




Sex Differences in Suicide Trends Among Adolescents Aged 10 to 14 Years in Canada

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Introduction

Suicide rates appear to be rising rapidly among youth in North America.¹⁻⁴ Historically, adolescent males have had much higher rates than females; however, this gap may be narrowing due to rising suicides among female adolescents.^{4,5,6} Over the last 40 years, reported youth suicide rates in the United States have increased most disproportionately among females aged 10 to 14 years, mainly by hanging and suffocation,⁴ but also by self-poisoning in the 10- to 12-year age group.³ In Canada, reported rates among females aged 10 to 14 have also steadily increased while rates among males have remained stable or declined.⁵ Although Canadian studies have presented suicide rates in young women across age brackets,^{5,6} no study has tested for sex differences in the 10 to 14 age group specifically.

The ages of 10 to 14 are marked by the onset of puberty, accelerated brain maturation, and, for many, a rapid rise in symptoms of depression and anxiety.^{57,58} These years are also when self-harm commonly emerges⁵⁹ and when adolescents are particularly impressionable, with increased susceptibility to social contagion.⁵¹⁰ Prior research has combined the younger ages of 10 to 14 years with older adolescents aged 15 to 19 years⁵; however, this approach risks masking granular data that is essential for detecting emerging trends and informing targeted suicide prevention strategies for this vulnerable group. As such, the objective of this study is to compare suicide rates among female and male adolescents aged 10 to 14 years in Canada from 2000 to 2018 and to test for sex differences in suicide trends in this age group over time.

Methods

We used publicly available data from the Canadian Vital Statistics Database to retrieve cause of death information based on the International Statistical Classification of Diseases

and Related Health Problems codes on death certificates. Data on suicide were available for all recorded deaths among Canadians aged 10+. We used census data to calculate the annual age- and sex-standardized rate per 100,000 from 2000 to 2018 for youth aged 10 to 14. We used segmented regression analysis to identify up to 3 breakpoints in the suicide rate for each age group and sex based on visual inspection,⁵¹¹ Bayesian Information Criteria, and by empirically fitting polynomial models to the series. We compared suicide rates between sexes in 2000, 2009, and 2018, fitting a linear model that included sex and an interaction between sex and year. To account for the change in slopes, we added an indicator of the year being larger or equal to the breakpoint in the model, interacting with sex and year. We modelled the outcome on the logarithmic scale to calculate incidence rate ratios at the desired time points. All analyses were conducted in R.

Results

From 2000 to 2009, the suicide rates among adolescents aged 10 to 14 years in Canada decreased in both males and

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Figure 1. Rate of suicide from 2000 to 2018 for youth aged 10 to 14 years by sex in Canada.

females. In 2009, the suicide rates diverged, remaining stable in males, while increasing at an average rate of 7% per year in females, surpassing males in 2011 (Figure 1). The estimated female:male incidence rate ratios in 2000, 2009, and 2018 were 0.85 (95% CI, 0.58 to 1.25), 0.76 (95% CI, 0.50 to 1.11) and 2.08 (95% CI, 1.54 to 2.86), respectively. That is, by 2018, the incidence rate ratio had more than doubled, indicating a higher suicide rate among females versus males.

Discussion

The marked and consistent trend of rising suicide rates among adolescent females aged 10 to 14 years in Canada signals increased distress and/or maladaptive coping in this segment of the population. There are many factors that could be contributing to increased distress in this demographic. For example, the proportion of school-age girls in Canada reporting symptoms consistent with depression—strongly linked to suicide risk^{S8}—is rising.^{S7} Mounting societal and gendered pressures in the form of familial stress from the 2008 global financial crisis^{S12} and its aftermath, or the advent of smartphones and ubiquity of social media may have put disproportionate stress on younger girls.^{S13} Additionally, changing gender norms and messaging that younger girls are exposed to could influence suicide rates.^{S14} This may include more frequent dissemination of information about self-harm, increased awareness and acceptability of more lethal suicide methods, and an inadvertent positioning of suicide as a normative response to distress.

To our knowledge, there is no other industrialized country^{S15} that has observed suicide rates among females superseding those of males in this age group, including Canada's closest neighbour, the United States.⁴ Reasons for this are unclear, but may include variability in how suicides are counted and reported,^{S16} access to mental health services, and/or approach to suicide prevention.^{S17} As Canada moves towards a national suicide prevention strategy, knowledge of the methods of suicide used by this age group is important to inform policy change to help reverse this concerning trend. Notwithstanding the limitations of Vital Statistics Data, such as misclassification and underreporting, these are glaring findings with crucial implications for suicide prevention among young people in Canada that must be addressed.

Author Contributions

R. Mitchell conceptualized and designed the study, interpreted the results, drafted the initial manuscript, and revised the manuscript. N. Kozloff and M. Sinyor conceptualized and designed the study, interpreted the results, and revised the manuscript. M. Sanches performed the statistical analysis, interpreted the results, and revised the manuscript. B. Goldstein, J. Amini, and J. Bridge interpreted the results and revised the manuscript. All authors reviewed and approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Supplemental Material

Supplemental material for this article is available online.

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