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Is relative age associated with sport dropout?
: Evidence from Japanese novelists

Hiroki Nakata 1)  Kiwako Sakamoto 2)

Abstract
The present study investigated the existence of the relative age effect, a biased distribution of birth dates, in Japanese novelists. The relative age effect is considered to be a factor for success in sporting activities, with relatively older players in the same age group being more likely to achieve sporting success than younger players. We hypothesized that relatively younger people were more likely to focus on other things besides sporting success, such as their work, study, obtaining licentiates, and hobbies, than relatively older people. A statistically biased distribution was observed in birth dates among novelists born in the 1940s and onward, and the percentage of relatively younger people that were winners of the Akutagawa Prize or Naoki Prize, prestigious Japanese literary awards, was significantly higher than relatively older people. These results suggest that relatively younger people shifted their interest from succeeding in sport to something else, and relative age effects lasted in both childhood and adults.

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Keywords: RAE, Sports, Dropout

キーワード：相対年齢効果，スポーツ，ドロップアウト

1) Corresponding author
奈良女子大学 研究院生活環境科学系
〒630-8506 奈良県奈良市北魚屋町
Nara Women’s University, Department of Health Sciences, Faculty of Human Life and Environment,
Kitauoya-Nishi Machi, Nara, 630-8506, Japan
E-mail: hiroki-nakata@cc.nara-wu.ac.jp

2) 自然科学研究機構 生理学研究所 感覚運動調節研究部門
Introduction

The relative age effect is considered to be a factor for success in sporting activities; relatively older children and players in the same age group were shown to be more likely to achieve sporting success than younger children and players. The relative age effect has been confirmed in many sports including baseball, soccer, ice hockey, cricket, basketball, sumo, NASCAR, and tennis. It is a complex phenomenon involving several possible factors and characteristics. The first factor is physical development. The attributes of greater height, mass, aerobic power, muscular strength, endurance, and speed have been shown to provide performance advantages in most sports. Therefore, relatively older children are more likely to be more successful and have longer playing times. The second factor is competition. Competition should come from the number of players for available places, and this number has been shown to depend on the popularity of a given sport in a given country. In addition, relative age effects do not exist in all sporting events in a given country. A previous study found no significant relative age effect in handball, rugby, badminton, American football, or golf among Japanese male players, whereas a significant relative age effects was observed in not only the major sports played in many countries, such as soccer, baseball, basketball, and volleyball, but also in sports unique to Japan, such as sumo and Ekiden, a long-distance relay running race. In Japan, baseball, soccer, volleyball, and basketball are very popular among male elementary and junior high school students, while handball, rugby, badminton, and American football are not as popular. Therefore, if a sport does not need a physical advantage and is not popular in a given country, the relative age effect may not be observed.

In the present study, our interest was different from traditional sport sciences that observed a significant relative age effect in sporting events, in that we investigated the relative age effect in novelists. We hypothesized that relatively younger people were more likely to focus on other things besides sporting success, such as their work, study, obtaining licentiates, and hobbies, than relatively older people. Relatively younger players may experience failure and frustration and be more likely to withdraw from the sport rather than to continue voluntary participation. Indeed, a recent study reported that greater psychological difficulties are experienced by children who drop out of sports, and greater social and emotional problems are experienced by
children who drop out of sports. We considered that in the study field of sport sciences, it was important to assess why people decided to drop out the sport, and what they had interests for after dropout or self-elimination from the sport. In the present study, we investigated Japanese novelists. There are two prestigious literary awards in Japan, the Akutagawa Prize and Naoki Prize. The Akutagawa Prize was established in 1935 in memory of the author, Ryunosuke Akutagawa, and is awarded every January and July to the best legitimate novel. The Naoki Prize was also founded in 1935 in memory of the author, Sanjugo Naoki, and is also awarded every January and July to the best lowbrow literature. We focused on the relative age effects in novelists for two reasons. The first is that data regarding the birth dates and profiles of winners of these prizes is more accessible than other work, due to personal information protection. The second is that these winners are clearly successful people in this field, which is similar to professional sports players. We analyzed the distribution of birth dates for novelists, and considered sociocultural factors contributing to the relative age effect.

