and emotional development in young athletes between born first day of the year and born last day of the year are closely related to the performance in sports activities where the players are divided into age groups and this situation is called the relative age effect (Brustio et al., 2018; Delorme et al., 2010a; Peña et al., 2018; Yagüe et al., 2018). While relative age is a determinant in sports where competition and physical development are important, it is stated that in

addition to competition and physical development, relative age also has an important effect on technical skills and motor development (Musch & Gronding, 2001; Van Rossum, 2006). Therefore, in soccer with a high level of competition, coaches naturally prefer physically developed players in their cast.

The relative age effect in sports was first made among elite ice hockey players in Canada in the early 1980s (Barnsley et al., 1985; Grondin et al., 1984; Van Den Honert, 2012). Since then, the relative age effect has been used in handball (Schorer et al., 2009), soccer (Cobley et al., 2008), basketball (Delorme & Raspaud, 2009), baseball (Thompson et al., 1991), rugby (Till et al., 2010), swimming (Nagy et al., 2015), tennis (Edgar & O'Donoghue, 2005), and volleyball (Okazaki et al., 2011). Soccer is the sport which examined most frequently of relative age effect among players and it has with the largest and most consistent results (Li et al., 2020).

Most studies examining relative age effect in soccer have focused on male soccer players, and studies have been conducted on subjects such as the differences among quarters, the effect of relative age effect and physical characteristics, relative age effect on success, league comparison (Andrade et al., 2015; Barnsley et al., 1992; Brustio et al., 2018; Cobley et al., 2009; Gioldasis et al., 2015; González et al., 2015; Helsen et al., 2005; Yagüe et al., 2018). In recent years, it has been reported that the participation of women in soccer has increased by 54% worldwide (Korgaokar et al., 2018). These increases are parallel to the factor such as increase of investment in women's team in Turkey, support of municipalities, Turkish Football Federation support and encouragement, had a positive impact on increasing the participation of women and the number of soccer teams. Although there is a significant increase in the number of women playing soccer worldwide (Korgaokar et al., 2018; Romann & Fuchslocher, 2013), the literature showing the relative age effect especially in women's soccer is quite limited (Delorme & Raspaud, 2009; Delorme et al., 2010a,b; Korgaokar et al., 2018; Romann & Fuchslocher, 2013; Sedano et al., 2015; Vincent & Glamser, 2006). It is stated in the literature that only 2% of the studies on relative age effect are related to female athletes (Cobley et al., 2009).

Relative age effect is especially important in soccer which is the branch where physical maturation and motor performance are important. Many studies have shown that relative age effect has an important effect on achievement in lower age categories in male and female soccer (Augste & Lames, 2011; Helsen et al., 2005; Yagüe et al., 2018). Therefore, physically more develop and matured players are preferred in younger age categories (Tunçel et al., 2018). However, it is stated that the relative age effect decreases especially in males in the adult category (Brustio et al., 2018; González et al., 2015). In women, some studies report that the relative age effect is in the adult category (Delorme et al., 2010b; Romann & Fuchslocher, 2013), while some of the studies do not indicate the relative age effect (Delorme & Raspaud, 2009; Lidor et al., 2014).

In the literature it has not been made a special study of the relative age effect for the women's soccer team in Turkey. This research is one of the pioneering studies on the relative age effect in Turkish women's soccer. Examining the relative age effect and contribution to success of relative age in adult women players in Turkey will contribute to literature.

. In line with all this information, the aim of the study is to examine the relative age effect on among Turkish woman soccer players and the contribution of the relative age effect to success.

Methods

Participants

In the study, players of teams which starting 2018-2019 season until 2012-2013 season each year take part in Turkish Football Federation Women's First Football league were examined. A total number of 7 seasons, 2684 licensed and players whose license active visa for season were taken into consideration. Within the scope of the research, woman soccer players who are within the club but not within the age limits (<15 years) specified in the competition status determined by Turkish Football Federation were not taken into consideration. The study was approved by Tekirdağ Namık Kemal University Scientific Research and Publication Ethics Committee with the decision number T2020-448.

