



Newspaper coverage of suicide and initiation of suicide clusters in teenagers in the USA, 1988–96: a retrospective, population-based, case-control study

Madelyn S Gould, Marjorie H Kleinman, Alison M Lake, Judith Forman, Jennifer Bassett Midle

Summary

Background Public health and clinical efforts to prevent suicide clusters are seriously hampered by the unanswered question of why such outbreaks occur. We aimed to establish whether an environmental factor—newspaper reports of suicide—has a role in the emergence of suicide clusters.

Methods In this retrospective, population-based, case-control study, we identified suicide clusters in young people aged 13–20 years in the USA from 1988 to 1996 (preceding the advent of social media) using the time–space Scan statistic. For each cluster community, we selected two matched non-cluster control communities in which suicides of similarly aged youth occurred, from non-contiguous counties within the same state as the cluster. We examined newspapers within each cluster community for stories about suicide published in the days between the first and second suicides in the cluster. In non-cluster communities, we examined a matched length of time after the matched control suicide. We used a content-analysis procedure to code the characteristics of each story and compared newspaper stories about suicide published in case and control communities with mixed-effect regression analyses.

Findings We identified 53 suicide clusters, of which 48 were included in the media review. For one cluster we could identify only one appropriate control; therefore, 95 matched control communities were included. The mean number of news stories about suicidal individuals published after an index cluster suicide (7.42 [SD 10.02]) was significantly greater than the mean number of suicide stories published after a non-cluster suicide (5.14 [6.00]; $p < 0.0001$). Several story characteristics, including front-page placement, headlines containing the word suicide or a description of the method used, and detailed descriptions of the suicidal individual and act, appeared more often in stories published after the index cluster suicides than after non-cluster suicides.

Interpretation Our identification of an association between newspaper reports about suicide (including specific story characteristics) and the initiation of teenage suicide clusters should provide an empirical basis to support efforts by mental health professionals, community officials, and the media to work together to identify and prevent the onset of suicide clusters.

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Introduction

Despite longstanding concerns about suicide cluster events¹ and extensive publicity surrounding so-called suicide outbreaks, few studies have systematically examined the occurrence of spatiotemporal clustering of suicide.² Early research on spatiotemporal (also known as time–space or point) clusters relied heavily on case-history methods,^{1,3} providing narrative or anecdotal accounts of so-called suicide epidemics, but its interpretability was diminished by the presence of selection bias and the absence of a comparison group.

During the past two decades, research into suicide clusters has shifted methodologically from descriptive to inferential studies, in line with the development and application of statistical techniques^{3,4} to detect statistically significant clustering effects. These techniques typically involve comparison of observed and expected frequencies of suicides within specified units of time or space. Although not all anecdotally identified suicide clusters reach the level of statistical significance needed to be

statistically defined as a cluster,⁵ inferential statistical studies have confirmed the occurrence of significant time–space clustering of suicides both in closed communities, such as prisons,⁶ and in the general population.^{7–9}

So far, few inferential studies of suicide clusters have assessed large-scale or national populations.^{5,6,10–13} Moreover, none has included comparative or control data from non-cluster suicides. Owing to the small amount of systematic data available,² the mechanisms that initiate suicide clusters are unknown. In a study that used stratified samples to investigate age-related effects, the incidence of cluster suicide was reported to be highest in teenagers and young adults.¹¹ Because of the comparative frequency of youth suicide clusters, suicide clusters in teenagers are particularly suitable to assess in a controlled investigation into factors contributing to the emergence of a suicide cluster.

By contrast with the shortage of systematic research on spatiotemporal (or point) suicide clusters, much research

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Division of Child and Adolescent Psychiatry, Department of Epidemiology, Columbia University, New York, NY, USA (M S Gould PhD); New York State Psychiatric Institute, New York, NY, USA (M S Gould, M H Kleinman MS, A M Lake MA, J Forman MPH, J B Midle MPH); Department of Community and Family Medicine, Geisel School of Medicine, Dartmouth College, Hanover, NH, USA (J Forman); and Office of Advanced and Graduate Education, Tufts University School of Dental Medicine, Boston, MA, USA (J B Midle)

Correspondence to:

Dr Madelyn S Gould, New York State Psychiatric Institute, 1051 Riverside Drive, New York, NY 10032, USA
gouldm@nyspi.columbia.edu

has been done into purely temporal (or mass) suicide clusters after media reports about suicide.^{14,15} 40 years of research has identified the conditions under which media reporting about suicide is likely to be followed by an increase in suicide. Studies have shown that, overall, suicide rates rise after increased media reporting about suicide, with a greater amount of coverage associated with a greater rise.¹⁶ Non-fictional as opposed to fictional stories, newspaper as opposed to television reporting, and stories about the suicide of political or entertainment celebrities are more likely to be followed by a surplus of suicides, whereas reporting that portrays suicide negatively is less likely to be followed by a rise in suicide rates.¹⁷ A decreased frequency in the reporting of suicides after the implementation of media guidelines has been associated with significantly lowered suicide rates.¹⁶

The aim of the present study was to identify the possible role of newspaper suicide stories in the initiation of suicide clusters by examining the largest group of youth suicide clusters studied so far, systematically identified by use of inferential statistics applied to US national mortality data, and compared with matched non-cluster suicides.

