Family Planning: Football Style. The Relative Age Effect in Football

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Abstract

Recent studies indicate that month of birth is related to achievement in a number of sports. Birth dates were collected for all players on teams competing in the 1990 World Cup and the 1989 Under-17s and Under-20s World Tournaments in Football. Results indicated that those born early in the "activity year" (August 1 through July 31 for football) were over-represented, while those born later were under-represented. The effect was particularly strong in the Under-17s and Under-20s tournaments. Results are interpreted in the context of the "relative age effect".

Prior to the 1990 World Cup in Italy, the press reported that the Italian team members had been directed to abstain from sexual activity in order to maintain their vigor for the more important activities which were to take place on the football field. If such regulation of sexual activity can be validated by enhanced predictions of sports success, then prospective parents and organizational bodies will find the following data and report instructive.

"Activity Year"

As children become older they continue to learn, mature and develop. Thus, no one would argue with the statement that for most children increases in chronological age are related to increased physical and mental development. As a result, whenever educational or recreational activities are planned for children, organizers have generally sought to group children by chronological age for the purposes of providing developmentally appropriate instruction and tasks. When the activity is sports related, the rationale includes the provision for fair competition and the assurance of equal opportunity of success for all participants.

Grouping by chronological age is generally achieved by establishing an "activity year". For example, in Canadian Minor Hockey a 12 year old is defined as a child who has his or her 12th birthday during the "hockey year" which falls between January 1 and December 31. Whereas, in Little League Baseball a 12

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year old is defined as a child who has his or her 12th birthday during the "baseball year" which falls between August 1 and July 31 of the next calendar year. Thus, it can be seen that an "activity year" varies on the basis of the cutoff date that has been established by the organizing body. Interestingly, throughout North America "school years" vary as a result of cutoff dates which range from September 1 to March 1.

Relative Age

Relative age refers to the difference in ages between children in the same age group that results from their different birthdates throughout the year. Thus, if a grade one class is comprised of children born in the "school year" from September 1 to August 31, then the children with September birthdates will possess approximately a one year relative age advantage over the children born in August of the following year. Conversely, the children with an August birthdate will have about a one year developmental disadvantage relative to their September born peers. For a five and one-half year old child this could result in a comparison with others who may possess up to an 18 percent maturational edge. The relationship of relative age to a variety of performance indicators has been the subject of a number of recent research reports.

Relative Age and Educational Achievement

The literature is consistent in reporting that children born early in the "school year" and therefore, possessing a relative age advantage, consistently demonstrate more educational success than those students who have a relative age disadvantage as a result of being born late in the "school year". Beattie (1970) and Davis, Trimble, and Vincent (1980) observed that the younger children entering Grade 1 achieved significantly less than their older classmates. This effect is apparently long lasting as Kalk, Langer, and Searle (1982) reported similar findings for 13 year-olds and Russell and Startup (1986) observed the phenomenon in university students.

Interestingly, and perhaps predictably, relative age has been shown to be related to the probability of a child receiving a special education label. Thus, Maddux (1980) and Diamond (1983) both found that children with relative age disadvantages were overly represented in programs for children with learning disabilities. On the other hand, Maddux, Stacy, and Scott (1981) presented data that demonstrated that children who possess a relative age advantage are a disproportionately larger group in programs for gifted children. On the basis of these data, Barnsley and Thompson (1985) have cautioned against responding positively to the frequent parental request to permit a child who has just missed the entry cutoff date to enrol in Grade One early.

Relative Age and Sports Performance

Barnsley, Thompson, and Barnsley (1985) would appear to be the first to note the impact of relative age in individual sports success. Reporting on the National Hockey League (NHL) and two of Canada's main "Junior A" professional development leagues, they demonstrated an extremely strong linear relationship between the month of birth (January to December) and the proportion of the players in the leagues studied. The strength of this phenomenon is realized by data which showed that approximately four times more players in the "Junior A" leagues were born in the first quarter of the "hockey year" (January, February, and March) than were born in the last quarter of the "hockey year" (October, November, and December). This trend was also found in the NHL.

In order to better understand how relative age and success in hockey were so strongly related, Barnsley and Thompson (1988) analyzed the birthdates of 7,313 players in the Edmonton Minor Hockey Association. First, the results of this study demonstrated a participation effect in that the older players (in relative age terms) tended to continue to play hockey as they became older whereas, the younger players were observed to drop out. Of more importance, perhaps, was the second finding which showed that in teams chosen for more intensive training and competition, the makeup of the roster largely reflected players who possessed significant relative age advantages. Thus, it can be argued that the players who have a relative age advantage over their playing peers, also possess, as a group, significant developmental advantages (e.g. height, weight, strength, coordination, etc.) which will have a direct impact on perceived athletic potential and predicted hockey success. Given the importance of these early experiences for the development of hockey skills, it is not surprising that in later years the NHL and their developmental leagues reflect such strong relative age effects.