Procedure

Birth dates of the players in Turkish Football Federation Women's 1st League were gathered from the official website of Turkish Football Federation (www.tff.org) and the birth dates of the players were recorded separately for each season. In order to examine the relative age effect, birth quarters (Q) were formed in quarterly periods for 4 quarters (Q1: January, February, March, Q2: April, May, June, Q3: July, August, September, Q4: October, November, December). The quarters of the team players in the league were determined separately for each season. In order to determine the relative age effect on the success, each season data was recorded according to the league's ending order of that season.

Statistical Analyses

The results are presented in terms of frequency and percentage to summarize the data. To test the extent of the relative age effect in each season, a chi-square test was used to assess the observed and expected birth distribution across the sample of players and league ranking (Delorme & Champely, 2015). Chi-square values were followed up by calculating Odds Ratios (OR) and 95% Confidence Intervals (95%CI) for the quartile distributions in order to examine quartile differences. The ORs compared the birth-date distribution of a particular quartile (Q1, Q2 or Q3) with the Q4 which is reference group. A higher OR indicates an increased incidence of players who were born in that particular quartile compared to the reference quartile Q4. For birth-quartiles comparations was used Zaiontz (2021) chi-square post-hoc test formulas.

Results

The dataset had been shown being expected, observed and percentage values in table-1 according to seasons and birth-distributions.

Table 1. Players counts in quartiles according to league ranking in each season.