Methods

Study design and participants

In this retrospective, population-based, case-control study, we obtained the following mortality data from the 48 US mainland state departments of health for each suicide (ICD-9 codes E950–959) of an individual aged 13–20 years from 1988 to 1996: certificate number, age, sex, race, date of death, cause of death (ICD-9 E code), and place of residence and death (county, town or city [or both], and zip code, if available).

The time–space analytical procedure used to identify cluster suicides (cases) within our sample was the Scan statistic.¹⁸ It seeks to establish clustering by showing an excess frequency of disease in specific times and places, using a moving window of preselected duration that scans or slides continuously over the entire period. The significance of the temporal clustering within each geographical area is assessed against the null hypothesis that the total number of observed events is randomly (uniformly) distributed over the entire period.¹⁹ We used a significance level of $p < 0.05$. Based on earlier analyses of national and state mortality data (unpublished), we used a 3-month time unit and the city or town of residence or occurrence as the space unit to define a cluster. Cities and towns are meaningful spatial units that are familiar to their residents, and whose borders are defined by the state in which they are located. We restricted our analyses to locales with populations under 500 000 because in large cities identification of a clinically meaningful cluster is difficult within the vast number of expected suicides. When several statistically significant clusters in the same locale were identified as occurring within

overlapping 3 month periods, they were considered to comprise one cluster. Moreover, if a suicide in an individual aged 13–20 years was identified within 3 months before or after the statistically derived cluster, it was included in the cluster.

Young people aged 13–20 years who died by suicide within 1 year of the cluster in the same state where the cluster occurred, but not within the same or a contiguous county, comprised the sampling pool from which our sample of matched non-cluster (control) suicides was selected. Matched non-cluster suicides and their communities were selected by a nearest-neighbour method, which involved calculating the logarithm of the population size of young people aged 13–20 years in the cluster community and then selecting comparison communities with the most similar (nearest) population size (logarithm). The comparison communities were matched to the cluster community according to whether or not they were within a standard metropolitan statistical area. Matched non-cluster suicide controls selected within these communities had to be within the age range of the cluster suicides, with dates of death outside the specified 3 month period of the cluster. We attempted to select two matched control communities for each cluster community.

The institutional review boards of the New York State Psychiatric Institute and Columbia University Department of Psychiatry and of each of the 48 mainland state health departments approved the study procedures, and a certificate of confidentiality was issued by the National Institute of Mental Health. Two phases of review by each state department of health were required. The first stage involved approval to obtain the de-identified state-wide data needed for the time–space cluster analysis. The second stage involved approval to obtain death certificates with information identifying specific individuals and to proceed with a psychological autopsy procedure.

Procedures

This study is nested within a larger case-control psychological autopsy study (not yet published) that examined factors associated with the initiation of youth suicide clusters. In the larger study, we attempted to interview at least one parent or guardian and a peer or sibling for each cluster and non-cluster suicide, and obtain official records (eg, death certificates, police reports, medical examiner records) to identify individual and social factors associated with suicide clusters. Additionally, we developed a comprehensive database of newspaper coverage of suicide in the cluster and control communities to examine the potential effect of this environmental factor. This aim and source of data are the focus of the present analyses.

We examined the newspapers within each cluster community for the period between the dates of the first and second suicides in the clusters—a period reflecting the initiation of the cluster. We examined the identical

Panel 1: Identification of and access to local communities' newspapers

Methods for identification of newspapers

- Editor and Publisher International Directory for the largest publications by circulation (ie, by readership or sales) in an area
- Each state's Press Association Directory for newspapers that are members of this association
- Burrelle's Media Directory for coverage area of newspapers irrespective of newspaper ownership or size
- Each town or city's Chamber of Commerce or Town Hall for newspapers distributed in the community, including those used for press releases
- Psychological autopsy interviews of informants for newspapers in their locale, with an indication of which ones were read by the suicidal individual and other family members

Methods for gaining access to newspapers

- On microfilm at the New York Public Library
- Interlibrary loan
- Library services such as Nexis, Data Times, and Dialog
- Copies of newspapers directly sent to research team
- Newspapers scanned by communities' research librarians, and suicide stories mailed to research team (this option was used only if a newspaper could not be obtained by any other method)

length of time after the date of death of the matched non-cluster suicide. For example, if 10 days passed between the first and second suicides in a cluster, newspapers in the cluster community were examined for those 10 days, and newspapers in each matched-control community were examined for 10 days after the date of the community's non-cluster suicide.

Newspapers read within each community were identified using a multistep process (outlined in panel 1) and made available to the research team for coding. Although we did not intentionally exclude national papers, none of the five national newspapers in the USA (*Christian Science Monitor*, *New York Times*, *USA Today*, *Wall Street Journal*, and *Washington Post*) were identified by our many sources as being read by any of the cluster and control communities. Newspapers identified by psychological autopsy informants were largely the same as those identified by other sources, increasing our confidence that all newspapers per community were identified.

Newspapers were examined for stories about suicide by screening for headlines that included the word suicide or any other phrase that indicated that someone had clearly killed him or herself (eg, killed self, shot self). Each story was reviewed for eligibility by at least two staff members and questionable stories were reviewed by the principal investigator (MG) and another senior researcher (JB).

