Birthdate and success in minor hockey: The key to the NHL

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ABSTRACT

Previous research (Barnsley, Thompson, & Barnsley, 1985) demonstrated an extremely strong linear relationship between the month of birth (from January to December) and the likelihood of playing in the National Hockey League and two major developmental Junior hockey leagues. The present study analyzes the birthdates of 7313 hockey players participating in the Edmonton Minor Hockey Association in the 1983-1984 season. The main findings are that players possessing a relative age advantage, i.e., born in the months of January to June, are more likely to participate in minor hockey and are more likely to play for "top tier," or "rep" teams than are players who are born in the months of July to December and thereby are disadvantaged by their relative age. Proposals by which these relative age effects could be reduced are considered.

Barnsley, Thompson, and Barnsley (1985) reported on the month of birth of hockey players from the National Hockey League (NHL) and two of Canada's main "Junior A" professional development leagues, the Western Hockey League (WHL) and the Ontario Hockey League (OHL). That study demonstrated an extremely strong linear relationship between the month of birth (from January to December) and the proportion of players in the leagues studied. The extent of this phenomenon can best be understood when it is realized that approximately four times more players in the WHL and the OHL were born in the first quarter of the year (January, February, and March) than were born in the last quarter (October, November, December). This trend followed through to the NHL.

In attempting to explain these findings, Barnsley, Thompson, and Barnsley (1985) suggested that the results may reflect another example of the "relative age" effect. Relative age refers to the differences in age between individuals who have been grouped together for some performance activity. For example, all children turning six years of age between January 1st and December 31st in any particular year generally enter school in Grade One in that year. It is obvious that within such

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groups of children there are age differences of up to one year brought about by the different birthdates throughout the year. This difference in age between individuals in a group has been termed relative age and, in educational research, has been shown to be related to academic achievement in a variety of ways (Beattie, 1970; Maddux, 1980; Kalk, Lange, & Searle, 1982; Diamond, 1983; Russell and Startup, 1986).

As in school, children who participate in sports are generally placed into age groupings. This is done in order to equalize competition, facilitate instruction, provide for program continuity, and promote safety for the participants (Barrow and McGee, 1971). Barnsley, Thompson, and Barnsley (1985) hypothesized that this method of grouping young hockey players, which creates relative age differences between the participants, has had the long-term effect of providing the WHL, OHL, and subsequently the NHL, with far more hockey players born in the first part of the year than those born in the last part of the year. Clearly, these data have implications for the effectiveness of the selection process and for individual opportunity.

This article is a follow-up to the report by Barnsley, Thompson, and Barnsley (1985). The purpose of this study is to seek an understanding of the processes that lead to such a large and long-term relative age effect in the development of hockey talent.

STUDY 1: BIRTHDATE AND RATE OF PARTICIPATION IN MINOR HOCKEY

One explanation that may be offered to account for the relationship between month of birth and hockey success resides in a proposed shift in participation rates in minor hockey programs for children born in different months. Therefore, it would be hypothesized that as the group of children in minor hockey gets older, those born in the first months of the year tend to remain as participants, whereas those born in the later months of the year tend to drop out.

This explanation is based on the fact that when children are age grouped, the older children in the age group have a developmental advantage over the younger children in the same age grouping. As a result, when these children play hockey together, the older children (January, February, March birthdates), who are generally bigger, stronger, and better co-ordinated than the younger children (October, November, December birthdates), do much better. By doing better, these older children achieve more success, receive greater rewards for their endeavours, and thus are more likely to remain in minor hockey for a number of years.

On the other hand, a complementary process is working against the younger players in their age grouping. As these children experience a developmental disadvantage in relation to their older playing mates, they are more likely to experience frustration and failure and, as a result, develop a lower expectation of themselves as hockey players. This analysis suggests that as a result of their negative

experiences the younger children may tend to leave hockey for other recreational activities in which they are more likely to achieve success. Therefore, players born in the early months of the year would represent a larger pool of players than those born in the later months.

Study One evaluated the hypothesized relationship between month of birth and participation in minor hockey.

METHOD

Subjects

The team rosters of all players registered in the hockey program of the Edmonton Minor Hockey Association for the 1983-84 season comprised the sample for this study.

Procedure

Simply, the birthdates for all players in each league (Mite, Pee Wee, Bantam, etc.) were tabulated by month. These categories were then compiled into quarters (Q1 = Jan., Feb., Mar.; Q2 = Apr., May, June; Q3 = July, Aug., Sept.; Q4 = Oct., Nov., Dec.).

