Original Research

Suicides in Young People in Ontario Following the Release of "13 Reasons Why"

Suicides chez les jeunes personnes en Ontario aprés le lancement de « 13 raisons »

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Abstract

Objective: "13 Reasons Why," a Netflix series, included a controversial depiction of suicide that has raised fears about possible contagion. Studies of youth suicide in the United States found an increase on the order of 10% following release of the show, but this has not been replicated in other countries. This study aims to begin to address that gap by examining the relationship between the show's release and youth suicide in Canada's most populous province.

Methods: Suicides in young people (under the age of 30) in the province of Ontario following the show's release on March 31, 2017, were the outcome of interest. Time-series analyses were performed using data from January 2013 to March 2017 to predict expected deaths from April to December 2017 with a simple seasonal model (stationary $R^2 = 0.732$, Ljung-Box $Q = 15.1$, $df = 16$, $P = 0.52$, Bayesian information criterion = 3.09) providing the best fit/used for the primary analysis.

Results: Modeling predicted 224 suicides; however, 264 were observed corresponding to 40 more deaths or an 18% increase. In the primary analysis, monthly suicides exceeded the 95% confidence limit for 3 of the 9 months (May, July, and October).

Conclusion: The statistical strength of the findings here is limited by small numbers; however, the results are in line with what has been observed in the United States and what would be expected if contagion were occurring. Further research in other locations is needed to increase confidence that the associations found here are causal.

Abrégé

Objectif : « 13 Raisons », une série Netflix, présentait un portrait controversé du suicide qui a suscité des craintes quant à une contagion possible. Des études sur le suicide chez les jeunes aux États-Unis a constaté une augmentation de l'ordre de 10% par suite de la diffusion de la série, mais cela ne s'est pas répété dans d'autres pays. La présente étude vise à aborder cet écart en examinant la relation entre la diffusion de la série et le suicide chez les jeunes dans la province la plus populeuse du Canada.

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Méthodes : Les suicides chez les jeunes gens (de moins de 30 ans) dans la province d'Ontario suivant le lancement de la série le 31 mars 2017 constituaient le résultat d'intérêt. Des analyses chronologiques ont été effectuées à l'aide des données de janvier 2013 à mars 2017 pour prédire les décès anticipés d'avril à décembre 2017 à l'aide d'un simple modèle saisonnier (Stationary R-Squared = 0,732, Test Q de Ljung-Box = 15,1, df = 16, p = 0,52, BIC = 3,09) qui offre le meilleur ajustement utilisé pour l'analyse primaire.

Résultats : La modélisation a prédit 224 suicides, cependant, 264 ont été observés, ce qui correspond à 40 décès de plus ou une augmentation de 18%. Dans l'analyse primaire, les suicides mensuels excédaient l'intervalle de confiance à 95% pendant trois mois sur neuf (mai, juillet et octobre).

Conclusion : La solidité statistique des résultats ici est limitée par de petits nombres, toutefois, les résultats correspondent à ce qui a été observé aux É.-U. et à ce qui serait attendu si la contagion avait lieu. Il faut plus de recherche en d'autres lieux pour accroître la confiance que les associations trouvées ici sont normales.

Introduction

On March 31, 2017, the first season of the Netflix series "13 Reasons Why" (13RW) was released worldwide.[1] Although Netflix does not release viewership numbers, 13RW reportedly had the second highest audience of any Netflix show in its first 30 days[2] and was the subject of more than 3.5 million tweets in its first week, a record for a Netflix opening.[3] It generated significant controversy because the show graphically depicts a highly identifiable character, Hannah Baker who has no obvious mental disorder, dying by suicide.[4-8] The show portrays her suicide method in detail, the suicide as achieving positive results, and a simplistic depiction of the causes of suicide (i.e., the "Reasons" for her death are her mistreatment by others and their failure to help), all in contravention of expert recommendations for media depictions.[9-13] The show's premise is additionally noteworthy as the character literally "lives on" for the viewer and thus it also fails to realistically portray the finality of suicide. Therefore, 13RW functions as an unintended natural experiment in which potentially harmful suicide messages were abruptly disseminated to youth worldwide. The study of its effect may help strengthen the scientific literature and clarify the impact of fictional, suicide-related messaging that is widely considered harmful on actual suicidal behavior.

