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## RESEARCH NOTES

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### **“Born to Play Ball” The Relative Age Effect and Major League Baseball**

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The records of 837 major league baseball players were examined in order to determine whether the Little League age eligibility criterion, based on the month of birth, affected participation rate at the professional level. The results indicated that major league players were more likely to have been born in the first months of the year, if that year corresponded to the one used for eligibility for Little League baseball (i.e., beginning in August and ending in July). A reanalysis of data presented in the literature (which suggested no effect) produced a similar result. These data are interpreted in terms of the relative age effect. That is, because of age cutoffs used in Little League baseball, some players gain a developmental advantage when competing against other youngsters who are considerably younger, although they are placed in the same age category for league play.

Although success in human performance activities is in large part determined by ability and training, recent evidence indicates that the relative age of a child who is just learning a skill can have a powerful and long-lasting effect. Relative age, which refers to the difference in age between individuals who have been grouped together for a particular purpose or function, was first observed in relation to school entry and subsequent educational achievement.

Upon entering Grade 1, a particular child may vary in age compared to another child by as much as 1 year. Children entering school at a younger age (within this 1-year span) tend to achieve at a significantly lower level than their older classmates (Beattie, 1970; Davis, Trimble, & Vincent, 1980) and are more likely to be classified as learning disabled at some point in their schooling (Diamond, 1983; Maddux, 1980). The overall effect is apparently long-lasting, being found among 13-year-olds (Kalk, Langer, & Searle, 1982) as well as university students (Russell & Startup, 1986). As a result of the strength of this effect,

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Barnsley and Thompson (1985) have cautioned against the practice of allowing children to start Grade 1 who have just barely missed the entry cutoff date, and who are thus even younger than their potential classmates.

On the assumption that the relative age effect would also apply to organized sporting activities in which achievement is at a premium and strict age-groupings are applied, Barnsley, Thompson, and Barnsley (1985) examined its influence on the performance of hockey players. They found a strong linear relationship between the month of birth (from January through December) and the proportion of players playing in the league under study. For example, professionals playing in the National Hockey League were twice as likely to have been born in the first quarter of the year compared to the last quarter.

This relationship was even stronger in the junior hockey leagues (which feed the NHL), which exhibited a first-quarter to last-quarter ratio of about 4:1. In a follow-up to the Barnsley et al. (1985) study, Daniel and Janssen (1987) reported that the relative age effect appears to be growing stronger over time among NHL players.

As an explanation for the relative age effect in hockey, Barnsley et al. (1985) hypothesized that the method of grouping young boys (and now girls) in minor hockey results in a developmental-age advantage for those who are older, that is, those born in the early months of the sport year, which for minor hockey league players corresponds to the calendar year. These children then compete for a team position against children who, on average, will be smaller, weaker, and less well coordinated. Furthermore, these children will be given further advantages such as placement on higher caliber teams, more and better competition, better coaching, more time on the ice, and more rewards and recognition by being accorded a higher status in the local sport hierarchy.

The overall result is greater skill development and, just as important, a greatly enhanced level of self-confidence and perceived self-efficacy (see Bandura, 1977). This in turn could lead to the self-fulfilling prophecy of current achievement being perceived by the players and coaches as an indicator of potential capability, resulting in continued favorable treatment (Rosenthal & Jacobson, 1968). A further hypothesized aspect of the relative age effect would be that children with a relative age disadvantage may become discouraged and quit the sport.

These two hypotheses were considered in a study by Barnsley and Thompson (1988), who examined the rosters of teams in a large minor hockey system comprising players ranging in age from 8 to 20 years. The results indicated that those with a relative age advantage were more likely to play for a top tier team than their counterparts in the same age grouping, and those with a relative age disadvantage were underrepresented in the older-age groupings (i.e., they appear to have dropped out more readily).

If the relationship between birth month and performance does in fact reflect a relative age effect, then one would expect to find a similar association in other sports in which the organization of younger players parallels that of hockey. Daniel and Janssen (1987) noted that Little League baseball, like minor hockey, is highly organized, employs strict cutoff dates, and uses similar age groupings (2-year spans). However, they found no statistically significant relative age effect among professional baseball players active in major league baseball in 1985.<sup>1</sup>

The Daniel and Janssen (1987) finding, that no relative age effect is apparent in major league baseball, is in theory surprising. Unfortunately, these authors

did not report the results of their statistical testing nor did they report the type of statistic used. It was thus not possible to properly replicate the Daniel and Janssen (1987) study as there was inadequate reporting of research procedures. As a result, a further review was undertaken of the relative age effect in baseball. In the context of this review it was determined that the age cutoff date for Little League baseball is August 1 (Little League Baseball, Inc., 1990) and not September 1, as utilized by Daniel and Janssen (1987). According to S. Weller of Little League Baseball Incorporated, this standard has been in place since the early 1950s (personal communication, June 19, 1990). Thus only an insignificant proportion of players active in 1990 would not have been subjected to the August 1 cutoff date.

Daniel and Janssen (1987) considered the relative age effect for a year beginning in September and ending in August, when in fact the year that should have been used would have started in August and ended in July. It is proposed that this mistake by Daniel and Janssen, of statistically combining the months incorrectly, may have masked the relative age effect in major league baseball. Therefore their conclusion, that the relative age effect is absent in baseball, needs to be reexamined.

The purpose of the present study, then, was to reconsider the relative age hypothesis as it applies to major league baseball by first reanalyzing the Daniel and Janssen (1987) data and then by conducting a new analysis of data collected from a later year.

