

A New Factor in Youth Suicide: The Relative Age Effect

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Objective: To determine whether youth in Alberta who had completed suicide were more likely to be younger than their classmates on entering grade 1 (that is, showed a relative age effect).

Method: Records were obtained for all deaths by suicide by individuals under the age of 20 years in Alberta during the years 1979–1992. The relative age of each of these persons was determined by comparing his or her month of birth to the birth months of the appropriate school-grade cohort.

Results: A disproportionate number of the subjects were born in the second half of the “school eligibility year,” indicating a higher probability that those who completed suicide were younger than their classmates.

Conclusions: Previous research indicates that relative age is strongly related to school performance and success in sports. The present study demonstrates that the relative age effect is also a factor in youth suicide. It is suggested that the higher incidence of youth suicide in the group of relatively younger school children may have resulted from poorer school performance, which in turn led to lowered confidence and self esteem. Past research suggests that these conditions may predispose children to hopelessness and depression, which are often thought to be essential components of suicide. Research aimed at neutralizing the negative effects of relative age should have important personal and social consequences.

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In 1938, Ellsworth Huntington of Yale University in “Season of Birth” analyzed volumes of quantitative archival data and reported “the cold facts as to millions of births leave no doubt that on an average the people born in February and March differ decidedly from those born in June and July. . . they also include a larger proportion not only of distinguished people, but also of unfortunates who become criminals or are afflicted with insanity or tuberculosis” (1, p 26). These startling differences based on “season of birth” have generated a great deal of research, particularly in relation to schizophrenia. A review of the research on season of birth and schizophrenia by Bradbury and Miller lists 104 related references (2), and the topic continues to stimulate the interest of researchers (for example, 3).

A similar area of research regarding the relationship of birth dates to performance and ability has not been as influential, particularly in the psychiatric literature. This is interesting because the phenomenon, spoken of as the “relative age effect,” the “birthday effect,” or the “age position effect,” has established powerful data that should interest practitioners in various disciplines and professions. This paper briefly summarizes the findings of the “relative age” literature and presents data indicating that this effect is related to the incidence of completed suicides in young adults.

The relative age phenomenon is based on children’s birth dates, not relative to the calendar year as with the season-of-birth literature, but rather as age-advantageous or -disadvantageous positions with regard to other children in a particular age-group. The effect is produced when, for logistical reasons, children are grouped by age for school attendance or other activities where performance is strongly correlated with development. Generally, such age groupings include children born in a 1-year period, and these 1-year periods, depending on the activity, may be defined differently than the calendar year. For example, an age grouping for attending school could be from September 1st to August 31st, while the age grouping for playing soccer is generally from August 1st to July 31st. A great deal of research has indicated that the differences in ages between children in these constructed groupings can confer significant advantages on the older children and present substantial challenges for those who are younger. This within-group “relative age effect” has been shown to produce substantial differences in school performance and in the development of professional athletes.

In school, children with a relative age advantage are more likely to have higher achievement (4,5) and to be placed in more challenging educational streams or classes (6,7), whereas children with a relative age

disadvantage are more likely to be retained (failed) for an additional year in the same school grade (8), referred for psychological assessment (9), and placed in a specialized group or provided with a diagnostic label for remedial instruction (10).

In minor league sports, children with a relative age advantage are more likely to play hockey in the National Hockey League (11), Major League baseball (12), and world class soccer (13). In contrast, children with a relative age disadvantage are more likely to stop playing the particular sport at an earlier age and, when they do participate, to play at a competitively lower level (14).

The simple conclusion from such studies is that children with a relative age advantage are more likely to succeed, while children with a relative age disadvantage are more likely to encounter problems in the particular activity for which they have been "age grouped." Clearly, in sports this is not necessarily a problem, since a particular child is not required to participate, or if athletic success is important, the child can choose a different sport with an age grouping that provides the child with a relative age advantage.

Such, however, is not the case with school. In school the child is placed in a particular age grouping and will, unless retained or accelerated, remain with the same age-cohort of children from grade 1 onward. Therefore, it is argued that children who experience the negative effects of a young relative age on school entry will experience both short- and long-term disadvantages at a higher rate than their age-grouped older classmates. It is predictable, and important, that such school-based disadvantages will produce later negative social-emotional effects (15,16).

