THE SIGNIFICANCE OF BIRTH DATES OF NZ 'ALL BLACKS' – A COMPARISON OF THE PROFESSIONAL & AMATEUR ERAS.

Geoff Simons and Luke Adams

INTRODUCTION

Relative Age Effect (RAE) refers to the difference in age between children in the same age group (Musch & Grondin, 2001). For example, while a child born in December is 11 months younger than a child born in January of the same year, both children are grouped in the same age category. The potential consequences of relative age are labelled under the term 'relative age effect' (Musch & Grondin, 2001). RAE has both immediate and long-term consequences that effect participation and selection in youth sport. RAE is present in most (but not all) sports around the world and can result in significant cognitive development changes, with some students being up to one year older in the same 'year group.' It is argued that RAE is likely to increase both intrinsic (observed competence) and extrinsic (appreciation by teachers and parents) motivation to continue involvement in sport. Experience will differ, with one child born in January versus December, in terms of playing the sport longer. Players born early in the selection year are more likely to be identified by professional teams, as opposed to players born late in the selection year, who are more likely to drop out of the sport. Some talent IDs are too focussed on short-term success, rather than looking at the bigger picture for development of the athlete. Clear evidence of RAE was found in national youth selections for U15, 16, 17, 18, and UEFA U16 tournaments. RAE is prevalent due to a bias toward physical attributes, rather than technical skills or greater experience playing the sport (January versus December).

Physical maturity is not everything, particularly in gymnastics and aerobic sports (such as long-distance running). Football, which is predominantly skill-based, shows no significant differences in physical maturity, particularly dribbling and shooting/passing accuracy. Often coaches develop a short-term focus on winning, rather than the long-term development of an athlete. The Matthew Effect – the early advantage enjoyed by older children – holds that this initial advantage tends to beget further advantage (Rigney, 2010).

There are a number of different factors in place that lead to RAE and that have been identified in various studies. In Canadian ice hockey, the youngest age division is strictly non-competitive, reducing the effects of RAE due to coach selections based on physical maturity. While these two factors are important, it is most likely that parents are responsible for the genesis of RAEs – parents' interpretations of their children's size, strength, abilities and safety. If we can reduce or eliminate the Matthew Effect related to relative age, we may reduce future inequitable birthdate distributions, providing a more equitable sport environment. The Pygmalion Effect is the perception that the greater the expectation placed on an individual, the greater the results that individual will attain and vice-versa. (Rosenthal & Jacobson (1968). This phenomenon has been offered as one explanation why coaches' select players based on physical maturation relating to 'talent.'

In support of this theory, Rejeski, Darracott and Hutslar (1979) found that youth sport coaches offered high-expectancy athletes positive reinforcement, while offering low-expectancy athletes general instructions only. The Galatea Effect holds that once expectations are placed on an individual, that individual typically acts congruently with those expectations. Kierein and Gold (2000) explain the Galatea effect as a type of expectation effects, occurring not when the leader has expectations of subordinates, but when subordinates' raised expectations of themselves

are realized in their higher performance. This may explain the role of the athlete in enhancing the effects of RAE in sport. For instance, if a player is selected based on physical maturity, but believes they have been chosen on skill, they will have higher self-expectations and train harder and more frequently, thus becoming more skilled.

Rae literature in sport

Barnsley and Thompson (1985) explored this trend amongst 7313 Canadian hockey players in the 1983-84 season for the minor leagues. The authors argued that RAE gave a competitive advantage to older children. Grondin et al. (1984) found a highly skewed distribution in birthdates among competitive youth hockey leagues, and in the major professional hockey league (NHL) – those born in the first three months were overrepresented as a result of RAE. They asked whether these supposed physical and mental advantages enjoyed by the older children could lead to the development of personality traits in the younger children, such as enhanced work ethic and commitment, in order to reduce the gap with their peers. A study conducted by Rusell and Startup (1986) strongly supported their findings. It showed that younger children are more likely to drop out of voluntary sport participation, perhaps due to physical differences, as opposed to attendance at school, which is compulsory during these years.

In soccer, Verhulst (1992) found that significant RAEs were evident in first- and second-division pro football players in Belgium, the Netherlands and France. Dudink (1994) found the same phenomenon in England. Musch and Hay (1999) concluded that Australia, Brazil, Japan and Germany all demonstrated RAE in football. Daniel and Janssen (1987) found that RAE was not as prevalent in the NHL in the 1970s and 80s as it is today. Many other sports, such as baseball cricket and tennis, also show the effects of RAE. Other suggested explanations for variation in birth rates and professional sport include climatic, environmental, sociocultural and biological factors. Barnsley, Thompson and Legault (1992) found that this effect also occurred in three male FIFA (soccer) World Cups held in 1989 and 1990. This effect was stronger in the age-group leagues (under 17 and under 20) compared with the senior league. The same trend was found by Dudink among top-ranked tennis players in the Netherlands and among soccer players in that country and in the English leagues.