These two hockey studies have served to promote interest in researching the relative age effect in other sporting endeavours. As such, Daniel and Janssen (1987) reported on the absence of a relative age effect in the professional sports of baseball and American football. Notwithstanding this report, recent research has shown that the relative age effect is apparent in both baseball and American football. With regard to baseball, Thompson, Barnsley and Stebelsky (1991) have shown that Daniel and Janssen's incorrect choice of cutoff dates (September 1 instead of August 1) for the Little League "baseball year" had masked the relative age effect in major league baseball. Similarly, Glamser and Marciani (1990), in a sophisticated analysis of "academic timing" (where a player is one or two years delayed in expected academic progress), have shown that relative age is related to participation in American College football. Thus, it appears that the relative age effect may have broad generality throughout a variety of sporting activities.

The research on the effect of relative age has, to this date, been limited to sports which are primarily played in North America. In order to further investigate the generality of the relative age effect, it was seen to be important to consider this concept in relation to an international sport. As a result, this report considers relative age in the context of football or soccer as played in international competitions.

Method

Subjects

The data for this study were derived from rosters of football teams competing in the 1990 World Cup and the 1989 Under-17s and Under-20s World Tournaments. These data were taken from FIFA (Federation Internationale de Football Association) publications which were made available by the Canadian Soccer Association.

Procedure

Simply, the birthdates for all players on each team were tabulated by month. These categories were then compiled into quarters which reflected the established "football year" from August 1 to July 31 of the next calendar year. Thus, the first quarter (Q1) included the months August, September, and October. The remaining quarters were Q2 (November, December and January), Q3 (February, March and April) and, Q4 (May, June and July).

For the purposes of this study it is assumed that male births in the countries represented are random throughout the year. Barnsley and Thompson(1988) validated this assumption with regard to male births in Canada.

Results

Football players' birthdates classified by quarter and country of origin are found in the following Tables. Table 1 presents data derived from the 1990 World Cup held in Italy.

Table 2 presents data derived from the 1989 Under-20s World Tournament held in Saudi Arabia.

Table 3 presents data derived from the 1989 Under-17s World Tournament held in Scotland.

In order to assess the overall relationship between relative age and participation in the three reported tournaments, Chi-square analyses were performed on the birth distribution of the total number of players across the four quarters of the "football year". The results of these analyses are found in Table 4. Theses analyses demonstrate that the distribution of players' birthdates in each of the three tournaments are not random and therefore, the number of players is related to the quarters of the "football year".

Discussion

The results of this study demonstrate a strong relationship between month of birth and success in international football. In the 1990 World Cup this finding appears to be limited to the under representation of players born in the fourth quarter of the "football year". However, much more striking data were found in the 1989 Under-17s and Under-20s World Tournaments. In these two

Table 1. 1990 World Cup and birth quarter

		Number of Players			
		Birth Quarter			
W. Cup Rank	Country	Q1 Aug-Oct	Q2 Nov-Jan	Q3 Feb-Apr	Q4 May-July
5	Yugoslavia	11	5	4	2
14	Columbia	9	7	4	2
10	Spain	9	3	6	4
9	Brazil	8	8	5	1
18	Austria	8	8	4	2
15	Denmark	8	5	6	3
18	Scotland	7	8	3	4
20	Egypt	7	7	3	5
21	Sweden	7	5	8	2
1	Germany	7	5	6	4
7	Cameroon	7	2	3	10
4	England	6	9	4	3
23	U.S.A	6	7	8	1
8	Ireland	6	7	4	5
12	Romania	6	4	9	3
24	UAE	6	4	6	6
16	Uruguay	6	4	6	6
11	Belgium	5	6	8	3
2	Argentina	5	6	6	5
17	USSR	4	7	8	3
13	Costa Rica	4	5	6	7
6	Czechoslovakia	3	7	7	5
3	Italy	3	5	6	8
22	Korea	2	4	10	6
Total		150	138	140	100
Percentages %		28.41	26.14	26.51	18.94

Table 2. 1989 Under-20s World Tournament and birth quarter

		Number of Players			
		Birth Quarter			
Tourn. Rank	Country	Q1 Aug-Oct	Q2 Nov-Jan	Q3 Feb-Apr	Q4 May-July
5	USSR	14	2	1	1
6	Iraq	12	6	0	0
7	Argentina	10	4	4	0
11	Norway	10	4	3	1
9	Czechoslovakia	9	4	4	0
1	Germany	9	3	3	3
13	Syria	8	8	1	1
10	Saudi Arabia	8	7	1	2
15	Spain	8	6	1	3
14	Costa Rica	8	5	3	2
3	Brazil	8	4	5	1
1	Portugal	8	4	3	3
16	Mali	7	11	0	0
8	Columbia	6	6	4	2
4	U.S.A.	5	10	2	1
2	Nigeria	5	10	1	2
Total		135	94	37	22
Percentages %		46.87	32.64	12.85	7.64