The rationale for the present study resides in the proposition that differences in school performance will affect teacher and peer expectations, with a resulting impact on matters such as self-confidence, self-concept, self-esteem, and self-efficacy. Whichever of these concepts is considered, the consensus is that a deficit is related to depression (17-19) or something akin to it, such as apathy or hopelessness (20). It has been well documented that depression shows a strong association with suicide (21-23) and suicide attempts (24-26). Further, depression and hopelessness are generally regarded as the essential ingredients of completed suicide (27,28). Therefore, it seems reasonable to predict that a relative age effect would be a causative agent for suicide in an individual who, because of being younger than his or her age-grouped classmates, came to lose confidence in his or her ability to do well in school. Thus, it is hypothesized that a relationship exists between relative age in school and suicide.

Method

Records were obtained for all deaths by suicide by individuals under the age of 20 years in Alberta during 1979-1992. These data were taken from the files of the Alberta Provincial Medical Examiner's Office.

At the time the persons in this study attended school, there were more than 150 independent school districts in Alberta, each exercising local authority in defining the dates for the age-group that would enter grade 1. For example, School District A might decide that the age-group for grade 1 would consist of children turning 6 years old between January 1st and December 31st, while neighbouring School District B, might decide that the age-group for their grade 1 classes would consist of children turning 6 years old between March 1st of one year and February 28th of the next. Thus, a child born in January or February in District B would begin school 1 full year earlier (and be one of the youngest in the class) than if the child were resident in School District A (where he or she would be one of the oldest in her class).

Given this situation, it was necessary to establish the relative age for each person in the study in relation to his or her school district. This was done by matching the address of each individual with the corresponding school district, determining the start and end dates for that district's age grouping, and then assigning to that individual his or her relative age within that school district.

It should be noted here that, due to limitations of the data, this method of "assignment" was based on the address of the individual at the time of death. For most cases, this will correctly identify the location at school commencement some time earlier. However, some individuals will have changed residence and perhaps school jurisdiction, causing some to be incorrectly assigned. While there are no data that can be brought to bear directly on this, it has been found that over a 5-year period, about 15% of children in Alberta will have changed health regions (there are 17 such regions in Alberta) (29). Since any resulting misclassification of birthdates has the effect of placing "older" persons in the "younger" birth categories and "younger" persons in the "older" categories, the consequence should be a net dilution of the relative age effect, thereby causing an underestimate of any possible influence.

Each individual's "relative age" was coded as either H1 (older, birthdate in first half of age-grouping year) or H2 (younger, birthdate in second half of year). For example, in School District A above, with an age grouping from January 1st to December 31st, H1 includes January to June, whereas H2 includes July to December. However, in School District B, H1 includes March to September, whereas H2 includes October to August. Thus, a child born in January would be coded H1 if he or she attended School District A, but H2 if he or she attended School District B. In this way, all persons in the study were assigned a "relative age," regardless of school district attended or chronological age.

Results

Table 1 shows the school relative age classification of the persons who are represented in this study. It can be seen from these data that the majority of persons (approximately 95%) attended school districts that used either March 1st to February 28th or January 1st to December 31st age-groups.

Table 1. "Relative age" classification of the persons represented in this study according to school eligibility year

	H1 (Older)	H2 (Younger)
March 1–February 28	152	172
January 1–December 31	92	117
September 1–August 31	5	9
November 1–October 31	2	7
October 1–September 30	1	6
December 1–November 30	0	1
Total	252 (44.7%)	312 (55.3%)

Table 1 also shows the total number of persons in this study classified by relative age. In all, 252 individuals were born in the first 6 months of the school eligibility year, and 312 were born during the last 6 months. A chi-square test of these data yielded a value of 6.38 ($P < 0.01$, $df = 1$), which indicates that the number of persons represented in each half-year is statistically different than would be expected by chance alone. In other words, the data demonstrate a statistically significant relationship between completed suicide and the individual's relative age in school.

Discussion

The results of previous research on the relative age effect have frequently provided large and striking effects. For example, it has been found that approximately 70% of successful hockey and soccer players had a relative age advantage because they were born in the first-half of the defined age-group for their respective sports. By comparison, only 30% of these top-level players were born in the last 6 months of the respective "sport year" (11,13).