Barnsley, Thompson, and Barnsley (1985) compared the distribution of NHL, WHL, and OHL players' birthdates to the actual distribution of male live births by month in Canada in 1966-67. In the present study, the observed frequency of birth months was compared to a theoretical expected frequency that assumed a random and unbiased distribution of male births throughout the year. It was felt that this comparison was more appropriate given the large number of years of birth of the subjects (1963 through 1976) and the fact that the quarterly expected theoretical distribution of births is virtually the same as the actual quarterly distribution of male live births in Canada in 1966-67 ($\chi^2 = .126$; df = 3; $p > .90$).

RESULTS

Hockey players' birthdates classified by quarter and league of play are found in Table 1.

In order to evaluate the overall relationship between birthdate and rate of participation, the "Total" scores found in Table 1 were compared, in a Chi Square analysis, to expected frequencies. The results of this analysis clearly demonstrate a relationship between the participation rates of players born in the different quarters of the year ($\chi^2 = 21.77$; df = 3; $p < .001$). These data are graphically depicted in Figure 1.

An examination of the data presented in Table 1 shows that there is no difference in the participation rate of young hockey players born in different quarters of the year in the "Mite F," "Mite," and "Junior" leagues. However, in the "Pee Wee," "Bantam," "Midget," and "Juvenile" leagues there is a statistically significant relationship between the number of players participating and the quarter of the year in which they were born. These results support the hypothesis that more players would be born in the first two quarters of the year and fewer players would be born in the last two quarters.

TABLE 1
Participation rates by league

		Number of players						
		Birthmonth					*Statistics*	
Age	*League*	Q-1 Jan.-Mar.	Q-2 Apr.-June	Q-3 July-Sept.	Q-4 Oct.-Nov.	Total	χ^2	Sig.
8 & Below	Mite F	450	434	393	399	1,676	5.39	N.S.
9 & 10	Mite	466	495	455	423	1,839	5.77	N.S.
11 & 12	Pee Wee	393	429	366	348	1,536	9.70	$p < .05$
13 & 14	Bantam	316	286	281	229	1,112	14.09	$p < .01$
15 & 16	Midget	202	238	204	171	815	11.04	$p < .05$
17 & 18	Juvenile	64	67	45	44	220	8.11	$p < .05$
19 & 20	Junior	30	22	30	33	115	2.32	N.S.
	Total	1,921	1,971	1,774	1,647	7,313	21.77	$p < .001$

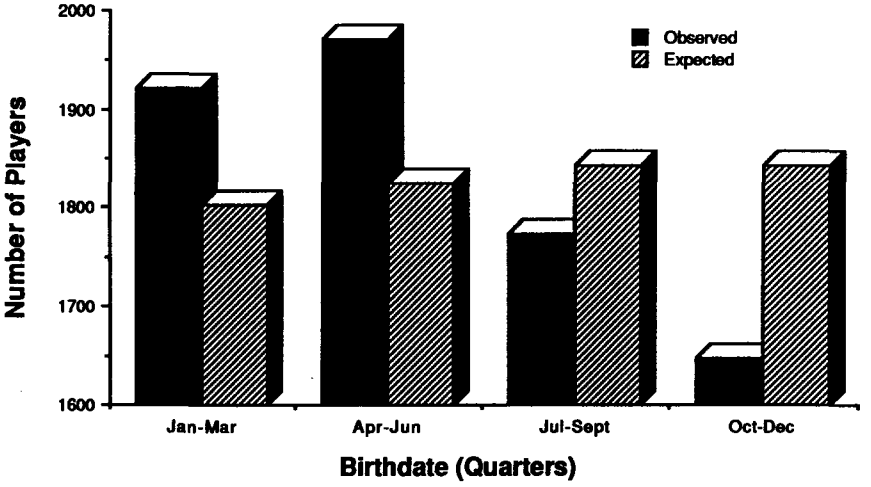

FIGURE 1
Relationship between birthdate and participation rates based upon 'Total' scores.

STUDY 2: BIRTHDATE AND SUCCESS IN MINOR HOCKEY

A second explanation that has been suggested to account for the relationship between month of birth and long-term success in hockey resides in the differential hockey experiences given to players who are chosen for "rep" teams (generally "representative" of a city or an area) or "top tier" teams in their leagues. The reasoning in this argument is that the young hockey players who have a relative age advantage (born in January, February, March) are more likely to be picked for the higher calibre teams than are those players who have a relative age disadvantage (born in October, November, December). Then, these higher calibre teams offer young hockey talent such advantages as better coaching, higher level competition, more ice time, greater prestige, and so forth. As a result, the future NHL players tend to evolve from the "rep" system and, therefore, it is hypothesized that the players chosen for the "rep" system will represent a larger number of players with a relative age advantage. Confirmation of this hypothesis could account for the findings of Barnsley, Thompson, and Barnsley (1985) with respect to the birth months of OHL, WHL, and NHL players.