We identified suicide-related newspaper stories published after index cluster and non-cluster suicides, then coded the characteristics of each story using a well defined content-analysis procedure.²⁰ Story type and quantitative and qualitative characteristics of each story were coded by abstractors (including JB and MG) masked to the case-control status of the story. News stories about assisted suicide and murder suicide (ie, an individual dying by suicide after committing a homicide) were distinguished from other news stories about suicide in view of the hypothesis that these story types might have a different effect on a suicidal reader. We have shown that these variables were reliably coded in a previously published report.²⁰

Statistical analysis

We used multilevel modelling (ie, mixed-effect regression analyses) to compare the mean number of newspapers reviewed, and the various types of suicide stories published after the index cluster suicide with the mean number of newspapers reviewed, and such stories published after a non-cluster suicide. The multilevel modelling accounts for the hierarchical structure of our data. This analytical procedure takes into account the block design of the study. Newspaper stories were nested within the block composed of a cluster community and its two matched control communities. Because the data are counts we used the Poisson distribution. We used Cohen's *d* as a measure of effect size.²¹ Analyses were done using PROC GLIMMIX in SAS version 9.3.²²

Role of the funding source

The sponsors of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

We identified 53 suicide clusters in the USA between 1988 and 1996. For confidentiality purposes, we have not provided the years in which the clusters occurred or their locations. We included 48 of the 53 identified clusters in the media review. We excluded one cluster because all the cases died in a pact, precluding any examination of the period between the first and second deaths. We excluded a further two clusters in which the index cases had died in suicide pacts since these could have been considered more newsworthy and influential than other suicide deaths. Another cluster was excluded because we discovered that the individuals in this cluster belonged to the same social network as those in another cluster in the same locale 2 years previously, making it difficult to identify an index case. We excluded a final cluster because the existence of a suicide within the same peer group in the year before the statistically derived cluster again made it challenging to define the index case.

The 48 clusters ranged from three to 11 suicides (mean 3.88 [SD 1.57]). 29 (60%) clusters consisted of three suicides, nine clusters (19%) had four suicides, five clusters (10%) had five suicides, and five clusters (10%) had six or more suicides. Duration of clusters ranged between 19 days and 164 days (mean 74.15 days [SD 33.35]); 40 (83%) ended within 90 days.

We selected two matched control communities for each cluster community; however, for one cluster we could identify only one appropriate control, therefore 95 matched control communities were included in the media review.

The periods of newspaper review (ie, the time between the first and second suicides in the clusters) ranged from 2 days to 103 days (mean 29.8 days [SD 20.1]). The period of review exceeded 90 days for one block of communities because, for the index cluster suicide in that block, the date of injury leading to death preceded the date of death by several weeks, and we decided to begin the media analysis on the date of injury.

We examined 469 newspapers (164 for clusters and 305 for controls) for stories about suicide. The number of newspapers per community (clusters and controls combined) ranged from one to ten. The mean number of newspapers identified was 3.42 (SD 1.53) per cluster community and 3.21 (SD 1.29) per non-cluster community. The number of newspapers reviewed did not significantly differ between the cluster and control communities ($F=0.41$ [df 94]; $p=0.522$). Thus, any subsequent differences between clusters and non-cluster controls were not a function of the number of newspapers reviewed per group.

We compiled a database of 1729 newspaper stories about suicide. The distribution of story types was significantly different between cluster and non-cluster communities ($\chi^2=21.26$ [df 6]; $p=0.0016$; table 1). A greater proportion of news stories in the cluster communities than in the control communities were about suicidal individuals. With the exception of fictional and advice column stories, the number of stories of each type was sufficient for hierarchical linear regression analyses.

The mean number of news stories about any suicidal individual published after the index cluster suicide was significantly greater than the mean number of such stories published after a non-cluster suicide (table 2). A median of four stories about any suicidal individual (range 0–55) were published in the cluster communities compared with three stories (0–36) in the non-cluster communities. In light of the skewness of the data, in addition to using the Poisson distribution, we did a sensitivity analysis to examine whether the outliers exerted a disproportionate effect on our findings. We Winsorised our data²³ by converting the top 2% of our datapoints to the values corresponding to the 98th percentile, for both clusters and controls. The sensitivity analysis using the trimmed data yielded nearly identical results for the mean number of news stories about any suicidal individual (7.06 stories [SD 8.49] in the cluster communities vs 4.93 [SD 5.19] in the control

communities; $F=26.71$ [df 94]; $p<0.0001$), increasing our confidence in the robustness of our finding.

The mean number of stories about the index suicide cases in the cluster communities was significantly greater than the mean number of stories about the non-cluster suicide cases in the control communities (table 2). At least one news story about the teenage suicide in question was published in 12 (25%) cluster communities compared with 13 (14%) control communities (table 2). Cluster communities were also more likely than control communities to have two or more stories about the local teenage suicide (six [13%] cluster communities vs one [1%] control community), and three or more stories (two [4%] vs none). The mean number of stories about other suicidal individuals was also significantly greater after the index cluster suicide than after the non-cluster suicide (table 2). Winsorising the data had no effect on the significance of these findings (data not shown). The mean number of other types of suicide stories did not significantly differ between the cluster and control communities (table 2).