There is now a robust literature spanning decades showing that media portrayals of suicide do, in some cases, increase rates of suicide across the population, a phenomenon known as the Werther Effect.[14-24] For example, in 2014, the widely publicized suicide of the renowned actor Robin Williams was associated with more than 1,800 additional suicides in subsequent months or nearly a 10% increase across the United States.[25] Although the Werther Effect takes its name from a fictional portrayal of suicide, most recent research in this area has focused on reporting of real suicides in the news media, perhaps in part due to previous findings that the association between fictional portrayals and actual deaths may be more tenuous.[26] Some previous individual studies do suggest a potential contagion effect, and experimental evidence suggests that viewing films about suicide can have a negative impact on vulnerable viewers.[27,28] Notably, research in the 1980s following airing of the German television show "Death of a Student" demonstrated an association with increased railway suicides in young men in Germany.[29] Parallels have been drawn between that show and 13RW, reinforcing the notion that 13RW may help clarify the impact of fictional media on suicides.

Initial research following the release of 13RW noted an increase in suicide-related Google searches including queries for how to end one's life[4] as well as an increase in patient volumes at U.S. pediatric emergency departments.[7] A study of 87 youth presenting to the emergency department in a suicidal crisis found half had been exposed to 13RW with half of those believing the show to have increased their suicide risk.[5] Those youth who identified more strongly with the lead character were more likely to report that the show had this impact.[6] An online questionnaire of youth aged 12 to 18 found nearly one in four reporting worsening mood after viewing the show with a greater likelihood of this occurring in those who had preexisting sadness, suicidal ideation or attempts.[6] Another questionnaire study found an overall decrease in suicidal ideation in 13RW viewers but an association between a past history of depression or suicidality with the opposite effect.[30] These findings are all largely consistent with experimental studies showing that identification and preexisting suicidality are the key mediators of risk.[28,29] That is, fictional depictions seem to have negative effects in only a vulnerable subset of those exposed.

Two recent studies used time-series analyses to examine youth suicide rates in the United States following 13RW.[31,32] Both studies showed a statistically significant increase in deaths above what was expected in youth overall.[31,32] Regarding sex differences, one found a more pronounced effect in young women (aged 10 to 19)[31] and the other found only significant increases in young men (aged 10 to 17).[32] Despite methodological differences and distinctions that yielded these slightly different results, these data represent the most powerful evidence to date of associations that

may suggest a potential harmful impact of 13RW. However, these results have yet to be replicated outside the United States and, given that the show was released worldwide, evidence of a similar impact in other countries would strengthen those findings considerably. This study therefore aims to address that gap by examining suicides in young people in Ontario, Canada's largest province by population before and after the release of the show's first season. The a priori hypothesis was that suicides would increase after 13RW at a magnitude consistent with previous harmful media events (i.e., >10%) and that this increase would be apparent in the months following its release.

Methods

This study was approved by the Sunnybrook Health Sciences Centre Research Ethics Board (ID# 199-2012). Suicides were identified through the Office of the Chief Coroner of Ontario using previously published methods.[33] The population of interest were young people, intentionally broadly defined as those aged 29 and under to capture the likely target demographic of 13RW, who died by suicide after the show was released (April to December 2017). Deaths in the same age group from January 2013 to March 2017 were also captured as baseline measures. The use of approximately 4 years of pre-event data to establish a baseline for time series is consistent with previously established methods.[25] It is also both long enough to identify longitudinal trends and short enough to avoid confounding according to population growth. Regarding the latter point, note that census data in Canada over the past decade are only available for 2011 and 2016. Between those years, there was a 1% increase in population under the age of 14 in Ontario and a 2% increase in those aged 15 to 64.[34,35] Since extrapolating and/or imputing population change by month using these data would likely introduce more errors into the calculation than that caused by this amount of population growth by itself and since time-series modeling largely accounts for such increases over time, raw counts were used for the analyses.

Time-series analyses were performed using IBM SPSS Statistics 24 (SPSS Inc., Chicago, IL) which accounted for autocorrelation and seasonal variation in suicide rates. A simple seasonal model provided the best fit (stationary $R^2 = 0.732$, Ljung-Box $Q = 15.1$, $df = 16$, $P = 0.52$, Bayesian information criterion [BIC] = 3.09). A sensitivity analysis was conducted to confirm the results using an alternate time-series method[23] and an ARIMA(0,1,1) model (stationary $R^2 = 0.488$, Ljung-Box $Q = 8.9$, $df = 17$, $P = 0.94$, BIC = 3.38). The ARIMA model was further used to estimate the possible effect of 13RW in the period of April to December 2017 with monthly increases in the number of suicides modeled as discrete pulses, using a dummy variable. Pulses reflected temporary changes in the intercept; their effects were estimated with one constant monthly value for the stated period and set to zero everywhere else. Possible changes in the slope of the time series were not addressed in

this model as such changes (1) were not expected and (2) cannot be modeled adequately with a period of interest of this short length.

