

Securing a Suicide Hot Spot: Effects of a Safety Net at the Bern Muenster Terrace

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The city of Bern has a high percentage of suicides by jumping (28.6%). Related to other local hotspots, the highest number of deaths (mean 2.5 per year) is found at the Muenster Terrace in the old city. In 1998, after a series of suicides, a safety net was built to prevent people from leaping from the terrace and to avoid further traumatization of people living in the street below. We analyzed the numbers of suicides by jumping before and after the installation of the net. We also assessed the number of media reports referring to this suicide method. After the installation of the net no suicides occurred from the terrace. The number of people jumping from all high places in Bern was significantly lower compared to the years before, indicating that no immediate shift to other nearby jumping sites took place. Furthermore, we found a moderate correlation between the number of media reports and the number of persons resident outside Bern committing suicide by jumping from high places in the city.

Prevention of suicidal behavior remains a complex and imperfect art (De Leo, 2002). One of the few strategies that have shown a preventive effect is reducing the availability of means (Leenaars et al., 2000; Schapira, Linsley, Linsley, Kelly, & Kay, 2001). Typical examples are: gun restriction by gun licensing laws (e.g. Loftin, McDowall, Wiersema, & Cottey, 1991; Sloan, Rivara, Reay, Ferris, & Kellermann 1990; Rich, Young, Fowler, Wagner, & Black, 1990); detoxification of do-

mestic gas (Lester, 1990b); securing railroads (Emmerson & Cantor, 1993); changes of prescribing habits and reduction of package size (Hawton, 2002; Hawton et al., 2001); and limiting access to high buildings (Nowers & Gunnell, 1996), bridges (Cetin, Gunay, Fin-canci, & Ozdemir Kulusayin, 2001; Coman, Meyer, & Cameron 2000; Seiden, 1978), or hospitals (White, Gribble, Corr, & Large, 1995).

Suicide by jumping from high places is a method typically used when such places are easily accessible, like in Singapore or New York, where 60% (Peng & Choo, 1992; Ung, 2003) or, respectively, 30% (Fischer, Comstock, Monk, & Sencer, 1993) commit suicide with this method. Even in small countries like Belgium the percentage of jumping compared to all methods varies by region (Moens, Loysch, & van de Voorde, 1988), implying that the use of methods depends on local availability (Hawton, Fagg, Simkin, Harriss, & Malmberg, 1998). In Switzerland, 7.2% of all suicides between 1981 and 2000 were categorized as "jumping from height."

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In the agglomeration of Bern (324,000 inhabitants) the percentage of suicides by jumping is 13.8% (Swiss Federal Statistical Office), and 28.6% in the city of Bern itself (124,000 inhabitants, statistics of the Bernese Police).

A jumping site becomes a hot spot when it has gained a reputation, when it gets media attention (Blohm & Puschel, 1998; Stack, 2003); and when the access to the site is easy (Surtees, 1982; Wiedenmann & Weyerer, 1993). The Bern Muenster Terrace fulfills all these criteria. It is an elevated small park at the side of the Muenster (a medieval cathedral), overlooking the river and the lower part of the old town. On sunny days, up to 400 people may gather in this popular park. On average, two persons each year commit suicide by jumping down the height of 33 meters. In 1997 and 1998 the place received increased media attention because of a series of suicides. The newspaper articles focused on the danger for citizens living at the foot of the terrace. On one occasion a suicidal individual landed next to a child playing in the street. This case got particular media attention in several articles and letters focusing on the traumatization of the persons living at the bottom. Such effects of people witnessing suicides have been described by Gunnell and Nowers (1997).

In December 1998, a safety net was built to prevent people from leaping from the terrace. This barrier consists of a four meter wide metal mesh, seven meters below the top level. The general prevention factor of the barrier was questioned because people can easily jump from other elevated places in the vicinity, such as two bridges of circa 50 meters height within five minutes walking distance, one of them in direct view from the Muenster Terrace.