In reviewing our finding regarding the greater prevalence of news stories about the index cluster suicides compared with the control suicides, we considered the possibility that an unknown quality of the index cluster suicides—eg, their being more public, well-known, or dramatic than the control suicides—could account for why they had been reported in more newspaper stories and why further suicide deaths occurred. To test for this potential confounding factor, we examined the location of death and method used for each suicide. The location of death was coded from the death certificates, police records, and medical examiner reports. Deaths occurring outside the home were considered to be public, by contrast with those that occurred inside the home. The location of death did not significantly differ between the index suicides and controls (15 [31%] of

	Cluster communities (n=48)	Control communities (n=95)	Total (n=143)
Total number of suicide stories	648	1081	1729
Type of story*			
About any suicidal individual	356 (55%)	488 (45%)	844 (49%)
About the index/control suicide in our study	25 (4%)	14 (1%)	39 (2%)
About other suicidal individuals	331 (51%)	474 (44%)	805 (47%)
General information about suicide†	51 (8%)	100 (9%)	151 (9%)
Obituary of an individual who died by suicide	39 (6%)	85 (8%)	124 (7%)
Assisted suicide	68 (10%)	157 (15%)	225 (13%)
Murder suicide‡	123 (19%)	217 (20%)	340 (20%)
Advice column	8 (1%)	31 (3%)	39 (2%)
Fictional suicide§	3 (<1%)	3 (<1%)	6 (<1%)

*Categories of story type are mutually exclusive. †Eg, an article about suicide prevention. ‡An individual dying by suicide after committing a homicide. §Stories about the suicide of a fictional character.

Table 1: Distribution of story types published after index cluster and non-cluster suicides

	Cluster communities (n=48)		Control communities (n=95)		Cohen's d	F statistic (df)	p value
	Stories published after index suicide, per community	Communities in which at least one story was published	Stories published after control suicide, per community	Communities in which at least one story was published			
About any suicidal individual	7.42 (10.02)	41 (85%)	5.14 (6.00)	73 (77%)	0.29	29.08 (df 94)	<0.0001
About the index/control suicide in our study	0.52 (1.22)	12 (25%)	0.15 (0.39)	13 (14%)	0.46	14.41 (df 94)	0.0003
About other suicidal individuals	6.89 (10.02)	39 (81%)	4.99 (6.00)	69 (73%)	0.24	21.51 (df 94)	<0.0001
General information about suicide	1.06 (1.36)	23 (48%)	1.05 (1.54)	46 (48%)	0.01	0.01 (df 94)	0.930
Obituary of an individual who died by suicide	0.81 (1.10)	24 (50%)	0.89 (1.03)	53 (56%)	0.07	0.25 (df 94)	0.619
Assisted suicide	1.42 (3.11)	14 (29%)	1.65 (3.68)	36 (38%)	0.07	1.00 (df 94)	0.320
Murder suicide	2.56 (3.22)	31 (65%)	2.28 (3.00)	65 (68%)	0.09	1.16 (df 94)	0.285

Data are mean (SD) or number (%), unless otherwise specified.

Table 2: Types of stories about suicide published after index cluster and non-cluster suicides

cluster cases occurred in public vs 25 [26%] of control cases; $F=0.42$ [df 94]; $p=0.520$). Furthermore, the distribution of methods used by the index cluster suicides was nearly identical to that of the non-cluster suicides (specific data not shown; $\chi^2=7.04$ [df 6]; $p=0.317$). A firearm was the most prevalent method for both the index cluster suicides (29 [60%]) and non-cluster suicides (55 [58%]). Hanging was the next most prevalent method for both the index cluster suicides (nine [19%]) and non-cluster suicides (20 [21%]).

Another possible confounding variable affecting our finding about the number of news stories about any suicidal individual might have been the significantly greater proportion of index cluster suicides than non-cluster suicides for which we undertook a psychological autopsy informant interview (38 [79%] vs 55 [58%]; $F=4.04$ [df 94]; $p=0.047$), which might have affected the number of newspapers reviewed. However, the presence of an informant was not significantly related to the number of newspapers identified per community ($F=0.01$ [df 94]; $p=0.924$), nor, as mentioned previously, did the number of newspapers reviewed significantly differ. Therefore, the different proportion of psychological autopsies for the cases and controls is unlikely to have explained the association between newspaper reportage and the initiation of a cluster.

The remaining results focus on news stories about any suicidal individual, including but not limited to stories about index suicide cases and matched control suicides included in our study. The number of news stories specifically about the index cluster suicides and control suicides was too small (table 1) to allow a meaningful comparison of the characteristics of stories about these individuals alone.

The mean number of stories per community about any suicidal individual that were printed on the front page, or with accompanying pictures, was significantly greater after an index cluster suicide than after a non-cluster suicide (table 3). The headlines of stories published after the index cluster suicides were significantly more likely than those published after

non-cluster suicides to contain the word suicide, mention the specific suicide method, and be rated as sensational—ie, written in a tabloid-like manner to arouse excitement in the reader (table 3).

The mean number of stories with accompanying pictures that displayed sadness was significantly greater after the index cluster suicide than after a non-cluster suicide, although these types of pictures were rare in both groups (table 3). Significantly more news stories about completed suicides and celebrity suicides were published after index cluster suicides than after non-cluster suicides. Furthermore, significantly more details about a suicide were provided in stories published after the index cluster suicides than after non-cluster suicides, including the name of the suicidal individual, name of school, time or place of death, suicide method procedure, number of sentences describing the method, and unfavourable characteristics of the suicidal individual (table 3). Suicide notes were more likely to be mentioned in stories published after the index cluster suicides than after non-cluster suicides (table 3).

