

# Increasing railway suicide acts after media coverage of a fatal railway accident? An ecological study of 747 suicidal acts

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## ABSTRACT

**Background** While coverage of a celebrity suicide in the mass media may trigger copycat suicides, evidence for the effect of media reports of non-prominent suicides is moderate. Diversification of current media may raise further doubts as to whether their influence on suicidal acts is still present. We examined whether widespread media coverage of a railway accident, in which several people were killed while investigating a presumed railway suicide, subsequently increased the number of railway suicides.

**Methods** The daily incidence of railway suicides was derived from the national accident registry on the German railway net. We estimated incidence ratios by Poisson regression, adjusting for relevant confounders (eg, outdoor temperature, unemployment rate), for the 2 months following the accident (predefined index period) and predefined control periods (preceding 2 years of the same period and 1 month before/after the index period).

**Results** The mean number of railway suicides per day in the index period increased significantly to 2.66 (95% CI 2.19 to 3.13) compared to 1.94 (95% CI 1.78 to 2.10) during both control periods. Fully adjusted Poisson regression showed a 44% daily increase in railway suicides in the index period compared to the control periods (incidence ratio 1.44, 95% CI 1.02 to 2.03). A maximum of eight suicides per day was reached about 1 week after the accident.

**Conclusions** Non-fictional media coverage of a fatal accident appears to affect subsequent railway suicide numbers. Supposedly, media reports drew attention to railways as a means of suicide.

## INTRODUCTION

Coverage of a suicide in the mass media may trigger copycat suicides.<sup>1</sup> Although this has been debated for more than 30 years,<sup>2–3</sup> at present, the most convincing evidence for the impact of media reporting on subsequent suicides exists for the increase of suicide rates following the reporting of celebrity suicides, particularly entertainment celebrities.<sup>4–6</sup> Despite conclusive single reports,<sup>7</sup> the overall impact of fictional portrayals of specific suicide methods on subsequent increases of suicidal behaviour remains controversial and the evidence for a causal association is considered moderate at best.<sup>8</sup> Moreover, the impact of non-prominent suicide reports on copycat behaviour has been less well-documented<sup>9</sup> and seems to be smaller than the impact of celebrity suicide reports yet significant.<sup>10</sup> However, the findings have been criticised on methodological grounds.<sup>8–11</sup>

Diversification of the contemporary media scene may raise further doubts as to whether media influences may still be present. Nevertheless, WHO has listed 'promotion of responsible reporting of suicides' as one of its six key strategies on suicide prevention.<sup>12</sup> Corresponding media guidelines<sup>13–14</sup> have been developed worldwide, which include recommendations that make common sense but their effectiveness has scarcely been evaluated.<sup>15–16</sup>

The widespread media coverage of an exceptionally dramatic accident with three persons killed on a railway track after an antedated presumed suicide or accident provided a current opportunity to investigate the possible subsequent clustering of railway suicidal acts. In particular, we were interested whether the fatal event in discussion led to an increase in fatal and non-fatal railway suicides even though the accident itself could not serve as a projection screen for suicide imitation.

