Suicide in the Transport System

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Anna-Lena Andersson and Kenneth Svensson

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A.-L. Andersson (✉)
Swedish Road Administration, Trollhättan, Sweden

Department of Orthopedics, Institute of Clinical Sciences at Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden
e-mail: anna-lena.andersson@trafikverket.se

K. Svensson
Swedish Road Administration, Gothenburg, Sweden
e-mail: kenneth.svensson@trafikverket.se

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Abstract

The Swedish Transport Administration (STA) work to reduce the number of suicides in the transport system. Fatalities, i.e., on roads, railways, and bridges, originate from either accidents or suicides, natural death excluded. Knowing the correct manner of death is needed to work with optimal prevention strategies. The aims are to separate fatalities due to suicides, follow the development, and implement measures for suicide prevention. Methods are developed for suicide classification and criteria for the selection in which suicides were suspected. Fatalities in level one and two of five were classified as suicides. Data from the STA's databases are used and so are data from the psychosocial investigations done by a trained investigator in the topic and with clinical experience from counselling at hospitals. 2129 persons died on the roads in Sweden, 10% (206 persons) were classified as suicides. 336 persons died after being hit by trains, 85% (284 persons) were suicides. 130 persons died by jumping from bridges.

The number of suicides increases with population density. Suicide in the transport system is a major problem; firstly personal tragedies, it is also a work environment problem for truck and train drivers and for the emergency staff. It generates delays and costs for passenger and cargo transport. By analyzing the results of countermeasures in the form of obstructive barriers, the physical environment can be improved and high-risk areas can be accentuated. Restricting access to the means of suicide is important in suicide prevention. Strategies for the STA include suicide prevention in the design of new roads, railways, and bridges, as well as by identifying and reducing existing high-risk locations. Sharing the results with other authorities and organizations and cooperation within suicide prevention missions are vital for the enhancement of the overall suicide prevention work in society.

Keywords

Suicides · Suicide classification · Transport-related · Transport system · Suicides on roads · Suicides on railways · Suicides on bridges · Jumping · Psychosocial examination · Countermeasures against suicides · Physical barriers · Suicide prevention · Multidisciplinary collaboration

Introduction

In September 2016, the Swedish government relaunched the Vision Zero initiative (Renewed Commitment to Vision Zero), which states that suicide in the transport system is a problem that also must be addressed within the traffic safety work. Preventive measures in order to reduce fatalities in road traffic, intentional or accidental, are in line with Vision Zero. The Swedish Transport Administration (STA) works actively to reduce the number of suicides in the transport system, i.e., in roads and railways, including suicide preventive measures on bridges.

Suicide is a major health problem and affects a large part of the population. In addition to the personal tragedies, suicide also affects professional working groups

and imposes costs on society. In Sweden, approximately 1200 persons per year die due to suicide by intentional self-harm and about 300 persons by undetermined intent (The National Board of Health and Welfare). Some suicide means can be more difficult to classify, if it has been with intention or if the person died unintentionally. Examples can be drowning oneself or drowning by accident, jumping from a high height or falling by accident, suicide by burning oneself to death or being burned to death by accident, and poisoning by purpose or unintentional overdose. Some people use the transport system to take their lives, and it can be hard to assess if the fatality was a suicide or an accident.

The Swedish Parliament decided in 1997 that Vision Zero should serve as the basis for traffic safety activities in Sweden. In 2010, the Swedish government decided that fatalities in road traffic due to suicides should be reported separately from fatalities due to accidents. Since then Sweden has been presenting statistics on suicides in road traffic separately from fatalities caused by accidents, using a specially developed method (Swedish Transport Administration 2017; Andersson and Sokolowski 2022). Suicide accounts for a significant proportion (10%) of road traffic fatalities. Since the year 2015, the method was adjusted to classify the fatalities on railway, and a majority of them are due to suicidal actions (85–90%). It can be difficult to assess whether a fatality is due to suicide or accident. Reporting statistics about suicides is a complex task due the hidden cases. A method has been developed for classification of road traffic fatalities in order to determine if the fatality was caused by accident or suicide. This method has been adjusted for suicide classification for fatalities on railways.

Suicides in the Transport System

The Public Health Agency of Sweden is a national expert agency striving for better public health. In order to prevent suicide, broad collaboration is needed between the Swedish government and the Swedish Parliament, authorities, municipalities and county councils, universities and colleges, voluntary organizations, and organizations that support bereaved families (Public Health Agency of Sweden 2016). The STA is one of the authorities that cooperate with the Agency. The national action program adopted by the Swedish Parliament in 2008 contains nine strategic areas of action to reduce the incidence of suicide. According to these nine actions, the Swedish Transport Administration works directly or indirectly with the strategies.

