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Private security for curbing unwanted sexual behaviours in train stations: a place-based randomised controlled trial

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Abstract

Background Unwanted sexual behaviours (USB) are widespread within mass transit networks worldwide. The present study examines the effectiveness of a place-based approach to tackle USB: repeated visits by capable guardians to prevent victimisation in train stations with a greater propensity for incidence of USB.

Methods Pretest-posttest between groups randomised controlled trial on the effect of an intervention administered by a non-police security team at a prominent train operating company in England and Wales. Eligible hotspot stations ($n = 51$) were randomly assigned to two conditions: enhanced security measures, encompassing heightened presence of security staff, proactive interaction with possible victims, and pre-emptive efforts to prevent USB, and business-as-usual conditions. Negative

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binomial regression models estimate the treatment effect in terms of USB, violence, and all other incidents in the treatment compared to the control arms.
Findings The implementation of heightened security measures led to significant reductions in reported incidents of USB at treatment stations compared to control stations. The intervention has also led to significant decreases in reported violent incidents but has had no significant effect on other reported incidents.
Conclusions Security personnel have the potential to serve as efficient guardians in train stations, effectively reducing the risk of USB and violence. The findings highlight the efficacy of place-based interventions as measures against USB. However, the intervention comes with a significant opportunity cost as the security teams had limited capacity to deal with other crime types. Implications for future research and practice are discussed.

Keywords Unwanted sexual behaviours · Violence against women and girls · Sexual harassment · Hotspots · Randomised controlled trial · Train stations · Private security

Introduction

USB is a common concern with severe implications for victims. The spectrum of behaviours encompasses a broad range of transgressions, from verbal harassment and the making of sexual comments to stalking, physical acts of assault, rape, and gender-based, as well as sexual orientation-based homicide (de Bruijn et al., 2006). Particularly in the mass transit system, USB fosters an environment characterised by fear and a lack of safety (Woodcock & Osmond, 2015). A recent survey suggests that nearly half of the women and a third of the men in England and Wales experienced USB on trains and in train stations (2CV, 2020, Ariel et al., 2024), figures that reflect the experience of many passengers around the globe, with "prevalence rates range from 15 to 95%" (Gekoski et al., 2017:3). Collectively, the evidence exposes a troubling pattern of USB risk in mass transit environments.

The distinct attributes of these settings, such as densely populated areas, the anonymity afforded by large crowds, and the ephemeral nature of travel, present obstacles in preventing and mitigating USB in this environment. Thus, despite this problem's widespread occurrence, there is a notable deficiency in comprehending the optimal approaches for addressing these occurrences within the mass transportation framework (Gekoski et al., 2015).

One possible approach to USB in the public domain and specifically in the mass transportation setting is a focus on place-based interventions—namely identifying micro-locations of USB that experienced disproportionate levels of USB in the past and, therefore, have the propensity to experience USB in the future, and then targeting these areas with preventative measures. This "hotspots" approach has yielded significant reductions in other crime types, including violence, gun crimes, antisocial behaviour, and property crime, relative to control conditions (Braga et al., 2019). Some research has also detected substantial reductions in overall crime in

the mass transit system (Ariel et al., 2020; Newton & Ariel, 2017). However, a place-based strategy has yet to be tested for preventing USB, particularly in this ecosystem.

The present trial is an attempt to fill this void. We tested the effect of assigning security presence and focused interventions in train stations with disproportionate rates of reported USB relative to control conditions. We then measured the impact of this treatment against control conditions within a randomised controlled trial study. Below, we present the design and the results and then discuss the outcomes in terms of policy, theory and future research.

Literature review

USB in mass transit systems

It is difficult to determine precisely how often, how severe, and which prominent types of USB occur in general or specifically in the mass transit system environment (see Gekoski et al., 2017; Schapansky et al., 2021)[1]. Still, the evidence points to the widespread of USBs in the transportation environment; in a comprehensive analysis, Williams et al. 2020) found that aside from public streets, transit systems are the second most frequent setting for sexual harassment.

