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Suicide and Life-Threatening BEHAVIOR

ORIGINAL ARTICLE

Behavioral and location-related antecedents of train suicides

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Abstract

Background: In the European Union, over 2000 suicides on railway premises were reported in 2020. Identifying individuals' behavioral and location patterns just before they die or attempt to die by train suicide (ITS) is critical for effective prevention of suicides by train. We conducted a naturalistic study using a newly developed instrument for the assessment of fatalities in rail traffic that used information from on-site video cameras.

Methods: A total of 56 case files and surveillance recordings of ITS prior to their suicide or suicide attempt were compared to 46 surveillance recordings of matched regular train passengers (RTP) before they boarded their trains. Groups were compared on individuals' behavior as well as location and contextual parameters.

Results: ITS performed unusual movement patterns more frequently, carried luggage less often, stayed on the platform longer, and let more trains pass relative to RTP.

Conclusions: If this study is replicated with a larger sample, artificial intelligence could be used to detect suspicious/unusual (movement) patterns in order to prevent train suicide. Social awareness campaigns that foster the identification of people in distress at train stations in combination with lower thresholds for the use of emergency devices on platforms may help to detect potential train suicides and reduce their incidence.

KEYWORDS

prevention, suicide, train suicide

Steffen Moritz and Celine Nguyen contributed equally and share first authorship.

INTRODUCTION

Prevalence of train suicide

In the European Union, 2204 suicides by train occurred in 2020 (Eurostat, 2021). In Germany, approximately 678 (7.3%; Eisenbahn-Bundesamt, 2021) out of 9206 suicides were train suicides in the same year (Federal Health Service Germany/Gesundheitsberichterstattung des Bundes, 2021).

For Germany, it has been estimated that each train engineer (driver) is at statistical risk of being directly confronted with a train suicide once or twice during their working lives (Gravert, 2017). Of these, at least one third will experience symptoms of acute stress disorder and other psychological problems (Bardon et al., 2021; Giupponi et al., 2019; Mehnert et al., 2012).

Train suicide and mental illness

People diagnosed with mental illness are six times more likely to die by train suicide than those without mental illness (Too et al., 2016). Of the 428 train suicides analyzed in the study by Mishara and Bardon (2017), 77.3% of the ITS suffered from at least one major somatic or mental illness. Of these, 57.3% were diagnosed with depression. In the study by Makara-Studzinska et al. (2021), 63.3% had received treatment for mental illness at the time of their train suicide or suicide attempt. It thus comes as no surprise that train suicides are more frequent near psychiatric institutions (Emmerson & Cantor, 1993; Erazo et al., 2004; Mishara & Bardon, 2017; Strale et al., 2018; Strauss et al., 2017). With respect to gender, most suicide by train attempts are by males, as is true for suicide overall (especially by violent methods) (Lukaschek et al., 2014; Wetzel, 2020).

Behavioral characteristics preceding train suicide

Few studies exist on behavioral characteristics directly before suicide. Lukaschek et al. (2011) interviewed police officers in Germany about their observations of behavioral and movement patterns of ITS shortly before the suicide (or suicide attempt). According to these reports, a quarter of ITS appeared agitated shortly before the incident (Lukaschek et al., 2011). Half ($n = 83$) of the ITS in Germany placed their personal belongings on the platform before suicide (Lukaschek et al., 2011), whereas this behavior was noted in only about one fifth in Canada (Bardon, 2013, as cited in Mishara & Bardon, 2016).

The present study

The present study was concerned with the behavioral and location antecedents of train suicides to improve the current knowledge. Existing data are yet too sparse to allow meaningful conclusions, and the parameters under investigation did not always use the same criteria, hindering comparisons. The aim of the present study is to overcome this knowledge gap by adopting stringent methodological standards while collecting a range of behavioral and contextual data to inform effective suicide prevention.

To address some of the caveats mentioned earlier, especially the memory distortions of eyewitnesses, we analyzed surveillance recordings of ITS at train platforms and employed a newly developed questionnaire to compare data of ITS with (RTP) who were on the same platform under similar temporal and seasonal conditions. Our study aimed to elucidate specific behavioral and location parameters of ITS shortly before their suicide to inform suicide prevention. In addition, characteristics of train stations, time points, and seasons were analyzed in an exploratory fashion as potential moderators.