Table 3. 1989 Under-17s World Tournament and birth quarter

		Number of Players			
		Birth Quarter			
Tourn. Rank	Country	Q1 Aug-Oct	Q2 Nov-Jan	Q3 Feb-Apr	Q4 May-July
1	Saudi Arabia	15	3	0	0
11	China	12	5	0	0
12	Ghana	11	6	1	0
5	Bahrain	11	6	0	1
10	U.S.A.	9	5	2	2
13	Columbia	8	7	2	1
7	Germany	8	6	2	2
15	Cuba	7	9	2	0
16	Canada	7	8	2	1
8	Argentina	7	6	3	2
14	Australia	7	5	5	1
4	Nigeria	6	9	1	2
9	Guinea	6	6	2	4
6	Brazil	6	3	8	1
2	Scotland	5	3	6	4
3	Portugal	4	10	3	1
Total		129	97	39	22
Percentages %		44.95	33.80	13.59	7.66

Table 4. Chi-square analyses of Football Data

Chi-Square Analyses of Football Data			
Event	Chi-Square	df	Prob.
1990 Wold Cup	11.541	3	.0091
1989 Under-20s World Tournament	110.953	3	.0001
1989 Under-17s World Tournament	101.530	3	.0001

tournaments the number of players was observed to drop rapidly in each succeeding birth quarter of the "football year". Such data may be strong indicators of the powerful effect of relative age in youth football programs throughout the world and may presage a stronger presence in professional football in the future.

The data from 1989 Under-17s and Under-20s World Tournaments bear a striking resemblance to the Barnsley, Thompson, & Barnsley (1985) observations in regard to "Junior A" hockey (approximate ages of players is from 18 to 20) in Canada. A graphic comparison of the birthdates of these football and hockey players can be found in Figure 1. In interpreting these data it must be

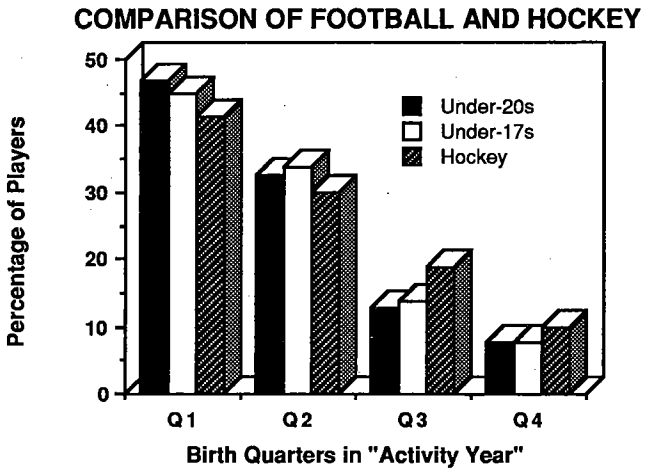

Figure 1. Comparison of Birth Quarter data from the 1989 Under-20s and Under-17s Football World Tournaments with "Junior A" Hockey data from Barnsley, Thompson and Barnsley (1985)

remembered that the first quarter of the "hockey year" comprises the months of January, February and March, whereas, Q1 in the "football year" includes August, September and October. Nevertheless, when these football and hockey players are compared, not by calendar birthdate, but rather by "birth quarter" in relation to their respective "activity years", the data are provocatively similar. The fact that these data have been drawn from different countries and different sports with different "activity years" is strong evidence for the generality of the

relative age effect in successful sports performance. Clearly, it would be worthwhile and productive to document the existence of a relative age effect in other sporting endeavours.

Barnsley and Thompson (1988) demonstrated that the relative age effect in hockey was the result of the organizational structure of minor hockey programs. They found that players younger in relative age terms tended to drop out of hockey as a recreational activity. Further, Barnsley and Thompson (1988) noted that the relative age advantage derived from having been born early in the "hockey year" was strongly related to the opportunity to play at higher levels of competition. The explanation here is simple, players who are older in relative age terms possess, on average, a developmental advantage (height, weight, strength, coordination, etc.) over the younger players and thus, are chosen for the higher calibre teams. As players on higher calibre teams generally experience better coaching, more practice and playing time, higher competition and more rewards, it is quite predictable that they should continue with the sport and gain more long term success.

Although the present study demonstrates a strong relationship between birthdate and participation in world football tournaments, relative age may not provide the complete explanation for this phenomenon. The preferred explanation (Barnsley and Thompson, 1988), which held the organizational structure of minor league programs responsible for creating the relative age effect, may not be entirely relevant to football. That is, highly structured youth programs, such as those found in hockey, are not consistently found throughout the world in youth football. Clearly, young football talent may be readily developed through some combination of school initiatives, community programs, and informal neighborhood activities, without any structured minor league involvement at all. Therefore, alternative hypotheses for this study's findings should be considered.