To determine whether these story characteristics contributed to the differentiation of the index cluster suicides and non-cluster suicides independently of the number of stories, we did the mixed-effect regression analysis for each characteristic adjusting for the number of stories about suicidal individuals. Only two types of story characteristics were independently associated with cluster status: an accompanying sad picture ($F=4.00$ [df 93]; $p=0.048$), and the celebrity status of the person who died by suicide ($F=6.65$ [df 93]; $p=0.012$).

Discussion

In our sample of 48 youth suicide cluster communities and 95 control communities, the major finding to emerge is that newspaper coverage of suicide is significantly associated with the initiation of suicide clusters. Significantly more news stories about suicidal individuals were published in the aftermath of a suicide that was followed by additional suicide deaths than in the aftermath of a suicide with no subsequent suicides. The

association was strongest, as evidenced by its moderate effect size, for news stories about the teenage suicides in our study. Overall, newspaper stories published after the

index cluster suicide were more prominent, as indicated by front-page placement and presence of a picture; more explicit, with headlines containing the word suicide and

	Cluster communities (n=48)		Control communities (n=95)		Cohen's d	F statistic (df)	p value
	Stories published after index suicide, per community	Communities in which at least one story was published	Stories published after control suicide, per community	Communities in which at least one story was published			
Quantitative/structure							
Front page	1.33 (2.06)	22 (46%)	0.87 (1.29)	44 (46%)	0.27	6.64 (df 94)	0.012
Large or prominent headline*	0.96 (1.52)	20 (42%)	0.66 (1.17)	35 (37%)	0.22	3.65 (df 94)	0.059
Presence of picture	1.77 (3.46)	24 (50%)	1.07 (1.60)	45 (47%)	0.28	11.84 (df 94)	0.001
Qualitative							
Headline characteristics							
Word suicide used in headline	4.29 (6.74)	34 (71%)	2.78 (3.36)	64 (67%)	0.30	22.71 (df 94)	<0.0001
Method mentioned in headline	1.69 (1.82)	34 (71%)	1.19 (1.94)	47 (49%)	0.27	5.93 (df 94)	0.017
Headline sensational	1.79 (2.53)	28 (58%)	1.34 (2.04)	49 (52%)	0.20	4.56 (df 94)	0.035
Headline romanticised	0.06 (0.24)	3 (6%)	0.04 (0.20)	4 (4%)	0.09	0.27 (df 94)	0.605
Headline glorified	0.06 (0.24)	3 (6%)	0.07 (0.30)	6 (6%)	0.04	0.06 (df 94)	0.813
Headline a positive presentation of suicidal individual	0.44 (0.92)	13 (27%)	0.40 (1.01)	18 (19%)	0.04	0.12 (df 94)	0.726
Headline a negative presentation of suicidal individual	1.42 (1.66)	28 (58%)	1.16 (2.07)	45 (47%)	0.14	1.79 (df 94)	0.185
Headline normalised suicide	0.10 (0.37)	4 (8%)	0.02 (0.14)	2 (2%)	0.31	3.66 (df 94)	0.059
Pictorial presentation							
Sadness in picture	0.31 (0.62)	11 (23%)	0.11 (0.31)	10 (11%)	0.43	7.12 (df 94)	0.009
Happiness in picture	0.15 (0.36)	7 (15%)	0.11 (0.31)	9 (9%)	0.12	0.44 (df 94)	0.510
Attractive picture	0.21 (0.50)	8 (17%)	0.11 (0.31)	9 (9%)	0.25	2.33 (df 94)	0.130
Unattractive picture	0.10 (0.47)	3 (6%)	0.04 (0.20)	4 (4%)	0.18	1.83 (df 94)	0.179
Teenager in picture	0.29 (0.65)	10 (21%)	0.19 (0.44)	16 (17%)	0.18	1.48 (df 94)	0.227
Type of event							
Completed suicide	6.17 (8.94)	39 (81%)	4.06 (5.02)	69 (73%)	0.30	30.41 (df 94)	<0.0001
Attempted suicide	0.71 (1.27)	17 (35%)	0.79 (1.42)	32 (34%)	0.06	0.26 (df 94)	0.612
Suicide pact	0.04 (0.20)	2 (4%)	0.31 (0.67)	21 (22%)	0.62	7.40 (df 94)	0.008
Suicide ideation	0.31 (0.72)	10 (21%)	0.24 (0.56)	18 (19%)	0.11	0.61 (df 94)	0.438
Celebrity suicide	1.85 (5.82)	22 (46%)	1.12 (1.97)	38 (40%)	0.19	12.88 (df 94)	0.001
Attitude toward suicide act or suicidal individual							
Suicide act sensationalised	0.98 (1.31)	22 (46%)	0.66 (1.29)	35 (37%)	0.25	4.19 (df 94)	0.044
Suicide act romanticised	0.21 (0.50)	8 (17%)	0.19 (0.49)	15 (16%)	0.04	0.06 (df 94)	0.806
Suicide act glorified	0.10 (0.37)	4 (8%)	0.12 (0.38)	9 (9%)	0.05	0.04 (df 94)	0.849
Suicide act political	0.19 (0.53)	7 (15%)	0.18 (0.56)	12 (13%)	0.02	0.02 (df 94)	0.902
Used the terms "failed" or "succeeded"	0.06 (0.24)	3 (6%)	0.06 (0.24)	6 (6%)	0.00	0.00 (df 94)	0.990
Emphasised loss or grieving	0.73 (1.59)	18 (38%)	0.53 (1.10)	27 (28%)	0.15	2.27 (df 94)	0.136
Sympathised with suicide case	1.10 (1.72)	22 (46%)	0.61 (1.39)	27 (28%)	0.32	9.94 (df 94)	0.002
Details of suicide							
Name of suicidal individual given	6.08 (8.72)	40 (83%)	4.07 (4.91)	73 (77%)	0.29	27.87 (df 94)	<0.0001
Name of school given	0.90 (1.29)	22 (46%)	0.52 (0.82)	33 (35%)	0.36	7.08 (df 94)	0.009
Detail about suicidal individual's life	1.13 (2.12)	21 (44%)	0.93 (1.59)	28 (29%)	0.11	1.34 (df 94)	0.249
Favourable characteristic about suicidal individual	1.21 (1.84)	26 (54%)	0.07 (1.94)	40 (42%)	0.07	0.57 (df 94)	0.452
Unfavourable characteristic about suicidal individual	2.58 (3.09)	32 (67%)	1.89 (2.64)	54 (57%)	0.24	7.35 (df 94)	0.008
Time or place of death given	5.58 (6.76)	40 (83%)	3.85 (4.64)	70 (74%)	0.30	22.23 (df XX)	<0.0001
Method procedure given	4.90 (5.34)	39 (81%)	3.49 (3.98)	57 (60.5%)	0.30	16.36 (df 94)	<0.0001
Number of sentences about method†	10.29 (11.38)	NA	7.04 (8.44)	NA	0.33	42.78 (df 94)	<0.0001
Mentioned suicide note	1.90 (4.36)	22 (46%)	1.00 (1.57)	28 (29%)	0.30	19.47 (df 94)	<0.0001
Mentioned memorials	0.42 (0.96)	14 (29%)	0.35 (0.85)	18 (19%)	0.08	0.44 (df 94)	0.511

