Monten. J. Sports Sci. Med. 5 (2016) 1: 11–15
Original scientific paper
UDC 796.093.432(481)-053.6

Presence of the relative age effect and its effect on playing time among under-20 players in the Norwegian premier league Tippeligaen – a four-year follow up

Stig Arve Sæther
Norwegian University of Science and Technology, Department of Sociology and Political science, Dragvoll, Trondheim, Norway

A B S T R A C T

European top-level soccer clubs are continually looking for talented players. Few clubs, however, are willing to let youth players play at the highest senior level. Perhaps as a consequence, the search for talented players has resulted in an imbalance in the characteristics of these players, towards an overrepresentation of players born early in the selection year, an effect called the relative age effect (RAE). The RAE has been documented to be present among senior top-level players. Even so, few studies have investigated the effect among youth players at the senior level. The aim of this study is to examine RAE among U17-U20 players in the Norwegian premier league Tippeligaen in the 2009-2012 seasons. Participants were 315 male players born in 1990-1996. The results showed that 68% of the players were born in the two first quartiles of the year. The effect was even increasing in the four-year period. As we could expect based on the literature, the oldest players are given more playing time. However, the connection between playing time and RAE was inconsistent. Norwegian top-level soccer seems to be affected by the RAE when selecting their players. These players are not however guaranteed playing time because of the RAE.

Key words: *Youth, relative age effect, soccer.*

Introduction

European top-level soccer clubs are continually looking for the most talented players. In the global soccer marked talented players are identified in a constant younger age, and given contracts in the big European leagues (Roderick, 2006). Giving playing time to youth players at the top-level have however often been considered as a risk, mainly because of the assumption of unstable performance as a consequence of young players inexperience. Preliminary results from one season in the Norwegian premier league *Tippeligaen*, show that there is a negative connection between a clubs seasonal table position and giving playing time to players under 20 years, even if the results are incoherent (Sæther, 2010). Even so, many top-level clubs are dependent of providing playing time both to be able to hold on to them, but also give them the opportunity to get the experience expected from a stable performer.

Playing opportunities for young players is there for essential both in a player and club perspective. A large number of talent development models have focused on how a player's development depend on environment factors (Bloom, 1985; Cote & Fraser-Thomas, 2008; Gagne, 2000), especially a qualified coach in the start of youth soccer, called the investment years (Ashworth & Heyndels, 2007, Cote et al., 2008). By representing the top-level clubs these players get an advantage in terms of a high performance environment (Simmons & Paull, 2001) and are expected to get an motivational boost and advantage ahead of the non-selected players in the same age cohort (Harter, 1978), and are thereby more likely to continue invest more time and effort in their sport with predictable results (Wilson, 1999). The players are thereby faced with a dilemma, while results on the one hand show that a young player's opportunity to be selected to an age-specific national team increases if you represent a top-level club (Haulan & Sæther, 2011), while the playing time decreases by choosing a club on the highest level (Poli, Besson & Ravenel, 2013).

Perhaps as a consequence of the clubs dilemma, the search for the most talented players has resulted in an imbalance in the characteristics of these players, towards an overrepresentation of players born early in the selection year (Helsen, van Winckel & Williams, 2005). This effect has been named the relative age effect (RAE) and has been overwhelmingly documented to be present on senior top-level soccer. In fact, the impact of this effect has been prominent in England (Dudink, 1994), Australia, Brazil, Germany and Japan (Musch & Hay, 1999), Sweden (Peterson, 2004), Norway (Wiium, Lie, Ommundsen & Enksen, 2010) and Spain (Jimenez & Pain, 2008). In Norway the effect has been clearly present among the players in the Norwegian premier league *Tippeligaen*, were 60 percent of the squad players were born in the first two quartiles of the year (Wiium et. al., 2010). The effect has been documented as even stronger among youth players, and especially among youth national team players (Brewer, Balsom & Davis, 1995, Helsen et. al., 2005, Williams, 2010, Sæther, 2015), but also among youth academy and youth professional players (Carling, le Gall, Reilly & Williams, 2009, Diaz Del Campo, Vicedo, Villora & Jordan, 2010, Glamser & Vincent,2004, Jimenez & Pain, 2008).