1. Promote good life opportunities for less privileged groups
2. Reduce alcohol consumption in the population and in groups at high risk for suicide
3. Reduce access to means and methods of suicide
4. View suicide as a psychological mistake
5. Improve medical, psychological, and psychosocial initiatives
6. Distribute knowledge about evidence-based methods for reducing suicide

7. Raise skill levels among staff and other key individuals in the care services
8. Perform “root cause” or event analyses after suicide
9. Support voluntary organizations

Promote Good Life Opportunities for Less Privileged Groups

Promoting good life opportunities by providing safe and secure traveling communications contributes to social sustainability.

Reduce Alcohol Consumption in the Population and in Groups at High Risk for Suicide

Demanding drivers not to be influenced of alcohol, e.g., by technical systems and behavioral impact, reinforces the second strategy. SMADIT (cooperation against alcohol and drugs in the traffic system) is a cooperation between different authorities with the aim to support persons who are reported for driving drunk or influenced of drugs (The Swedish Transport Administration 2012). The procedure is based on being able to offer help from the health care as quickly as possible, preferably within 24 h. The STA supports technical development for sober driving in vehicles and implementation of alcohol interlock devices. The STA also works on an information assignment to citizens, where sobriety is one of the areas, and cooperation with the police is another important area in the field.

Reduce Access to Means and Methods of Suicide

The third strategy is the action most often associated with the work of the STA. Restricting access to means of suicide is effective in preventing suicide, and suicide prevention measures on roads are beneficial for all road users. Collision at high speed against a solid object in the roadside area can be avoided by putting up guardrails or by removing the solid object. Rebuilding roads to the so-called 2+1 roads will reduce the number of fatal head-on collisions. Erecting fences or barriers along high-speed roads in urban areas will make it harder for pedestrians to carry on with a suicidal attempt and can prevent persons from being tempted to take a dangerous shortcut. Installing high fences on bridges and viaducts will increase the safety for all pedestrians and may prevent sabotage in the form of throwing down objects. The Swedish road and bridge design guidelines have been updated to make sure those suicide preventive measures are included in the design of new roads and bridges.

To reduce access to the railway system, different measures are to prevent people from intruding on the tracks at distances between stations on suicide- and accident-

prone routes. Measures such as barrier fences, intermediate fencing between tracks, anti-trespass panels, alarming cameras that monitor the track areas, and platform screen doors are examples of physical barriers. Other important actions are functioning communication between the STA and emergency services when someone is on or close to the tracks as well as designed environments, which promote safety and security.

View Suicide as a Psychological Mistake

Suicide can be seen as a psychological mistake or mental accident (Beskow 2008, 2010), where the deliberate self-destructive act can lead to death, as the individual experiences a situation that seems impossible to change. The "solution" to take one's own life can be impulsive, and in those situations, protective barriers can prevent the act, by disturbing the impulse.

Improve Medical, Psychological, and Psychosocial Initiatives

On rare occasions, the STA can take the initiative to alarm the police, psychiatric care, and the municipality to report that a person is recurrently located in a risky place in the transport system. This action can be lifesaving as the psychiatric care and the responsible municipality can provide focused support to the person in an ongoing crisis.

Distribute Knowledge About Evidence-Based Methods for Reducing Suicide

Sharing the results from the suicide classification in the transport system to other authorities and organizations with suicide prevention missions is vital for enhancement of the overall suicide prevention work in society.

Raise Skill Levels Among Staff and Other Key Individuals in the Care Services

By analyzing the results from the systematic suicide classification, countermeasures in the form of obstructive barriers in the physical environment can be improved, and high-risk areas can be accentuated. The facts of the psychosocial contexts and patterns of transport-related suicides are important to share with other stakeholders. The exchange of information from the STA to responsible authorities is also a part of the total activity against suicides.

Perform "Root Cause" or Event Analyses After Suicide

Methods have been developed for suicide classification of fatalities on the roads (Swedish Transport Administration 2017; Andersson and Sokolowski 2022) and the railways. Criteria for the selection of fatalities in which suicides were suspected were compiled, and a classification scale with five levels was defined. Fatalities in level one and two were classified as suicides. Data from the STA's databases (Trafikverket 2012) have been used together with data from psychosocial investigations performed by a trained investigator and with clinical expertise through counselling at hospitals. The suicide classification method will be described below.