We expected that ITS would display increased signs of agitation (e.g., tripping; frequent crossing of the safety lines at the platform's edge) relative to RTP in view of existing associations of psychomotor agitation with a higher probability of suicidal behavior and suicidal ideation (Duffy et al., 2020; Kim et al., 2020; McClure et al., 2015; Rogers et al., 2016). We also expected a relatively high number of lifetime psychiatric diagnoses among ITS.

METHOD

Design and setting

The study was set up as a naturalistic observational study. Ethical approval was obtained from the local psychological ethics committee (LPEK-0153). The evaluation period started on April 21, 2020, and ended on September 22, 2021.

Data collection took place at the offices of the German Federal Police (BPOL, German abbreviation for Bundespolizei) Inspectorate Hamburg-Jenfeld (Germany). Sociodemographic data related to the victims and the characteristics of the events were compiled from the official files of the BPOL and the corresponding surveillance videos of the train suicides (or suicide attempts). To enhance reliability, a second assessor (SB) evaluated 20 of

the files and videos on train suicide (or suicide attempts) in the same way as the main rater (CN).

Sample

We included all ITS for which an official police file had been prepared or for which secured surveillance videos or a folder of photographs of the suicide scene were available. Only suburban and mainline train stations were included as the BPOL does not have access to surveillance data of Hamburg's subway stations. The cases were dated from 2013 to 2021 and included 56 train suicides or attempted suicides (cases that were unclear [$n = 5$] due to indefinite behavior were treated as suicide attempts).

Of the 56 train suicides (or suicide attempts), 21 cases (37.5%) took place in the central district of Hamburg, where around 310,000 people live. In 55 cases, the method of execution of the suicide (or suicide attempt) could be observed: 19 ITS jumped directly in front of the arriving train (34.5%), 11 lay down on the tracks and were run over (20%), and 10 stood in the tracks in front of the train (18.2%), 2 ITS went into the track bed before the train arrived, and 2 ran or jumped into the side of the incoming train and as a result fell into the track bed (each 3.6%); eleven cases (20%) were classified as other (e.g., climbing under the train). Of the 56 ITS cases, 44 (78.6%) did not survive the suicide attempt, 5 survived with severe injuries (8.9%), 4 survived with minor or no injuries (7.2%), and 3 suicides were prevented by bystanders (5.4%).

In 39 of the 56 train suicides (or suicide attempts), video data were available. Of these, the movement and behavior patterns of the ITS on the platform were evaluated in 38 cases (in one case, vision was blocked). Reports and photographs were available for 8 cases of the remaining 17 files that had no videos. Thus, for 46 cases (38 cases with video and 8 without video) behavioral characteristics prior to the suicide could be determined. Written reports and photographs provided important information on static aspects (e.g., personal belongings at the scene), but they could not be used to analyze dynamic behavioral aspects (e.g., stepping in place). In ambiguous cases, a train suicide (vs. an accidental fall or being pushed onto the tracks) was assumed if suicide notes or announcements were documented in the case files.

Cases were sorted by weekday and month and by train station and time of day. Forty-six control videos were prepared that matched the final set of 46 suicide cases in terms of season, time of day, day of the week, and train station. Control persons were randomly selected regular train passengers (RTP) who were on the platform waiting to board their train. Their behavioral patterns were assessed in the same way as the ITS using the questionnaire Characterization of Train Suicides and Suicide Attempts (Char-TS) developed by the authors.

Information on relationship status was available for 41 (73.2%) of the ITS, 24 (58.5%) of whom were single; 14 (34.1%) had a partner and 3 (7.3%) were divorced. Forty-four of 56 (78.6%) of the ITS were German citizens. The average age of the individual attempting or dying by train suicide was 37.45 years (SD = 17.44; range: 15–78 years). The sample consisted of 43 (76.8%) male and 13 (23.2%) female ITS.

Information on the occupational status of the ITS at the time of the suicide (or suicide attempt) was available for 35 individuals. Of these, 13 were unemployed/seeking for work (37.1%), 7 were working full-time (20%), 6 were in training or were students (17.1%), 1 (2.9%) was working part-time, and 6 were retired or disabled (17.1%). One (2.9%) was currently convicted of a crime and was on the run, and one was an undocumented immigrant (2.9%).

Char-TS

We developed a questionnaire titled Characterization of Train Suicides and Suicide Attempts (Char-TS). We filled out the questionnaire for each ITS using the data found in the BPOL files.