Competition is a major factor here: when competition is low, every player will belong to a team and compete, as there is space available. The larger the pool of players, the more likely RAE will come into play – as in ice hockey in Canada and soccer in England and Brazil. Physical development is the second most important factor, particularly in relation to the position played. RAE is not as prevalent in gymnastics, where physical development in terms of size is less important. Gender, earlier maturation of females versus males, and higher variance amongst males are all contributing factors, as is less competition, depending on the sport. In France, rugby union, handball and soccer are popular sports, leading to the hypothesis that they would incorporate a high RAE. Although RAE was not significant in these sports at the elite level, it could be argued that high-contact sports where physical attributes are important are more likely to show RAE. Also, profit maximisation leads to selection of players based on physical attributes, particularly at the youth level. The focus is on short-term success, prompted by the pressures of promotion and relegation and monetary incentives. Few studies have explored this phenomenon in professional rugby union.

The aim of this study was to explore the role played by RAE in the All Black rugby team in both the amateur (1884-1995) and professional (1996-2016) eras. Drawing on available data, the authors will offer a perspective on whether RAE effect was greater in the professional era than in the amateur era.

Case study: Professional vs. Amateur era All Blacks

A total of 1051 male athletes were included in this case study. The percentage of births each month (and quarter) were compared to the birth rates in New Zealand during the period 1980-1994 (These dates align well with

players entering the All Blacks during the professional era starting in 1996). We found that the actual birth rate per month during 1980-1994 differed slightly from the expected birth rate based on the number of days in a month.

We found that the amateur era and the professional era each showed the Relative Age Effect (RAE) as prominent. This was expected, given that many previous studies of high-performing athletes in other codes have also illustrated this – Barnsley on ice hockey, American football and baseball (North America); Dudink on tennis (Netherlands) and soccer (England); as well as Baker and Logan on ice hockey (North America).

Comparing the numbers of players born in each of the birth months for the amateur and professional eras, t-distribution results gave a significant difference between the two sets of data. The probability p-value is 0.000, meaning that the value of 61.583 could not have been achieved through random chance.

Table 1 and Figure 1 illustrate the expected birth rates based on actual rates in New Zealand during the period 1980-1994, compared to the percentage by month of birth dates for All Blacks over the two eras.

Month	Expected	1884-1995	1996-2016
Jan	0.085	0.101	0.117
Feb	0.077	0.09	0.092
Mar	0.085	0.085	0.121
Apr	0.082	0.087	0.102
May	0.085	0.08	0.058
Jun	0.082	0.073	0.063
Jul	0.085	0.081	0.087
Aug	0.085	0.081	0.068
Sep	0.082	0.08	0.063
Oct	0.085	0.087	0.068
Nov	0.082	0.079	0.078
Dec	0.085	0.075	0.083

Table 1. Percentage by month of All Black birth dates

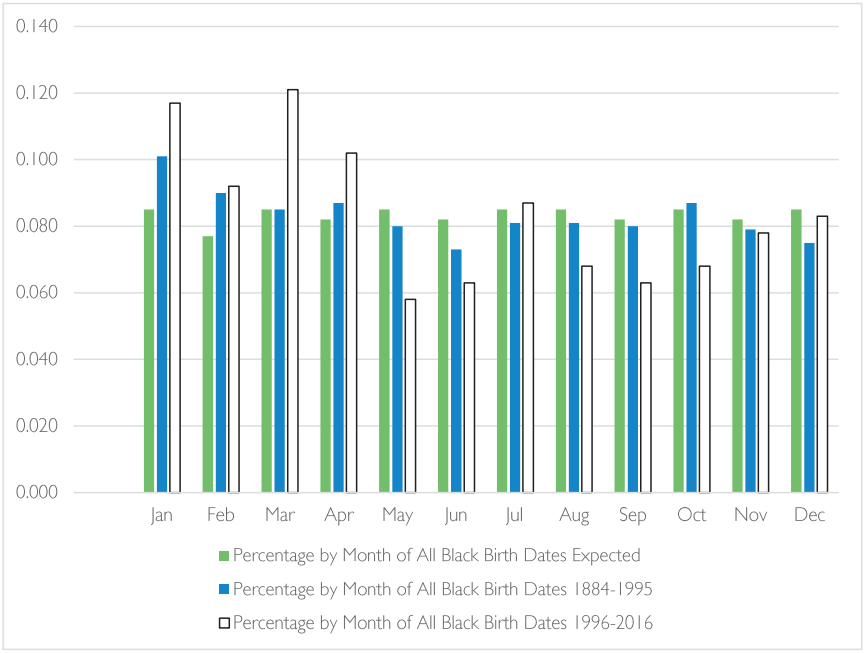

Figure 1. Percentage by month of All Black birth dates

The results show an increase in players born in each of the first four months of the year in the professional era compared to the amateur era. However, July, like February, also showed a small gain and, surprisingly, December was a popular month for player births.