USB transgresses social and economic lines, affecting individuals across various backgrounds (though not all social strata use mass transit systems with the same frequency). Everyday USB experiences on trains include unwelcome leering, whistling, and verbal abuse, with nearly a fifth of women reporting exposure to exhibitionist acts in the past year, a figure that rises to almost 30% over their lifetime of public transport use (see also Fielding et al., 2021; Suth, 2003). Echoing this, interviews and surveys with women around the world reported feelings of vulnerability and fear during transit, sentiments that are consistently found in studies from Bangladesh, Pakistan, Ghana, Nepal, New York, India, China, and elsewhere (Anand & Nanda, 2022; Ceccato and Loukaitou-Sideris, 2021; Duvvury et al., 2021; King et al., 2021; Neupane & Chesney-Lind, 2014; Quinones, 2020; Yang et al., 2022). Research also shows that all forms of USB are damaging and carry a myriad of adverse effects on victims and the wider public (Harned, 2004), including physical and emotional harm, restricted movement, and economic and psychological distress (see more broadly in Infante-Vargas & Boyer, 2022; Pina & Gannon, 2012; Roberts et al., 2022).

Yet despite these effects on victims, USB is largely an underreported phenomenon. The literature shows a wide gap between official records of USBs and their prevalence. According to the US National Crime Victimisation Survey, 2015–2019, only 310 out of every 1000 sexual assaults are reported to police; nearly 80% of

[1] Malacad and Hess (2011:328) identified recurring issues in studies of USB: "47% of the studies failed to address the question of sexual orientation, sexual behaviour terminology was explicitly defined in only 32% of questionnaires, fewer than 5% of surveys clarified whether the sexual encounters in question were consensual."

rapes and sexual assaults go unreported (Morgan & Kena, 2018); less than a third (29%) of all stalking victims reported the victimisation to the police in 2019 (Morgan & Truman, 2022); and a survey from UN Women UK found that 97% of 18–24-year-old women have been sexually harassed, and 96% did not report the incidents (see Gekoski et al., 2017). These alarming statistics highlight the severity of the issue, suggesting that in some conditions, USB is part of the journey experience of vast populations.

The underreporting phenomenon can be ascribed to a multitude of variables, encompassing the emotional response of victims characterised by guilt and fear, as well as the societal acceptance of harassment incidents as an inescapable element of public transportation (see Ayres et al., 2009; Woodcock & Osmond, 2015). Moreover, the transient characteristic of public transport poses challenges in apprehending the transgressors who can often 'escape into the crowds', which not only makes identifying them difficult (thus reducing the motivation to report the incident to the authorities) but also exacerbates a climate of impunity that can potentially perpetuate repeat offending (Heinen, 2023).

Interventions

Since the beginning of the twenty-first century, addressing USB within the UK's rail network has become a significant focus of political discourse, professional attention, and academic research. This trend aligns with a broader, global commitment to eliminating all forms of USB (United Nations, 2023).

Despite the widespread agreement on the urgency to prevent USB and particularly violence against women and girls[2], the criminal justice system often falls short (United Nations, 2023). Once a USB incident has occurred and reported to the police, victims usually express dissatisfaction with reporting procedures (Ariel et al., 2024; Magsi & Ariel, 2024), frequently feeling neglected by the system intended to serve them (Vijayasiri, 2008). The pivotal role of police contact in shaping public confidence in law enforcement has been noted by Avery et al. (2020) and Bradford et al. (2009): such encounters are fundamental in forming the public's trust in policing and underscore the necessity for a more empathetic, victim-focused approach (Lay et al., 2023). Thus, if victims feel like they are not taken seriously or sense their complaints are made purposelessly, the likelihood that future victims will complain is significantly reduced (Fielding et al., 2021; Buchnik et al., 2024).

To be sure, 'cases' that do continue within the criminal justice beyond the initial reporting of the crime are often dropped due to lack of incriminating evidence, the unwillingness of victims to give testimony in court, and the inability of prosecutors to secure a guilty verdict, should an assailant be identified and charged (see discussion in Buchnik et al., 2024). Whilst many receive adequate support services during the process, especially victims who have been physically harmed, the fact that the majority of cases discontinue is likely to discourage most from reporting USB—and, by implication, victims are less likely to access treatments and legal compensations.

[2] Recent studies have correctly underscored the need for a more gender-sensitive assessment of USB (Matthewson & Kalms, 2021).