It has been argued that restriction of a specific method can lead to a decrease of the overall suicide rate (Sloan et al., 1990), at least in a short term perspective (Fischer et al., 1993; Gunnell & Nowers, 1997). There is some doubt whether a restriction of a certain method will have a long-term effect (Fischer et al., 1993; Gunnell & Nowers,

1997). In some investigations a shift in methods (De Leo, Dwyer, Firman, & Neulinger, 2003; Lester, 1990a) or a shift to another jumping site (Cantor & Hill, 1990) has been observed. Considering that jumping is a very lethal method, a transfer from jumping to a less lethal method would increase the chance of survival. Barriers in particular may be effective in preventing suicide (Coman et al., 2000; Goss, Peterson, Smith, Kalb, & Brodey, 2002; Prevost, Julien, & Brown, 1996), but only a few studies have actually evaluated the effect of barriers at jumping sites. Cantor and Hill (1990), O'Carroll and Silverman (1994), and Ellis (1996) reported that barriers resulted in a reduction of suicides at that site and Beautrais (2001) found that the removal of previously installed barriers led to an increase of suicides.

In this study we investigated the effects of the safety net on the Muenster Terrace and the other local hotspots in Bern. Because increased media reporting can lead to copy-cat suicides (Blohm & Puschel, 1998; Marzuk et al., 1993; Stack, 2003), we also determined the number of publications in the local newspapers and relate these numbers to the suicides and the residency of persons who committed suicide by jumping in Bern.

We expected that in the years after the installation of the safety net no suicides from the Muenster Terrace occurred. Regarding the influence of the safety net on nearby jumping sites, both was considered possible: an increase of jumps on nearby sites or a general decrease mediated by less media reporting. When analyzing the changes, it seemed necessary to differentiate between different time spans in the suicide data: (1) The long-term development of suicide by jumping (before the installation of the net); (2) the time of high media attention (1997/1998); and (3) the time span after the net was installed (December 1998 to 2002). According to the investigation of O'Carroll & Silverman (1994) we expected not only the number of suicides to decrease, but also the percentage of suicides by jumping in relation to other methods. During the time of high media attention, people living outside Bern may have

been attracted and come to Bern city to kill themselves. We therefore expected that during this time individuals who leaped from the heights in the city were more often resident outside the agglomeration of Bern, in comparison to previous years. The expected effects of the safety net were formulated as four hypotheses (see result section).

METHOD

In our analyses we included two different data sets. The first, obtained from the Swiss Federal Office for Statistics (Bundesamt für Statistik), is based on the place of residence of individuals who committed suicide. Data were available for the period from 1969 to 2000. This data set includes the numbers of all officially confirmed suicides, specified by time (year), residence, and method used. The agglomeration of Bern and the city of Bern are listed separately. The second data set, recorded by the Bern City Police, is based on the place of death, namely the city of Bern. These data were available from the period 1981 to 2002. Both data sets are complete, as by law the police have to be involved in any violent death, and the Swiss Federal Office for Statistics has to be informed of any death of a person living in Switzerland. If a person resident in the agglomeration of Zurich jumps from the Bern Muenster Terrace, this death will appear in the Bern police record, but not in the record of the Swiss Federal Statistical Office referring to Bern. Instead, this death will appear in the statistics of the Swiss Federal Office referring to Zurich and Switzerland. We can exclude the possibility that unknown deaths occurred at the Muenster Terrace. There is a theoretical possibility that a small number of deaths from people jumping in the river have not been detected, but due to several weirs the likelihood of undetected death is extremely low and can be neglected. To investigate the media activity, we scanned all Swiss newspapers using the Swissdix System and collected all articles related to suicides at the terrace or other jumping sites in the city of Bern. Media

data were available from 1988. All analyses were calculated using SPSS 11.0.

RESULTS

Hypothesis 1: There were no more suicides from the Muenster Terrace after the installation of the safety net. Indeed, no suicides from the Muenster Terrace occurred in the years after the safety net was installed (1999–2002).