(Table 3 continues on next page)

	Cluster communities (n=48)		Control communities (n=95)		Cohen's d	F statistic (df)	p value
	Stories published after index suicide, per community	Communities in which at least one story was published	Stories published after control suicide, per community	Communities in which at least one story was published			
(Continued from previous page)							
Attribution of blame							
Parents	0.06 (0.32)	2 (4%)	0.06 (0.28)	5 (5%)	0.00	0.00 (df 94)	0.990
Spouse	0.00 (0.00)	0	0.02 (0.14)	2 (2%)	..	..	..
School	0.00 (0.00)	0	0.03 (0.23)	2 (2%)	..	..	..
Friends or classmates	0.13 (0.44)	4 (8%)	0.19 (0.59)	12 (13%)	0.12	0.77 (df 94)	0.382
Society	0.02 (0.14)	1 (2%)	0.07 (0.30)	6 (6%)	0.23	1.39 (df 94)	0.241
Suicidal individual	1.19 (1.42)	29 (60%)	0.99 (1.63)	44 (46%)	0.13	1.23 (df 94)	0.271
Other	1.42 (3.77)	23 (48%)	0.61 (1.16)	30 (32%)	0.33	22.54 (df 94)	<0.0001
No one	4.79 (6.43)	36 (75%)	3.35 (4.23)	60 (63%)	0.27	18.02 (df 94)	<0.0001
Risk factors or motives mentioned							
Mental illness	1.17 (2.47)	18 (38%)	0.64 (1.07)	35 (37%)	0.30	10.63 (df 94)	0.002
Depression	0.88 (1.92)	16 (33%)	0.44 (0.77)	29 (31%)	0.33	9.94 (df 94)	0.002
Other mental illness	0.10 (0.37)	4 (8%)	0.15 (0.46)	11 (12%)	0.12	0.44 (df 94)	0.512
Trouble with the law	1.77 (2.48)	28 (58%)	1.31 (2.04)	46 (48%)	0.20	4.86 (df 94)	0.030
Drug or alcohol abuse	0.42 (0.99)	10 (21%)	0.51 (1.20)	24 (25%)	0.08	0.49 (df 94)	0.484
Previous suicide attempts	0.19 (0.45)	8 (17%)	0.11 (0.37)	8 (8%)	0.20	1.59 (df 94)	0.211
Marital problems	0.25 (0.48)	11 (23%)	0.40 (0.86)	24 (25%)	0.22	1.99 (df 94)	0.162
Romantic difficulties	0.31 (0.59)	13 (27%)	0.19 (0.53)	13 (14%)	0.21	2.07 (df 94)	0.154
Parent or child difficulties	0.13 (0.44)	4 (8%)	0.19 (0.59)	12 (13%)	0.12	0.77 (df 94)	0.382
Public humiliation	0.40 (1.09)	9 (19%)	0.23 (1.11)	10 (10%)	0.15	3.00 (df 94)	0.087
School or work difficulties	1.35 (4.11)	18 (38%)	0.46 (1.19)	23 (24%)	0.34	30.62 (df 94)	<0.0001
Debt or financial difficulties	0.35 (0.79)	10 (21%)	0.25 (0.55)	19 (20%)	0.15	1.16 (df 94)	0.285
Health problems	0.56 (1.29)	11 (23%)	0.33 (0.71)	21 (22%)	0.23	4.37 (df 94)	0.039
Political problems	0.67 (2.25)	9 (19%)	0.29 (0.86)	15 (16%)	0.24	10.12 (df 94)	0.002
Other problems	1.50 (2.03)	25 (52%)	1.31 (1.80)	49 (52%)	0.10	0.97 (df 94)	0.328
No problems mentioned	1.79 (2.49)	29 (60%)	1.21 (1.68)	56 (59%)	0.28	7.81 (df 94)	0.006
Explanatory models of suicide							
Simple monocausal reason	3.10 (5.46)	29 (60%)	1.95 (2.73)	61 (64%)	0.28	18.57 (df 94)	<0.0001
Complex (several) reasons	0.75 (1.36)	18 (38%)	0.57 (1.13)	28 (29%)	0.14	1.72 (df 94)	0.193
Understandable reaction to stress	0.00 (0.00)	0	0.04 (0.25)	3 (3%)	..	..	..
Medical	0.31 (0.78)	9 (19%)	0.21 (0.50)	16 (17%)	0.16	1.37 (df 94)	0.246
Ineffective treatment	0.06 (0.24)	3 (6%)	0.04 (0.20)	4 (4%)	0.09	0.27 (df 94)	0.606
Suicide contagion	0.15 (0.50)	4 (8%)	0.14 (0.48)	9 (9%)	0.02	0.02 (df 94)	0.887
Economic	0.06 (0.24)	3 (6%)	0.03 (0.18)	3 (3%)	0.14	0.70 (df 94)	0.405
No explanation given	3.52 (3.91)	37 (77%)	2.48 (2.89)	57 (60%)	0.31	12.45 (df 94)	0.001
Preventive and educational content							
Preventive or therapeutic advice	0.42 (0.79)	14 (29%)	0.26 (0.62)	17 (18%)	0.23	2.39 (df 94)	0.125
Checklist of suicide risk	0.08 (0.28)	4 (8%)	0.03 (0.18)	3 (3%)	0.22	1.61 (df 94)	0.207
Community treatment resources	0.06 (0.32)	2 (4%)	0.08 (0.28)	8 (8%)	0.07	0.19 (df 94)	0.661