When the police are not notified about incidents, they cannot do much about this crime problem.

USB hotspots

More important, however, is the attempt to prevent USBs before they occur. Some of the literature points to the prevention of secondary or tertiary re-victimisation prevention programmes and, to a lesser extent, primary victimisation, especially in domestic and workplace environments (Antecol et al., 2007; Hodgkinson et al., 2023; Welsh & Nierobisz, 1997). Still, many units of analysis can be targeted through social control mechanisms (e.g. police, security and health) that could lead to USB prevention (see review by Gekoski et al., 2015). Managing offenders (Belur et al., 2020; McCartan & Richards, 2021; McGuire et al., 2021; Ramsay et al., 2020), training (Antecol & Cobb-Clark, 2003), or increasing awareness of safety measures for passengers (see Solymosi et al., 2018), to name a few.

Here, we concentrate on place-based preventative interventions—i.e. treatments that focus on specific places where USB is likely to take place—and through the high visibility of police or security apparatuses, as well as localised interventions, the aim is to prevent USB incidence. To do this, the first step is to reaffirm the presence of the Pareto curve for spatial units of crime; once we identify that a relatively small number of units are responsible for a sizable and predictable portion of crime, we can then target these units with preventative measures. In place-based criminology, this concept was substantiated through the "law of concentration of crime in place" (Weisburd, 2015, p. 133), where criminal activities cluster in specific, localised areas called hotspots. Sherman et al. (1989), Weisburd (2018), and an expensive body of literature have documented this phenomenon, emphasising that these hotspots are typically confined to small geographic areas such as specific street blocks, individual addresses, or train stations. Ariel's (2011) analysis reveals that roughly half of all crime in the entire train network in the UK is concentrated in 5% of the stations, and a comparable pattern was observed in the London Underground (Ariel, 2018). These locations also host a substantial portion of unreported crimes, as illustrated by data from South-West Trains (UK), which indicated that around half of all incidents reported to the train operating company (but not necessarily to the police) also occur in less than 5% of locations (Ariel et al., 2017). These findings collectively reinforce the notion that the spatial of criminal activities are not random occurrences but are instead systematically linked to specific locales with characteristics conducive to crime (Brantingham & Brantingham, 1995; Eck, 1995; see also recent developments in Weinborn et al., 2017 and Norton et al. 2018).

Some hotspots remain 'hot' for long periods of time. A longitudinal examination by Weisburd et al. (2004) underscores the temporal stability of these crime hotspots, as the street segments in Seattle, USA, identified as the most crime-prone at the onset of the study retained their rankings by its conclusion 14 years later. This persistence is attributed to the continuous availability of opportunities for criminal activities that these micro-places offer, in contrast to other locales (Weinborn et al., 2017). Multiple longitudinal studies corroborate these findings, demonstrating a

long-term remarkable concentration of incidents in specific spatial locales (Braga et al., 2011; Gorr & Lee, 2012; Groff et al., 2010; Schnell & McManus, 2020; Weisburd et al., 2009; Weisburd & Amram, 2014). In the context of mass transit systems, these opportunities proliferate in areas with large crowds, such as major transit hubs, and during events like football matches, which catalyse large gatherings (Gorr et al., 2017; Giulianotti & Armstrong, 2002).

Considering the factors correlated with crime in hotspots (apart from sheer masses of potential victims in small areas), the literature points to (a) the absence of capable guardians and the lack of surveillance (Cohen & Felson, 1979a); (b) specific types of establishments, particularly those catering to the night-time economy like clubs, fast-food outlets, and liquor stores (Block & Block, 1995; Brantingham & Brantingham, 1995; Roncek & Bell, 1981; Roncek & Maier, 1991); and (c) ecological variables like poor lighting (Ceccato & Uittenbogaard, 2014; Ceccato and Loukaitou-Sideris, 2020; Loukaitou-Sideris, 2014) that collectively increase the risk of crime at hotspots.