		Q1										*Total*	*Q2*										*Total*	*Q3*										*Total*	*Q4*										*Total*	ALL
	Rank	1	2	3	4	5	6	7	8	9	10		1	2	3	4	5	6	7	8	9	10		1	2	3	4	5	6	7	8	9	10		1	2	3	4	5	6	7	8	9	10		
12-13	f	21	8	16	6	12	8	4	11	11	8	105	13	9	7	6	8	13	11	13	9	5	94	9	9	5	5	9	8	11	10	9	5	80	6	10	5	5	5	6	5	5	5	5	55	334
	%	43	22	49	27	35	23	13	28	32	35	31	27	25	21	27	24	37	36	33	27	22	28	18	25	15	23	27	23	36	26	27	22	24	12	28	15	23	15	17	16	13	15	22	17	100
	Exp.	15	11	10	7	11	11	10	12	11	7		14	10	9	6	10	10	9	11	10	6		12	9	8	2	8	8	7	9	8	6		8	6	6	4	6	6	5	7	6	4		
13-14	f	27	5	8	17	7	12	7				83	13	14	12	3	9	11	9				73	14	6	9	7	11	7	10				64	10	13	6	6	7	6	4				52	272
	%	42	13	23	52	17	35	26				31	20	37	34	9	39	27	22				26	22	16	26	21	27	21	37				24	16	34	17	18	17	18	15				19	100
	Exp.	20	12	11	10	13	10	8					17	10	9	9	16	9	6					15	9	8	8	10	8	6					12	7	7	6	8	7	5					
14-15	f	21	4	12	9	14	15	13	16	14		118	11	10	7	12	4	10	4	18	9		85	6	6	8	15	10	19	6	17	15		102	5	6	3	10	5	6	7	18	15		118	423
	%	49	15	40	20	42	30	43	23	26		31	26	38	23	26	12	20	13	26	17		22	14	23	27	33	30	38	20	25	28		27	12	23	10	22	15	12	23	26	28		20	100
	Exp.	13	8	9	14	10	16	9	21	16			10	6	7	10	7	11	7	15	12			12	7	8	12	9	13	8	19	14			8	5	6	9	7	10	6	14	10			
15-16	f	20	4	15	19	9	11	9	13	35	8	143	5	10	10	12	10	3	10	16	30	2	106	16	5	10	11	11	9	13	11	25	7	111	5	9	10	13	5	4	18	8	31	3	118	478
	%	43	14	33	35	26	41	18	27	29	40	30	11	36	22	22	29	11	20	33	25	10	23	35	18	22	20	31	33	26	23	21	35	25	11	32	22	24	14	15	36	17	26	15	22	100
	Exp.	14	8	14	17	11	8	15	14	36	6		10	6	10	13	8	6	11	11	28	5		11	7	11	14	9	7	12	12	30	5		10	6	10	12	8	6	11	11	27	4		
16-17	f	25	13	12	17	15	10	11	19	16		138	9	15	11	9	9	6	10	12	10		91	14	16	8	2	14	8	14	16	15		107	7	6	12	6	6	6	7	6	14		70	406
	%	45	26	28	50	34	33	26	36	29		34	16	30	26	26	20	20	24	23	18		22	25	32	19	6	32	27	33	30	27		26	13	12	28	18	14	20	17	11	25		17	100
	Exp.	19	17	15	12	15	10	14	18	19			12	11	10	8	10	7	9	12	12			14	13	11	9	12	8	11	14	14			9	9	7	6	8	5	7	9	9			
17-18	f	13	17	14	15	11	17	12	8	18	12	125	11	12	9	6	10	10	7	7	8	9	80	5	12	5	7	13	17	5	14	6	10	84	10	7	11	6	6	22	4	1	7	6	74	363
	%	33	35	36	44	28	26	43	27	46	32	34	28	25	23	18	25	15	25	23	21	24	22	13	25	13	21	33	26	18	47	15	27	24	26	15	28	18	15	33	14	3	18	16	20	100
	Exp.	13	16	13	12	14	23	10	10	13	13		9	11	9	8	9	15	6	7	9	8		9	11	9	8	9	16	7	7	9	9		8	10	8	7	8	13	6	6	8	7		
18-19	f	12	16	19	10	17	19	11	8	17	9	129	13	21	7	19	8	6	5	12	10	5	101	11	9	8	6	9	11	13	13	11	3	91	6	12	8	14	4	3	3	4	16	7	70	391
	%	29	28	45	20	45	49	34	22	31	38	33	31	36	17	39	21	15	16	32	19	21	26	26	16	19	12	24	28	41	35	20	13	23	14	21	19	29	11	8	9	11	30	29	19	100
	Exp.	14	19	14	16	13	13	11	12	18	8		11	15	11	13	10	10	8	9	14	6		10	13	10	11	9	9	7	8	12	5		8	11	8	9	7	7	6	7	10	4		

f: Frequency – Observed values, Exp.: Expected values, %: Ratio according to observed values