Methods

Samples

A total of 327 Japanese novelists (76 females and 251 males) were evaluated in the present study. All novelists were winners of the Akutagawa Prize or Naoki Prize. The novelists were grouped into four categories according to their birth year. Sample sizes were 80 novelists in 1894-1920 (before 1920), 113 in 1921-1940 (the 1920s-1930s), 79 in 1941-1960 (the 1940s-1950s), and 55 in 1961-1984 (after 1960). The birth dates of samples were collected from official websites as of July 18th, 2013.

Procedure

Japan has applied a unique annual-age grouping for education since 1886, which is from April 1 to March 31 of the following year. Therefore, April 1 is the beginning of the ‘new year’, and this specific calendar follows an education system including elementary, junior high, and senior high schools, university (college), government, company, and sports calendars. Novelists were divided into four groups based on their month of birth; quarters Q1 (April–June), Q2 (July–September), Q3 (October–December), and Q4 (January–March of the following year). Two researchers double-checked that the data were
Chi-square tests were applied to each group according to the four quarters to assess the significance of deviations from the expected number of births in each quarter. In line with previous studies \(^7\), \(^17\), \(^18\), the expected distribution was calculated based on national birth statistics for females and males during 1911-1980 in Japan (Ministry of Internal Affairs and Communications, the Statistics Bureau and the Director-General for Policy Planning of Japan \(^2\)). The expected number of births was calculated by utilizing national birth statistics during 1911-1920 for before 1920, during 1921-1940 for the 1920s-1930s, during 1941-1960 for the 1940s-1950s, and during 1961-1980 for after 1960. Statistical significance was set at \(p \leq .05\).

\(^2\) (http://www.stat.go.jp/index.htm)

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### Results

Table 1 shows the results of chi-square tests for each group. A significant relative age effect was not observed in any group, but a slight relative age effect was observed for the 1940s-1950s (effect size = 0.28) and after 1960 (effect size = 0.34).

Based on this result, we reanalyzed the relative age effect by grouping all novelists into two categories, before 1940 and after 1940. A significant relative age effect was observed after 1940 (effect size = 0.32), but not before 1940 (effect size = 0.09) (Table 1 and Figure 1).

Table 2 shows the distribution of the general population for each decade among Japanese people. A biased distribution was found in the 1910s, 1920s, 1930s, 1940s, and 1950s, which indicated that the birth percentage was more than 29% for Q4. Thus, even if the birth percentage among novelists for Q4 was 36.3% before 1920 and 32.7 in the 1920s-1930s, a significant relative age effect was not detected.

### Discussion

In our previous study, we investigated the existence of the relative age effect in Japanese professional baseball players born between 1911 and 1980 \(^17\). Significantly biased distributions of birth dates were observed among players born in the 1940s and subsequent decades (medium effect), and a similar (but small) relative age effect was observed among players born in the 1910s, 1920s, and 1930s. The percentage of Q1 (April-June) was 28.1% in the 1910s, 25.1% in the 1920s, 28.0% in the 1930s, 35.6% in the 1940s, 32.4% in the 1950s, 34.1% in the 1960s, and 36.8% in the
Table 1: Distribution of all novelists divided into quarters and halves according to birth year groups

