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## Studies into train suicide

van Houwelingen, C.A.J.

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# Chapter 8

## Concluding remarks



## 1. INTRODUCTION

Throwing oneself in front of a moving train is a gruesome act with devastating consequences. In the majority of cases, the body is severely mutilated. As a rule, a train suicide complicates the grieving process because relatives often are not allowed to view the deceased after the incident. Train suicides lead to high costs as a result of traumatized railway personnel and delays to railway services affecting thousands of travellers.

The studies of this thesis were not aimed at the individual's decision to end his or her life, but at investigating environmental factors influencing the choice for this suicide method. More specifically, aggregated data of many suicides were used to study underlying principles of train suicidal behaviour belonging to the realms of railway transportation, psychopathology and chronobiology. It was expected that insight into these matters would make it possible to provide timely help to desperate suicidal persons in general and would help take preventive measures reducing these atrocious occurrences.

## 2. MAJOR FINDINGS

### 2.1. Variation over time

An important observation was that train suicide frequency has not been a constant feature in the Netherlands. A considerable variation was found over the past 60 years, ranging from less than 50 cases per year before 1970 to about 185 cases per year since the eighties of the previous century. We do not know whether these numbers have reached a ceiling or if they will rise even further in the future.

### 2.2. Contribution of railway system parameters

In the first study of this thesis the railway system's contribution was ascertained in a basic manner by means of a visual appraisal of the trends in train suicide, individual railway parameters and general population suicide (Chapter 2). The conclusion was that railway parameters did not seem to be a contributory factor, as train suicides and railway parameters were found to exhibit different trends. Train suicide frequencies decreased slightly after 1989, while train traffic intensity and passenger kilometres showed a further increase (Chapter 2). However, this interpretation of the data did not explain why train suicide frequencies had remained relatively high since 1989 while general population suicide had shown a downward trend. In the final chapter of this thesis we chose a different approach, after the Dutch-German comparative study had shown a clear impact of train traffic intensity on train suicide rates (Chapter 6). The availability of trains proved to be a key factor. A model in which train suicide rates in the Netherlands were related to the product of general population suicide

rate and train traffic intensity gave a much better explanation of the observed prevalence of train suicide by men and women over the whole study period of 58 years (Chapter 7). Therefore, these two factors would seem to have a complementary contributory role in train suicide. From this last observation we can extrapolate that a further expansion of rail transport resulting in higher train frequency may bring about a rise in the number of train suicides. This tendency may be modified by trends in national suicide figures.

The finding that train suicide rates are related to train traffic intensity suggests that the number of trains passing influences the decision-making process of the suicidal person. According to the suicidal process models proposed by Beskow et al. (1994) and Råd bow et al. (2008), the perceived availability of trains plays a role in the decision to move towards the tracks in the pre-crash phase. We think that train frequency also plays a role once a suicidal person has come near the tracks or entered them. High frequencies of passing trains may elicit impulsive responses, while lower frequencies allow for more reflection time, thus creating a greater chance for the person to refrain from jumping.

### **2.3. Relationship to national suicide figures**

As described above, the number of train suicides shows strong co-variation with general population suicide figures. Therefore, train suicide would seem to depend on suicide trends in a particular country. As a consequence, developments in society or prevention programs that reduce national suicide figures might also have a beneficial influence on the problem of train suicide. Or conversely, if, for example due to an economic recession, the national suicide figure were to move into an unfavorable direction, the number of train suicides might increase as well. This indicates that the problem of train suicide is influenced by a wider context of socio-cultural and economic factors.

### **2.4. High-risk locations**

The studies of this thesis confirm the widespread notion that high-risk locations (HRLs) exist near psychiatric hospitals that are situated close to railway tracks. The panel shows an example of the geographic distribution of train suicides in the province of Drenthe (Chapter 3). Although most train suicides near psychiatric hospitals are inpatients, the panel also illustrates that a small minority have no history of mental healthcare. In addition, high-risk locations can be found in built-up areas independently of the presence of psychiatric hospitals. It goes without saying that high-risk locations should be primary prevention targets. It should be remembered, though, that quantitatively speaking, almost 50 % of the suicides take place scattered on half the railway network (Chapter 2, Table 3). Therefore, preventive interventions at high-risk locations will at best be a partial solution to reducing the number of train suicides, which in itself would be quite an accomplishment, though.