## MATERIAL AND METHODS

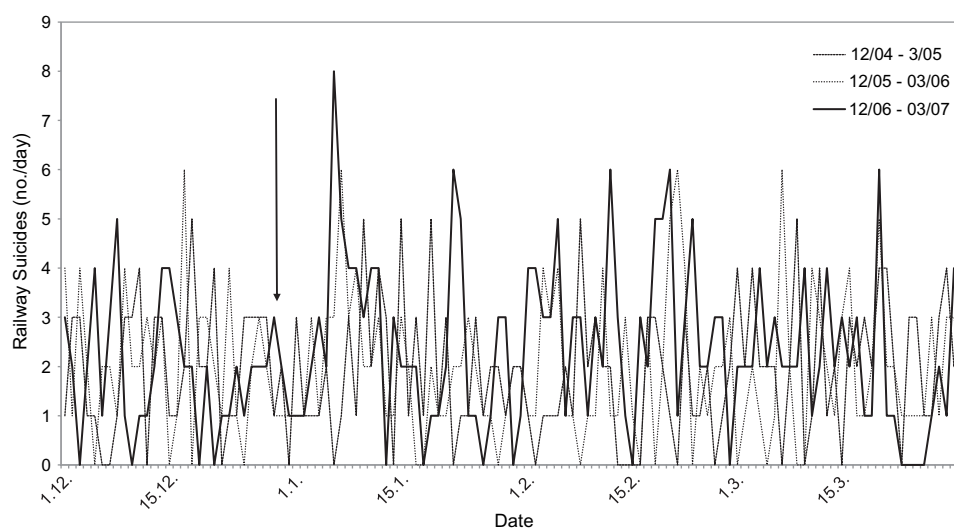
### The media reports

In an attempt to salvage the corpse of a person who was killed for unknown reasons on the main railway trunk line between Munich in Germany and Zuerich in Switzerland, a police investigation team of five police officers and an undertaker were examining a track next to Bregenz, Austria, on the morning of 29 December 2006. At 10:00 an International City Express train crashed into the investigation team immediately killing three persons (one woman and two men). The accident was reported by television and radio news channels and internet news throughout that day, and received widespread attention in German newspapers on the following day. We analysed the reports of three major nationwide television channels, three national subscription newspapers (coverage in the second half of the year of 2006 0.5%, 1% and 1.7% of the German population<sup>17</sup>) and the national boulevard paper (coverage 17.7%<sup>17</sup>). The initial fatal event was addressed by all television channels and most newspapers as a 'presumed suicide or accident'. Only the leading mass-media publication, 'Bild', explicitly labelled the death as a suicide.

### Data sources

The database of the present study is derived from the Event Database Safety, which is the national central registry of all person accidents in the context of the national German railway company covering the entire German railway track system excluding municipal subway providers. From this registry, we obtained the daily frequency of suicidal

**Figure 1** Number of suicides per day from 1 December to 31 March in 2004/2005, 2005/2006 and 2006/2007. Arrow indicates the event on 29 December 2006.



acts (fatal and non-fatal) on the German railway track system (defined according to the International Classification of Diseases (ICD) 10 code X81 as ‘intentional self-harm by jumping or lying in front of a moving object’,<sup>18</sup> and resulting in a serious breakdown of the railway system) from December to March for the periods 2004/2005, 2005/2006 and 2006/2007. Fatal suicide was defined as ‘death within 30 days’.

To account for relevant confounding effects of meteorological<sup>19</sup> and social factors,<sup>20</sup> we received the average monthly temperatures during the index and control periods from the database of the German National Meteorological Service,<sup>21</sup> which provides data from 44 observation stations covering the entire country. Monthly unemployment rates were obtained from the German Federal Agency for Employment.<sup>22</sup>

**Data description**

We compared suicidal acts occurring during three predefined different periods: The ‘index period’ covered roughly the first 2 months (59 days) after the occurrence on 29 December 2006 considering a delay of 2 days (1 January to 28 February 2007). Control period I ranged from December 2004 to March 2005 and December 2005 to March 2006 with a total of 242 days. Control period II consisted of the month immediately before/after the index period (December 2006 and March 2007) representing 62 control days. Due to theoretical considerations, the relevant periods were fixed before examination of the data.

An average monthly temperature was obtained by calculating the mean of the average monthly measurements of 43 selected observation stations (data from the observation station on the Zugspitze, Germany’s highest mountain, were omitted for the present analysis) and reported continuously in degrees Celsius. Monthly unemployment rates were given in percentages.

**Statistical analysis**

We used the  $\chi^2$  test for associations to assess the significance of associations between categorised variables and for equal proportions to find out temporal variations. We applied the t test for independent samples to compare means. We performed a Poisson regression analysis<sup>23</sup> with a log link to model the number of suicides per day. To account for possible confounding we calculated different models, including day of the week, month, period (2004/2005, 2005/2006, 2006/2007), average monthly temperature and unemployment rate (both continuous). From the resulting models, the incidence ratios with their 95% CI and p values were calculated. In case of over-dispersion of the Poisson regression model, the dispersion parameter was estimated by the ratio of the deviance to its associated degrees of freedom. For all statistical analyses, a p value less than 0.05 was considered to be statistically significant. All evaluations were performed with the statistical software package SAS v9.1 for Windows.

**RESULTS**

A total of 747 fatal and non-fatal railway suicides were observed during the index and the two control periods of the study. Of these, 669 (89.5%) resulted in death leading to a fatal to non-fatal ratio of 8.6:1. There was no significant difference between case death and periods ( $\chi^2$  test for association = 0.59, degrees of freedom (df) = 6, p=0.99). Analysing 2004/2005 and 2005/2006 together as one control period was justified because the monthly frequency and distribution of railway suicidal acts was not different during the 2 years ( $\chi^2=4.12$ , df=3, p=0.25).