When results was evaluated separately, we found statistically significant differences according to ranking in related season. In 2012-2013 season, we found statistically significant differences among birth quartiles in teams which finish season being 1st and 3rd place (respectively: X^2 =10.347, 0.27<OR<1.90, p<0.01, X^2=10.03, 0.14<OR<7.31, p<0.05). And in the 1st place team, it was determinated that Q1 was significant different from other guarters and Q2 was significantly different from Q4 (p<0.01). In 3rd place team's quarters, we determinated that Q1 was statistically significant differences from other quarters (p<0.01). In 2013-2014 season, it was found statistically significant differences in the 1st and 4th teams' birth-quarters. Q1 is statistically differences from the other quarters and Q2 is statistically differences from Q4 in both teams (respectively: X^2 =10.625, 0.31<OR<4.68, p<0.01, X^2=13.424, 0.06<OR<6.93, p<0.05). In 2014-2015 season, Q1 of 1st place team was statistically significant differences form other quarters and Q2 is statistically differences from Q4 and Q1, Q2 and Q3 in the 5th team are statistically different from Q4 (respectively: X^2 =14.953, 0.20<OR<9.80, p<0.05, X^2=7.848, 0.13<OR<7.34, p<0.05). In 2015-2016 season, we found statistically significant differences among only 1st place team birth quartiles and we were determinated that Q1 was different from other quarters and Q3 was different from Q4 (X^2 =15.391, 0.22<OR<10.66, p<0.05). In 2016-2017 season, we determinated statistically significant differences among 1st and 4th place team's birth-quartiles. While 1st place team's Q1 was different from other quarters and 1st place team's Q3 was different from Q4, 4th place team's Q1 was different from other quarters (respectively: X^2 =14.164, 0.27<OR<5.70, p<0.05, X^2=14.235, 0.03<OR<5.61, p<0.05). As different from the other seasons in 2017-2018 season, we found statistically significant differences among 8th and 9th place team's birth quarters. 8th place team's Q4 was different from the other quarters and 9th place team's Q1 was different from the other quarters (respectively: X^2 =11.333, 0.19<OR<119.1, p<0.05, X^2=9.513, 0.43<OR<5.20, p<0.05). In last season, we found statistically differences among 3rd, 5th, 6th and 7th places team's quarters. 3rd place team's Q1 was differ from the other quarters (X^2=9.238, 0.13<OR<3.20, p<0.05,), 5th and 6th place team's Q1 were differences from the other quarters, 5th and 6th place team's Q3 were differ from Q4 (respectively: X^2=9.368, 0.57<OR<9.86, p<0.05, X^2 =15.051, 0.27<OR<16.15, p<0.05). And finally, we found statistically significant differences Q1 from Q2 and Q3 from Q4 in 7th places team's quarters.

Table 2. Chi-Square and OR comparison [%95 CI] results according to league ranking.