First, we extracted key sociodemographic data such as gender, age, occupational status, marital status, nationality, migration background, and residence status, as well as putative debts from the police file (available only for those who died by suicide). The presence of psychiatric and physical diagnoses and the possible influence of psychotropic drugs, medications, and critical life events at the time of the event were recorded based on the statements of relatives, acquaintances, the persons themselves (if they survived the incident), or medical personnel (available only for those who died by suicide). In addition, the location of the station, the time the incident occurred, the weather conditions, and the day of the week were recorded. Furthermore, the duration of the ITS's stay on the platform and the position of the ITS as well as the number of people who were in the immediate vicinity of the ITS during the suicide (or suicide attempt) were documented after watching the suicide video and/or analyzing the photograph folder. Additionally, behavioral patterns of the person while on the platform were derived from the video.

The surveillance camera videos were viewed and analyzed by CN using SMAVIA Viewing Client and SeeTec Viewer software. SMAVIA Viewing Client is a software used to evaluate recordings from the SMAVIA Recording Server (Dallmeier Electronic, 2015). SeeTec Viewing Client is a network-based software used to manage video surveillance (SeeTec GmbH, 2016). The Char-TS was filled

out by two raters (CN and SB) to establish inter-rater reliability and optimize ratings. The evaluation forms and digital lists did not contain any data that would allow the identities of the persons to be traced.

RESULTS

Psychiatric status of ITS

Data on psychiatric status was available for 36 (64.3%) ITS. Of these, no psychiatric diagnosis at the time of the suicide (or suicide attempt) could be inferred for seven individuals. Six ITS had two diagnoses each, and one person had three diagnoses. In 12 individuals, a diagnosis of a depressive disorder could be determined. A schizophrenia spectrum disorder was diagnosed in six individuals. Emotionally unstable personality disorder, cannabis dependence, other drug dependence and suicidality were each present in two of the ITS. Alcohol dependence was present in four of the ITS. Furthermore, dysthymia and manic depression were each reported once. Only seven individuals had known somatic diagnoses. In 19 cases, critical life events were present shortly (within 3 months) before the suicide or suicide attempt. For seven of the ITS, separation from or disputes with their partner or conflicts with family/friends and others were documented; health deterioration was noted in four.

Seasonality of train suicides

Of the 56 train suicides evaluated, there was a peak in springtime (22 cases, or 39.3%). Most suicides occurred on Mondays or Fridays (17.9% each). Data on weather and times are presented elsewhere.

Characteristics of the platform sections and their frequency of use for suicide

Forty-two of the 56 suicides (75.0%) considered for the present analyses occurred in train stations with platforms, while the remainder (25.0%) occurred on open tracks. Forty cases (71.4%) involved commuter trains, six involved regional trains (10.7%), and the rest involved long-distance high-speed trains (i.e., the ICE in Germany), freight trains, the Nordbahn (a railroad company in northern Germany), or trains that could not be identified. In 35 cases, it was possible to identify the area of the platform from which the ITS moved onto the track. Twenty persons (57.1%) stayed at the end of the platform where the train entered the station prior to attempting suicide by train, seven were in the middle of the platform (20%), and eight were at the far end (22.9%) of the platform (as seen from the incoming train); thus, most ITS were hit by the train at a high speed. Furthermore, in 37.5% of the cases there were no people in the immediate vicinity of the ITS shortly before the suicide (or suicide attempt). In another 19.8% of the cases, up to 10 people were in the vicinity and in 21.4% of the cases between 15 and 50 people; in another 21.4%, no data could be collected for this variable. The comparison with the RTP did not reveal any deviant patterns (nonsignificant at a small effect size) concerning the number of people in the vicinity of ITS shortly before the suicide (or suicide attempt).

Behavioral differences

Stepping in place was significantly less frequent in ITS than in RTP prior to boarding the train ($p = 0.009$, see Table 1). Unexpectedly, moving onto or across the safety line was not different between groups. Other unusual movement patterns (e.g., tampering with a barrier warning sign, hitting a barrier warning sign, riding the escalator repeatedly, throwing away their luggage, staggering, swinging their arms around) were more frequent in the ITS ($p = 0.021$) than in the control passengers.

