Railway suicide analysis and prevention in a Swedish context
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By
Helena Rådbo, Ragnar Andersson, Inge Svedung

Karlstad University Sweden

In collaboration with The Swedish National Rail Administration: Banverket
List of studies

- Suicide and other fatalities from train-person collision on Swedish railroads: A descriptive epidemiologic analysis as basis for systems-oriented prevention
- Suicide Prevention in Railway Systems: Application of a barrier approach
- Suicide and potentials for suicide prevention on the Swedish Rail Network; a qualitative multiple case study
- Feasibility of railway suicide prevention strategies; a focus group study
Background

- Suicide is a major public health problem
- More than 75% of all fatal train–person collisions are suicides
- The dominating cause of fatal injuries in the Swedish railway system
Aim of study 1

• To give an epidemiologic description of the railway suicide problem in Sweden
• To compare similarities and differences between suicidal and accidental train – person collisions
Materials and methods

- Reports on fatal incidents available at the Swedish National Railway Administration, Banverket
- Includes all fatal railway incidents in three years 2000-2002
Sex of victim

- Suicide:
  - Male: 100
  - Female: 40
- Accident:
  - Male: 10
  - Female: 2
- Unknown intent:
  - Male: 20
  - Female: 10

Legend:
- male
- female
Age

The diagram shows the distribution of suicides, accidents, and unknown intent across different age groups. The x-axis represents the age range, while the y-axis represents the count. The diagram is divided into two categories: adults aged 20-59 (blue bars) and younger/older (brown bars).

- Suicide: The majority of suicides occur in the adults 20-59 age group, with a significant number in the younger/older group.
- Accident: There is a small number of accidents in both categories, with a slight increase in the younger/older group.
- Unknown intent: The unknown intent category shows a similar trend to the suicide category, with a higher number in the adults 20-59 group and a smaller number in the younger/older group.
Daytime vs. night time

suicide

accident

unknown intent

kl 06-18

kl18-06
Urban vs. rural areas

- Suicide: Urban area (120) vs. Rural area (20)
- Accident: Urban area (10) vs. Rural area (1)
- Unknown intent: Urban area (30) vs. Rural area (1)
Activity and movement pattern

- Suicide: standing/lying (120)
- Accident: jumping suddenly (10)
- Unknown intent: jumping suddenly (20)

Legend:
- Standing/lying
- Jumping suddenly
Conclusion

- Victims normally trespass track area a good while before train arrives
- Incidents are highly concentrated to densely populated areas
- Suicidal and accidental incidents show many similarities (from a preventive point of view)
Aim and Method study 2

• To theoretically derive and categorise a set of railway suicide prevention strategies

• Methodologically, generic accident and suicide prevention models were synthesized
Suicidal process model

Modified from Beskow (1979)
Fault tree analysis: Two basic conditions for critical impact

Critical impact

and

Person on the tracks

and/or

Train with critical impact potential

and/or
Energy model

TRAIN (Energy source)

BARRIERS

VICTIM (vulnerable target)

After William Haddon
A combined list with barriers from both FTA and Haddon’s 10 strategies

- Abolish rail transportation
- Reduce frequency and mass (regarding speed, see below)
- Increase individual and public knowledge on existing barrier functions, survival rate, etc.
- Reduce spatial and temporal availability
- Physical barriers: fences, bars, etc.
- Spatial barriers: tunnels, elevated tracks
- Electronic barriers: detection and alarm functions
- Human barriers: professional or public surveillance
- Repulsive functions

- Removal functions
- Speed limits
- Braking capacity
- Driver alerting (visibility, signals, etc.)
- Rail and surrounding structure design
- Front design
- Deflecting devices
- Wheel design
- First aid
- Health care
- Rehabilitation (physical and mental)
Aim and Method study 3

- To evaluate existing police and rail administration reports on railway suicide incidents
- To identify and categorize additional preventive-oriented information
- Method: Multiple Case-study
Results

- Police and Railway administration usually collect adequate background information on train, place and victim

- Missing details of relevance for the prevention:
  - Victims behaviour before collision
  - Circumstances preceding the collision
  - Characteristics of the location
Feasibility of railway suicide prevention strategies; a focus group study
Aim and Method study 4

- To analyse the acceptance of proposed preventative strategies among relevant professional groups
- To validate and further develop these strategies
- Focus Group interviews
Model of measures
Results

Theme 1, Category 1-3

• Measures reducing the attractiveness of railway as a means of suicide

1 The expected level of violence
2 Compensation
3 Availability
Results cont.
Theme 2, Category 4-5

- Measures obstructing the accessibility to the track area

4 Noise barriers
5 Fences
Results cont.
Theme 3, Category 6-8

• Measures influencing the victim’s determination while awaiting train

  6 Information about the unlawfulness
  7 Warning signals
  8 Information posted at hot spots
Results cont.
Theme 4, Category 9-13

- Early warning systems, enabling the train to brake sufficiently or the victim to be removed before collision

9 Camera surveillance
10 Patrolling
11 Public alertness
12 Calls from other train drivers
13 IR technology
Results cont.

Theme 5, Category 14-16

• Measures to make the collision less violent and thereby less fatal and injurious

  14 Speed
  15 Braking capacity
  16 Design
  • Front, Axel box damper, Airbags
Practical implications, measures available today:

- Informing the public on trespass prohibition
- Patrolling/surveillance at critical sites (potential hot-spots)
- Promoting public awareness and emergency calls
- Facilitating warning feedback from train drivers, when they observe trespassers
Practical implications, measures available today; (cont.)

• Maintenance and improvement of existing fences and noise barriers

• Proper fencing (when lacking) in densely populated areas
Practical implications, measures available in the longer term

- Air bag (external)
- Redesigning level crossings
- Improving visibility with the aid of IR-technology
- Redesigning platforms
- Redesigning axel box dampers
- Warning alarm, triggered by the presence of the victim
- Improved train front design
- Magnetic brakes on more trains
Conclusion

• There is a general acceptance and understanding of preventative principles
• The results support the validity of the proposed model for railway suicide prevention
• No major additional categories were identified, not covered by the model
Thank you for your attention

Helena.radbo@kau.se