**Panel**

In the Drenthe study, information about the location of the incident was available in 56 out of 57 suicide cases (Chapter 3). It was possible to distinguish two well-defined major clusters. One cluster contained 15 suicides spread over a 2-km track-length, directly adjacent to a small town with a psychiatric hospital located within the town limits. This section included the local railway station. Within this cluster a subcluster of 5 inpatient suicides was found around a level crossing located at a distance of less than 100 m from the hospital grounds. The second suicide cluster, which was directly in front of a psychiatric hospital in a different town, contained 10 cases over a distance of 1050 m. Two minor clusters were found within the boundaries of two other towns having no psychiatric hospitals. These minor clusters consisted of 4 cases over a distance of 2.5 km and 6 cases over a distance of 3.5 km. The remaining 21 cases (21/56) showed a scattered distribution. 20 out of 25 suicides taking place in the two major clusters were committed by inpatients, 3 by outpatients and 2 by persons with no history of psychiatric treatment. Of the 31 suicides taking place elsewhere on the railway tracks, 4 were inpatients, 12 were outpatients and 15 had no psychiatric treatment history.

**2.5. Mental Health Services**

A relatively high proportion of train suicides in Drenthe (63%) received mental healthcare at the moment of suicide, compared to 36 % of the general suicide population (Chapter 3 and 4). This is explained in part by the observation that a large number of psychiatric hospitals are located near railway tracks. These hospitals house patients with severe psychopathology and co-morbid suicidality. The fact that the majority of those dying through train suicide are in care makes the Mental Health Services an important potential ally in reducing the number of train suicides.

**2.6. Psychopathology**

In popular belief train suicide is connected to young males with schizophrenia, as persons with schizophrenia tend to apply suicide methods resulting in severe physical injuries. This idea was partially supported by the studies presented. It was found that the majority of train suicides with a functional non-affective psychosis was younger than 40 years (Chapter 3). In addition, a multinomial regression analysis, with the suicide method of hanging as a reference group, showed high odds ratios for psychotic and bipolar disorders in the train suicide population (Chapter 4). However, in absolute numbers affective disorders were the most prevalent (Chapter 3, Table 1; Chapter 4, Table 2). The overall picture emerging was that train suicides are characterized by the presence of severe psychopathology. The link between high-risk locations and psychiatric hospitals described in Chapter 2 and the significant relationship

between the method of train suicide and inpatient status of suicides demonstrated in Chapter 4 make it probable that the choice of train suicide is not only determined by the type of psychopathology, but also by highly practical considerations like easy access to nearby railway tracks with frequent trains. In a way, this availability can be compared to the ubiquity of handheld guns in the USA, which is a well-documented cause of suicide in that country (Miller et al, 2008). The prominent availability of trains in the Netherlands may compensate for the relatively difficult access to medication in clinical settings and for pathology-related impairments of patients who find it hard to apply other methods.

## **2.7. Chronobiology**

The study of time patterns in train suicides revealed a strong environmental influence on suicidal behaviour involving trains. It demonstrated a robust increase of train suicides at the beginning of the night (1.5–2 h after sunset; Chapter 5, Figure 3). This finding inspired us to use a two-dimensional approach, namely data analysis as a function of time of day and time of year simultaneously, which was unprecedented in circadian cycle research. This way we discovered seasonal and 24-h patterns in suicide rates that would otherwise have remained hidden. The diurnal distribution of train suicides changed over the year in such a way that peaks in summer occurred at times of day that showed troughs in winter and vice versa (Chapter 5, Figures 4a-c). This implies that investigations of 24-h patterns in the occurrence of suicide and probably in most biological and social parameters should only be conducted if time of day and time of year are taken into account simultaneously (Van Houwelingen and Beersma, 2001a).