	2012-2013 Season				2013-2014 Season				2014-2015 Season				2015-2016 Season			
	X^2	Q1vsQ4	Q2vsQ4	Q3vsQ4	X^2	Q1vsQ4	Q2vsQ4	Q3vsQ4	X^2	Q1vsQ4	Q2vsQ4	Q3vsQ4	X^2	Q1vsQ4	Q2vsQ4	Q3vsQ4
1	10.38*	1.9**#&** (0.55-6.56)	1.31$ (0.36-4.80)	1.06 (0.27-4.17)	10.63*	1.69**#&** (0.61-4.68)	0.93* (0.31-2.79)	1.13 (0.38-3.44)	14.95*	2.67**#&** (0.73-9.80)	1.94$ (0.48-7.90)	0.88 (0.20-3.88)	15.39*	2.96**#&** (0.83-10.55)	0.98* (0.22-4.44)	2.87 (0.77-10.66)
2	0.222	0.43 (0.11-1.68)	0.55 (0.14-2.10)	0.64 (0.16-2.53)	6.84	0.24 (0.06-0.96)	0.77 (0.23-2.58)	0.38 (0.09-1.49)	2.92	0.42 (0.08-2.28)	1.47 (0.31-7.00)	0.74 (0.15-3.66)	3.71	0.33 (0.07-1.58)	1.09 (0.26-4.53)	0.5 (0.11-2.32)
3	10.03*	1.73**#&** (0.41-7.31)	0.84 (0.18-4.02)	0.71 (0.14-3.70)	2.14	0.84 (0.20-3.50)	1.42 (0.35-5.74)	1.22 (0.29-5.21)	5.47	2.54 (0.50-13.00)	2.06 (0.36-11.81)	1.96 (0.36-10.72)	1.67	1.11 (0.35-3.49)	0.98 (0.29-3.38)	0.9 (0.26-3.05)
4	0.182	0.65 (0.11-3.68)	0.73 (0.13-4.19)	0.71 (0.12-4.38)	13.42*	1.78**#&** (0.45-6.93)	0.36 (0.06-1.99)	0.95 (0.21-4.31)	1.83	0.57 (0.17-1.95)	1.06**#&** (0.31-3.60)	1.1 (0.34-3.56)	2.82	1.08 (0.39-3.01)	0.91 (0.30-2.75)	0.76 (0.25-2.31)
5	2.94	1.3 (0.30-5.58)	0.97 (0.21-4.45)	1.28 (0.28-5.91)	5.34	0.63 (0.16-2.48)	1.63 (0.45-5.83)	1.28 (0.34-4.86)	7.84*	1.78 (0.43-7.34)	0.71 (0.13-3.81)	1.47 (0.34-6.43)	2.37	1.33 (0.32-5.89)	1.96 (0.46-8.44)	1.98 (0.40-8.27)
6	3.06	0.72 (0.17-3.10)	1.31 (0.32-5.36)	0.95 (0.22-4.23)	2.47	1.25 (0.31-5.01)	1.07 (0.25-4.52)	0.95 (0.21-4.26)	7.76	1.59 (0.46-5.48)	1.47 (0.39-5.54)	2.33 (0.68-7.98)	6.63	2.04 (0.12-1.13)	0.74 (0.11-4.78)	2.02 (0.40-10.13)
7	5.52	0.43 (0.08-2.35)	1.33 (0.29-6.06)	1.57 (0.34-7.30)	2.78	1.1 (0.21-5.70)	1.07 (0.20-5.82)	2.03 (0.39-0.79)	6.00	1.18 (0.30-4.69)	0.5 (0.10-2.63)	0.63 (0.14-2.88)	3.92	0.37 (0.12-1.13)	0.55 (0.18-1.69)	0.65 (0.22-1.91)
8	3.56	1.19 (0.29-4.94)	1.58 (0.38-6.48)	1.43 (0.33-6.17)					0.16	0.56 (0.22-1.47)	0.88 (0.33-2.35)	0.69 (0.26-1.82)	2.83	1.2 (0.37-3.93)	1.96 (0.59-6.49)	1.23 (0.36-4.22)
9	2.34	1.19 (0.28-5.17)	1.09 (0.24-4.92)	1.28 (0.28-5.91)					1.87	0.59 (0.20-1.72)	0.53 (0.16-1.71)	0.74 (0.25-2.15)	1.68	0.84 (0.42-1.67)	0.95 (0.46-1.97)	0.72 (0.35-1.52)
10	1.17	0.87 (0.16-4.58)	0.61 (0.10-3.55)	0.71 (0.12-4.29)									5.2	1.98 (0.3212.02)	0.65 (0.07-0.43)	2.1 (0.33-13.48)