Finally, we are aware of a limited body of research on violence against women and girls (VAWG) that observed spatial concentrations but none on USB. Knight (2022) studied VAWG in three boroughs in London, UK, and reported that of '27,370 hexagons mapped, 408 of these hexagons contained 50% of all crime count, just 1.5% of all space. One hundred thirty-four mapped hexagons contained 50% of all harm. Just 0.48% of all space across three boroughs contained half of all public space VAWG harm' (p. 63). A similar finding was reported by Pearcey (2023:4), who looked at similar hexagons in Dorset and detected that half of all public space VAWG harm is concentrated in 2.6% of the hexagons in that UK jurisdiction. However, we re-emphasise that VAWG is one category of USB, and therefore, the existing body of evidence on the topic of this study remains absent.

USB hotspots patrols

Thus, the concentration and habitualness of crime at certain hotspots make crime—at least a substantial portion—predictable in spatial terms. In turn, the predictability of crime at hotspots lends itself to the potential of preventing crime at these locations. The positioning of capable guardians in hotspots was found to be effective in inhibiting crime, with a global trend showing a consistently significant reduction in recorded crime in treatment hotspots relative to control hotspots (Braga et al., 2019; Sherman & Weisburd, 1995; Weisburd et al., 2009). Saturated presence, with regular patrols and proactive activities, has particularly been impactful, with multiple studies, including in the UK, showing its effectiveness in curtailing crime and disorder (Ariel et al., 2016; Bland et al., 2021). Within the specific environment of train stations, research evidence is also supportive of this approach (Ariel et al., 2020); a recent nationwide experiment yielded a 19.8% reduction in crime as a result of a hotspot patrol initiative applied in 195 train stations relative to control conditions (Newton & Ariel, 2017). Thus, "hotspot patrols" cause moderate though significant benefits in the form of crime reduction—though we stress that the term encapsulates

informal control mechanisms (on using security guards in hotspots, see Ariel et al., 2017).

Hotspot patrols, which target high-crime areas with the increased presence of capable guardians, also sit squarely within situational crime prevention theories, focusing resources where they are most needed (Clarke, 1980). Integrating hotspot patrols by non-state agents within the situational crime prevention framework can enhance the effectiveness of crime reduction efforts by addressing the environmental factors and the geographic concentration of criminal activities. Clarke's theoretical frameworks underscore the importance of situational factors in criminal behaviour, advocating for practical measures to mitigate these factors (Clarke, 1980). His work, rooted in rational choice theory, posits that criminals make decisions based on their actions' perceived risks and rewards. By manipulating environmental factors to increase perceived risks or reduce perceived rewards, situational crime prevention aims to deter criminal activities (Clarke, 1995).

Finally, routine activity theory (Cohen & Felson, 1979b) also provides a robust theoretical foundation for understanding the dynamics of crime and the effectiveness of intervention strategies, mainly when non-state agents are involved. Crime is contingent upon the convergence of three elements: a motivated offender, a suitable target, and the absence of a capable guardian. This framework is particularly relevant to our study, as it underscores the importance of environmental and situational factors in USB prevention, using capable guardianship. Capable guardians, including security personnel, increase the perceived risk for potential offenders, thereby deterring criminal activities (Felson, 1995). By enhancing guardianship through regular patrols, our study aims to disrupt the convergence of the three elements necessary for crime, thus reducing the incidence of USB.

We note that previous research has demonstrated the effectiveness of interventions grounded in routine activity theory. For example, visible security measures have been shown to significantly decrease the likelihood of crime in public spaces (Reynald, 2009).

The present experiment

Can place-based interventions by security guards curb USB in transit systems? This question has not been addressed in the literature thus far. We can only hypothesise that USB hotspots exit, given the evidence on crime concentrations in hotspots and VAWG concentrations (Roy & Chowdhury, 2023)—but USB, which covers as harmful as well as less harmful behaviours than VAWG, has not been explicitly looked at.

Our primary hypothesis posits that train stations allocated to the treatment condition, wherein additional security measures are implemented, will exhibit a statistically significant decrease in reported USBs compared to train stations in the control condition. However, it is equally plausible that reported USB would increase as a result of this intervention, as the saturated presence of capable guardians may increase the likelihood of reportage of an otherwise underreported crime type (see Barthe & Stitt, 2011; Rouse, 1985).