METHOD

Subjects
The same subjects were used as in Study One.

Procedure
The birthmonths for all players were classified into quarters as in Study One and were then compiled by the level of league play. For example, players in the "Mite" division were compiled in "D" (bottom

tier), "C" (middle tier), or "B" (top tier) categories depending upon the classification of the hockey team for which they played. "Rep" teams are generally classified as "A" level teams.

In order to factor out the effects of "rates of participation" that were reported in Study One, all statistical analyses were compared against theoretical distributions that were constructed from the actual participation rates observed for each league. As a result, any observed statistically significant relationships would be independent of the differential quarterly participation rates observed in Study One.

RESULTS

The number of hockey players born in each quarter of the year referenced to the tier of league play in which they participated are found in Table 2.

In order to demonstrate the overall relationship between players' birthdates and the hockey tier in which they are participating, the data presented in Table 2 (excluding Mite F, Juvenile BB, and Junior B) were combined into three categories. The categories were Bottom Tier (the lowest tier teams in each league) Middle Tier (the middle tier teams in each league), and Top Tier (the top tier and "rep" teams in each league). A Chi Square analysis of these frequencies demonstrated a significant relationship between birth quarter and the tier level of minor hockey league participation ($\chi^2 = 160.89$; df $= 6$; $p < .001$). These data are presented graphically in Figure 2.

A better understanding of these data can be realized by examining Table 2. In viewing these results, it should first be noted that the "Mite F," "Juvenile BB," and "Junior B" data are the same as reported in Table 1 as there were no other tiers at these levels of play.

With regard to the remaining data, a number of interesting patterns emerge. First, it can be seen that in each league, with the exception of "Midget," the lowest tiers ("D") demonstrate significant relationships between birth quarter and participation rates. These results reflect fewer players with a relative age advantage playing at this lower tier level as opposed to quite a high proportion of players born in the last part of the year and thereby possessing a relative age disadvantage.

A second pattern can be discerned with respect to the middle tiers ("C") in that no relationship exists in this tier between birthdate and participation rate. This finding reflects the fact that at this level of play the hockey players' birth months are evenly distributed throughout the year. This would appear to be the result of the higher proportion of players with relative age advantage being placed in the higher tier leagues and the fact (Study 1) that players born in the last two quarters of the year are underrepresented in the Minor Hockey League program.

Finally, the third pattern that is found relates to the top tiers (Mite and Pee Wee "B," and Bantam and Midget "AA"). It can be seen that in each of these cases, statistically significant results exist that represent a much higher proportion of players born in the first half of the year than in the second half. This finding supports the hypothesis that selection to a top tier or "rep" team is highly related to the relative age advantage of the hockey players.

TABLE 2
Birth quarter and hockey league "tier"

		Number of players						
		Birthmonth					*Statistics*	
Age	*League*	Q-1 Jan.-Mar.	Q-2 Apr.-June	Q-3 July-Sept.	Q-4 Oct.-Nov.	Total	χ^2	Sig.
8 & Below	Mite F	450	434	393	399	1,676	5.39	N.S.
9 & 10	Mite D	168	186	201	209	764	12.27	$p < .01$
9 & 10	Mite C	197	216	194	182	789	.11	N.S.
9 & 10	Mite B	101	93	60	32	286	33.62	$p < .001$
11 & 12	Pee Wee D	89	129	122	121	461	11.08	$p < .05$
11 & 12	Pee Wee C	179	212	180	175	746	1.05	N.S.
11 & 12	Pee Wee B	125	88	64	52	329	29.44	$p < .001$
13 & 14	Bantam D	125	133	175	153	586	25.81	$p < .001$
13 & 14	Bantam C	62	54	48	42	206	.56	N.S.
13	Bantam AA Minor	72	55	39	17	183	21.57	$p < .001$
14	Bantam AA Major	57	44	19	17	137	22.17	$p < .001$
15 & 16	Midget C	101	130	122	110	463	3.79	N.S.
15 & 16	Midget B	56	72	54	45	227	.78	N.S.
15	Midget AA Minor	45	36	28	16	125	10.82	$p < .05$
17 & 18	Juvenile BB	64	67	45	44	220	8.11	$p < .05$
19 & 20	Junior B	30	22	30	33	115	2.32	N.S.

FIGURE 2
Relationship between birthdates and hockey tier.