	2016-2017 Season				2017-2018 Season				2018-2019 Season			
	X^2	Q1vsQ4	Q2vsQ4	Q3vsQ4	X^2	Q1vsQ4	Q2vsQ4	Q3vsQ4	X^2	Q1vsQ4	Q2vsQ4	Q3vsQ4
1	14.16*	1.81**#&** (0.58-5.70)	0.99 (0.27-3.63)	1.31 (0.39-4.44)	3.56	0.76 (0.23-2.54)	0.99 (0.27-3.60)	0.43 (0.10-1.79)	2.76	1.12 (0.30-4.15)	1.57* (0.41-5.99)	1.50 (0.38-5.93)
2	4.88	1.1 (0.31-3.91)	1.92 (0.53-7.04)	1.74 (0.49-6.22)	4.17	1.42 (0.43-4.65)	1.54 (0.43-5.52)	1.16 (0.41-5.19)	5.89	0.74 (0.26-2.14)	1.27 (0.44-3.66)	0.61 (0.19-2.00)
3	1.00	0.51 (0.15-1.31)	0.71 (0.20-2.48)	0.44 (0.12-1.58)	4.39	0.74 (0.23-2.43)	0.74 (0.20-2.72)	0.39 0.09-1.61)	9.24*	1.33 (0.13-1.26)	0.63 (0.16-2.50)	0.82 (0.21-3.20)
4	14.24*	1.44**#&** (0.37-5.61)	1.15 (0.26-5.13)	0.22 (0.03-1.47)	6.71	1.46 (0.38-5.57)	0.9 (0.19-4.14)	0.99 (0.22-4.43)	7.57	0.4 (0.13-1.26)	0.99 (0.33-2.96)	0.35 (0.10-1.28)
5	4.91	1.27 (0.35-4.60)	1.15 (0.28-4.68)	1.53 (0.41-5.74)	2.60	1.07 (0.29-4.02)	1.5 (0.37-6.02)	1.84 (0.48-7.12)	9.37*	2.37 (0.57-9.86)	1.45 (0.31-6.80)	1.84 (0.39-8.62)
6	1.47	0.85 (0.20-3.66)	0.77 (0.15-3.85)	0.87 (0.19-4.04)	4.24	0.45 (0.18-1.14)	0.41 (0.14-1.17)	0.65 (0.25-1.73)	15.05*	3.53**#&** (0.77-16.15)	1.45 (0.27-7.83)	3.0 (0.60-15.04)
7	2.38	0.8 (0.22-2.93)	1.1 (0.28-4.32)	1.31 (0.36-4.82)	5.43	1.76* (0.38-8.16)	1.57* (0.29-8.41)	1.06* 0.19-6.01)	8.50*	2.05 (0.40-10.38)	1.21 (0.20-7.17)	3.55 (0.68-18.65)
8	7.15	1.61 (0.48-5.41)	1.54 (0.42-5.68)	1.74 (0.50-6.12)	11.33*	4.67 (0.46-47.06)	6.29 (0.59-67.15	11.91 (1.19-119.1)	5.49	1.12 (0.24-5.10)	2.18 (0.49-9.76)	2.66 (0.59-12.03)
9	1.51	0.58 (0.20-1.67)	0.55 (0.17-1.78)	0.7 (0.23-2.10)	9.51*	1.5**#&** (0.43-5.20)	1.03 (0.25-4.17)	0.73 (0.17-0.97)	2.74	0.59 (0.21-1.66)	0.45 (0.15-1.41)	0.56 (0.18-1.75)
10					2.02	1.17 (0.31-4.44)	1.35 (0.32-5.65)	1.42 (0.35-5.80)	3.33	0.72 (0.16-3.29)	0.52 (0.10-2.77)	0.35 (0.06-2.22)

*It is different from Q4

#It is different from Q3

&It is different from Q2

*signifficant differences for X^2 p<0.05

Table 3. Chi Square and OR analysis according to total players birth-distribution of each season.