## **3. RECOMMENDATIONS FOR PREVENTION**

We can distinguish three areas of prevention:

1. Interventions related to the railway system
2. Interventions aimed at identified high-risk populations
3. Interventions in society aimed at the reduction of suicide risk in general, contextual variables.

### **3.1. Interventions related to the railway system**

#### **3.1.1. Train traffic intensity**

The studies of this thesis show that railway density and familiarity with railway transport as a passenger would not seem to play a contributory role in train suicide in the Netherlands, where 75 % of the population live within a 5-km distance from a railway station. Nor does

regional population density. However, it also became clear that the frequency of trains passing (train traffic intensity) does play a role in train suicide frequency (Chapters 6 and 7).

According to this model, train suicide prevention would benefit from a reduction in the frequency of trains running on the tracks by increasing the capacity of each individual train. This can be reached by making trains longer, by using double-decker trains, or even by introducing compartments with standing places.

### **3.1.2. Track accessibility**

The studies presented offer three reasons why track accessibility should be an important focus of attention. 1) The relation between train suicide and train traffic intensity. If train frequency reduction is not a viable option because of strategic policies on the part of the railway companies, then making the tracks inaccessible is the only option left. 2) The high-risk locations in built-up areas and near psychiatric hospitals. 3) The vulnerability of the railway system to developments in society that may increase general suicide figures as well as the number of train suicides.

Easy access to overground railway tracks is a universal phenomenon, with the exception of newly-built tracks like the Betuweroute line in the Netherlands and the high-speed tracks in France (TGV). This clearly is a heritage from the construction of overground railway networks in the 19th century. Therefore, after a Dutch railway history of about 150 years, it would seem worth the effort to look ahead some decades and see what infra-structural developments and concurrent investments are needed to eliminate the possibility of direct contact between persons and moving trains and consequently to prevent train suicides. At this moment more than half of the train suicides take place on open track, a quarter on level crossings and almost a fifth on station platforms. The open track is often accessed by level crossings. Our conclusion is that limiting access to railway tracks, reducing the number of level crossings and designing platforms in such a way that jumping in front of trains is made more difficult, will all have preventive effects on train suicides. These measures make trains less available for suicidal behaviour.

#### *3.1.2.1. Open track*

The open track situated at high-risk locations and running through built-up areas or areas with a psychiatric hospital nearby need to be fenced-off with fences designed to prevent desperately suicidal people entering the tracks. This probably requires fences with different features from those used in the prevention of trespassing in general. Until 2003 it was unclear who was to take the lead in the construction of adequate fences to prevent suicidal persons from entering the tracks at high-risk locations. The introduction of a new Railway Law, a consequence of the liberalization of the European railway transport market, is a milestone in train suicide prevention. It stipulates that the manager of the railway infrastructure ProRail



must make tracks inaccessible to the public. Which is a rather complicated job in a densely populated country like the Netherlands. Mental Health Services and other stakeholders in the train suicide problem need to update ProRail on a continuous basis in order to enable them to give extra care to those locations where populations at risk of suicide are housed close to the tracks.

#### *3.1.2.2. Level crossings and accessing open track through level crossings*

Solving the problem of people entering the tracks through level crossings is difficult. Obvious solutions would be to reduce the number of level crossings or to replace them with viaducts or tunnels. Preventing train suicide provides an additional argument for investments of this type. At the remaining locations sophisticated technology, which is becoming available today, may be applied for the timely detection of anomalous behaviour, such as persons entering the tracks or lingering in places longer than usual. The follow-up after detection is a complicated matter which might entail a redefinition of the roles of ProRail surveillance officials (BOA's), railway police and police.

#### *3.1.2.3. Station platforms*

If the interventions on open track and level crossings are successful, this might result in an increase of suicides from platforms due to shifting towards platforms. The open structure of platforms makes them a difficult target for train suicide prevention. Yet our inspection of high-risk stations revealed that relevant improvements can be implemented locally with minor efforts, for example: a. improved lighting in dark sections of the platforms; b. closing-off remote parts; c. eliminating structures people can hide behind; d. placing fences at the end of platforms to prevent people from easy entering open track.