## Method

### *Subjects*

Data for the reanalysis of 1985 major league baseball players' birth months were taken from Daniel and Janssen (1987) ( $n=682$ ). Birth-month data were also collected for the 837 players on the 1990 spring training rosters of all teams in the National and American Baseball Leagues, excluding those who had never before played in the major leagues. (Rookies were excluded because most would not make the final cut, rendering them unrepresentative of players at the level of primary interest.) Additional information was collected on each player:

*Country of Birth.* The variable of American versus foreign born was based on the assumption that the organization of baseball for children may be different in foreign countries, making a relative age effect difficult to predict.

*Handedness.* This variable affects throwing and batting and was included because, although left-handedness is less common in the general population, the nature of baseball produces certain niches for left-handers (e.g., first base, pitching) which may influence the development of the relative age effect.

*Year of Birth and Number of Years in the Majors.* These variables were included to examine the possibility that the relative age effect has changed over time, as it has in professional hockey (Daniel & Janssen, 1987).

*Position.* This distinction, between pitchers and others, was based on the assumption that the skills required for pitching differ from those in other positions.

*Lifetime Performance Measures.* The measures of number of all-star appearances, ERA for pitchers and batting average for nonpitchers, were included to test the view that, given the presence of the relative age effect, it should be stronger among the most accomplished players. All 1990 data were taken from Siegel (1990).

**Procedure**

Birth dates for all players were simply tabulated by month across a year beginning in August and ending in July. Chi-square statistical tests were applied to the data in order to determine the significance of deviations from the expected number of births in each month. Since the proportion of live births differs very little from month to month (Barnsley & Thompson, 1988), expected values were calculated on the basis of an even distribution of births. Because the chi-square statistic cannot shed light on the existence of trends in the data (as were expected given a relative age effect), possible linear relationships between birth month and the distribution of players were examined by the calculation of correlation coefficients. The additional data collected were used to examine other potential influences on the relative age effect.

**Results**

The results of the simple birth-month analyses are shown in Table 1. Also shown are the same data tabulated by quarter-year (i.e., Quarter 1 = August, September, and October; Quarter 2 = November, December, and January; etc.). As indicated in Table 1, the analyses by quarter produced statistically significant results for both 1985 and 1990, with the proportion of players born in each quarter diminishing consistently from the beginning to the end of the sport year.

In order to calculate Spearman rank-order correlations, months were treated as subjects. In terms of relative age, a rank of 1 was assigned to August (which produces the oldest relative age), 2 to September, and so on through to July, which was assigned a rank of 12. In regard to the distribution of players, the month displaying the highest frequency of players was assigned the rank of 1, the second highest was assigned a rank of 2, and so on. The results of this analysis showed

**Table 1**

**Birthdate by Month and by Quarter for the 1985 Reanalysis and for 1990 Major League Players**

	Month of birth											
	A	S	O	N	D	J	F	M	A	M	J	J
1985 (n = 682)												
Month	64	57	74	68	60	58	60	51	47	47	45	51
Quarter*		195			186			158			143	
		28.6%			27.3%			23.2%			21.0%	
1990 (n = 837)												
Month	80	76	88	68	76	67	64	65	65	61	65	62
Quarter**		244			211			194			188	
		29.2			25.2%			23.2%			22.5%	

\*  $\chi^2$  (1985) = 10.28, *df* = 3, *p* < .02;

\*\*  $\chi^2$  (1990) = 9.06, *df* = 3, *p* < .05.

a strong relationship for both 1985 ( $r=0.79$ ,  $p<.01$ ) and 1990 ( $r=0.88$ ,  $p<.01$ ). That is, there is a significant tendency for professional players to have been born early in the baseball year. Interestingly, none of the additional measures such as handedness or ERA showed a statistically significant correlation with birth month (Spearman  $r$  ranged from  $-0.08$  to  $0.08$ ).

## Discussion

The results of this study provide strong support for the view that the relative age effect is a factor in major league baseball, as it is in hockey and academic achievement. Thus, as in these cases, it appears that a significant number of budding baseball players are prevented from reaching their potential because of an accident of birth.

It should be noted, however, that the effect is not as strong as that found in hockey. This may be due to the fact that Little League baseball starts at a later age than hockey, thus reducing the magnitude of the relative age effect. The finding that the other factors examined showed no effect on relative age indicates that, unfortunately, no further light can be shed on the issue from the results of this study. Further research is clearly required. The most useful undertaking at this point would be a study on Little Leaguers that would parallel the Barnsley and Thompson (1988) study on minor league hockey players. This would confirm or disconfirm the existence of the relative age effect at an early age in baseball and would allow an examination of hypotheses related to participation rates and all-star selection.

One other activity of potential importance could be to examine the role of perceived self-efficacy among those disadvantaged by relative age. This could lead to changes in coaching style that would render confidence building as important as skill development, at least for some children.

However, in the absence of such Little League data, the advice offered by Barnsley and Thompson (1988) with regard to minor hockey programs should be considered. These authors have put forward a number of suggestions designed to neutralize the effects of relative age among hockey players that may have some relevance for Little League baseball: (a) bringing the issue to the attention of minor-league officials on the assumption that awareness may lead to increased sensitivity to talented younger players; (b) reducing the relative age advantage by lessening the range of the age groupings, changing the cutoff dates for age groupings from year to year, or implementing a quota system so that all children can have an equal opportunity to play on all-star teams; and (c) undertaking a thorough review of the minor sports system, especially examining the extreme emphasis on competition at the expense of skill development for all children.

Any intervention should be approached with caution, however. First, the suggestions offered here are tentative and in need of careful study. Second, we should not forget that many superb athletes might not have reached their level of performance without the boost provided by a relative age advantage.

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<sup>1</sup>Daniel and Janssen (1987) reported that their data pertain to players active in 1984–85. Since the baseball season does not extend from one year to the next, it is assumed that the year in question was 1985 and thus we report it as such.

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