Support Voluntary Organizations

Different research grants are given to nonprofit organizations with the aim, e.g., to reduce alcohol consumption in society and to work in the field of traffic safety, where reducing suicide is a part.

Suicide Classification Methodology and Psychosocial Factors

Not all fatalities in road traffic are accidents, some are suicides. Since 2010 Sweden has been presenting suicides in road traffic separately from fatalities caused by accidents. To undertake this, a method has been developed for the classification of road traffic fatalities (Swedish Transport Administration 2017; Andersson and Sokolowski 2022) based on whether the fatality was caused by accident or suicide. It can be difficult to assess whether a fatality is due to one or the other. Reporting statistics about suicides is a complex task and the choice of method can make a substantial difference. Data showing that the fatality was an accident are as relevant as data speaking for a suicidal act.

Vision Zero is the ethical standpoint that no one should be killed or suffer lifelong injury in road traffic. The Swedish Parliament decided in 1997 that Vision Zero should serve as the basis for traffic safety activities in Sweden. In 2008 the Swedish Parliament also stated in a new health policy that no person should end up in such situation that suicide is seen as the only way out. In connection with the introduction of Vision Zero, in-depth studies were carried out on all fatal accidents in road traffic in Sweden by investigators at the STA. The in-depth studies (Trafikverket 2012) are stored in a database at STA. In each case information on the vehicle, the road and event, and the road user are collected.

Already in 2001, a group of well-informed scientists wrote about the problem that statistics about road traffic fatalities contained at least three groups: "accidental" fatalities, suicides, and natural deaths. They also requested criteria for the classification of manner of death in "borderline" cases (Ahlm et al. 2001). According to Värnik et al. (2010), there is an underestimation of suicides, due to shortage of necessary information for determining the manner of death.

The work with the classification method has been carried out in cooperation between the STA, the Swedish Transport Agency, the National Board of Forensic Medicine, and Suicide Prevention Western Sweden. This method was developed to be used for road traffic, but with suitable modification, it can also be used for other modes of suicide. Since 2015 a revised method has been used to classify suicides on the Swedish railway system.

The study about suicide classification method (Andersson and Sokolowski 2022) has been approved by the Central Ethical Review Board in Gothenburg.

Criteria to Undergo the Classification Process

Criteria for selecting fatalities, which were to undergo the classification process because of a significant suspicion of suicide, were determined and are shown in Table 1. The criteria were influenced by a list developed by the European Rail Agency (ERA 2004) of factors that may indicate that a death is a deliberately act. That list is based on the so-called Ovenstone criteria (Ovenstone 1973). Criteria for cases that were to undergo the classification process in 2012 included the traffic event; the vehicle; together with a knowledge of psychosocial factors, such as prior suicide attempts; indirect suicidal communication and knowledge of ongoing depression, and so forth.

Classification Scale

A classification scale was developed and is shown in Table 2. The scale for assessing suicidal diagnosis by Lönnqvist (1977) influenced the assessment tool (Lönnqvist 1977). The classification harmonizes with the National Board of Forensic Medicine for assessment of the manner of death, but only a five-point scale is used, instead of a nine-point scale (Rättsmedicinalverket 2014).

Table 1 Criteria for selecting fatalities, which might be suicides and are to undergo the classification process

Criteria
1. Farewell message, oral or written, where intention is clearly communicated and where the traffic event supports a suicide
2. A traffic event that indicates a suicide in combination with knowledge of a) Recent known suicide attempts b) Recent indirect suicidal communication c) Communication about committing suicide or having no reason to live d) Ongoing prolonged depression or mental illness e) Previous severe emotional or stressful life event
3. A traffic event that strongly indicates a suicide

Table 2 Classification scale for fatalities in the road traffic system

Grade	The result of the examination
1	Shows that manner of death was suicide Requires farewell letter or equivalent
2	Strongly supports that the manner of death was suicide Almost certain suicide, but the intention is judged primarily on the basis of evidence in the surroundings
3	Cannot determine whether the manner of death was suicide or the result of an accident The information is not sufficient to determine whether an event was a suicide or accident
4	Strongly supports that the manner of death was accidental Almost certainly an accident
5	Shows that the death was accidental way Surely accident

Data Collection and Psychosocial Examination

The investigators from STA and the police collected the primary data at the scene of the fatality. The investigator at STA gathered important documents such as the autopsy report, photos, information from the police, press clippings and details of the technical investigation of the car, and information about the road environment. The material was registered in the STA's database, the so-called in-depth client.