*Greater than 1 inch (2.54 cm) tall, extended over two or more columns, and/or located towards the top of the page.†By contrast with the remainder of the variables in this table, the mean number of sentences about the suicide method rather than the mean number of stories with a specific characteristic is the focus of the analysis.

Table 3: Quantitative and qualitative characteristics of news stories about any suicidal individual published after index cluster and control suicides

specifying the method used; more detailed, publicising names, method procedures, and the presence of a suicide note; and more likely to report on completed rather than attempted suicide.

Although some have questioned whether social contagion plays any part in the generation of youth

suicide clusters,^{2,24} our findings are consistent with the conclusion that knowledge of a previous suicide, disseminated via the news media, can increase the risk of subsequent, surplus suicides (panel 2).^{14,15,25} Repeated, detailed, and explicit reporting on completed suicide might normalise suicide in the eyes of vulnerable young

people, reducing their inhibitions against the modelled act.²⁷ Alternatively, the effect of suicide reporting might operate through the mechanism of priming, in which the activation of one thought might trigger related, preprogrammed thoughts in suicidal youth.² Our finding that only stories about suicidal individuals, as opposed to other types of newspaper stories about suicide, are associated with the occurrence of a subsequent suicide supports the theory that the media effect operates through the mechanism of identification with a model.²⁸ Our finding that stories about the teenage suicides in our study had the strongest effect on subsequent teenage suicides is consistent with the theory of differential identification, in which the models with the most effect are those who are either similar to the reader (ie, another teenager) or revered by him or her (eg, a celebrity).^{14,17} Our finding that stories about celebrity suicides are associated with subsequent teenage suicides is consistent with substantial previous studies into media effects in the general population.^{14,17} However, the causes of suicide are complex, and if publicity around a suicide model does contribute to a suicide death, it invariably does so in concert with many other suicide risk factors.²⁹ News stories about the index cluster suicides in our study appeared in only 25% of cluster communities, and stories about celebrity suicides in only 46%. The factors that contributed to the emergence of suicide clusters in cluster communities without an excess of suicide reporting are yet to be identified.

The present study has several advantages for the examination of the effect of newspaper stories on the initiation of youth suicide clusters. First, we used a large, national sample of statistically verified suicide clusters and a methodologically robust case-control design. Our use of suicide controls addresses a major limitation of earlier studies of suicide clusters, which were uncontrolled or used live controls.²⁶ Second, the scientific advantage of matching cluster and control suicides within the same state is that medical examiners' reporting procedures and the demarcation of city or town limits are both standardised. Third, our sample of newspaper stories was derived using a diverse set of sources, including parents and peers of the individuals who had died by suicide. Lastly, we regard it an advantage that the suicide clusters and controls were identified before the advent of the internet or social media. In view of increasing evidence that the internet and social media can influence suicidal behaviour,^{8,30} our sample provides an opportunity to examine the unique contribution of newspaper stories, which more recent samples would preclude. In a study published in 2011³¹ of young people aged 14–24 years who were interviewed about their exposure to news of an individual's suicide, the most frequently cited source of suicide stories was in newspapers (64%), followed by friends or relatives (55%) and internet news sites (44%). Even since the advent of the internet, therefore, newspapers remain the

predominant source of suicide reporting to which adolescents and young adults are exposed, and consequently research-informed guidelines for print media reporting remain important.