The spread of RAE can therefore be considered an essential and influential factor in the talent identification process (Williams and Reilly, 2000). This effect has been shown to be present over time among German senior top-level soccer (Cobley et. al., 2008), and the effect was documented to affect playing time between both Belgian semi-professional and amateur senior players (Vaeyens, Philippaerts & Malina, 2005). Even so, few

Received for publication October 11, 2015

have investigated the effect among youth players in top-level soccer, and in which degree the effect affects playing time over time. This article focuses on the spread of the RAE among U20 players, in a four year period in the Norwegian premier league *Tippeligaen* and in which degree this effect is connected to the amount of playing time.

Methods

Sample and Data collection

The present study is based on data collected from a website (www.altomfotball.no). Birth dates were acquired from male soccer players born between 1990-1996 given playing time (1 minute or more) selected for one or more match on a premier league team in the period 2009-2012. The players was categorised after age categories described as U17-U20 players, were U17 players turned 16 during the season; the U18 players turned 17 and so forth.

Procedure and Data Analyses

The players' birth of month was categorised into quarters reflecting the Norwegian soccer year. The first quarter includes January, February, and March, and the fourth quarter includes October, November, and December. The results are presented with basic descriptive statistics such as frequency counts and percentages. To be able to compare in which degree RAE effects playing time, the players was categories into quartiles, were quartile 1 was the 25 percent of players given the least playing time, quartile 2 was the middle 50 percent of players given "medium" playing time and quartile 3 was the 25 percent given the most playing time. Chi-square tests were performed to compare differences between the observed and expected birth rate distribution across the four quarters of the Norwegian soccer year. The significance level of .05 was selected to determine statistical significance. A second analysis examined all the selected players in the period, divided into age categories from U17 to U20, both in terms of birth month and playing time. Thirdly, by focusing on one age cohort of players born in 1993, I follow the RAE effect from U17-U20, indicating in which degree the effect changes in the same age-cohort in the four-year period.

Results

The results show that RAE is present among the total sample of squad players were 68 % of the players were born in the first two quartiles of the year, ranging from 57 to 77 % in the period from 2009 to 2012 (Table 1). This tendency is also increasing from 2009 to 2011 (Table 2). Another finding is that there is a reduction in the percentage of players born in the last quartile of the year in the whole period from 20 % in 2009 to 5 % in 2012 among the players who are given playing time. The number of players selected to the top-level clubs squads was increasing in the period from 72 to 135 players, while the number of players who got playing time was more stable in the same period ranging from 45 to 66 players. This RAE effect was even stronger among the players who got playing time in four seasons, compared with all the players in the clubs squads (Table 4).

Table 1. Birth distribution among U17 toU20 players in the period from 2009-2012, total sample.

Quarter 1	Quarter 2	Quarter 3	Quarter 4	Sample size
40	28	22,5	9,5	315

Table 2. Birth distribution among U17 to U20 players in the period from 2009-2012, according to year.

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Sample size
2009	37,5	22	25	15,5	72
2010	31	36,5	23	9,5	74
2011	50,5	27	17,5	5	97
2012	42	28	24	5	135

Table 3. Playing time distribution among U17 to U20 players in the period from 2009-2012, according to year.

	U20	U19	U18	U17	Sample size
2009	20461	4596	680	3	72
2010	13867	4846	497	83	74
2011	22398	13702	2100	345	97
2012	26908	5326	2061	68	135

When comparing the different age groups, there is a clear tendency that the percentage of players born early in the selection year, are highest among the youngest players, even if these results are somewhat inconsistent (Table 5). Among the youngest players (U17 & U18), no player born in the last quartile was given playing time in the period. Furthermore, with few exceptions there was also a tendency that a larger percentage of the players were born in the first two quartiles of the year, with the exception of the U17 players, were there was a reduction in the period.