Hypotheses 2: The reduction of suicides by jumping from the terrace was associated with a change in the number of people jumping from all sites in Bern. To test this hypothesis, several methods were applied. A numeric decrease was found for the Kirchenfeld Bridge, which is the bridge closest to the Muenster Terrace. Six persons jumped during the 4 years before the safety net installation (1995–1998), but only three during the 4 years after the installation in 1998. However, no statistical analyses can be performed on these small numbers. Using an interrupted time series analysis (Leenaars, Moksony, Lester, & Wenckstern, 2003), we first tested whether a significant change between the expected and the observed numbers of suicides by jumping in Bern could be found. If a linear model was applied comparing the time of higher media attention before the installation (1995–1998) with the 4 years after the installation (1999–2002), significantly fewer people committed suicide than expected (95 expected, 44 observed; binominal-test: $p < 0.001$). It is questionable whether the suicide rate would have continued to increase as would be expected in a linear model. A more conservative approach is to assume that without any intervention (building barriers or other) the number of suicides would have stabilized at a higher level. A mathematical function that comes close to this assumption is the logarithmic curve. The effectiveness of the net in this case can be calculated by the difference between the observed values from 1999 to 2002 and the values of logarithmic curve estimation. If a logarithmic curve estimation was assumed (1995–1998 vs. 1999–2002), the difference between expected and observed num-

bers was still significant (73 expected, 44 observed; binominal-test: $p < 0.01$). We also performed an interrupted time series analysis of the long-term baseline from 1981 to 1997. In the interrupted time series a linear regression serves to estimate the expected numbers of suicides and thus to determine changes and trends (e.g., whether it will continue over time or fade out). When considering a long-term development (1981–1998 vs. 1999–2002), no significant difference was found (52 expected, 44 observed; binominal-test: ns).

Which mathematical model can best explain the phenomena? The logarithmic curve estimation and the 4-year linear time series reached a significant level of fit (adjusted $R^2 = 0.927$; $F = 39.21$, $p = 0.025$, respectively, $R^2 = 0.902$; $F = 35.59$, $p = 0.027$), whereas the long-term model did not. This result indicates that the logarithmic curve estimation is the best fitting assumption of the dynamic that took place before 1998.

Finally, we tested whether after the installation a trend between observed suicides and the long-term baseline occurred at the jumping sites of Bern city as a whole. Such a curve suggests a drop after the installation of the net and a return to the baseline a few years later. This analysis, however, failed statistical significance (see Fig. 1).

Hypothesis 3: The proportion of suicides by jumping in comparison to other suicide methods was higher in the year of the increased media attention (1997/1998) than before.

We found a highly significant increase of media reports related to suicide by jumping in Bern in the years before the installation of the safety net (data included 1988 to 1998; ANOVA: $f = 189.1$; $p = .002$). The number of media reports was particularly high in the period from 1997 to 1998. These data were, therefore, separately analyzed. In the period 1981 to 1998, on average 28.9% of all persons living in the city of Bern who committed suicide did this by jumping from a high place. In the period 1997 to 1998 (the time of the most media attention), this percentage rose to 41.4% (mean). The relation between suicide by jumping and other suicide methods was borderline significant (Chi²-test

failed statistical significance, Fisher's exact test, one-sided: $p = 0.05$). In 1998, a prominent peak was observed. During this year 59.3% of people who committed suicide in the city of Bern did so by jumping from height (see Fig. 2). These data suggest a regional increased popularity of this suicide method.

Hypothesis 4: Media reporting correlates with the number of suicides by persons resident outside Bern.

We found a moderate but statistically nonsignificant correlation between the number of media reports and the number of persons coming from outside Bern to kill themselves by jumping in Bern in the years 1988 to 2001 ($r = .41$; $p = ns$); the total number of suicides did not positively correlate with the number of media reports. This hypothesis therefore could not be confirmed.