	Rank of League		Quarters of Birth						OR Comparisons [%95 CI]			
			Q1	Q2	Q3	Q4	Total	X^2	Q1vsQ4	Q2vsQ4	Q3vsQ4	Pairwise Comparisions
All Seassons	*12/13*	*f*	105.0	94.0	80.0	57.0	336	15.309*	1.10 (0.71-1.73)	1.32 (0.83-2.10)	1.10 (0.69-1.76)	Q1>Q2,Q3,Q4 Q2>Q3,Q4 Q3>Q4
		%	31.3	28.0	23.8	17.0	100					
		Exp.	107.9	80.9	82.5	64.7	336					
	13/14	*f*	83.0	73.0	64.0	52.0	272	7.676	0.96 (0.59-1.56)	1.13 (0.67-1.87)	0.97 (0.58-1.62)	
		%	30.5	26.8	23.5	19.1	100					
		Exp.	87.4	65.5	66.8	52.4	272					
	14/15	*f*	118.0	85.0	102.0	75.0	380	11.347*	0.94 (0.63-1.42)	0.91 (0.59-1.40)	1.07 (0.70-1.64)	Q1>Q2,Q3,Q4 Q2> Q4 Q3>Q2,Q4
		%	31.1	22.4	26.8	19.7	100					
		Exp.	122.0	91.5	93.3	73.2	380					
	15/16	*f*	143.0	108.0	118.0	106.0	475	7.299	0.81 (0.56-1.16)	0.82 (0.56-1.20)	0.87 (0.60-1.28)	
		%	30.1	22.7	24.8	22.3	100					
		Exp.	152.6	114.3	116.6	91.5	475					
	16/17	*f*	138.0	91.0	107.0	70.0	406	24.285*	1.18 (0.57-0.79)	1.04 (0.68-1.60)	1.20 (0.79-1.83)	Q1>Q2,Q3,Q4 Q2>Q4 Q3>Q2,Q4
		%	34.0	22.4	26.4	17.2	100					
		Exp.	130.4	97.7	99.7	78.2	406					
	17/18	*f*	137.0	89.0	94.0	80.0	400	19.26*	1.03 (0.69-1.52)	0.89 (0.58-1.36)	0.92 (0.60-1.41)	Q1>Q2,Q3,Q4 Q2> Q4 Q3>Q2,Q4
		%	34.3	22.3	23.5	20.0	100					
		Exp.	128.5	96.3	98.2	77.0	400					
	18/19	*f*	138.0	106.0	94.0	77.0	415	19.168*	1.07 (0.72-1.59)	1.10 (0.73-1.67)	0.96 (0.63-1.46)	Q1>Q2,Q3,Q4 Q2>Q3,Q4 Q3>Q4
		%	33.3	25.5	22.7	18.6	100					
		Exp.	133.3	99.9	101.9	79.9	415					
	Total	*f*	862.0	646.0	659.0	517.0	2684	90.858*	-	-	-	Q1>Q2,Q3,Q4 Q2>Q3,Q4 Q3>Q4
		%	32.1	24.1	24.6	19.3	100					

Analysis of the total number of players in all seasons was shown in Table 3. When the quarters in the total number of players were evaluated, it had been determined that there was a statistically significant difference between the birth quarters in the 2012-2013, 2014-2015, 2016-2017, 2017-2018, 2018-2019 seasons (respectively: X2(3) =15.309, 11.347, 24,285, 19.260, 19.168, p<0.05).

Discussion

The aim of this study was to examine effect of relative age in Turkey Women First Football League from 2012-2013 season to 2018-2019 season. In the present study we determined that there is the relative age effect according to total number of players in five season which include 2012-2013, 2014-2015, 2016-2017, 2017-2018 and 2018-2019 seasons. And when we evaluated according to league rank for each season, we found the relative age effect among team's players. We determine that there is a difference among birth-quartiles of teams which finish league as champion except last 2 seasons. However, this result, there was other teams which differ rank place or not champion. Accordingly, whereas we can say that there is effect of relative age in Turkish Women First Football League players, we cannot say that this effect on success. Until 2017-2018 and 2018-2019 seasons, champion teams had relative age effect.

While it is stated that the relative age effect is widespread in young teams in male soccer players, this effect decreases in adult categories. On the contrary, in the limited number of studies on female soccer players, it is stated that the relative age effect continues (Delorme et al., 2010b; Romann & Fuchslocher, 2013; Vincent & Glamser, 2006). It is very difficult to make a definite judgment based on the limited number of studies showing the effect of relative age effect on female soccer players. In line with this thinking, this research is done with an idea that, it would contribute to the literature to examine the relative age effect on women's soccer in Turkey. And this study results supports studies results which is related female soccer literature. There was relative age effect in Turkish adult female soccer players.

Studies show that the relative age effect is seen in younger age categories and the relative age effect decreases as the age gets older (Brustio et al., 2018; González et al., 2015; Sierra et al., 2017). Delorme et al. (2010b) reported that there was a relative age effect from the young age category to the adult category in their study in which they examined the relative age effect in female soccer players. On the contrary, Delorme et al. (2010b) reported that there is a significant difference between the birth quarters of adult elite female athletes in team sports in France and the relative age effect is not in adult women's sports. Likewise, it stated that there is not difference between the birth quarters of the players in the team sports in Israel 1st League, so there is not relative age effect.