The present study did not yield such large differences in suicide rates between those with a relative age disadvantage and those with a relative age advantage. Nevertheless, the predicted relationship between completed suicide and relative age was clearly evident and was statistically significant at $P < 0.01$. Given that various school age groupings existed at the time of the study, that it was difficult to establish with absolute certainty the appropriate school district for each suicide victim, that family movement frequently places children in different school districts with different age groupings, that for particular students relative age may change as a result of grade retention or acceleration, and that errors in categorizing an individual's relative age diminish the effect, then the results of this study not only are compelling but strongly suggest that the effects of relative age may be robustly related to youth suicide. In any case, the results are too provocative and potentially important to ignore.

To reliably establish the relationship between relative age and youth suicide, other studies such as this ideally should be undertaken in jurisdictions with only 1 age grouping for school attendance. However, given the current extent of family mobility and the practical problem of accessing individual suicide data, it is doubtful that such research will emerge. Therefore, future research in this area may more profitably study the negative social and personal consequences of relative age through such indicators as school absenteeism, early self-esteem, school dropout rates, or young offender rates. Since there are strong relative age findings in other areas, it is predictable that strong relationships will be found.

If there is a relationship between relative age and negative social and personal problems, what possible remedies might exist? To date, school policymakers, who should be aware of the privileging and marginalizing effects of relative age, have taken no initiatives to compensate for the effect of educational age grouping. Parenthetically, for at least 30 years, educators have usually subsumed the discussion about relative age under the maturational notion of "school readiness," and it then followed that the reported problems could be solved by raising school entrance age. However, Morrison and others have demonstrated that, while at any point in time younger children know less than their older classmates, these same younger children do learn as much and at a rate similar to their older peers (30). These data clearly reject the notion of "school readiness" as an explanation for the relative age effect. Logic and empirical data demonstrate that the relative age effect is an independent phenomenon, and although a number of proposals have been suggested to reduce this effect in both school and sport, no clear solutions are evident. However, if data such as these in the present study accumulate, solutions must be found.

Clinical Implications

- Those who are or were younger than their classmates at school may be at higher risk for emotional disturbance and suicidal behaviour.
- Relative age effects are, at present, not attended to.
- Prevention-planning endeavours could benefit from the consideration of relative age effects.

Limitations

- The association between relative age and suicide is likely underestimated because of many factors that cannot be controlled (for example, different school age groupings, family migration).
- Relative age effects relevant to suicide are not likely restricted to the school age cohorts studied here.
- A new methodology may have to be developed for further studies on relative age and suicide.