DISCUSSION

In the four years after the safety net was built, no more suicides at the Bern Muenster Terrace occurred, and the number of suicides by jumping in Bern decreased. The latter finding is in concordance with Cantor and Baume (1998), Goldney (2000), and other authors who demonstrated that a reduction of accessibility leads to a reduction in method specific suicide rates. The net was mainly built to protect people at the bottom of the terrace; it does not completely surround the terrace and jumping at the west side would still be lethal. The effect of the terrace is, therefore, at least partially a psychological one and the elimination of suicides not exclusively a physical consequence due to obstruction.

We used three different methods to calculate statistical differences before and after the installation of the barrier. The results suggest that the best fitting model is the logarithmic model, which suggests a significant reduction of suicides by jumping after the installation of the net. This method indicates an increase of suicides in the years 1997/1998 rather than a decrease from the

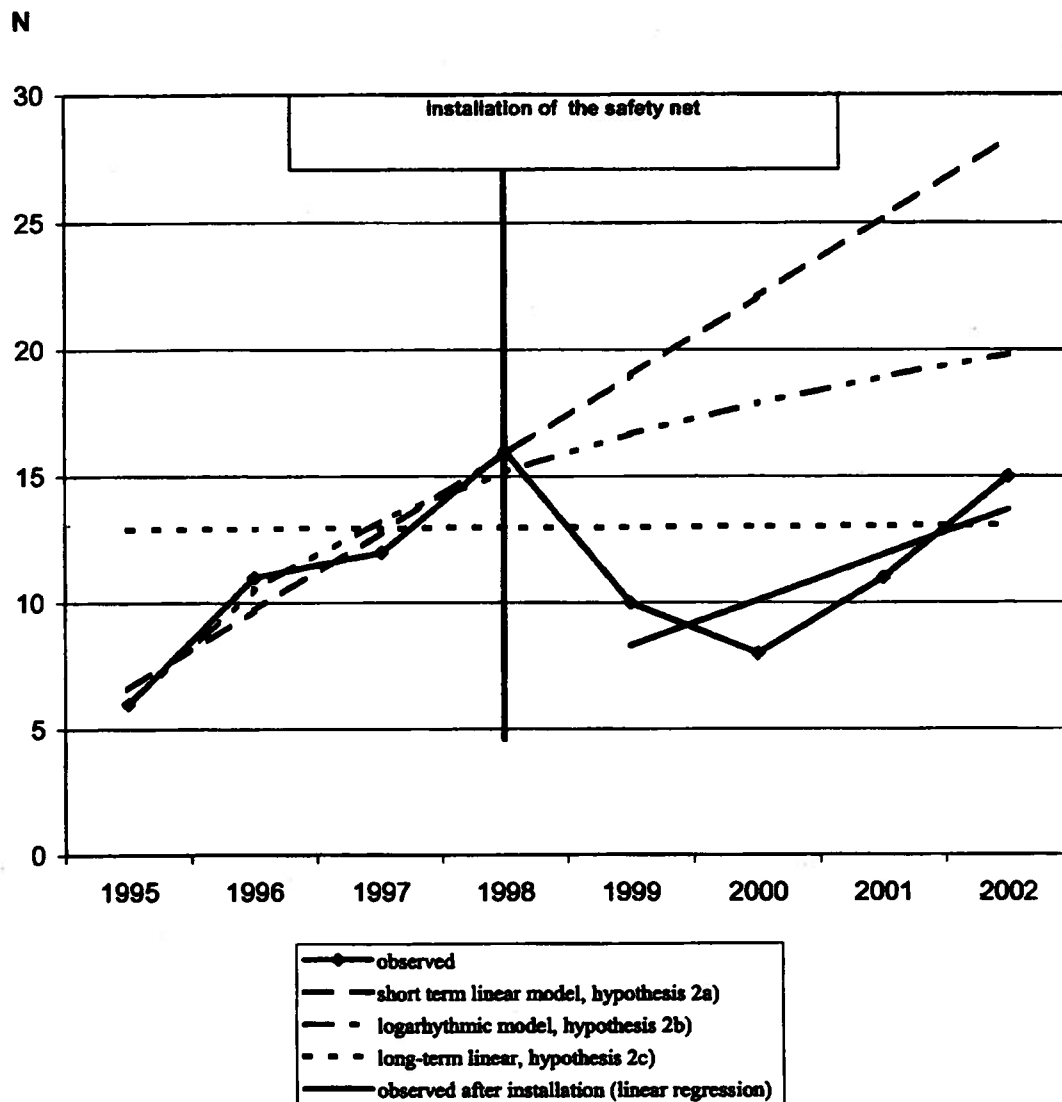


Figure 1. Possible models in the development of the number of suicides by jumping in the city of Bern.

baseline. In the years before the installation of the safety net an average of two suicides per year was observed at the terrace. Assuming that two suicides per year could be prevented, more than 30 years of data would be needed to reach statistically significant results of the influence on the total number of suicides in Bern City. The reduction of the deaths by jumping from the Muenster Terrace does not explain the decrease of suicides by jumping in Bern, but it is plausible that as a result of stopping the suicides at the terrace (e.g., through a drop in the number of suicide reports in the media), the barrier had an indirect preventive effect on other jumping sites.

