BEHAVIOURAL INTERVENTIONS TO PREVENT TRESPASS AND VANDALISM: LESSONS LEARNED FROM THE RESTRAIL AND GRAFFOLUTION RESEARCH PROJECTS

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Trespassing behaviour is a problem for railway operations because it leads to train-pedestrian collisions and important delays. Trespassing incidents result from the violation of the rail track access rules by pedestrians. In many cases this behaviour is driven by vandalism intentions. Various measures have been developed and implemented to reduce trespass and vandalism on railway premises, but to date there is no publication to show which of these measures are more effective. This paper aims to review the good practices and recommendations on the prevention of railway trespass and vandalism and to provide a summary of the most promising preventive measures which involve organisational and human factors. The method included a systematic review of the literature on the topic, as well as a collection of prevention practices from the railway operating community. Both procedures were conducted during the EU-funded RESTRAIL and GRAFFOLUTION projects. The results revealed promising measures but very few studies which brought evidence for their effectiveness. We discuss how measures can be combined to increase their efficiency for trespass and vandalism prevention in the context of a behavioural theoretical framework applied to the rail context.

Introduction

Trespassing behaviour has a major impact on railway operations, resulting in a high number of trespassing incidents. In 2012, 58% of all fatalities on European railways involved unauthorized persons on tracks (suicides excluded), causing a two-hour average traffic shut-down time after each incident (European Railway Agency, ERA, 2014). Trains typically have to stop or slow down if there is a trespasser on the line, and this affects transport schedules and many passengers even if the collision is avoided.

Trespassing behaviour is the act of crossing the tracks in illegal places mostly for taking a shortcut. However, trespass is likely to be associated with different personal, social, and environmental variables (Lobb, 2006): e.g. teenagers
seeking a thrill on the railways (Lerer & Matzopoulos, 1996) or people walking or loitering along the tracks (Lobb et al., 2001). Among the individual motivations to trespass on railway property, the execution of vandalism and graffiti is particularly important. Whilst vandalism refers to the intentional damage to or destruction of property owned by others, illegal graffiti includes painting or drawing words or pictures onto varied surfaces, commonly walls and windows (e.g. van Vliet, 1992).

Campbell (2008) has shown that illegal graffiti is the most widespread form of vandalism on the railway network. As discussed by Thompson et al. (2012), an environment with a high level of vandalism and illegal graffiti is perceived by passengers as unsafe, negative, and discourages passenger use whilst enhancing feelings of fear. In addition, there are economic and operational costs associated with vandalism repair and graffiti removal (Thompson et al., 2012), that result in reputation and societal costs. Since illegal graffiti is a frequent drive of trespass behaviour and sprayers are unauthorised on the railway property, it makes sense for the railway community to approach trespass and vandalism as a single issue, and to assess preventative measures which are likely to be effective against both phenomena.

This paper aims to review the good practices and recommendations on the prevention of railway trespass and vandalism and to provide a summary of the most promising behavioural measures. In this paper, behavioural measures refer to influential, social, enforcement or psychological measures dedicated to influence the person’s knowledge and/or attitudes and to call for more responsible actions and voluntary decisions towards legal and safe behaviours. Similarly, a promising measure refers to any preventative intervention largely recommended in the scientific literature, extensively implemented in practice by various stakeholders, and/or supported by positive results of field trials.

**Method**

This paper is based on the research conducted during two European projects with complementary topics and which employed similar approaches. It presents the results of these integrated approaches concerning rail trespass and graffiti vandalism prevention.

RESTRAIL (REduction of Suicides and Trespasses on RA ILway property) was a three-year EU FP7 collaborative project coordinated by the International Union of Railway’s Security Division (grant agreement N° 285153). The project benefited from multi-disciplinary expertise provided by a consortium of 17 partners from 12 countries. The project ended in September 2014 and provided the rail industry and researchers worldwide with an analysis of the most cost-effective preventative measures, including specific measures to prevent trespassing behaviour. Several approaches undertaken in this project were particularly relevant for the issues discussed in the current paper: (1) systematic reviews of the existing literature on trespassing events and preventative measures
GRAFFOLUTION is a two-year EU FP7 collaborative research project which will end in February 2016 (grant agreement N° 608152). The consortium consists of eight partners including the International Union of Railways. The project seeks to decrease graffiti vandalism in public areas and transportation networks by focusing on smart awareness and positive prevention solutions for all affected stakeholder groups. The project has delivered notable inputs from an extensive literature review focusing on the extent of illegal graffiti in Europe with specific concentration on public areas and transport (Willcocks et al., 2014). In addition, the project collected experiences from Australia, UK, USA, Germany, Netherlands, Belgium, Austria, Spain, Portugal, Sweden and Tunisia through several interviews with key actors, mainly stakeholders and dutyholders. These interviews provided an insight on the graffiti’s categorisation models, case studies, prevention methods and best practices, including how the stakeholders communicate and collaborate (Clavell et al., 2014; Tomàs et al., 2014).