Figure 1 displays the daily number of suicidal acts for each study period revealing a marked increase in incidences during the index period by visual inspection.

**Table 1** Description of the data: events during index period, control periods and total

	Index period*	Control period I†	Control period II‡	Control periods I and II	Total
Number of events	157	470	120	590	747
Number of days	59	242	62	304	363
Mean events/day (95% CI)	2.66 (2.19 to 3.13)	1.94 (1.77 to 2.12)	1.94 (1.60 to 2.27)	1.94 (1.78 to 2.10)	2.06 (1.91 to 2.21)
SD	1.80	1.40	1.33	1.38	1.48
Median events/day	3	2	2	2	2
Minimum/maximum	0–8	0–6	0–6	0–6	0–8

\*Index period: January and February 2007.

†Control period I: December 2004 to March 2005 and December 2005 to March 2006.

‡Control period II: December 2006 and March 2007.

**Table 2** Incidence ratios with their 95% CIs: index period (January and February 2007) versus control periods

	Incidence ratio (95% CI)		
	Control period I: December 2004 to March 2005 and December 2005 to March 2006	Control period II: December 2006 and March 2007	Control period I and II
Crude model	1.37 (1.12 to 1.67)	1.37 (1.06 to 1.79)	1.37 (1.13 to 1.66)
Model 1*	1.43 (1.12 to 1.83)	1.49 (1.03 to 2.15)	1.53 (1.11 to 2.11)
Model 2†	1.05 (0.57 to 1.94)	1.49 (1.03 to 2.15)	1.44 (1.02 to 2.02)
Model 3‡	0.92 (0.27 to 3.11)	1.49 (1.03 to 2.15)	1.44 (1.02 to 2.03)

\*Adjusted for weekday, season, month.

†Adjusted for weekday, season, month, temperature.

‡Adjusted for weekday, season, month, temperature, unemployment rate.

As can be seen in table 1, the mean number of railway suicides per day of both control periods was equal (1.94 per day) with comparable CIs. However, during the index period, the mean number increased to 2.66 compared to the whole control period ( $t=-2.92$ ,  $df=1$ ,  $p=0.005$ ) leading to almost five more suicides on average per week. A daily maximum of eight railway suicides was reached on 6 January 2007—about 1 week after the event. It is of interest that in March 2007 (third month after the index event) the railway suicide incidence figures returned to the baseline level of the two preceding control years ( $\chi^2$  test for equal proportions=1.30,  $df=2$ ,  $p=0.52$ ).

The unadjusted (crude) model of the Poisson regression indicated a significant 37% daily increase in railway suicidal acts compared to the control period days (table 2). After adjusting for the weekday, month and period, the daily number of suicidal acts was 43–53% higher during the 2 month index period in comparison to the control period days (model 1). Taking the temperature into account, the 44% increase in suicidal acts during the index period compared to total control period days was still significant as well as the 49% increase in comparison to the days of December 2006 and March 2007 (model 2). The comparison with the control days of the previous years 2004/2005 and 2005/2006 yielded a non-significant result. The same pattern was found when additionally accounting for the monthly unemployment rate (model 3).

## DISCUSSION

The present study reveals a marked increase in railway suicidal acts following extensive media coverage of a disastrous accident involving three people on a railway trunk line. This study provides good evidence for the impact of non-fictional media coverage of non-prominent railway death on subsequent suicides despite the pronounced diversification of the contemporary media scene.

The impact of the media coverage summed up to a 44% relative increase after adjustment for potential confounding covariates during the 2 months of observation. Nevertheless, given the transient and focused nature of the media effect under investigation, the impact of the total incidence of suicides in the population (9765 total suicides in 2006 and 9402 suicides in 2007<sup>24</sup>) presumably remains restricted.<sup>25</sup> The Poisson regression analysis controlled for temperature and unemployment rate as potential confounding covariates. In the literature, unemployment is associated with a higher suicide rate.<sup>20</sup> With temperature, positive as well as negative associations have been reported.<sup>19</sup> In our study, controlling for the monthly unemployment rate did not change the models. However, the temperature adjusted models comparing daily suicidal acts during the index period versus the longer control period I (December 2004 to March 2005 and December 2005 to March 2006) did not show a significant increase in the number of railway suicidal acts,

while the models using only the previous and following month of the index period as control periods remained significant with an increase of 49%. This pattern might be explained statistically by the coincidence of the unusually warm 2006/2007 winter season (with an almost constant average temperature per month from 3.98 to 6.33°C) with the index period. In control period I, the temperature varied much stronger per month and was overall lower (from -2.30 to 3.60°C). Moreover, we cannot exclude an over-adjustment of the models by including temperature as an additional confounding variable.