References

1. Huntington E. Season of birth. New York: John Wiley & Sons; 1938.
2. Bradbury TN, Miller GA. Season of birth in schizophrenia: a review of evidence, methodology, and etiology. *Psychol Rev* 1985;98:569-94.
3. McGrath J, Welham J, Pemberton M. Month of birth, hemisphere of birth and schizophrenia. *Br J Psychiatry* 1995;167:783-5.
4. Thompson D. Season of birth and success in the secondary school. *Educational Research* 1971;14:56-60.
5. Allen J, Barnsley RH. Streams and tiers: the interaction of ability, maturity, and training in systems with age-dependent recursive selection. *J Hum Resources* 1993;28:649-59.
6. Freyman R. Further evidence on the effect of date of birth on subsequent school performance. *Educational Research* 1965;8:58-64.
7. Sutton P. Correlation between streaming and season of birth in secondary schools. *Br J Educ Psychol* 1967;37:300-304.
8. Langer P, Kalk JM, Searls DT. Age of admission and trends in achievement: a comparison of Blacks and Caucasians. *American Educational Research Journal* 1984;21:61-78.
9. DiPasquale GW, Moule AD, Flewelling RW. The birthdate effect. *Journal of Learning Disabilities* 1980;13:4-8.
10. Maddux CD. First-grade entry age in a sample of children labeled learning disabled. *Learning Disability Quarterly* 1980;3:79-83.
11. Barnsley RH, Thompson AH, Barnsley PE. Hockey success and birthdate: the relative age effect. *Canadian Association for Health, Physical Education, and Recreation Journal* 1985;51:23-8.
12. Thompson AH, Barnsley RH, Stebelsky G. Born to play ball: the relative age effect and major league baseball. *Sociology of Sport Journal* 1991;8:146-51.
13. Barnsley RH, Thompson AH, Legault P. Family planning football style: the relative age effect in football. *International Review for the Sociology of Sport* 1992;27:77-88.
14. Barnsley RH, Thompson AH. Birthdate and success in minor hockey: the key to the NHL. *Can J Behav Sci* 1988;20:167-76.
15. Holmes CT, Matthews KM. The effects of nonpromotion on elementary and junior high school pupils: a meta-analysis. *Review of Educational Research* 1984;54:225-36.
16. MacMillan DL, Meyers CE. Educational labeling of handicapped learners. In: Berliner DC, editor. *Review of research in education*. Volume 7. Washington (DC): American Educational Research Association; 1979.
17. Abramson LY, Metalsky GI, Alloy LB. Hopelessness depression: a theory-based subtype of depression. *Psychol Rev* 1989;96:358-72.
18. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev* 1977;84:191-215.
19. Battle J. The relationship between self-esteem and depression among high school students. *Percept Mot Skills* 1980;51:157-8.
20. Skinner BF. What is wrong with daily life in the western world? *Am Psychol* 1986;41:568-74.
21. Borg SE, Stahl M. A prospective study of suicides and controls among psychiatric patients. *Acta Psychiatr Scand* 1982;65:221-32.
22. Dorpat TL, Ripley HS. A study of suicide in the Seattle area. *Compr Psychiatry* 1960;1:349-59.
23. Guze SB, Robins E. Suicide and primary affective disorder. *Br J Psychiatry* 1970;117:437-8.
24. Dyck RJ, Bland RC, Newman SC, Orn H. Attempted suicide and psychiatric disorders in Edmonton. *Acta Psychiatr Scand* 1988;77 Suppl 338:64-71.

25. Silver MA, Bohnert M, Beck AT, Marcus D. Relation of depression, attempted suicide, and seriousness of intent. *Arch Gen Psychiatry* 1971;25:573-6.
26. Weissman MM. The epidemiology of suicide attempts, 1960 to 1971. *Arch Gen Psychiatry* 1974;30:737-46.
27. Beck AT, Kovacs M, Weissman MM. Hopelessness and suicidal behaviour: an overview. *JAMA* 1975;234:1146-9.
28. Dyer J, Kreitman N. Hopelessness, depression and suicidal intent in parasuicide. *Br J Psychiatry* 1984;144:127-33.
29. Schopflocher D. Representing migration between Regional Health Authorities. Graph of The Week #41. Alberta Department of Health; November 12 1996.
30. Morrison FJ, Alberts DM, Griffith EM. Nature-nurture in the classroom: entrance age, school readiness, and learning in children. *Dev Psychol* 1977;33:254-62.

Résumé

Objectif : Déterminer si les jeunes de l'Alberta qui se sont suicidés étaient susceptibles d'être plus jeunes que leurs camarades de classe en entrant en première année (c'est-à-dire, s'ils présentaient un effet de l'âge relatif).

Méthode : On a obtenu les dossiers de tous les décès par suicide des personnes de moins de 20 ans en Alberta, entre 1979 et 1992. L'âge relatif de chacune de ces personnes était déterminé en comparant la date de naissance de la personne aux mois de naissance de la cohorte de la classe appropriée.

Résultats : Un nombre disproportionné de sujets sont nés dans la deuxième moitié de « l'année d'âge scolaire admissible », ce qui indique une probabilité élevée que les personnes qui se sont suicidées étaient plus jeunes que leurs camarades.

Conclusions : La recherche précédente indique que l'âge relatif est fortement lié au rendement scolaire et à la réussite sportive. La présente étude démontre que l'effet de l'âge relatif est également un facteur du suicide chez les jeunes. L'on suggère que l'incidence plus élevée de suicide au sein du groupe d'enfants d'âge scolaire relativement plus jeune peut être le résultat d'un piètre rendement scolaire, qui a entraîné une diminution de la confiance et de l'estime de soi. La recherche antérieure porte à croire que ces conditions peuvent prédisposer les enfants au désespoir et à la dépression, que l'on tient pour des composantes essentielles du suicide. La recherche visant à neutraliser les effets négatifs de l'âge relatif devrait avoir d'importantes répercussions personnelles et sociales.

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