When the number of players in birth quarters in all seasons are analyzed, it was found that there is a significant difference between quarters. However, especially in 5 years, it has been determined that there is a significant difference between the birth quarters of the players. While the relative age effect was observed to be between the players born in the first quarter of the year and other quarters, Delorme et al. (2010b) stated in their study that the 2nd and 3rd quartiles were at a higher frequency than the 1st and 4th quarters, and this was statistically significant. In this study, when the total of the players in the birth quarters in all seasons was evaluated, it was found that there was a significant difference between the 1st quarter and 2nd, 3rd and 4th quarters, unlike Delorme et al. (2010b). Similarly, study of Götze and Hoppe (2021) which examine relative age effect in German soccer players stated that there is relative

age effect among German female soccer players according to total number of players. Their results have supported our studies results.

In another study examining the U17 Women's World Championship, it is stated that geographical differences may affect the relative age effect (Romann & Fuchslocher, 2013). The differences in this study together with Turkey's geographic and demographic structure and the teams participating from different regions of the country may support Romann and Fuchslocher's (2013) study. However, Romann and Fuchslocher's (2013) study can be explained by the fact that different countries are national team players and there are genetic differences specific to countries. Our study's results are similar to Roman and Fuchslocher (2013) study's results and this smilarity may arise from etnical and geographical structure of Turkey. Because Turkey have big land which is totally 784.000 km^2 area and a lot of ethnic groups.

In addition to all these, Vincent and Glamser (2006) state that the relative age effect is less in female athletes than in men. However, different from the research findings of Vincent and Glamser (2006), Delorme et al. (2010b) found that there is a relative age effect on adult female soccer players. This study reveals that the relative age effect also exists in adult women's soccer, even if not in all seasons. It can be explained by the fact that all players playing in the league in both studies were recruited and the number of participants was high. However, it is very difficult to make a definite judgment about this due to the limited number of studies on adult female soccer players in the literature and contradictory findings (Delorme et al., 2010b; Roman & Fushslocher, 2013; Vincent & Glamser, 2006).

There are limited resources in the literature examining to contribute of relative age effect on success (Augste & Lames, 2011; Helsen et al., 2005; Tunçel et al., 2018; Yagüe et al., 2018). In the studies conducted with male soccer players, studies are conducted especially on young people. Tunçel et al. (2018) reported that the relative age effect is effective in success in the last 4 teams in Turkish Football Federation Academy League U14 men's teams. In another study, Augste and Lames (2011) stated that the relative age effect is effective on success in German U17 men's teams, and the selection of premature players has a positive effect on success. Helsen et al. (2005) reported that the relative age effect is effective in success in U18, U17, U16 and U15 teams in the European continent. In the study in which the first, middle and last 4 team players in the ranking of the top 10 leagues of Europe were examined, a significant difference was found between the birth quarters of male soccer players, it was stated that the number of players in the 1st and 2nd quarters was higher than the number of players in the other quarter (Yagüe et al., 2018). In this study, there was statistically significant differences among team's birth-quarters distribution according to league rank. But only in two seasons, it was not found in first team's birth-quarter distributions. These findings make it difficult to say that there is an obvious difference in league rankings.

Consequently, in this study, it was determined that there is the relative age effect was effective in Turkish Football Federation Womens First Football League. All the same time, even though there are statistically significant differences according to in league ranking among birth quarters distributions, it is very difficult

to report that the relative age was an effect on success. Because there were statistically significant differences among birth quarters different teams which place differ ranking end of the season. Unfortunately, there is not a study in literature which examine relationship between relative age effect in female players and success. This deficiency in the literature makes it difficult to discuss the findings of this study. However, this study will contribute to future studies in terms of evaluating the contribution of relative age effect to success in adult female football players.

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