The results show a natural increase in the number of playing minutes as the players go from 16-19 years (Table 3). With the exception of 2010 the U20 players get an increasing amount of playing minutes in the four-year period. The same seems to be the case among the U19 players even if the exception for this age cohort is the 2011 season. The U18 and U17 players have more inconclusive results during the period, while the U17 players are given extremely little playing time, as expected. Even so, the U20 and U18 players were given more playing

opportunities the last two years. By tracking the age-cohort of players born in 1993 from U17 in 2009 to U20 in 2012, there was a strong RAE ranging from 66 to 100 % in the period (Table 5).

Table 4. Birth distribution among U17 to U20 players in the period from 2009-2012, for players with playing time, according to year.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Sample size
2009	36,5	20,5	22,5	20,5	49
2010	26,5	40	24,5	9	45
2011	50	26	16,5	7,5	66
2012	40,5	33,5	21	5	57

Table 5. Birth distribution among U17 to U20 players in the period from 2009-2012, for players with playing time, according to year.

	U20				U19				U18				U17				Sample
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	size
2009	37	18,5	18,5	25,9	28,5	21,5	28,5	21,5	57	14,5	28,5	0	0	100	0	0	49
2010	13	43,5	26	17,5	37,5	37,5	25	0	66,5	0	33,5	0	33,5	66,5	0	0	45
2011	48,5	24	18,5	9	52	26	13	9	57	28,5	14,5	0	33,5	33,5	33	0	66
2012	40,5	34,5	15,5	9,5	26,5	40	33,5	0	66,5	22,5	11	0	0	0	100	0	57

Combining the RAE and playing time the results indicated a clear connection between a birth month within the first two quartiles of the year and the highest amount of playing time. When dividing the age cohorts according to birth quartile and amount of playing time from the 25 % of the players with the least, the 25 % with the most playing time and the 50 % in the middle, the results was inconclusive (Table 6). The chi-square test between these groups did not show any significant results between the players who were given the most playing time and those who were given the least, within each age-cohort within each year in the period. Even so, there was almost a significant difference between the players among the U19 players in 2011 and the U18 players in 2012.

Table 6. Playing time distribution according to quartiles among U17 to U20 players in the period from 2009-2012, according to year.

		U20				U19				U18				U17			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	25	50	20	0	28,5	0	33,5	0	0	25	0	50	0	0	100	0	0
2009	50	20	40	40	28,5	100	33,5	100	100	75	100	50	0	0	0	0	0
	25	30	40	60	43	0	33,5	0	0	0	0	0	0	0	0	0	0
		x^2	4,466	p	,614	x^2	8,556	p	,200	x^2	,875	p	,646				
		U20				U19				U18				U17			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	25	0	20	16,5	50	16,5	33,5	0	0	50	0	100	0	0	50	0	0
2010	50	33,5	60	33,5	25	83,5	50	75	0	0	0	0	0	100	50	0	0
	25	66,5	20	50	25	0	16,5	25	0	50	0	0	0	0	0	0	0
		x^2	5,379	p	,497	x^2	3,239	p	,510	x^2	,750	p	,386				
		U20				U19				U18				U17			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	25	19	12,5	33,5	0	33,5	0	0	100	25	50	0	28,5	100	100	0	66,5
2011	50	56	50	16,5	100	33,5	83,5	66,5	0	75	50	100	71,5	0	0	100	33,5
	25	25	37,5	50	0	33	16,5	33,5	0	0	0	0	0	0	0	0	0
		x^2	6,267	p	,394	x^2	11,093	p	,086	x^2	,875	p	,646				
		U20				U19				U18				U17			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
	25	7,5	27,5	40	33,5	25	16,5	60	0	66,5	50	0	55,5	0	0	0	0
2012	50	38,5	54,5	40	33,5	75	83,5	40	0	33,5	50	0	33,5	0	0	100	0
	25	53,5	18	20	33	0	0	0	0	0	0	100	11	0	0	0	0
		x^2	5,314	p	,504	x^2	2,475	p	,290	x^2	9,200	p	,056				