When the STA's investigators suspected that the fatality was due to a suicide, they reported this to the psychosocial investigator, who from the year 2012 conducted an expanded psychosocial data collection. The psychosocial investigator also attended the monthly review of the previous month's fatal accidents in road traffic to detect suspicious cases. Reports from the police, written and oral, information from relatives, and witnesses of the accident scene, as well as information from autopsy reports, were used. When possible, medical case records were collected as primary data. The psychosocial investigation was conducted by an investigator with education in behavioral and medical sciences and with experience from counselling at hospitals and trauma care. The psychosocial investigation (Andersson and Sokolowski 2022) is a working routine similar to, but not the same as, a "psychological autopsy" (Cavanagh et al. 2003). The most common reason to conduct a psychological autopsy is to determine the mental state of someone who is already deceased to determine the cause or nature of death, whether it be by natural causes, suicide, homicide, or an accident.

The review of the deceased was performed regarding data about socioeconomic background factors, as well as data about the life situation earlier and at the time of the traffic event. The review could include marital status, education, gainful employment and working situation, health, economy, residence, alcohol, and drug or medicine abuse.

Information such as suicide notes, previous suicide attempts, suicidal communication, recent suicide threats, long-term mental illness, use of psychopharmacologic

drugs, or neuropsychiatric diagnoses were noted. Other important information was triggering factors as separations or recently revealed "socially unacceptable behavior."

Expert Group

An expert group of five experienced professionals with knowledge in forensic medicine, behavioral and medical science, counselling, and traffic safety classified the suspected suicides using the classification scale in Table 2. During the first years, complex cases were discussed in a special referee group. The expert group and referee persons contributed over time to more comparable assessments. The cases classified as suicides were reported to the Swedish government agency for transport policy analysis, Transport Analysis, which compiles and publishes the official statistics on road traffic injuries. In 2013 Transport Analysis approved the method with data from the STA's database and the psychosocial investigations for delivery of the official Swedish statistics of suicides in road traffic.

Data on Suicides in Road Traffic 2010–2018

During 2010 and 2011, no psychosocial investigations where done, since these started in 2012. Results of the distribution of suicides and accidents in road traffic during 2010–2018 are shown in Table 3. The validation of the method is reported in a manuscript (Andersson and Sokolowski 2022) comparing results when the suicide classifications are conducted, without and with psychosocial investigations as a ground.

Data on Suicides on Railway 2010–2018

During 2015 and 2018, the suicide classifications were made using the adjusted method from road traffic for the fatalities on railway (Table 4).

Table 3 The official statistics for fatalities in road traffic, 2010–2018

Fatalities in road traffic	2010	2011	2012	2013	2014	2015	2016	2017	2018
Suicides	16	23	36	28	25	23	31	29	35
Accidents	266	319	286	260	270	259	270	253	324
Total	282	342	322	288	295	282	301	282	359
Percentages of suicides %	5,7	6,7	11,2	9,7	8,5	8,2	10,3	10,3	9,7

Without psychosocial examinations, 2010-2011
With psychosocial examinations, 2012-2018

Table 4 The official statistics for fatalities on railway, 2010–2018

Fatalities on railway	2010	2011	2012	2013	2014	2015	2016	2017	2018
Suicides	66	57	84	93	78	87	68	50	79
Accidents	45	25	15	18	25	16	13	14	9
Total	111	82	99	111	103	103	81	64	88
Percentages of suicides %	59	70	85	84	76	84	84	78	90

Before the adjusted suicide classification started, 2010-2014
After the adjusted suicide classification were used, 2015-2018

Data on Suicides by Jumping from Bridges 2010–2017

Earlier there has not been any collected or reliable data in Sweden about how many people take their own lives by jumping from bridges. In collaboration with the National Board of Forensic Medicine, data from 2010 to 2017 was collected (Riesenfeld 2020). In total 130 people died in this way during 2010–2017, distributed on 61 different bridges, whereof 8 bridges had 3 to 20 suicides, and the rest of them, 1 or 2 each. Physical barriers have been installed on some of the bridges during this time and positive effects have been noted. Analysis of the data has started and the effects of erecting fences will be studied. The most affected places are the bridges in or near urban areas with large populations. During the observation period, 2010–2017, no reduction in total was noted in Sweden, but the survey showed fewer suicides by jumping from bridges than expected. Riesenfeld (2020) points out that to make the data collection more effective, it is important to have high quality of documentation from different authorities and a simpler coding method for the certificate of cause of death. The National Board of Forensic Medicine and STA will further develop the suicide classification method.