Physical and/or verbal interactions with bystanders were significantly ($p = 0.041$) more frequent in the ITS. ITS stayed on the platform on average of almost 5 min longer ($p = 0.013$) and let significantly more trains pass by without boarding than control individuals ($p = 0.009$). ITS were also significantly less likely to carry luggage (handbags, backpacks, or bags) ($p < 0.001$) and also used significantly fewer objects than RTP (cell phones, cigarettes, food, etc.) on the platform ($p < 0.001$), particularly cell phones. Overall, interrater reliability showed high convergence for the main variables of interest ($p < 0.001$; data available upon request).

DISCUSSION

Train suicide is a violent suicide method with a high lethality rate. Preventing train suicides remains an important goal as its consequences extend far beyond the death of the suicidal person and frequently traumatize the persons present at the scene, especially the train engineer (Bardon et al., 2021; Giupponi et al., 2019; Mehnert et al., 2012). The primary objective of this study was to examine whether there are antecedents to train suicides pertaining to behavior and location. The percentage of train suicides was highest in spring

TABLE 1 Differences between groups pertaining to behavior and location: total number (percent) or mean (standard deviation). The movement pattern variable was based on video material only, but for the other variables videos as well as photographs and witness reports were consulted.

			Statistics
Variable	**RTP, $n = 46$**	**ITS sample, $n = 56$**	t, χ^2, d, V, Φ
Movement patterns on the platform (video material only was used for this variable)			
Stepping in place? (yes/no)	29/17 (63/37)	13/25 (34.2/65.8)	$\chi^2(1) = 6.920$, $p = 0.009$, $\Phi = 0.287$
Sitting/standing still? (yes/no)	39/7 (84.8/15.2)	27/11 (71.1/28.9)	$\chi^2(1) = 2.330$, $p = 0.127$, $\Phi = 0.167$
Walking in circles? (yes/no)	34/12 (73.9/26.1)	24/14 (63.2/36.8)	$\chi^2(1) = 1.126$, $p = 0.289$, $\Phi = 0.116$
Platform change? (yes/no)	0/46 (0/100)	3/35 (7.9/92.1)	$\chi^2(1) = 3.766$, $p = 0.052$, $\Phi = 0.212$
Other unusual movement patterns present? (yes/no)	6/40 (13/87)	13/25 (34.2/65.8)	$\chi^2(1) = 5.327$, $p = 0.021$, $\Phi = 0.252$
Number of boundary line crossings	$M = 0.43$ (SD = 1.15)	$M = 0.40$ (SD = 0.84)	$t(84) = 0.158$, $p = 0.806$, $d = 0.035$
Behavior patterns and events on the platform			
Duration of time on platform until train arrival/suicide or suicide attempt in minutes	$M = 10.27$ (SD = 12.53)	$M = 15.55$ (SD = 18.62)	$t(84) = 1.562$, $p = 0.013$, $d = 0.341$
Number of objects used on the platform?	$M = 0.78$ (SD = 0.84)	$M = 0.53$ (SD = 0.92)	$t(89) = 1.350$, $p = 0.615$, $d = 0.286$
Which type of item does the person use on the platform? (none, cell phone/ headphones, food/drink, cigarettes, other)	20/20/2/1/1/0/2 (43.5/43.5/4.3/2.2/2.2/0/4.3)	31/1/0/1/5/2/5 (68.9/2.2/0/2.2/11.1/4.4/11.1)	$\chi^2(6) = 27.508$, $p < 0.001$, $V = 0.550$
Is the person carrying luggage? (yes/no)	35/11 (76.1/23.9)	17/39 (30.4/69.6)	$\chi^2(1) = 21.134$, $p < 0.001$, $\Phi = 0.455$
Does the person have contact with others on the platform? (no, verbal contact, physical contact)	44/2/0 (95.7/4.3/0)	38/6/4 (79.2/12.5/8.3)	$\chi^2(2) = 6.399$, $p = 0.041$, $V = 0.261$
How many trains does the person let pass by while on the platform?	$M = 0.39$ (SD = 0.80)	$M = 2.09$ (SD = 9.47)	$t(85) = 1.691$, $p = 0.009$, $d = 0.369$
Does the person smoke on the platform? (yes/no)	3/43 (6.5/93.5)	3/43 (6.5/93.5)	$\chi^2(1) = 0.000$, $p = 1.000$, $\Phi = 0.000$
Does the person drink alcohol on the platform? (yes/no)	0/46 (0/100)	2/44 (4.3/95.7)	$\chi^2(1) = 2.044$, $p = 0.153$, $\Phi = 0.149$
Does the person drink alcohol and smoke on the platform? (yes/no)	0/46 (0/100)	2/44 (4.3/95.7)	$\chi^2(1) = 2.044$, $p = 0.153$, $\Phi = 0.149$
Does the person do anything else on the platform? (yes/no)	4/42 (8.7/91.3)	3/43 (6.5/93.5)	$\chi^2(1) = 0.155$, $p = 0.694$, $\Phi = 0.041$
Number of people in the immediate vicinity at the time of train entry/ suicide or suicide attempt	$M = 10.98$ (SD = 16.28)	$M = 8.18$ (SD = 11.79)	$t(88) = 0.930$, $p = 0.971$, $d = 0.198$