Results

The joint results of the RESTRAIL and GRAFFOLUTION research projects showed that the possibilities to prevent trespass and vandalism range from educational activities to surveillance and prosecution and to wider community engagement and activity support. Our analysis indicated that the most promising safety and security behavioural measures against rail trespassing and graffiti vandalism can be grouped under education and enforcement. The specific measures described under each of these categories are transversally supported by organisational and collaborative measures between different stakeholders and community actors.

Education measures

One strong belief is that trespassing can be effectively prevented by increasing individual knowledge about the various risks associated with trespass and the alternative safe behaviours (e.g. DaSilva & Carroll, 2011; Lobb, 2006; RSSB, 2005) through education targeted at specific high-risk categories. Educational measures are highly recommended in the scientific literature against trespassing (Havârneanu et al., 2015), showed positive results in the RESTRAIL trial evaluations (Plaza et al., 2014) and represent a 21% of the effective anti-social graffiti prevention strategies identified in GRAFFOLUTION (Clavell et al., 2014).

Formal education can be conducted in schools using various educational tool kits for pupils and communication specifically aimed at teachers (e.g. Patterson,
Education at school about the dangers of trespassing helped reduce trespass behaviour when combined with communication and enforcement (Lobb et al., 2003) or fencing and signage (Lobb et al., 2001). Two RESTRAIL pilot studies conducted in Finland and Spain have shown that railway safety education in schools had a significant effect on 8-11 year old children, with positive changes in self-reported behaviour, estimation of danger and understanding of legality (Plaza et al., 2014). Spanish teachers also reported increased responsibility for introducing railway safety concepts within their teaching activities, higher confidence and better skills to teach railway safety education (Plaza et al., 2014). In addition, education programmes in schools may employ drama, filmmaking, and lectures to make students aware of the dangers and impact of vandalism on others and the environment (Offler et al., 2009). It is important to note that positive educational approaches against graffiti raise awareness on the vandalism linked to graffiti without criminalizing graffiti writers or the expression of art. These include street art in art classes as well as social responsibility and vandalism in the curriculum. Furthermore, this scope backs youth programmes and arts-related activities (Clavell et al., 2014). However, there are no published studies about education measures in schools against vandalism.

Education can also be conducted outside of schools by developing awareness programmes for children, adults, communities or social workers. For example, the RESTRAIL railway safety education programme conducted in two railway museums in Spain has been effective on 8-10 year olds since it developed safer attitudes to trains and railways and improved the knowledge and awareness of safety on railway property, including the dangers of games or inappropriate activities near tracks and how to cross the tracks safely (Plaza et al., 2014). Furthermore, a campaign amongst the parents of very young children may improve their awareness of the dangers of railway trespass and encourage them to prepare their children better to avoid them (RSSB, 2006). It is also recommended that risk awareness should be raised at strategic locations close to the tracks such as bars and taverns (Savage, 2007), or places where vandalism is the main root of trespassing behaviour (Thompson et al., 2012). Educational scopes to prevent illegal graffiti are not limited to schools but some are implemented through media or giving key information to parents (Clavell et al., 2014). Other recommendations point to the combination of education with enforcement (Patterson, 2004) or with environmental interventions (Wasnik, 2010). For example, Lobb et al. (2001) reported that educational messages distributed to workers at railside factories, and in surrounding residential, commercial and industrial areas in combination with fencing and signage significantly reduced trespass, although education may have had a weaker effect than the other two measures. To date there are no studies to show the clear effects of education measures on vandals or graffitists.

Broader public awareness can be increased through mass media campaigns targeted at high-risk audiences; hence a segmentation of vulnerable trespasser groups is recommended. Safety communication against trespass consists of
organised communication through different media channels in a given time period, describing the dangers related to being on the tracks and the consequences of an accident (BTRE, 2002). Planned media coverage may also include comments of local authorities or photographs of other implanted measures throughout the campaign (Lobb et al., 2001). Clavell et al. (2014) have indicated that strategies based on education for prevention and awareness aiming to tackle graffiti usually educate under the idea that all graffiti is anti-social and is actually a form of vandalism. However, intervention strategies stressing less criminalized conceptions of graffiti but rather the positive traits of graffiti and the positive social impact on the community when performed in controlled environments are equally important (Clavell et al., 2014). These education strategies have gradually developed for public spaces, while for public transport settings (including railway industry) they still concentrate on anti-social strategies such as law enforcement and prosecution.

Enforcement measures

Law enforcement measures (e.g. prohibitive signs, prosecution, control and surveillance) are highly effective according to RESTRAIL literature research (Havârneanu et al., 2015) and field evaluations (Plaza et al., 2014) and represent 34% of the effective anti-social graffiti prevention strategies identified in GRAFFOLUTION (Clavell et al., 2014).