It has been suggested that placing communication poles with instructions on platforms could serve as a clear intermediate for suicidal persons looking for contact with a suicide prevention service or for commuters to ask for help when spotting a possible candidate suicide on the station platform. At this moment, a pilot study on this type of technology is underway in Belgium (Infrabel, personal communication, 2009). The suicide prevention service 113online ([www.113online](http://www.113online)), see below, which has started in 2009, should play a role in the follow-up of notifications via communication poles.

#### *3.1.2.4. Station design*

Eliminating the possibility of direct contact between persons and moving trains involves railway station design. A number of measures are to be considered, some of which need to be implemented in the construction phase of newly-built stations: a. increasing the clearance between the train and the body by deepening the space between the rails, creating so-called *suicide pits*, was a measure that proved to be effective in the prevention of underground

railway suicides (O'Donnell and Farmer, 1992) (Coats and Walter, 1999); b. putting transparent intermittent fences on the platforms, which do not obstruct boarding and getting off the train, and which mark a no-standing area on the platform until a train has stopped. Such fences could serve as a psychological barrier for suicide candidates; c. laying railway tracks away from platforms allowing high-speed through-trains (passenger and freight) to pass local stations without driving along platforms with waiting commuters.

The best option would be if the platforms could be closed off at the edges by a flexible system of sliding panels serving a variety of train types. These panels should slide open at the exact spot where the train doors are located after it has stopped. It has been demonstrated that retrofitted sliding doors in underground railway systems have led to a significant reduction in railway suicides (Law et al, 2009). However, these systems have doors at fixed positions on the platforms, deal with one type of train only, and are unsuited to the variety of trains used in most overground systems. At present, designing this type of flexible panel system able to accommodate a variety of types of overground train would seem to be a futuristic endeavor. The funds needed to develop the necessary technology clearly exceed a single stakeholder's budget.

A different type of measure suggested in the literature is to reduce the speed of trains about to stop before reaching the platform (Clarke and Poyner, 1994).

### **3.1.3. Applying bright light**

The study of time patterns revealed a preference in suicidal persons for the dark hours of the day. This implies that applying bright light at high-risk locations may have preventive potential (Van Houwelingen et al, 1996). As a result of this finding ProRail installed "intelligent" lamps at a number of high-risk locations, starting in December 2007. These lamps switch on automatically when people start walking along the tracks. The impact of these interventions on the incidence of suicidal behaviour at these locations and their surroundings needs to be evaluated.

## **3.2. Interventions aimed at identified high-risk populations**

The studies of this thesis show that a high percentage of train suicides received mental healthcare at the moment of suicide and that in terms of psychopathology the majority suffered from psychotic and affective disorders. Mental Health Services therefore, have a pivotal role in train suicide prevention in

- a. Improving the quality of care by working according to international guidelines (Huisman and Kerkhof, 2010) and performing systematic risk evaluations as an integrated part of regular care. In this way, suicidal ideation might be detected more easily and become part of the therapeutic dialogue with the client and necessary safety precautions can be taken in time.

- b. Talking with clients about suicide: this creates opportunities to point out the disadvantages of this suicide method for others, a subject rarely discussed. In doing so, a sense of reality is introduced into the therapeutic alliance without suggesting the person should use some other suicide method.
- c. Taking good care of high-risk populations when making sure the grounds are a safe environment for suicidal patients, with no or only limited access to nearby railway tracks. Besides that, Mental Health Services should see to it that, within a radius of 5 kilometres from their grounds access to railway tracks is reduced with the help of other stakeholders, like ProRail and local authorities (Kerkhof et al, 2010).
- d. Being aware of danger: Mental Health Services should be aware of the danger of nearby railway tracks and proactively inform ProRail of any changes occurring in the accommodation of populations at risk or of new housing plans.
- e. Discussing every case of train suicide, not only internally, but also externally with ProRail. This form of postvention may generate ideas on how train suicide can be prevented in the future.

### **3.3. Interventions in society aimed at the reduction of suicide risk in general**

#### **3.3.1. Suicide prevention programs**

Train suicide frequencies covariate with the tendency for suicide within the nation. If suicide in general can be reduced, train suicides and the accompanying burden on society may be reduced too.