We look specifically at the effect of private security rather than police officers on USB reduction. Our motivation is to consider a sustainable intervention that can be implemented over a long period of time. As Ariel (2023) recently observed, the police in England and Wales struggle to implement long-term hotspot policing initiatives due to capacity issues. The British Transport Police (BTP), which has police jurisdictional powers over the UK's railway, also struggle to apply a rigorous hotspot policing strategy in the UK's train stations, as they are overwhelmed with calls for service and public order demands. On the other hand, security guards not only can provide similar crime prevention benefits in this environment (Ariel et al., 2017), but they are more available at the train stations to conduct proactive patrols that can potentially prevent USB (as they are often stationed at designated train stations, and they do not rotate between calls for emergency service between different stations as constables often do).

Our auxiliary hypotheses posit that train stations subjected to the treatment condition will demonstrate a discernible variation in instances of (a) violence and (b) property or other crimes relative to train stations in the control condition. As the security apparatuses focus on USB, there may be a favourable diffusion effect to other crime types, in line with the existing literature on the effect of officers' presence in hotspots (Clarke & Weisburd, 1994). We separate between violence and all other crime categories as violence can be spatially stochastic and rarer (Harinam et al., 2022), whereas all other crimes—fare evasion, theft-from-person or graffiti—are more common and may be more susceptible to the effects of hotspot policing in the mass transit environment (Braga et al., 2019)[3].

Methods

Study design

This study was conducted as a randomised controlled trial (RCT) to assess the effects of enhanced security visibility and proactive engagement on USB within train stations under the jurisdiction of Northern Trains. Twenty-five train stations were assigned to treatment, and 26 train were stations assigned to control conditions, as can be seen in Fig. 1. A simple randomisation sequence was used, and treatment was delivered throughout a 6-month period in the treatment arm but not in the control arm.

Setting

Northern Railway invited us to conduct the experiment. It granted us approval to engage their security teams to generate empirical insights into the effectiveness of

[3] Braga et al. (2019: Table 2) report that the biggest effect size for hot spot policing is for drug offences (d = .244, 95% CI .114, .373), followed by disorder offences (d = .161, 95% CI .101, .220), property offences (d = .124, 95% CI .063, .185), and finally violent crimes (d = .102, 95% .047, .156).