<table>
<thead>
<tr>
<th></th>
<th>Q1 (Apr-Jun)</th>
<th>Q2 (Jul-Sep)</th>
<th>Q3 (Oct-Dec)</th>
<th>Q4 (Jan-Mar)</th>
<th>Total</th>
<th>(X^2)</th>
<th>P</th>
<th>Effect size</th>
</tr>
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<tbody>
<tr>
<td>Before 1920</td>
<td>N: 14 (17.5)</td>
<td>N: 13 (16.3)</td>
<td>N: 24 (30.0)</td>
<td>N: 29 (36.3)</td>
<td>80</td>
<td>2.5</td>
<td>0.47</td>
<td>0.18</td>
</tr>
<tr>
<td>1920s–1930s</td>
<td>N: 25 (22.1)</td>
<td>N: 24 (21.2)</td>
<td>N: 27 (23.9)</td>
<td>N: 37 (32.7)</td>
<td>113</td>
<td>0.2</td>
<td>0.97</td>
<td>0.05</td>
</tr>
<tr>
<td>1940s–1950s</td>
<td>N: 16 (20.3)</td>
<td>N: 12 (15.2)</td>
<td>N: 22 (28.8)</td>
<td>N: 33 (41.8)</td>
<td>79</td>
<td>6.2</td>
<td>0.10</td>
<td>0.28</td>
</tr>
<tr>
<td>After 1960</td>
<td>N: 10 (18.2)</td>
<td>N: 13 (23.6)</td>
<td>N: 18 (22.8)</td>
<td>N: 22 (40.0)</td>
<td>55</td>
<td>6.5</td>
<td>0.09</td>
<td>0.34</td>
</tr>
</tbody>
</table>

Before 1940     | N: 39 (20.2) | N: 37 (19.2) | N: 51 (26.4) | N: 66 (34.2) | 193   | 1.4    | 0.70| 0.09        |
| After 1940     | N: 26 (19.4) | N: 25 (18.7) | N: 28 (20.9) | N: 55 (41.0) | 134   | 10.9   | 0.01*| 0.29        |

The number in the second row shows the expected number of samples. Note: N = number of samples; \(X^2\) = Chi^2-value.

Table 2: Distribution of the general population (female and male) divided into quarters according to birth year groups

<table>
<thead>
<tr>
<th></th>
<th>Q1 (Apr-Jun)</th>
<th>Q2 (Jul-Sep)</th>
<th>Q3 (Oct-Dec)</th>
<th>Q4 (Jan-Mar)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910s</td>
<td>N: 3,498,955 (19.4)</td>
<td>N: 3,926,666 (21.7)</td>
<td>N: 4,386,077 (30.0)</td>
<td>N: 6,242,435 (36.3)</td>
<td>18,054,113</td>
</tr>
<tr>
<td>1920s–1930s</td>
<td>N: 8,320,438 (20.1)</td>
<td>N: 9,305,707 (22.5)</td>
<td>N: 9,706,741 (23.4)</td>
<td>N: 14,088,120 (34.0)</td>
<td>41,421,006</td>
</tr>
<tr>
<td>1940s–1950s</td>
<td>N: 9,537,760 (22.6)</td>
<td>N: 10,197,994 (24.2)</td>
<td>N: 9,873,104 (23.4)</td>
<td>N: 12,610,539 (29.9)</td>
<td>42,219,397</td>
</tr>
<tr>
<td>1910s–1940s</td>
<td>N: 11,819,393 (19.9)</td>
<td>N: 13,232,353 (22.2)</td>
<td>N: 14,092,818 (23.7)</td>
<td>N: 20,330,555 (34.2)</td>
<td>59,475,119</td>
</tr>
<tr>
<td>1940s–1970s</td>
<td>N: 18,367,128 (23.5)</td>
<td>N: 19,375,930 (24.8)</td>
<td>N: 18,594,446 (23.8)</td>
<td>N: 21,861,170 (28.0)</td>
<td>78,198,674</td>
</tr>
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1970s. This study suggested that the magnitude of the relative age effect changed especially among players born in the 1940s onwards. This characteristic was symmetric to the present results for Japanese novelists, in which a significant relative age effect was found after 1940, but not before 1940 (Table 1). Therefore, sociocultural factors relating to symmetric relative age effects on novelists and baseball players should be considered. Two studies suggested population growth and increased participation in sport, and the international stage associated with heightened
Before 1940

![Birth data distribution before 1940 and after 1940.
Q1 = April-June; Q2 = July-September; Q3 = October-December; Q4 = January-March](image)