It is beyond the scope of this thesis to discuss national suicide prevention programs at length. Needless to say that the interdepartmental Dutch government approach to tackle the problem of road traffic safety, resulting in a 40 % reduction of traffic fatalities in 1996–2008, could serve as a challenging model for suicide prevention.

There is a new initiative that should be mentioned. In September 2009, an online suicide prevention service was launched ([www.113online.nl](http://www.113online.nl)) with the aid of an 18-month government subsidy. This service offers direct help to suicidal persons, to those who are worried about a person at risk of suicide and to survivors (those who have lost a family member or friend by suicide). These three forms of help all have preventive potential. The low threshold of this online service cannot be beaten by any form of institutionalised mental healthcare. 113online, therefore, appears to be a necessary complementary service that can contribute to an increased public awareness of the problem and reach out to suicidal persons outside professional care. The financing of providing care on an anonymous basis needs the adoption of new administrative rules in order to secure that such valuable low-threshold services can be continued.

### **3.3.2. Educating the wider public**

Besides national initiatives directed at providing adequate care, there are other types of intervention possible on a societal level that can influence the wider public and the suicide-prone among them, which are discussed in the following paragraphs.

#### *3.3.2.1. Media coverage*

The subject of train suicide easily draws print media and television attention. The reasons for this are that train suicides always take place in the public domain and lead to a disruption of “public routines” (Jamieson et al, 2003). The media cater to the need of the public at large to know what is going on in society. Also, the gruesome aspects of train suicide play a role in its newsworthiness. In general, violent or dramatic suicide methods predict subsequent media coverage (Pirkis et al, 2007), indicating that a need for sensation by the public at large is met by the media. The result of the newsworthiness of train suicide is that it is over-represented in the media (Jamieson et al, 2003; Pirkis et al, 2007), which, in society, leads to a distorted picture of suicide. An even more serious aspect is the finding that media coverage of jumping, i.e., jumping in front of moving objects or from great heights, in particular, has been associated with subsequent increases in suicide (Niederkröthenthaler et al, 2010). The dilemma between the task of the media to inform and the risk of inducing copycat behaviour demands a sensible approach. Otherwise this suicide method may propagate itself by repetitive media attention and become more deeply rooted in our culture. Extensive, prominent and sensationalist coverage of suicidal acts and explicit descriptions of suicide methods should be avoided (Pirkis et al, 2007). Usually media reports on train suicide are accompanied by pictures of railway tracks, which somehow, is like showing the gun in the case of a suicide by gunshot. At this moment we do not know whether, in the case of train suicides, these visual elements are contagious. A prudent approach by the print media would be to explore the artistic use of images made by an illustrator, rather than using photographs, and to avoid using images representing high-risk locations in television reports.

Special care should be paid to the implicit messages of reports. Stories depicting suicide as the consequence of living in a “scary world” or otherwise describing suicidal acts as a solution for life’s problems that can be sympathized with, can be detrimental. Background information on psychiatric illnesses like depression and substance abuse and related treatment options can, however, contribute to a better understanding of the suicide problem and ways to prevent it (Jamieson et al, 2003). Quite surprisingly, recent research has found that print media coverage with its main focus on suicide research, or coverage including so-called expert opinions or items containing contact information on support services, was associated with increased suicide rates after publication (Niederkröthenthaler et al, 2010). Reports on persons with suicidal ideation, who succeeded not to attempt suicide, on the other hand, have led to a reduction of suicides (Niederkröthenthaler et al, 2010). The suicide-protective impact of

media reports of stories on individuals employing alternative coping strategies, the so-called Papageno effect, could be employed when media coverage of train suicides is appropriate. In order to promote safe reporting on suicides in the Netherlands the Ivonne van de Ven Stichting has issued a media guideline ([www.ivonnevandevenstichting.nl](http://www.ivonnevandevenstichting.nl)).