Discussion

The RAE has been proven to have major impact on the selection on the most talented players in European top-level soccer. Consistent with findings of previous studies from European soccer (Jimenez & Pain, 2008; Diaz Del Campo et. al., 2010; Carling et. al., 2009), players born during the first two quartiles of the year appeared to be overrepresented among U17 to U20 players who were given playing time in the Norwegian premier league Tippeligaen. This bias was evident in the total sample in all four seasons, since between 57 and 77 percent of the players were born in the first two quartiles of the year in all these seasons, confirming earlier studies. According to age the number of players born in the two first quartiles of the year varied between 55-75% among the U20, 50-78% among the U19, 66-89% among the U18 and 0-100% among the U17 players. With few exceptions the percentage of players born in the two first quartiles was increasing among the U20, U19 and U18 players in the four-year period. These findings could be described as confirming other studies of both elite and lower level youth soccer, even though there are few studies on the relative age effect among youth players in top-level clubs. All the studies of Jimenez and Pain (2008), Diaz Del Campo and colleagues (2010) and Carling and colleagues (2009) found similar results among Spanish and French youth players, even if these studies mainly cover younger players, which make it difficult to explicitly compare the results. The present study also found large differences among the age cohorts, were the RAE bias seemed to be fluctuating among the different age groups.

The most disadvantaged group is the players born in the last quarter of the year, were approximately 10% of the players are born in this quarter in the total sample of this study. The number of players born in this quarter was decreasing during the four seasons from 20% in 2009 to 5% in 2012. Players born in this quarter of the year are overall the most biased group in the talent development process. Even so, a study of English players divided into who found themselves in a professional and a non-professional club, only 6 per cent (ten players) was born in the last three months of the year, but of those players became 70 percent professional players (Carling et. al., 2009). Furthermore, Ashworth and Heyndels (2007) found that players born late after the cut-off date earn systematically more than those born early after the cut-off date. The authors explained the difference because the born late players are a more selective subset than professional players born early after the cut-off date (Roderick, 2006). Thus, players who are born late after the cut-off date and still become professional have actually survived a system that discriminates against them. A second reason for a wage premium to occur for late-born players lies in the fact that they benefit from training and competing with better players.

Even if RAE is well documented in a range of countries and both among youth and senior players, few of these studies have investigated the RAE impact on playing time for the youngest players in the top-level clubs, and furthermore how it is present over time. Earlier studies have highlighted the decreased likelihood of playing time among high-level clubs (Vaeyens et. al., 2005, Poli et. al., 2013), but an increased likelihood of representing age-specific national team representing high level clubs (Haulan & Sæther, 2011). The present study shows a natural increase in the number of playing minutes as the players go from 16 to 19 years. With the exception of 2010 the U20 players get an increasing amount of playing minutes in the four-year period. The same seems to be the case among the U19 players even if the exception for this age cohort is the 2011 season. The U18 and U17 players have more inconclusive results during the period, which could be explained by the low number of players who get playing time among these age cohorts, especially among the U17 players. However, the chi-square test did not show any significant results between the players who were given playing time and those who were not, within each age-cohort within each year in the period. Even so, there was almost a significant difference between the players among the U19 players in 2011 and the U18 players in 2012. One reason for this lack of significance could be that RAE already biases the selected players for Norwegian premier league clubs as a group.

Playing time is an important factor in talent development, both from a club and player perspective. The clubs hypotheses risk (Sæther, 2010) and the players' dilemma of playing opportunities (Roderick, 2006), must be considered as essential. Highlighted by the large number of club changes seen among youth players in top-level soccer, young players are willing to swap club to be able to get this playing time. The opportunity of playing time is expected to give these players a motivational boost and advantage ahead of the non-selected players in the same age cohort (Harter, 1978). Initially the selected players could get the confirmation of their skills as a player and are more likely to continue perfecting their abilities and invest more time and effort in their sport with predictable results (Wilson, 1999). However, since many of the squad players got few or non, playing opportunities as U17-U20 players, it could also be likely that some of these players might become discouraged enough to drop out of sport altogether (Gould et. al., 1996), or compete at a lower performance level. As Vaeyens and collegues (2005) documented among Belgian semi-professional and amateur senior players born in the first quarter of the selected age band, these players received more playing opportunities. For this group of players, the self-fulfilling prophecy can be regarded as an important influence on the playing opportunities in top-level clubs in the four-year period.