Q1 = April-June; Q2 = July-September; Q3 = October-December; Q4 = January-March

competition in youth sport, linked to media coverage and the growth of television. Since media coverage, especially television, started broadcasting professional baseball games in Japan in the 1950s, a marked increase in the percentage of Q1 among baseball players from the 1940s onwards would be confirmed in the relative age effect on the history of Japanese baseball. In contrast, because of later psychological and physical development (e.g. height, weight, and muscular strength), relatively younger people experience disadvantages for succeeding in sport, and may be more likely to have negative sport experiences in childhood. Thus, we suggest that their interest shifted from succeeding in sport to something else. In other words, relatively younger people may hope to succeed in other things in their lives, whether consciously or not. These characteristics develop in childhood, and have long-lasting effects on adults. Relatively younger people perceive disadvantages in many things in their lives, while the results for novelists may encourage them to think positively. As a matter of course, becoming a novelist requires effort from all individuals.

The general population showed a biased distribution of birth dates from the 1910s to 1950s (Table 2); many Japanese were born in Q4 (January-March). However, it is difficult to explain this finding. We suggest two possible reasons. The first explanation is related to the social structure of workers in Japan. In 1920, 53.8% of workers were engaged in primary industries including agriculture, forestry, and fishery, and 23.7% in tertiary industries such as information-communication technology, finance, service, real estate, and education. In 1960, 32.7% of workers were engaged in primary industries and 38.2% in tertiary industries. In 1980, 10.9% of workers were in primary industries and 55.4% in tertiary industries. Larger changes were not seen over time in the percentage of workers in secondary industries including mining,
construction, and manufacturing, 20.5% in 1920, 29.1% in 1960, and 33.6% in 1980. The definition of industry was based on the Japan Standard Industrial Classification.

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3 Ministry of Internal Affairs and Communications, the Statistics Bureau and the Director-General for Policy Planning of Japan (http://www.stat.go.jp/index.htm)

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As the nation’s economy grew stronger, tertiary industries began to expand rapidly. Before WWII, most Japanese workers categorized in primary industries were rice farmers. Rice was the staple food in Japan for breakfast, lunch, and dinner, and Japanese-sake, which is an alcohol beverage, was made from fermented rice. In general, Japanese farmers plant rice in late May, and harvest it in late September. Therefore, June, July, and August are busy months for cultivating rice, whereas March, April, and May are not. We speculated that time pressures in daily life were related to the birth rate, and the planting season, including June, July, and August, was associated with low birth rates in April, May, and June in the 1910s, 1920s, and 1930s. A previous study on Japanese lifestyle, which investigated sexual relationships in 1468 Japanese people, reported that the highest percentage of people did not have such a relationship because of work-related exhaustion. The second explanation is that the season of birth in humans has been associated with temperature. According to Cogwill, the number of births may be related to temperature. Even higher primates including humans have an annual breeding season in the spring because many European countries such as Norway, Sweden, Finland, France, England, and the Netherlands show a major peak in births between January and April. In our results, this was consistent with the birth distribution from the 1910s to 1950s, but not from the 1960s onwards (Table 2). Cogwill assumed that as the standard of living in all these countries improved, the chance of being born alive during the "off-season" became greater, which may have had some effect on birth patterns.

There are several limitations in this study. First, it is difficult to explain the exact reason why a significant relative age effect was observed among novelists. As mentioned in the Introduction section, we hypothesized that relatively younger people were more likely to focus on other things besides sporting success, such as reading, writing, their work, study, obtaining licentiates, and hobbies, than relatively older people. Further studies are needed to clarify this. Second, this phenomenon may be specific to Japan because the history of social structures in Japan clearly differs from other...
countries, and many activities, sports-related or academic, in Japan are based on a unique cutoff date (April 1st), which is not the case in other countries.

In conclusion, a relative age effect existed among Japanese novelists born in the 1940s onwards. We assumed that relatively younger people may focus on other things such as reading and writing, rather than sporting success. In addition, since the magnitude of the relative age effect changed with time, socio-cultural factors including economics and history should be considered to clarify the detailed mechanisms of the relative age effect in future studies.

References