When estimating the trend in all suicides by jumping after the barriers were installed, the data presented here suggest an initial reduction below the long-term baseline with a slow return. In other words, the barrier may have had an overall, but time-limited life saving effect. This result is supported by Gunnell and Nowers (1997) and Fischer et al. (1993), who pointed out the possibility of short-term effects. However, the nature of this effect must be examined. We believe that it is more than the Hawthorne effect where any intervention leads to the targeted goal for a short time. As we indicated above, an installation of a physical bar-

rier has an effect which reaches beyond physical obstruction. It may influence the dynamics of suicide actions or suicide plans, or it may be perceived as a sign of care.

In the years before 1998 the Muenster Terrace and "jumping as a method to commit suicide" received increased public attention. From all suicides in the city of Bern, the percentage of those who committed suicide by jumping from height rose from 24% to 59% during the years 1997-1998, a figure that is as high as in Singapore (Ung, 2003). In this period the number of suicides by jumping was accompanied by a higher number of media reports focusing on this topic. Therefore,

the most likely factor responsible for this rise appears to be the increased reporting on suicides by jumping at Muenster Terrace. This is consistent with the findings of several authors (e.g. Blohm & Puschel, 1998; Marzuk et al., 1993; Stack, 2003) who investigated the influence of media reporting on suicidal behavior. The increased media attention to the terrace suicides most probably had an influence not only on terrace suicides but on the total number of suicides by jumping. Reports about suicide by jumping may have activated the specific suicide ideation "ending one's life by leaping off the Muenster Terrace" (Werther effect, e.g., Frei et al., 2003)