No consensus in the literature exists on the width of a vulnerable timeframe of a media effect on suicides. In the present study, the effects prevailed for 2 months and, thus, were slightly longer than the typical 2–4 week timeframe shown in other media effect investigations.<sup>4 26 27</sup> Interestingly, the media coverage effect observed in this study is comparable to the effects seen after fictional television presentations of railway suicides.<sup>7</sup>

We did not observe a compensatory deficit in the number of railway suicidal acts in the third month after the index event. The monthly incidence rate returned to the average level of the control periods instead of declining below the average figures. This provides further support for the assumption that media coverage does not precipitate suicides that were expected to occur regardless of any media effect.<sup>7</sup>

The exact nature of the initial stimulus that provoked the devastating consequences remains largely undetermined. However, a pure copycat effect can be ruled out as the context analysis of the news clearly revealed that the focus of the media coverage was on the deadly fate of the members of the investigation team and not on the presumed railway suicide (which later turned out to be a tragic accident). Thus, imitation as mode of action can be excluded. Furthermore, media reports avoided sensationalising or glamorising the underlying presumed suicidal act and did not give it undue prominence, although the accident per se had been running as a lead item in diverse media bulletins. However, the photographs of the deceased investigators, the scene of the event and the coffins being carried away from the track were broadcasted (the latter in a manner of representation, which would have violated current guidelines on media reporting of suicides<sup>14</sup>).

One major finding about choice-structuring methods of subjects committing railway suicide<sup>28</sup> is that subjects at risk are

### What is already known on this subject

There is evidence of an association between sensationalised media reporting of suicides (most often of celebrity victims) and a subsequent increase in suicides.

## What this study adds

- ▶ Media coverage over a fatal accident on railway tracks impacts subsequent railway suicide numbers despite any projection screen for an imitation effect.
- ▶ It underlines the necessity of adherence to media guidelines for the reporting of suicides and, possibly, also accidents that may draw attention to the railway as a means of suicide.

occupied by the omnipresent belief that suicide on the track results in a certain and painless death.<sup>29</sup> It is not unlikely that the media coverage in this case operated on and supported this particular belief. Thus, it may be speculated that the widespread media attention of the disastrous sequel to an undefined railway track death functioned as an invitation to die, by means of railway suicide, for vulnerable subjects.

## Limitations

Several study limitations must be considered. First, our analysis does not permit the identification of the exact trigger for the choice of railway suicide. Information on exposure of the suicide victims to media stimuli was absent<sup>5</sup> and no additional qualitative analysis (eg, suicide notes, medical records) could be undertaken. Second, the data do not allow for sex and age-related analysis and, thus, we were unable to determine whether younger subjects (known to be particularly prone to media-induced copycat suicides<sup>30–31</sup>) were at increased risk. Third, although monthly data on suicides were available from the German Federal Statistical Office, comparisons with the Event Database Safety were not possible due to intrinsic reporting differences. Thus, we were unable to test, although unlikely, whether other suicide means increased or decreased correspondingly over the study period. Fourth, we controlled for temperature and unemployment rate; however, the influence of factors other than the ones considered in our models cannot be ruled out.

## CONCLUSIONS

With these limitations in mind, the present investigation shows that the media coverage of a serious three-person accident on a railway trunk line was significantly associated with an increase in the number of subsequent railway suicides. Therefore, not only the sensational presentation of a suicidal event, but also the presentation of a fatal accident of non-celebrities, may constitute a powerful stimulus for suicidal behaviour. Supposedly, the wide-reaching prominent featuring of the completely unexpected and disastrous consequence of the investigation team entering the railway track drew attention to the railway as a means of suicide. These findings underline the necessity of a strict adherence to media guidelines in the reporting of suicides. Furthermore, reporting of any fatal railway accident should be treated with reserve. Further studies to investigate the effects of media coverage of suicidal and accidental deaths on railway tracks in other countries are warranted. A replication of our results with Austrian and Swiss data would be desirable.

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