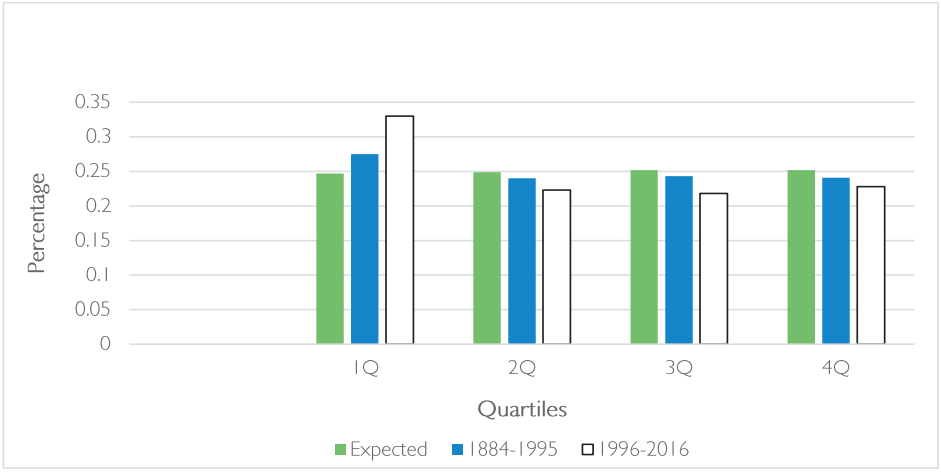

Figure 2. Percentage by Quartiles of All Black birth dates

Quartile	Expected	1884-1995	1884-2016
1Q	0.247	0.275	0.33
2Q	0.249	0.24	0.223
3Q	0.252	0.243	0.218
4Q	0.252	0.241	0.228

Table 2. Percentage of Quartiles of All Black birth dates

When divided into quartiles, the data clearly shows an increase in advantage for those players born in the first three months of the year who began playing in the professional era. This is illustrated in Table 2 and Figure 2.

It is widely believed that players who are older and more mature than their peers within an age-group level have a selection advantage. For example, an under 12-year-old born on 1 January has an 8% age advantage over a player born on 31 December, and an average advantage of 4% over others in their year group. The data suggests that in a sport like rugby union, where the size of a player is important, skilled players, especially if smaller, can be overlooked. It is worth noting that the All Blacks' most capped player, Richie McCaw, was born on 31 December. Once chosen for a representative team, older players get access to better coaching and knowledge, thus building more confidence. Their names are also better known by representative coaches, so that they are more likely to be chosen as a 'default' options for future teams.

FINAL THOUGHTS

Could RAE be a reason for players born in the later months of each year dropping out of their sport? In some sports with limited resources, both human and financial, an argument could be put forward that concentrating resources on fewer athletes could produce better results overall. However, the New Zealand Rugby Union is well resourced, and it would probably be of benefit if more players could have their standard raised across the game. Date of birth may not be the determining factor – the rate of development through significant developmental stages through early childhood may be more significant, and would relate directly to sociocultural and environmental factors. The larger the pool of players, the stronger the resulting RAE usually is, as reported by Grondin et al. (1984); this would apply to world football and rugby in New Zealand.

Physical development is crucial in rugby and other sports, is strongly correlated to chronological age and is position-specific – for example, a goalie in hockey might show a clear RAE due to having to carry heavy equipment. Gymnastics, where late maturation is preferred, is the opposite case, with RAE not evident among elite young British gymnasts.

More often it is the experience gained by older children in their sport that can exacerbate the effects of RAE – the more time invested in the sport, the more improvements are likely. This may lead to improved chances of selection for representative sides, leading to better coaching and higher levels of competition, specifically in terms of developing a foundational skillset at a younger age. Remedies for this situation would include classification according to biological age (height, weight, etc). Grondin et al. (1984) suggest a 15- or 21-month system designed to break through the yearly classifications. Baxter-Jones, Helms, Maffulli, Baines-Preece, & Preece (1995) found a difference in gender for RAE. They reported earlier maturation for females, and a high variable maturity status for boys. Awareness of RAE for coaches will be a crucial tool to help them understand and address this issue.