Note: Sample size varies depending on the available data.

Abbreviations: ITS, individuals who attempt or die by train suicide; RTP, matched regular train passengers.

(39.3%; $n = 22$). The majority of the ITS stood at the end of the platform where the train entered the station (i.e., at highest speed) and went in front of the train from that location. However, the comparison of the position of ITS on the platform to RTP only achieved statistical trend level, although with a medium effect size tentatively suggesting that the effect could be clinically meaningful and would have reached significance in a larger sample. Furthermore, people were in the vicinity of the ITS in approximately half of the train suicides (or suicide attempts). Yet, again, no significant difference emerged in comparison with RTP.

Unexpectedly, ITS did not step on or over the boundary line more often than matched controls (negligible effect size). ITS did show more unclassified movement patterns but stepped in place less frequently than RTP. Despite the absence of statistical significance, it should be mentioned that RTP more often stood or sat still compared to the ITS and that the latter switched to the opposite platform more often. This can be interpreted as signs of increased

psychomotor agitation, which has been associated with a higher risk of suicidal behavior and suicidal ideation (Duffy et al., 2020; Kim et al., 2020; McClure et al., 2015; Rogers et al., 2016) and may reflect ambivalence and emotional turmoil (e.g., anxiety, despair). In contrast, the less frequent stepping in place on the part of the ITS could reflect determination to die by suicide in a subgroup.

ITS stayed significantly longer on the platform and accordingly allowed a significantly greater number of trains pass them by than RTP did. In addition, ITS had more frequent contact (both verbal and physical) with other individuals on the platform, although this was still the exception (20.8%). One explanation for ITS letting more trains pass and staying on the platform longer could be ambivalence toward their suicide in a subgroup of ITS. At the same time, ITS were significantly less likely to carry luggage and differed significantly from RTP in the types of belongings they carried or used on the platform; 43.5% ($n = 20$) of the RTP used their cell phones while waiting for the train, whereas this was true for only 2.2% ($n = 1$) of the ITS. This could again speak to the determination of a subgroup of ITS because carrying or using objects, specifically a cell phone, is unnecessary if there is a firm plan to die by suicide.

A psychiatric diagnosis, especially the presence of depression, was higher in the group of ITS than in the general population (27.8%; Jacobi et al., 2014, 2016), which is in accordance with studies that link risk of suicide with the presence of psychiatric illness (Bertolote et al., 2004; Haltenhof et al., 2013; Hansen et al., 2003; Sher, 2006). A total of 78.6% ($n = 44$) of the present sample were German nationals, which is somewhat lower than the proportion of individuals with German citizenship in Hamburg in 2020 (82.9%; Federal Statistical Office/Statistisches Bundesamt, 2021). Moreover, 76.8% ($n = 43$) of the ITS were male. The gender distribution of cases of suicide is thus similar to that in Germany as a whole in 2020, in which 75.7% of those who completed suicide were men (Federal Health Service Germany/Statistisches Bundesamt, 2021). Consistent with studies reporting an association between suicides and suicidal ideation with unemployment or duration of unemployment (Breuer, 2015; Faria et al., 2020; Fountoulakis, 2020; Wang et al., 2020), the unemployment rate was 37.1% in the ITS sample whereas it was 7.6% in Hamburg overall at the time (Federal Agency of Work Germany/Bundesagentur für Arbeit, 2021).

Strengths and limitations

While our study has a number of strengths (e.g., a novel and reliable instrument that provided new insights into the antecedents of train suicides; data derived from video cameras limited the effects of subjectivity), some limitations need to be acknowledged, particularly the relatively small sample size (however, see Normand, 2016). Furthermore, data were only available for train suicide (or suicide attempts) at or near rail stations that are part of the Hamburg rail network, limiting the generalizability of the results to other environments and countries, especially more rural areas. As a further caveat, surveillance cameras were not installed on every platform in the catchment area. Moreover, the 56 train suicides and suicide attempts cover a time span of 9 years (2013–2021), making it impossible to assess the influences of developments such as the COVID-19 pandemic or changes in technology (e.g., widespread use of smart phones).