DISCUSSION

Study One supports the hypothesis, proposed by Barnsley, Thompson, and Barnsley (1985), that the relative age differences in young hockey players would create differing experiences of success and thereby alter the participation rate of minor hockey league players based upon their month of birth. Thus, it can be concluded that the older players (January – June birthdates) continue to play minor hockey till a later age than do the younger players (July – December birthdates) who tend to drop out of the sport. Parenthetically, the fact that there was no participation effect in the Junior league is undoubtedly due to the fact that the better Junior hockey players participate in leagues outside of Minor Hockey Associations.

In Study Two, it was determined that the top tier or "rep" teams have a larger number of players born in the first half of the year than in the second half. Given that there is no reason to suspect that potential hockey talent is related to month of birth, it follows logically that a highly significant correlate in the selection of young "rep" hockey players is their age relative to the other participants. This, combined with the previously discussed differential experiences made available to the players of higher calibre teams, strongly suggests that a far larger proportion of hockey players born early in the year are developed to their potential than is the case of those born later in the year. These results appear to account for the pre-

viously observed relative age effect (Barnsley, Thompson, & Barnsley, 1985) in WHL, OHL, and NHL hockey. In a light, yet serious vein, it could be argued from these data that professional hockey players are really drafted when they are nine years old, at the time when they are selected for the top tier leagues in their age group.

In relation to these findings, it is interesting to consider whether the observed relative age effect in hockey is evident in other areas of sports endeavour. Recently, Daniel and Janssen (1987) looked for relative age effects in professional football, basketball, and baseball and, having found none, conclude that these findings ". . . lend support to the theory that the relative age effect is a product of the *present* Canadian minor hockey system. . . " (Daniel and Janssen, 1987, p. 23). Clearly, this study lends empirical support to the "theoretical" assertion of Daniel and Janssen (1987) and strongly suggests that the underlying factor is the early age at which minor hockey, in comparison to other youth sports programs, begins highly competitive programs which "tier" players or select "rep" teams.

Given this situation, the question is raised as to what could be done to remedy the differing rates of participation and success which are related to month of birth. In considering this issue, three possible groups of proposals emerge that could reduce the observed relationships with month of birth. First, it is suggested that simply bringing this study to the attention of minor hockey league officials may create an awareness of the problem, which, in itself, may lead to a reduction of the relative age effect.

A second set of proposals is based on the assumption that as participation and success are related to relative age, then manipulations of relative age could be used to alter the phenomenon. In this regard, such ideas emerge as: a) lessening the range of the age groupings and thereby reducing the relative age advantage of the "older" players; b) changing the annual cut-off dates for the age groupings (currently December 31st) from year to year in order to provide different groups of players with a relative age advantage; or c) implementing a quota system in the selection of the higher calibre teams in order to ensure that a proportionate number of "younger" relative age players have the opportunity to play on "rep" teams. These strategies should significantly alter or eliminate the relative age effect in minor hockey. However, such proposals appear to be unacceptable to officials of minor hockey league organizations as they tend to be administratively cumbersome and may have the effect of reducing the calibre of play in the younger teams.

A third set of proposals considers the possibility of restructuring minor hockey programs in Canada. In this light, it is suggested that a review could be undertaken which would focus on such issues as: a) the advantages and disadvantages of the "tier" system; b) the optimal age at which "rep" hockey should begin; c) possible classification criteria in addition to age and ability (e.g., height and weight); d) the time at which body checking is initiated and, whether opportunity ought to be provided to all players, regardless of age, to play "no hit" hockey; and e) whether

the current competitive nature of minor hockey is more effective than alternate programs such as "hockey school" formats. Finally, it is suggested that in such a review the basic philosophy underlying minor sport could be examined. Specifically, should it be the purpose of minor hockey in Canada to develop hockey players for the National Hockey League, or to use the experience of sport to assist in the development of youth? Clearly, the consideration of such questions may effect the lives of many young people.

RÉSUMÉ

Des recherches antécédentes (Barnsley, Thompson, & Barnsley, 1985) ont démontré une relation linéaire extrêmement puissante entre le mois de la naissance (de janvier à décembre) et la probabilité de jouer dans la Ligue Nationale de Hockey et dans deux ligues de hockey junior. La présente étude analyse les dates de naissance de 7313 joueurs de hockey qui participaient dans l'Association de Hockey Mineur d'Edmonton durant la saison 1983–1984. Les résultats principaux sont que les joueurs qui possèdent un avantage relativement à l'âge, c'est-à-dire ceux nés entre les mois de janvier et de juin, sont plus sujets à participer dans le hockey mineur ainsi qu'à évoluer pour les équipes de premier rang et les équipes représentatives que les joueurs nés entre les mois de juillet à décembre. Des propositions permettant de réduire ces effets relatifs dus à l'âge sont considérés.

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