Another suggested solution to the RAE problem is rather than having age-group bands chosen on a full year cycle, alternative categories could be included. For example, representative teams could be chosen on an 18- or 30-month basis depending on the level under consideration and the resources an organisation has access to. A 15-month spread may be even better. An 18-month representative programme could be based on ages at the end of the year as follows: Under 12, Under 13.5, Under 15, Under 16.5, Under 18. The counter argument to this scheme is that selecting representative teams then becomes more difficult. However, in many current age-group representative teams, the best players are often playing for club or school teams in an older age group or are divided into weight categories.

Acknowledgements

The authors would like to thank Ron Palenski for confirming the birth dates of many All Blacks listed on the NZRU website as 1 January by default, and Associate Professor John Harraway of the University of Otago's Department of Mathematics and Statistics for his work on the statistical data.

Geoff Simons has been involved in in many facets of sport administration for 40 years. For much of this time he has been involved in rugby, especially at secondary school level. His event management experience has been across multisport events such as the NZ Masters Games, the NZ University Tournament and the NZ Area Schools Tournament. He has an interest in rugby history and is a contributing member to the Association of Rugby Historians and Statisticians. He lectures at the Otago Polytechnic Institute of Sport and Adventure.

Luke Adams is a recent graduate of Otago University with a Bachelor in Physical Education, majoring in exercise prescription. Currently living in Nelson, he is head trainer at Nelson Marist Rugby Club, and has led the club's strength and conditioning programme for most of 2017. He is also head trainer for the Tasman Makos women's campaign for 2017, overseeing their fitness, strength, recovery, and nutrition programming. He is currently completing the Graduate Diploma in Applied Science (Physical Conditioning Speciality) at Otago Polytechnic.

Correspondence to: Geoff Simons, Institute of Sport and Adventure, Sargood Centre, Otago Polytechnic, 40 Logan Park Drive, Dunedin 9016, New Zealand. Email: geoff.simons@op.ac.nz.

REFERENCES

Baker, J. & Logan, A. J. (2007). Birth Developmental contexts and sporting success: birth date and birthplace effects in national hockey league draftees 2000–2005. *British Journal of Sports Medicine, 41*(8), 515-517

Baxter-Jones, A. D. G., Helms, P., Maffulli, N., Baines-Preece, J. C., & Preece, M. (1995). Growth and development of male gymnasts, swimmers, soccer and tennis players: a longitudinal study. *Annals of Human Biology, 22*(5), 381-394.

Barnsley, R. H. & Thompson, A. H. (1988). Birthdate and success in minor hockey: The key to the NHL. *Canadian Journal of Behavioural Science/Revue Canadienne des Sciences du Comportement, 20*(2), 167.

Barnsley, R. H., Thompson, A. H., & Legault, P. (1992). Family planning: Football style. The relative age effect in football. *International Review for the Sociology of Sport, 27*(1), 77-87.

Delorme, N., Boiché, J., & Raspaud, M. (2010). Relative age effect in elite sports: Methodological bias or real discrimination? *European Journal of Sport Science, 10*(2), 91-96.

Delorme, N., Boiché, J., & Raspaud, M. (2009). The relative age effect in elite sport: the French case. *Research Quarterly for Exercise and Sport, 80*(2), 336-344.

Douglas, M. (2017). World Rugby. Retrieved on 1 June 2017 from http://playerwelfare.worldrugby.org/?documentid=110

Dudink, A. (1994). Birth date and sporting success. *Nature, 368*(6472), 592-592.

Hancock D. J., Adler, A. K., & Cote, J, (2013). A proposed theoretical model to explain relative age effects in sport. *European Journal of Sport Science, 13*(6), 630-637

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

Kierein, N. M. & Gold, M. A. (2000). Pygmalion in work organizations: a meta-analysis, *Journal of Organizational Behaviour,* 21, 913-928.

Musch, J. & Grondin, S. (2001). Unequal Competition as an Impediment to Personal Development: A Review of the Relative Age effect in Sport. *Development Review, 21*(2), 147-167

Rosenthal, R. & Jacobson, L. (1968). *Pygmalion in the classroom: Teacher expectation and pupils' intellectual development*. New York: Holt, Rinehart & Winston.

Thompson, A. H., Barnsley, R. H., & Stebelsky, G. (1991). Born to play ball: The relative age effect and Major League Baseball. *Sociology of Sport Journal, 8*(2), 146-151.