Dividing data according to age groups (10 to 19 and 20 to 29) and sex resulted in counts that were too small for adequate statistical comparisons; however, counts are presented in the Results section for descriptive purposes. To conduct these descriptive analyses, we calculated suicide events between April and December 2017 and compared this to the same time period (April to December) from 2014 to 2016. We restricted our descriptive analyses to this time period in part to avoid seasonal confounding. There was also a 29% increase in suicides from April to December 2014 compared to the same period in 2013 with relatively stable suicide counts from 2014 to 2016. Taking a conservative approach, counts from 2013 were excluded. This was done in an effort to avoid potentially inflating pre–post differences with the inclusion of a remote year with low counts that was not subject to time-series adjustment. Rates of suicide by cutting, the method depicted in 13RW, will also be presented descriptively.

The sponsor had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Results

Suicides in people aged <30 years in Ontario (2013 to 2017) including expected deaths after 13RW are shown in Figure 1. There were 264 deaths observed while both the simple seasonal and ARIMA time-series models anticipated 224 deaths. Expected and observed values for deaths from April to December 2017 are shown in greater detail along with 95% confidence limits in Figure 2. Suicide counts tracked values predicted by the model for 6 of the 9 months subsequent to 13RW (April, June, August, September, November, and December) while rates at or above the upper 95% confidence limit of the model were observed for 3 months (May, July, and October). The ARIMA time series (not shown) predicted 25 suicides in each subsequent month with a somewhat wider confidence interval in which only October suicides exceeded the 95% confidence limit. Modeling monthly increases in the number of suicides as discrete pulses in the ARIMA model, suicides increased by 4.90 ($SE = 2.75$) per month in the period April to December 2017. However, this effect did not rise to the level of statistical significance ($P = .081$).