Since RAE seems to be an important predictor of playing opportunities, this effect can result in a lowering of the overall quality of the highest competitive teams (Vincent & Glamser, 2006). The English Football Association recognised this problem in the mid-1990s, but still the effect was shown to be present a decade later. Simmons and Paull (2001) suggested that although the differences observed by month of birth could simply be the effect of developmental advantages, they could also reflect training advantages gained from selection for various teams and competition at an earlier age, which was related to their relative maturity at that time. Jimenez and Pain (2008) argue that the current identification and development process, which allows for age bias, results in "wasted potential". Technically gifted, but younger and less mature players drop out or fail to receive advanced training, while older, more mature players fail to develop the technical aspects of their game. Combined, these two factors may diminish the talent pool of talented players for top-level clubs in Norway. This study showed that RAE is stable and present in all four season and even increasing among the oldest age cohorts. It is possible that the long term effect could be different, but a resent study from Sæther (2015) showed that RAE was present among age-specific national team players in a five-year period, even if the players selected for the national teams was changed during the periode.

Conclusion

The results from this study support the conclusion that the relative age effect is as much a major factor in the selection of elite youth male soccer players in Norway as it is in other

countries. This study shows a stable and even increasing RAE over a four-year period, among U17-U20 players representing Norwegian premier league clubs. These results show that the players selected for premier league clubs are systematically selected by their birth of month, on a yearly basis, confirming results from all players in the Norwegian premier league (Wiium et. al., 2010). Few studies have drawn the attention to the long term present of the RAE. Most studies are cross-sectional and look at differences in age within one year. Most talented players are a part of a selection and more important reselection processes were they either get to play matches in their club, or they do not. This reselection is vital in terms of given playing time to be able to further develop and get match experience as a top-level soccer player.

REFERENCES

Ashworth, J. & Heyndels, B. (2007) Selection Bias and Peer Effects in Team Sports. The Effect of Age Grouping on Earnings of German Soccer players. *Journal of Sports Economics*, 8 (4), 355-377.

Besson, R., Poli, R. & Ravenel, L. (2013) *Demographic study 2013*. Retrieved November 20, 2013, from http://www. football-observatory.com/IMG/pdf/DS2013_excerpt-3.pdf

Bloom, B.S. (1985) *Developing talent in young people*. New York:Ballentine books.

Brewer, J., Balsom, P. & Davis, J. (1995) Seasonal birth distribution amongst European soccer players. *Sports Exercise and Injury*, 1, 154-157.

Carling, C., le Gall, F., Reilly, T. & Williams, A.M. (2009) Do anthropometric and fitness characteristics vary according to birth date distribution in elite youth academy soccer players? *Scandinavian Journal of Sports Medicine*, 19, 3-9.

Christensen, M. K., Laursen, D. N. & Sørensen, J. K. (2011) Situated learning in youth elite football: a Danish case study among talented male under- 18 football players. *Physical Education and Sport Pedagogy*, 16, 2, 163-178.

Cobley, S. P., Schorer, J. & Baker, J. (2008) Relative age effects in professional German Soccer: A historical analysis. *Journal of Sports Sciences*, 26 (14), 1531-1538.

Cote, J. & Fraser-Thomas, J. (2008) Play, practice and athlete development. In Farrow, D., Baker, J., & MacMahon, C.I (*Eds*). *Developing sport expertise*. London: Routledge.

Diaz Del Campo, D.G., Vicedo, J.C.P, Villora, S.G. & Jordan, O.R.C. (2010) The relative age effect in youth soccer players from Spain. *Journal of Sports Science and Medicine*, 9, 190-198.