One potential explanation is that the tournament "age cutoff dates" could have, in and of themselves, produced the phenomenon observed in this study. Such a hypothesis is not without empirical support. Ryan (1989) studied competitive swimming in Canada (which does not have a regulated "activity year") and observed relative age effects that he related to the particular time of year when key competitions were held. A second hypothesis is that the effect found here is only coincidentally related to the "football year", and may in fact be due to some other factor that produced a grouping of children by age. For example, in some countries the apparent relative age effect may simply reflect the "school year" which happens to be coincidental with the "football year".

Given the large number of countries considered in this study, and the variety of youth football programs that they represent, it is possible that several explanations underlie the large relative age effect observed in the 1989 Under-17s and Under-20s World Tournaments. A number of hypotheses could be properly evaluated by an examination of the regulations, structure, and/or practices related to youth football in all participant countries. Furthermore, research involving analyses of birthdates, such as that undertaken by Barnsley and Thompson (1988) on young hockey players in Canada, could be profitably replicated on young football players in each country where data are available. Such research could provide valuable information on the development of young football players throughout the world and shed light on the large relative age effect being reported in this study.

The observation that a relative age effect predominates in a particular sport is generally of concern to players, parents, and sports organizers alike, as these persons tend to share the desire that all children should have an equal opportunity to be successful. Complementing this view is the probability that in a sport in which relative age is having a large impact, the pool of players will be significantly reduced with advancing age and that some talented players will be restricted in their development. It can be argued that the result of these situations will be a lowering in the overall quality of the highest competitive teams. As such, attention should be given as to how to reduce or eliminate the relative age effect in sporting activities.

Barnsley and Thompson (1988) have identified three categories of proposals for reducing the relative age effect in sports. First, it is suggested that an awareness of the phenomenon may have an impact on the behaviour of sports organizers, coaches, players and parents, thereby stimulating action designed to reduce the relative age effect. The second category of proposals embodies the notion that if the organizational structure of a minor sports program creates the relative age effect then, changes to the organizational structure will be required to eliminate it. Proposals in this category include reducing the age range of the age groupings, altering cutoff dates for the "activity year" in subsequent years so as to provide different players with a relative age advantage, and the possibility of requiring "quotas" of children born throughout the "activity year" on any high calibre competitive team. Finally, a third set of proposals would consider such issues as the need for competitive teams, the age at which high competition should begin and, alternative ways of grouping children for competition (e.g. height and weight instead of age alone). Perhaps, it would be instructive to seek out sports which do not reflect a relative age effect at the highest levels of adult competition and then, determine the philosophy, organization and structure of their children's developmental programs.

And of course, if all else fails, "family planning: football style" could be encouraged. This proposal would entail a recommendation to prospective parents to limit their sexual activity to the months from November to January – thus, providing for the birth of future footballers in the first quarter of the "football year".

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Planning Familial: Style de Football – l'Effet de l'Age Relatif dans le Football

Résumé

Des études récentes indiquent que le mois de naissance est lié à qualité des prestations dans un certain nombre de sports. Les dates de naissance ont été enregistrées pour tous les joueurs des équipes participant à la Coupe de Football 1990 et aux Tournois de 1989 des Moins de 17 ans et des Moins de 20 ans. Les résultats ont indiqué que les joueurs nés au cours de "l'année d'activité" (du 1er août au 31 juillet pour le football) étaient surreprésentés, tandis que ceux qui étaient nés plus tard étaient sous-représentés. L'effet a été particulièrement fort parmi les moins de 17 ans et les moins de 20 ans. Les résultats sont interprétés dans le contexte de "l'effet de l'âge relatif".

Familienplanung: Die Art Fußball zu spielen – der relative Alterseffekt im Fußball

Zusammenfassung

Frühere Untersuchungen zeigen, daß der Geburtsmonat in einer Vielzahl von Sportarten in Verbindung steht mit der Leistung. Die Geburtsdaten wurden für alle Spieler der Mannschaften, die am World Cup 1990 und 1989 in der Gruppe der 17jährigen und in der Gruppe der 20jährigen bei den Weltmeisterschaften im Fußball teilnahmen, gesammelt. die Ergebnisse zeigen, daß jene, die früh in dem in der Altersklasse (1. August bis 31. Juli des folgenden Jahres für Fußball) geboren wurden, überrepräsentiert sind, während jene, die später geboren sind, unterrepräsentiert sind. Dieser Effekt ist sehr ausgeprägt, sowohl in der Gruppe der 17jährigen als auch in der Gruppe der 20jährigen. Die Ergebnisse werden im Kontext des relativen Alterseffektes interpretiert.