There was a 24% and 23% increase in suicide counts in 10- to 19- and 20- to 29-year-olds, respectively, in April to December 2017 compared to the previous 3 years (10- to 19-year-olds: 74.0 vs. 59.7; 20- to 29-year olds: 192.0 vs. 155.7). There was also a 24% and 23% increase in suicide counts in males and females, respectively, across both age groups between the two epochs (male: 184.0 vs. 148.7; female: 82.0 vs. 66.7). Suicide by cutting, the method depicted in 13RW, accounted for only 1% of all deaths for
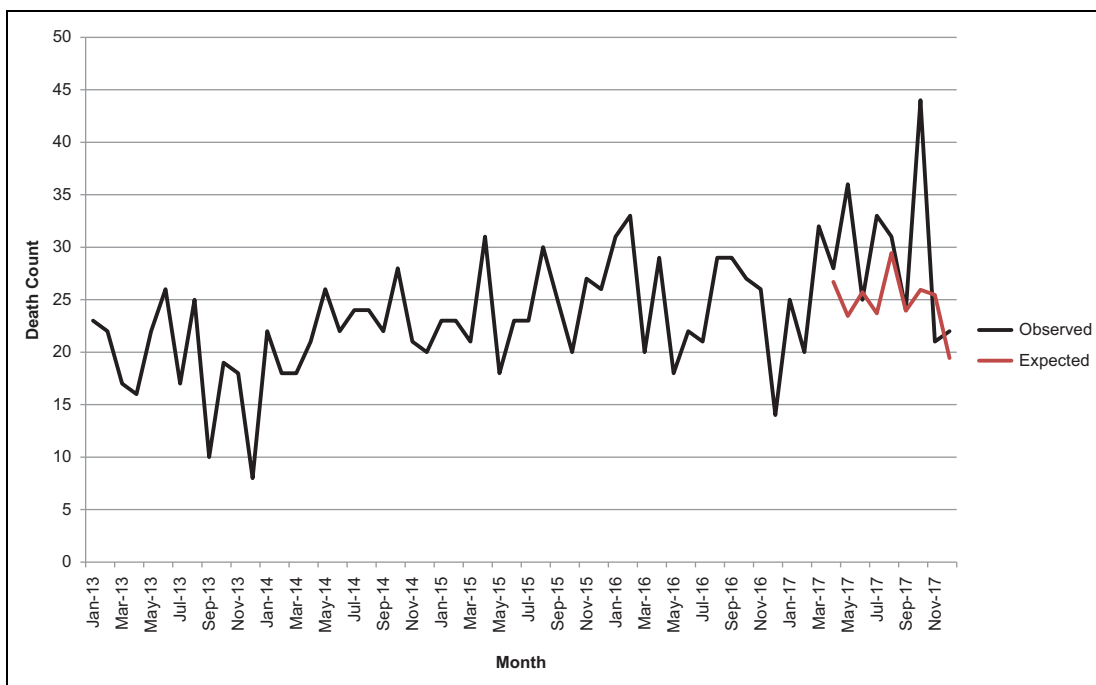
Figure 1. Observed monthly counts of suicides (age <30) in Ontario 2013 to 2017 with expected counts after the "Release of 13 Reasons Why."
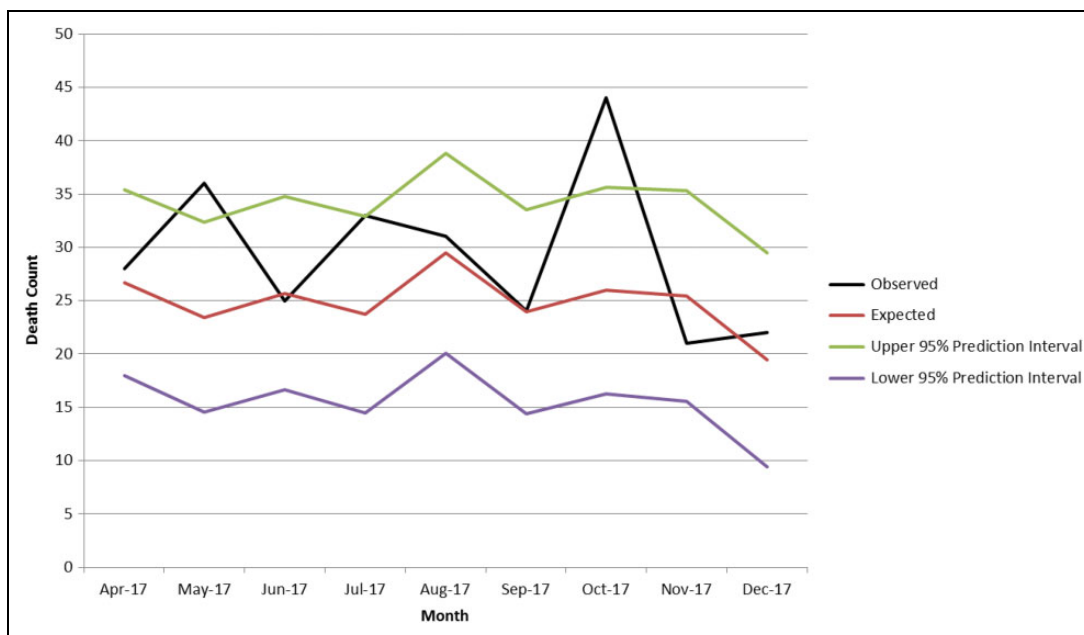

Figure 2. Expected and observed monthly counts of suicides in Ontario after the "Release of 13 Reasons Why" with 95% confidence intervals.

the entire study period, and there were fewer than five such deaths in the 9 months following the release of 13RW.

Discussion

This study demonstrated that there were 40 more deaths by suicide than expected in those aged 29 and under in Ontario in the 9 months following the release of 13RW equating to an 18% increase. This result from the primary time-series analysis was robust to sensitivity analysis. Because of the relatively low rate of suicide in young people in Ontario and the inherent variability in this low-base rate phenomenon, this study was likely underpowered to detect a significant difference as reflected by the wide confidence intervals in