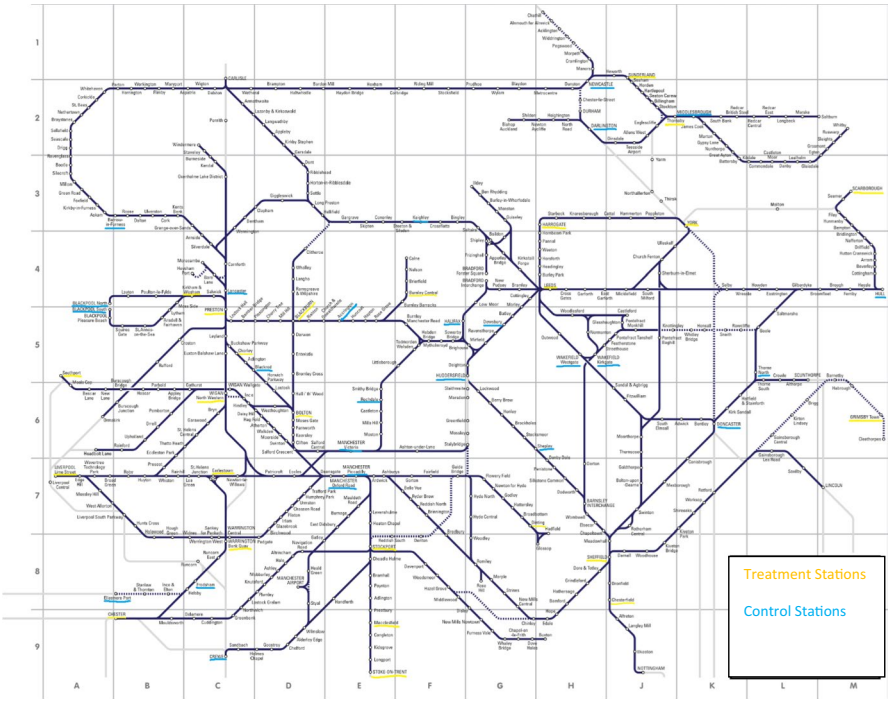

Fig. 1 Geographical distribution of treatment and control stations

private security measures against USB within their operational jurisdiction. Northern Railway trains call at nearly 550 stations, about 20% of all UK stations. Out of these, 477 stations are managed by Northern Railway. Their fleet consists of 333 trains on nearly 3000 km of track. During the experiment, the company employed over 6500 employees, who provided more than 2500 services daily, making it the largest train operator outside London and the second largest in the UK, servicing 100 million passengers annually. Despite this licensing arrangement that provided Northern Railway with the legal power to operate the participating stations, these stations maintain the status of 'public spaces,' wherein ingress is unrestricted, contingent upon adherence to the prevailing legal statutes. Nevertheless, certain areas, such as the platform zones, the on-board train compartments, and the first-class lounges, are reserved exclusively for paying passengers.

Baseline crime data from the BTP indicate that USB crimes are relatively low within the Northern Railway jurisdiction, as recorded in 2021-23 and most stations in this jurisdiction experience zero USB incidents. Of the various offence categories documented by the BTP, theft-from-person and low-harm anti-social behaviour constitute the majority. However, it is noteworthy that 51 stations accounted for more than half of the total reported USB, and of the remaining 500 stations, most stations recorded zero or negligible criminal activity. These spatial concentrations are consistent with observed patterns in other mass transit systems (Ariel et al., 2017; Ariel et al., 2020).

The intervention

The intervention consisted of deploying additional security patrols at selected train stations to deter potential perpetrators and support potential victims of USB. This approach aligns with the principles of routine activity theory and the "cops on dots" strategy used in early hot spot policing research (e.g., Sherman & Weisburd, 1995). The primary mechanism through which security guards deter potential perpetrators and support potential victims involves increasing the visible presence of capable guardians in the environment. Security guards were strategically stationed within the train stations at high-traffic areas, particularly during peak hours when the likelihood of USB incidents was higher. This constant presence was designed to increase the perceived risk of detection and apprehension of potential offenders, thereby deterring criminal activity. Uniformed guards equipped with communication devices patrolled regularly, ensuring a high visibility that enhanced their authority and effectiveness (Clarke, 2009; Felson, 1986).

In addition to patrolling, security personnel actively engaged with commuters, providing assistance and maintaining vigilance for any suspicious behaviour. By interacting with the public, they reinforced a sense of security and encouraged commuters to report incidents of USB. This engagement also allowed guards to identify and intervene in potential incidents more quickly. The concept of proactive engagement is supported by studies showing that active guardian involvement can significantly reduce crime rates in public spaces (Sampson, Eck, & Dunham, 2010).

Furthermore, the guards were responsible for monitoring surveillance cameras and coordinating with station control rooms to maintain comprehensive oversight of the station. This enhanced surveillance capacity ensured that any suspicious activities were promptly identified and addressed. The use of surveillance as a deterrent is well-documented in criminological literature, highlighting its effectiveness in reducing crime through increased perceived risk of apprehension (Welsh & Farrington, 2009). Additionally, guards were trained to document and report incidents of USB accurately, contributing to a more robust data collection process for the study.

In instances where USB was detected or reported, security guards were trained to provide immediate support to victims, ensuring their safety and offering assistance in reporting the incident to the authorities. This support included guiding victims to safe areas, facilitating communication with law enforcement, and providing emotional support. The importance of providing support to victims in real-time is emphasised in victimology literature, which stresses the need for immediate and compassionate responses to enhance victim recovery and cooperation with law enforcement (Davies et al., 2017).

Thus, train stations allocated to the treatment group received increased visibility of security staff members, supplemented by proactive engagement strategies to deter potential perpetrators and support potential victims. The intervention was also designed to foster a sense of safety and security among commuters, though we have no measures of perceptions in the present trial.

Whilst attired in uniforms, these security teams were civilians devoid of weaponry, detention, or arrest authority. Their primary mandate was maintaining a conspicuous presence and deterring criminal activities, specifically USB, in the 25 treatment sites. In addition, the security guards were tasked with providing reassurance to passengers and engaging in problem-solving endeavours whenever feasible to reduce USB (on reassurance policing, see Clark et al., 2022 and McKee et al., 2023). They were expected to interact with passengers in circumstances where USB could occur, in all areas of the train stations (most stations only have two platforms). Should passengers require assistance or the security guards encounter USB incidents, they were mandated to interject promptly. Moreover, the guards consistently and proactively interacted with other stakeholders and place managers, ticket enforcers, and sanitation personnel, thereby accumulating fundamental intelligence and information pertinent to their areas of responsibility.