With regard to trespass, warning signs and prohibitive signs are equally recommended and should be placed at hotspots (e.g. BTRE, 2002; RSSB, 2005, 2006). Silla and Luoma (2011) evaluated the effectiveness of prohibitive signs at a hotspot in Finland and found that trespass dropped by 30.7% providing support for this measure. Station signage can be effective in reducing trespass (RSSB, 2005) but the potential of signs to change behaviour in absence of any other activity is limited (RSSB, 2006), therefore they should be included in wider interventions and in conjunction with other measures. For example Lobb et al. (2001) evaluated the effect of warning signs and posters in combination with fencing and education and found that it significantly decreased trespass at a railway station from New Zealand. Similarly, one RESTRAIL field trial conducted by CIDAUT evaluated the effect of warning and prohibitive signage at a Spanish railway station previously identified as a trespassing hotspot. The installation of large posters indicating that crossing is illegal as well as the possibility of being fined a huge sum of money for trespassing led to a significant decrease of observed trespassing behaviour (Plaza et al., 2014). Similar results were reported from a second RESTRAIL field trial conducted by TCDD in Turkey where new prohibitive signs were used in combination with new fences, anti-trespass panels and surveillance cameras at a station previously identified as a trespassing hotspot (Plaza et al., 2014). However, it is not clear from these studies if the effect is able to persist long term. In addition, there are no studies to show that vandals or graffiti sprayers would comply with posted signs. However, prohibitive signs may have an effect on graffitists in the sense that they help enforcement authorities apply the relevant legal frames. Specifically, prohibitions define the boundary between the legal/illegal premises,
they specify the unauthorised actions, and sometimes they contribute to the penalty strengthening by translating the legal risks to the potential transgressors (e.g. the type of prosecution, the amount of money to be fined). Most of the existing studies support that information provided through signage may have some deterrent effect, only if the person also perceives a real chance of being detected and prosecuted.

Both the objective and perceived chances of detecting trespassers and vandals can be increased through improved enforcement procedures. Most enforcement recommendations are similar for the two problems. For example, patrolling should be targeted, meaning it should be done particularly during the peak periods for trespass and vandalism (Offler et al., 2009). Trespass prevention requires visible security patrols able to detect and fine illegal and unsafe behaviour (Lobb, 2006), which may also include notable legislative efforts (DaSilva & Carroll, 2011). The risk of being detected has the power to act as a real deterrent in some area, but only if the risk is real (RSSB, 2006). Consequently these patrols should be as visible as possible, for example by wearing visible clothing. Passengers also report feeling more secure when security staff are highly visible, yet Thompson et al. (2012) suggest that security staff wearing plain clothes in the field are more effective in detecting and stopping graffitists. The actions performed by security officers should be based on larger legal measures such as banning the sale of graffiti materials to minors, stop and search activities and house searches, as well as prosecution laws (Clavell et al., 2014). Although these measures are mainly centred on anti-social reduction, they may also cross into pro-social promotion of graffiti by reflecting forms of activity support (Clavell et al., 2014). In addition, in the trespass contexts involving non-malevolent acts (e.g. illegal crossing), reinforcing safe behaviours should be complementary to punishing the undesired ones. A study by Lobb et al. (2003) indicated that combining punishment with intermittent reinforcement of desired behaviour (i.e. rewards) significantly reduced trespass behaviour in male pupils. The same principle is promising in graffiti prevention through the legal alternatives such as the ‘free walls’ projects.

Staff training can also facilitate effective law enforcement on the railway premises by improving human surveillance. For example, a general training programme for railway staff (Cohen et al., 2003) could teach the staff at stations or level crossings to increase awareness (Wasnik, 2010) and to identify and report signs of previous trespass such as holes in access fences (RSSB, 2005). In the UK for example, a quick initial training with volunteers encouraged to report ‘live’ trespass, proved a cost-effective addition to existing formal monitoring and reporting systems (RSSB, 2005). In addition, Offler et al. (2009) and Thompson et al. (2012) propose an increased presence and visibility of staff on trains, employing young people to staff patrols, or establishing a ‘railwatch’ for staff and public against vandals.

While classic surveillance devices typically facilitate incident detection and intervention of security staff, there is also a growing body of evidence showing
that detected trespassers who are provided with some form of automated feedback in real time are likely to change behaviour. DaSilva et al. (2006) have shown the long-term effectiveness of a video camera combined with an infrared illuminator and speaker on a railway bridge in the USA where the trespass rate dropped by 60% from the first to the second year and by 17% in the third year compared to the first one. In the UK, CCTV combined with public address system announcements was effective in deterring children from trespassing but less effective for adults (RSSB, 2005). Other recommended systems are composed of long-range motion detectors combined with sound warnings or flashcams which take photographs of trespassers (RSSB, 2005). The RESTRAIL field trial conducted by VTT at two trespassing hotspots in Finland has indicated a significant effect of video enforcement combined with sound warnings: trespassing behaviour decreased by 44% at one hotspot and 18% at the other one (Plaza et al., 2014).