How Do We Address the Problem of Suicides in the Transport System?

Suicides are a major health problem which affects a large part of the population. According to the World Health Organization (WHO), nearly one million people take their own lives in the world every year. Suicides in the transport system cause personal tragedies and loss for relatives and affect the working environment for truck and train drivers, as well as for operational and service personnel. Suicides cause delays of goods and passengers and impose costs for society.

Suicide is the result of complex interactions between genetic, individual, and social factors. The most effective way of approaching this complex topic is through interdisciplinary research (WHO Library Cataloguing in Publication Data 2010).

The same principle should be used when assessing the manners of death in the transport system. The combination of different competences in the classification group has been successful. The safety analysts take into account the road, bridge, or railway environment and the factors concerning the vehicles or trains. The forensic doctor interprets the autopsy report and contributes medical knowledge. The psychosocial investigator has competence in behavioral, psychological, and clinical sciences and from practice counselling patients, as well as next of kin to persons who died because of suicides. The ordinary road user data like gender, age, influence, etc. are not enough; it has to be complemented with additional complete psychosocial information.

Suicide Prevention in the Society

Suicide prevention provided by the health-care system should contain early diagnosis and customized treatment, which is individualized to the person suffering from mental illness. The level of knowledge in the government, municipalities, and authorities about suicides must be increased. Another important task is to restrict means and methods of suicide.

Strategies for the STA comprise suicide prevention in the design of new roads and by identifying and reducing existing high-risk locations. Key preventing strategies include building intrusion protection and middle separation as well as clearing the side region of the roads to protect people from taking their lives in road traffic.

Besides roads and bridges, people use the railway system for suicidal acts. To prevent suicides on the railways the systematic work with creating barriers between people and tracks is important. The number of suicides increases with population density. Building barrier fence, intermediate fencing between tracks, anti-trespass panels, alarming cameras that monitor the track areas, and platform screen doors is vital.

Designing an environment that promotes safety, which makes people feel secure, can reduce suicidal thoughts. Other important actions are functioning communication between the STA and emergency services. This is important in situations when someone is near or on the railway tracks and needs to be taken care of by the police or emergency units. The STA can order the train to stop or run at reduced speed, so that the rescue staff can manage to help the suicidal person. Rapid alert chains and cooperation between the STA and the emergency services also guarantee a safe working environment for the staff. Suicide prevention is a multidisciplinary commitment, and collaboration with emergency services and highlighting good examples of alert chains and cooperation are crucial.

Other measures that can be used against suicides in the transport system are analyzing the suicide events with a uniform method and discussing the psychosocial contexts and patterns with responsible authorities. Strategies against suicide should be developed continuously based on the best research knowledge available and the cooperation of all stakeholders in the community. According to the WHO, suicide

prevention programs should be multidimensional (WHO Library Cataloguing in Publication Data 2010).

Conclusions for the Future

There are several important pre-crash factors determining whether an injurious or fatal event occurs in the transport system (Andersson 2003). There are material factors, such as the condition of the road, vehicle status, the weather, etc., and there are psychosocial factors, such as mental illness, abuse, socioeconomic problems, etc. An accident or a suicide often depends on a combination of factors, the latter especially in case of a suicide. To improve prevention, knowledge regarding the importance of psychosocial factors is required and should be a part of the work.

Good-quality data are needed for the analysis of the incidence and patterns of suicides in the transport system. A uniform method of suicide classification for all modes of transport should be used. Nevertheless, the method must be adjusted to the different challenges and circumstances of roads, bridges, and railways. The systematic suicide classification methods and the analysis concerning suicides should be used in the prevention work in the transport system. They should also be used in collaboration with other organizations and authorities. The countermeasures against suicide should be intermodal for the systems of roads, bridges, and railways. Suicide-preventive measures are important variables in the design of new roads, railways, bridges, platforms, etc. Already existing exposed places and stretches can be located and remedied.

Many countermeasures against suicides require the same types of mind-sets regardless of means of suicides. By working with countermeasures and in collaboration with other responsible authorities to reduce the total incidence of suicides in the society, the transport-related suicides can decrease.

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