### 3.3.2.2. *The Netherlands Railways way of informing commuters about incidents*

The need for more transparency in times news is spreading fast through mobile phones prompted the Netherlands Railways to inform travellers on delays due to incidents of train suicide with the help of loudspeakers or electronic billboards with the wording: “*Vertraging door aanrijding met een persoon*” [Delay because of collision with a person]. In this way the travellers affected by the actual delay and many thousands of other travellers were kept informed. This can be considered a form of unintentional continuous education of the public at large, including the suicide-prone among them, about the method of train suicide. It is recommended that these messages are replaced by announcements that give information about the delay and are at the same time neutral about the nature of the incident. For example: “*Vanwege een ongeval rijden er geen treinen...*” [Delay because of an accident].

### 3.3.2.3. *Changing the lethal image of the railway system*

A subject that has not been explored yet is the relation between the visual appearance of the railway environment and suicidal behaviour. Could it be that certain locations appeal to people considering suicide, and if so, could this be changed? Two examples are given to illustrate what is meant by this. Law et al. (2009) demonstrated that after platform screen doors (PSD) had been installed in Hong Kong underground stations there was a huge decrease of underground railway suicides without signs of displacement of suicide attempters to unsealed railway platforms in the region. In an aside, the authors remarked that the absence of displacement might be the result of the much safer “look” of the system with PSD, “delethalizing” the image of railway suicide altogether (Law et al, 2009).

In Bern suicides by jumping from the Muenster Terrace stopped completely after the installation of a safety net of 4 metres wide, seven metres below the top level (Reisch and Michel, 2005). As the net was mainly constructed to protect the people below, it does not completely surround the terrace, and jumping from the west side would still be lethal. The authors concluded that the effect of the net was, therefore, at least partially a psychological one. It may influence the dynamics of suicide actions or suicide plans, or may be perceived as a sign of care (Reisch and Michel, 2005).

Bearing these examples in mind it may be true that a deserted-looking open-level crossing with bars that are a mere indication of a barrier between a train passing at high speed and the passer-by may attract suicidal persons, whereas a fenced-in, well-lit, orderly-looking level crossing, with extra lights switching on when someone approaches has a less lethal appeal.

In summary, my hypothesis would be that railway environments can “speak” a language that encourages or discourages suicidal behaviour.

## 4. OTHER RECOMMENDATIONS

### 4.1. Longitudinal database

The majority of the studies in this thesis were carried out using a national longitudinal database. This database was not available but had to be built with materials from the archives of the Netherlands Railways, which was a laborious job. Maintaining this database and the search for missing data demands a continued effort. Some years ago the database was handed over to the Inspectorate for Transport, Public Works and Water Management (IWW), who manage the annual input from the Netherlands Railways and ProRail. This database is rather unique. At present only a few countries are able to present longitudinal information on case level on time, location and demographic data. Continued and guaranteed maintenance of this database is essential, especially when in 2014 concessions for railway transport on the major lines are reallocated. This type of database is a prerequisite for a proper follow-up of the trends in train suicide and the evaluation of preventive measures. It creates opportunities for international comparison. The feasibility of creating an international train suicide database with standardized definitions, similar to the International Road Traffic and Accident Database (IRTAD) should be investigated (Routley et al, 2007).

### 4.2. Directions for future research

#### 4.2.1. Epidemiology of suicide on light rail systems

In the Netherlands the proportion of light rail and underground metro systems in suicide on railways is unknown, while light-rail systems are rapidly growing through the liberalization of the railway transport market. An investigation with follow-up will be a necessary complement in railway suicide epidemiology.

#### 4.2.2. Pre-crash behaviour

While the studies presented have focused on populations of people who committed suicide, there is a lack of knowledge about what happens on the individual level. What considerations do people have who move into the direction of the railway tracks and ultimately jump before a moving train? There is a need for studies addressing the issues of impulsivity, psychiatric status at the moment of the suicidal act, the reasons for choosing this method and a specific location. This can be achieved by interviewing those that have survived a suicidal act on the

tracks. In addition, we need to know whether these persons felt they had received adequate help in their suicidal despair or possible wish for assisted suicide in the period preceding the suicidal act.

#### **4.2.3. Impact of fences**

In recent years ProRail has put much effort into building fences along railway tracks. An evaluation of the impact this intervention has had on the number of train suicides, if any, is needed.