**Collaborative measures (with transverse implications)**

Collaborative and organisational measures at local and national level are very important for the implementation of all previous measures. Collaborative and organisational measures are transverse because they underpin the implementation of other categories of measures (Havârneanu et al., 2015) and have a cross-cutting effect on the safety and security practice. In general, trespass and vandalism prevention can be improved through a better inter-agency communication (RSSB, 2006) and by sharing resources, reducing duplication of efforts, coordinating services, and attaining greater credibility on the issue (Cohen et al., 2003). For example, cooperation achieved across different levels of government, railway companies, public safety organisations, police, unions and community groups to promote rail safety is essential for carrying out effective education campaigns (BTRE, 2002). Collaboration with schools and mass media and local community partnership is highly recommended against trespass (RSSB, 2005), and collaboration with police, other law enforcement authorities and justice departments against vandalism (Offler et al., 2009). Collaboration to prevent vandalism usually considers three possible scenarios (Clavell et al., 2014): social collaboration (peer to peer), engagement (organisation to peer) and participation (peers and organisations). Collaborative and organisational measures have been proposed and particular recommendations have been made, but since their evaluation is difficult there are no published studies to indicate which type of collaboration is more effective and in which circumstances.

**Discussion and conclusion**

Insights from the RESTRAIL and GRAFFOLUTION projects indicated that the categories of measures to reduce railway trespass and graffiti vandalism overlap, and that most of the specific measures under each category can be used to tackle any type of trespasser, including vandals and graffiti sprayers. Even though there are few studies supporting the effectiveness of the identified measures, the available body of empirical evidence suggests that most measures are actually
interdependent and are likely to work better in combination. This supports the theoretical viewpoint that both trespass and vandalism can be regrouped under a broader type of illegal behaviour on the railway premises ranging from minor ‘incivilities’ to more severe ‘crimes’. An example of such integration can already be seen in the UK, where the British Transport Police frequently refer to ‘route crime’ – which includes graffiti and other crimes such as trespassing, creating obstructions on tracks, and more. Furthermore, the overlapping measures against railway trespass and vandalism bring a major advantage for the safety and security practice because the concerned stakeholders can address the two problems simultaneously, in a shorter time and with fewer resources. These practical advantages are in line with the comprehensive protection approach, specifically an integrative approach to tackle all the risks that threaten the railway property through complex interventions.

The comprehensive approach would also consider the interactions between the two phenomena as well as possible influences on one another. For example, it is known that in many countries, graffiti hotspots include back alleys, footbridges, subways and transport interchanges (see Campbell, 2008; Tomàs et al., 2014). At the same time, vandalised footbridges or underpasses are likely to become ‘user-unfriendly’ and perceived as insecure, hence may be avoided on purpose by some pedestrians. In other words, illegal graffiti in these places may discourage correct crossing behaviour and may be one factor accounting for trespass at stations. By preventing vandalism in such places one can also prevent illegal track crossing. In summary, one should anticipate any interaction (either positive or negative) between problems, as well as the multiple effects of measures implemented in well-defined circumstances.

The railway industry needs a more consistent theoretical approach to trespass and vandalism. This approach should be based on consistent definitions. Policy makers and dutyholders are encouraged to understand trespass as a broader concept, and graffiti as need for expression for some segments of society. A differentiation of graffiti significance (political or social demands, artistic expressions, bombers or offenders) should be taken into account when discussing the motivations of the actions. A deep yearning to better understand this social phenomenon drives necessary to more imaginative solutions beyond penalty strengthening and punishment. Similarly, trespassers who take shortcuts across the tracks need to be distinguished from metal thieves or young vandals and from people who deliberately enter the tracks to commit suicide. This process also requires redefining the prevention strategies in terms of comprehensive protection.

Future evaluations could benefit from the elaboration of a theory-based evaluation framework dedicated to prevent railway trespass, where trespass is considered an overarching concept that incorporates vandals and graffitists. Recently such a model has been proposed in RESTRAIL to describe the chain of events leading to railway suicides and trespassing accidents (Burkhardt et al., 2014). This model already integrates vandalism and risk-seeking as important
drives of the trespassing intent. It is the first attempt towards the comprehensive prevention approach and to define trespass as a sequential process in which each step has a corresponding class of prevention measures depending on their type of effect mechanism (e.g. influence decision, deter access, influence behaviour in the track area or mitigate the consequences). This model could provide the basis for a more elaborated theory-based approach to evaluate the effectiveness of preventative measures against all types of railway trespass.

References


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