The study has important limitations. First, given the ecological nature of our study, we cannot show that individuals who died by suicide after publication of newspaper reports about suicide were in fact exposed to and influenced by the coverage. As noted, we did attempt to identify newspapers that were probably read in the homes of the individuals who died by suicide. Second, we are unable to distinguish the effect of the number of news stories about suicidal individuals per se from the effect of the stories' characteristics. Although the results of our content analyses are broadly consistent with those of previous media content analyses³² and with previously published media guidelines,³³ the sheer number of news stories about suicidal individuals, rather than the specific story characteristics, might be the driver of the effect.

Panel 2: Research in context

Systematic review

We searched PubMed, PsycINFO, and Google Scholar with a combination of keyword and title and abstract searches (using the terms "suicide", "suicides", and "suicidal" in combination with "cluster", "clusters", "clustering", "aggregation", "outbreak", "outbreaks", "epidemic", and "epidemics") to identify original research articles and reviews about spatiotemporal (or "point") suicide clusters published in English in the past 10 years. After excluding non-relevant articles, we identified 16 new research articles on spatiotemporal suicide clusters, and one review of risk factors and mechanisms involved in suicide clustering.² Of the 16 research articles identified, none included a control group. The review of risk factors for cluster suicide² concluded that existing evidence of risk factors for cluster suicide is largely derived from descriptive studies lacking methodological rigour, and is unable to differentiate cluster from non-cluster suicide. Of the many studies of suicide clusters we have previously reviewed,^{1,7,25} the only study to include a control group²⁶ used living adolescents as matched controls. As a result, the identified risk factors for dying in a youth suicide cluster (eg, previous suicidal behaviour, previous admission to psychiatric hospital, exposure to violence, a recent breakup) were highly consistent with risk factors for youth suicide in general. Although suicide clustering has been shown to be more prevalent in adolescents and young adults than in other age groups,^{10,11} little else is known about the conditions under which suicide clusters arise.

Interpretation

We believe our study to be the first to analyse a national sample of statistically inferred adolescent suicide clusters by comparison with a matched control group of non-cluster suicides. We found publication rates of news stories about the young people who had died by suicide in our study, and of news stories about other suicidal individuals, to be significantly higher after the index suicide in a cluster than after a non-cluster suicide. Additionally, more prominent, explicit, and detailed reporting on any suicide in the wake of an initial adolescent suicide was associated with the occurrence of a subsequent adolescent suicide. Our findings constitute the first available information about the circumstances differentiating a suicide that leads to a suicide cluster from one that does not. Together with previous research,^{2,26} our findings suggest that the vulnerabilities characteristic of suicidal youth might be compounded in the context of media reporting on a previous suicide. Our findings emphasise the importance of adherence to media guidelines in the wake of a suicide, and of heightened postvention efforts with vulnerable adolescents after a suicide that receives media attention.

Nevertheless, we have presented a profile of articles that, when published repeatedly after a suicide, are associated with the emergence of a youth suicide cluster. Third, because we used fixed rather than variable spatial and temporal units, we probably have not identified every statistically significant cluster occurring from 1988 to 1996. Moreover, the state departments of health did not provide us with mortality data from sovereign indigenous communities—ie, reservations—precluding our ability to identify suicide clusters occurring in these communities. Fourth, an unmeasured confounding factor might have been responsible for both the heightened publicity about the index suicide in our cluster communities and the occurrence of subsequent suicides. However, our findings that cluster suicides were no more likely than controls to take place in public, and that distributions of suicide methods did not differ, increase our confidence that the cluster and non-cluster suicides had comparable characteristics, and that differential rates of reporting did play a part. Lastly, our study was designed to examine the role of newspaper coverage in the initiation of a suicide cluster, but our data cannot address the media's role in sustaining a cluster beyond the second suicide death.

In conclusion, although we cannot show causality, our findings support the interpretation that media portrayals of suicide might have a role in the emergence of some teenage suicide clusters. As such, these portrayals might constitute a modifiable risk factor for the emergence of these clusters. Media guidelines on the reporting of suicides have shown an effect,³⁴ and an improved understanding of the ways in which newspaper reporting on suicide might influence subsequent suicides can support the development of these and other effective suicide prevention and postvention strategies. Specifically, the publication of news stories about suicidal individuals, and particularly of prominent, detailed, and explicit stories about completed suicides, is discouraged, and heightened vigilance regarding already vulnerable individuals, especially adolescents, is recommended in the aftermath of the publication of such stories. Additionally, although we studied newspaper reporting exclusively, our findings might provide a useful baseline and template for future studies of the role of electronic media in the initiation of teenage suicide clusters. In particular, our findings point to the importance for future media analyses of differentiating between general information or conversations about suicide, and reports about the completed suicide of a specific, non-fictional individual that might serve as a model for future suicidal behaviour.

Contributors

MSG was responsible for obtaining funding. MSG designed the study with input from MHK. MSG, JF, and JBM devised the newspaper content analysis coding procedure. MSG, JF, and JBM were involved in data collection. MSG and MHK took the lead on statistical analysis. MSG led the interpretation of the findings with additional input from MHK and AML. MSG and AML did the initial reference search. MSG was

principally responsible for the writing of the paper. AML led subsequent revisions, with all authors contributing to successive drafts.

Declaration of interests

We declare that we have no competing interests.

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