both analyses. Nevertheless, it is notable that the direction and magnitude of the potential effect is in line with both the a prori hypothesis of the study and with evidence from the United States. The differences by month are also noteworthy. Assuming an incubation period of several weeks for vulnerable young people to discover and watch the 13-episode series (e.g., April 2017), increased deaths above and beyond what would be expected in 2 of the immediately following 3 months (May and July) suggest a possible strong initial impact of the show. The cause of the subsequent peak observed in October, the month with the largest number of suicides following the show, is less clear. This study did not systematically examine other potential exposures that could provoke more suicides. Note that the authors of this article who work in Ontario are unaware of any specific factors or events that might have triggered the observed increase. It is therefore possible that some vulnerable young people in Ontario who were struggling to cope after the beginning of the school year, a theme for 13RW's protagonist, identified with the show and died by suicide in October 2017. Research by our group has shown that media exposures can have a detectable impact on the order of a year following their occurrence.[36] However, it is also possible that the show and the peak are unrelated events. Note that while Ontario youth frequently attend schooling into their early to mid-20s and some throughout their 20s, this study is unable to determine how many youth who died by suicide captured in the analysis were in school at the time of death. The fact that proportional increases in suicides in those aged 10 to 19 and 20 to 29 were nearly identical adds justification to the broad definition of youth in this study as those under the age of 30. It suggests that either 13RW or some other confounding factor had a similar impact on both groups over this time span. It is notable that percentage increases in suicide counts were similar between males and females in line with U.S. data showing increases in both sexes.[31,32] This is not necessarily an unexpected finding as there is a potential for identification in both groups. Although the show's protagonist who dies by suicide is female, 13RW raises issues common to both sexes and the first season notably includes a high-lethality suicide attempt (firearm) by one of the show's male characters. Likewise, the continued low rates of suicide by cutting are also expected. Cutting is a low-lethality suicide method, and increases in its use would likely be reflected in suicide attempt data rather than suicide death data although further studies would be needed to confirm that speculation. The one study of U.S. data that examined suicide methods in youth following 13RW likewise found significant increases in deaths by hanging rather than by cutting.[31] The results of this study and those in the United States would be further strengthened if they were replicated in other locations; however, they already suggest a potentially ominous trend. Indeed, because the show was released worldwide and because each of these suicides individually is a great tragedy, even a 1% increase if multiplied across the Netflix-viewing world would be a catastrophic outcome.

This study has several important limitations. Most crucially, it examines what is essentially a large, uncontrolled natural experiment, meaning that associations observed here could be mainly or partially the result of 13RW or could represent some other phenomenon entirely. This study only examined a single province in Canada, as Canadian suicide data are housed provincially and this was the only data available to the study investigators. A fulsome understanding of the impact of 13RW would require similar studies conducted in other provinces in Canada and elsewhere. Larger studies might also be able to test for a relationship between suicides and regional differences in viewership and/or social media conversation about 13RW, which could strengthen the case for a causal relationship. Furthermore, a regression discontinuity analysis may have strengthened the methodology for this type of study; however, the relatively small number of suicides in youth in Ontario and substantial month-to-month variability in these deaths precluded its use. A major limitation of this study is that it also did not examine exposure. Although Netflix does not release viewership data, it is clear that it was widely viewed across North America and specifically in Canada where interest in and controversy about the show resulted in 71 articles being published about it in major Canadian newspapers between April and June 2017 alone.[37] Nevertheless, while there were more deaths following the show, this study design could not demonstrate that those people who died had been exposed to and influenced by the show. This is a problem that pervades the suicide contagion literature. That is, that small, clinically based studies can establish exposure without a statistical rise in deaths while large population-based studies can demonstrate changes in suicide rates without proving exposure. Therefore, the synergy of the two types of research is really needed for a complete understanding of the impact of a show like 13RW and the present study contributes to the population-level aspect. This study also examined only 9 months following the release of the show. That is a potential strength as contagion effects would be expected to occur within months of the exposure.[14-25] However, potential longer term impacts on suicide rates could not be tested with this design. Note that the upward trend in suicide deaths since 2013 is not a limitation of the study as the time-series analyses account for that preexisting increase. The study did not correct for population growth although the magnitude of growth during the months of the study was minimal. Finally, this study relied on deaths classified as suicide by the Office of the Chief Coroner of Ontario and did not seek to reexamine deaths ruled as occurring due to accident to identify additional possible suicides.

Although the results reported here should not be considered definitive and require replication in other locations, this study adds to U.S. data demonstrating a signal suggesting that 13RW's release may have been associated with an increase in suicide in young people in Ontario at a magnitude on the order of 18%. While there is a long history of fictional portrayals of suicide being disseminated in various parts of

the world,[26] 13RW is somewhat unique in that it was suddenly and rapidly disseminated worldwide with the potential for suicide contagion across many countries. The results reported here suggest that companies like Netflix have a particularly strong moral obligation to seek and heed advice from multiple suicide prevention and public health experts before disseminating suicide-related content. Australia's Mindframe initiative that explicitly targets stage and screen productions may be a useful model to emulate.[38] In general, engagement with the television and film industry should be an avenue of greater focus for suicide prevention and this should be reflected in future iterations of responsible media recommendations.

Authors' Note

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Declaration of Conflicting Interests

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