Another weakness is the partial absence of some data points and the low reliability of some data. For example, information on relationship and occupational status was often derived from information provided by relatives or friends, which is biased and unreliable.

Furthermore, the number of people in the immediate vicinity of the suicide (or suicide attempt) could only be estimated in almost one third of the cases (30.4%; $n = 17$) because the entire platform section was not always fully visible or there were too many people on the platform.

Finally, while the newly developed Char-TS questionnaire may help to characterize train suicides, it requires further validation and perhaps should be extended to incorporate additional features.

CONCLUSION AND FUTURE DIRECTIONS

Although an understanding of the actions and circumstances immediately preceding suicide is essential for the development and further refinement of preventive measures against train suicides, hardly any research on this topic exists. Our study aimed to close that gap.

The present study elucidated several distinct behavioral patterns that distinguish ITS immediately before the suicide (or suicide attempt) from regular public transport passengers. To prevent future suicides, these distinct patterns (e.g., less frequent stepping in place, less frequent carrying of luggage, a longer than average stay on the platform in conjunction with letting trains pass by) could help to improve alarm systems, such as camera systems equipped with artificial intelligence that alert security personnel. Alternatively, automated (nonspecific) loudspeaker announcements or music could be played with the aim of preventing suicide through acoustic irritation (for the effectiveness of motion detectors, audible warning signals, and infrared illuminators, see DaSilva et al., 2012).

As it appears that ITS display unusual behavior, another measure could be to promote general awareness

campaigns (not focusing on suicide, however, because reports about suicide raise prevalence rates) to encourage fellow travelers to use the alarm system if someone appears to be in distress or in danger or is behaving in a peculiar way (standing on the platform for a long time without boarding). Currently, high penalties to prevent false alarms are a disincentive to the use of such systems outside of clear emergencies. While this measure may lead to false alarms with respect to train suicides, it may also help to detect persons who require other medical or psychological help.

In addition, on-site security personnel should be trained to recognize signs of a possible attempted train suicide (e.g., through gatekeeper training programs; World Health Organization, 2019, p. 44) and to approach persons exhibiting these signs. The frequent selection by ITS of positions at the end of the platform from which the train enters the station speaks to the potential effectiveness of barriers on these platform sections that open only after the train arrives and close again when the train leaves (Law et al., 2009; Law & Yip, 2011). This recommendation is in line with studies showing that fencing along walkable tracks (Lobb et al., 2001; Silla & Luoma, 2011), tracks in densely populated areas (Ceccato & Uittenbogaard, 2016; Rådbo & Andersson, 2012), and tracks located near psychiatric institutions (Van Houwelingen, 2011) is an effective method to reduce suicides (Beautrais et al., 2009; Law et al., 2009; Law & Yip, 2011). Our study replicated the relatively high prevalence of psychiatric disorders found in ITS. Given the correlative relationship between the proximity of psychiatric institutions to railroad tracks with suicides, we concur with those researchers (e.g., Ladwig et al., 2009, as cited in Havârneanu et al., 2015) who recommend at least 3–5 km (1.9–3.1 miles) between a psychiatric institution and the nearest accessible train platform.

Our findings clearly suggest that there are subgroups of ITS, and we suspect it will remain difficult to identify those with a clear determination to die by suicide due to their inconspicuous behavior.

Future studies should recruit a larger sample size and expand and refine our assessment questionnaire (e.g., with a more precise classification of movement patterns) to ensure a firm data basis for effective suicide prevention. Such studies should again investigate the seasonality of train suicides (or suicide attempts) and possibly also identify regional locations where more personnel should be deployed. Follow-up studies should determine the proximity of train stations to mental health facilities as this likely represents a relevant factor in prevention measures. Such research may help to decrease suicide rates as well as suicide's sequelae such as lingering distress among witnesses of the incident, particularly train engineers, professional first responders (e.g., paramedics) at the location, and families and friends of the deceased (Cerel et al., 2019) and the financial burden for the city or state as well as railroad companies caused by suicide (e.g., Sawada et al., 2017).

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CONFLICT OF INTEREST

The authors report no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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