Dudink, A. (1994) Birth date and sporting success, *Nature*, 368, 592

Gagné, F. (2000) Understanding the complex choreography of talent development through DMGT-based analysis, in: K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. Subotnik (Eds). *International handbook for research on giftedness and talent* (2nd) (Oxford, Pergamon Press), 67–79.

Glamser, F. D. & Vincent, J. (2004) The relative age effect among elite American youth soccer players. *Journal of Sport Behaviour*, 27, 31-38.

Gould, D., Udry, E., Tuffey, S. & Loehr, J. (1996) Burnout in Competitive Junior Tennis Players: 1. A Quantitative Psychological Assessment, *The Sport Psychologist*, 10, 322-340.

Haulan, C. & Sæther, S.A. (2011) *Aldersbestemte fotballandslag i Norge. Dette kjennetegner de selekterte spillerne i 2009***.** Retrieved November 01, 2012, from http://idrottsforum.org/articles/saether/haulan_saether/haulan_saether110831.html

Harter, S. (1978) Effectance motivation reconsidered: Toward a development model. *Human Development*, 1, 34-64.

Helsen, W.F, Van Winckel, J.V. & Williams, M. (2005) The relative age effect in youth soccer across Europe. *Journal of Sports Sciences*, 23 (6), 629-636.

Jimenez, I. P. & Pain, M. T. G. (2008) Relative age effect in Spanish association football: Its extent and implications for wasted potential. *Journal of Sports Sciences*, 26 (10), 995-1003.

Musch, J. & Grondin, S. (2001) Unequal competition as an impediment to personal development: A review of the relative age effect in sport. *Developmental Review,* 21, 147-167.

Musch, J. & Hay, R. (1999) The relative age effect in soccer: Cross-cultural evidence for a systematic discrimination against children born late in the competition year. *Sociology of Sports Journal*, 16, 54-64.

Peterson, T. (2004) Selektions- och rangordningslogiker inom svensk ungdomsfotboll. Retrieved November 10, 2010, from http://idrottsforum.org/articles/peterson/peterson.html

Poli, R., Besson, R. & Ravenel, L. (2013) *The demographic polarization of European football*. Retrieved March 25 2013, from http://footballperspectives.org/demographic-polarisation-european-football

Roderick, M. (2006) *The Work of Professional Football. A Labour of Love?* London: Routledge.

Simmons, C. & Paull, G. (2001) Season-of-birth bias in association football. *Journal of Sports Sciences*, 19, 677-686.

Sæther, S. A. (2010) Retrieved June 15, 2011, from http://idrottsforum.org/articles/saether/saether101124.html

Sæther, S. A. (2015) Selecting players for youth national teams - a question of birth month and reselection? Science & Sports (in press)

Vaeyens, R., Philippaerts, R. M. & Malina, R. M. (2005) The relative age effect in soccer: A match-related perspective. *Journal of Sports Sciences*, 23 (7), 747-756.

Vincent, J. & Glamser, F. D. (2006) Gender differences in the relative age effect among US Olympic Development Program youth soccer players. *Journal of Sports Sciences*, 24 (4), 405-413.

Wiium, N., Lie, S. A., Ommundsen, Y. & Enksen, H. R. (2010) Does Relative Age Effect Exist among Norwegian Professional Soccer players? *International Journal of Applied Sports Sciences*, 22, 2, 66-76.

Williams, A. M. & Reilly, T. (2000) Talent identification and development in soccer. *Journal of Sports Sciences*, 18, 657-667.

Williams, J. H. (2010) Relative age effect in youth soccer: analysis of the FIFA U17 World Cup competition. *Scandinavian Journal of Medicine & Science in Sports*, 20, 502-508.

Wilson, G. (1999) The birthdate effect in school sports teams. *European Journal of Physical Education*, 4, 139-145.

S. A. Sæther
Norwegian University of Science and Technology, Department of Sociology and Political science, Dragvoll, 7491 Trondheim, Norway
e-mail: stigarve@ntnu.no