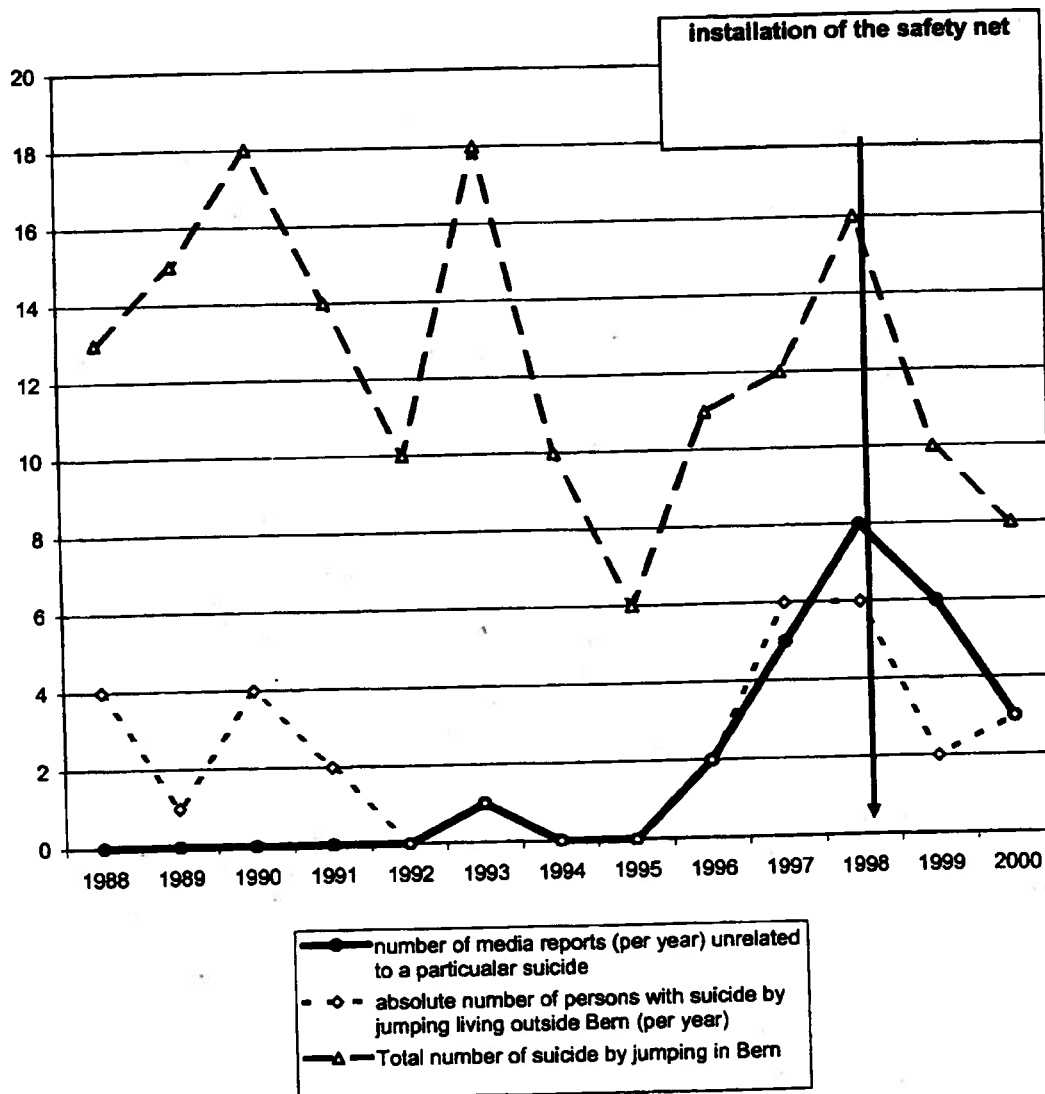


Figure 2. Suicide by jumping and media reporting.

or the less specific ideation "jumping is a possible way to kill oneself." This appears above all to have been the case for persons living outside the city of Bern. The most plausible explanation for this finding is that media reports increase the knowledge of the existence of a hotspot in this population, whereas people living in Bern already know about it.

Our study has several limitations. The overall small numbers of suicides limit the power of the statistical analyses. We cannot exclude that the increase of suicide by jumping during the time of high media attention (1997–1998) is related to extreme but unrelated fluctuations with a random synchronicity. We only covered the first 4 years of observation after the net was installed. We

included the full 1998 data in the pre-installation time span although the barriers were in place in mid-December. Time series based on a 4-year period are sensitive to small fluctuations. Therefore, our results have to be interpreted with caution. No Bonferroni correction for multiple testing was applied. The power of the data did not allow us to test for transfer effects to other suicide methods; however, this should not be a reason for not installing further barriers at suicide sites. Furthermore, other aspects that were not investigated in this study, like protecting bystanders from the massive traumatization, are also worth all our efforts to reduce the accessibility of suicide hot spots.

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