Dosage

The scheduling of patrols did not adhere to specific times of the day; instead, they were instructed to conduct patrols 'as frequently as possible' to maximise their deterrent effect through enhanced visibility. Empirically, determining an optimal frequency and duration for security visits to hotspots remains controversial in criminological research (see Dau et al., 2023). Various studies have proposed differing thresholds for the length and frequency of these visits, indicating a lack of consensus or underlying theoretical framework guiding these recommendations. For instance, Koper (1995) suggested visits of 15 min, a duration also adopted in subsequent studies (e.g., Ariel et al., 2016; Telep et al., 2014). However, the rationale for this specific time frame is not firmly established in theory.

Regarding the frequency of visits, recommendations in the literature vary significantly, ranging from minimal interventions such as one visit per day (Bland et al., 2021) to more frequent, albeit undefined, patterns labelled as 'sporadic' (Barnes et al., 2020) or 'several' visits (Ariel et al., 2020), and even more intensive approaches (Gibson et al., 2017). Despite these variations, research consistently indicates that an increase in police presence at hotspots, provided it exceeds the level of intervention at control sites, is generally effective in reducing crime (Ariel et al., 2023).

Control group

Train stations assigned to the control group continued with their existing security protocols, maintaining the standard level of security visibility and engagement. This group served as a benchmark to evaluate the effectiveness of the enhanced security measures implemented in the treatment group on USB, as no USB proactive interventions linked to the treatment conditions were delivered in these locations.

Outcomes

Use of rates over counts or means

We opted for rates rather than USB counts or means per station for both statistical and practical reasons. Rates provide a more precise measurement by considering the frequency of a crime event relative to the number of passengers in a given period, thus offering a standardised approach to data that accounts for variations in population size or exposure time. This method is particularly useful in ensuring the comparability of crime data across different stations and contexts. For example, in previous studies in train stations, rates helped in accurately depicting the incidence of crime by adjusting for the large transient population that frequents the mass transit system, thereby allowing for more meaningful comparisons across different regions or demographic groups (see Ariel et al., 2017). Unlike raw counts, which can be misleading when comparing groups of different sizes, rates provide a clearer and more accurate picture. By focusing on rates, the trial can present findings that more accurately reflect the intervention's impact, adjusted for baseline differences in the sample. This aligns with experimental research best practices (on the importance of density in the context of mass transit USB, see Ball and Wesson (2017). From a practical perspective, this approach is common in mass transit environments, in lieu of using counts or means as main dependent variables (e.g., Ariel et al., 2017). Emphasising rates as the primary dependent variable not only enhances the methodological soundness of the study but also improves the generalisability and comparability of the results.

A. *USB incidents reports*: This outcome focuses on the number of USB incidents reported by the passengers to train operating companies' staff at the stations. These incidents encompass a range of behaviours, including verbal harassment, inappropriate touching, and other forms of sexual misconduct. As noted, to ensure comparability across stations with varying passenger volumes, we present the descriptive data by calculating the incident rate per 100,000 passengers.
B. *Violence incidents*: This outcome encompasses incidents involving against-person offences directed towards individuals. These incidents may include physical altercations, assaults, or other acts of violence and threats. Evaluating this outcome helps us understand the broader physical safety implications at train stations. Similar to the USB incidents, we present the rate of violence incidents per 100,000 passengers.
C. *All other incidents*: This outcome category addresses incidents related to all other crime types, including property damage, theft, fare evasion, graffiti, and theft from individuals who may also be affected by the interventions applied by the security teams. Whilst not directly related to USB, these incidents can impact passengers' overall experience at train stations. Like the other outcomes, we present the rate of all incidents per 100,000 passengers.

Randomisation

After the long-term trend of USB (2021–2023) at each participating station was assessed, stations were enrolled in the study. Stations were then assigned to the treatment or control groups based on the pre-generated randomisation sequence. We used a computer-generated random number table to create the randomisation sequence to allocate train stations to treatment and control groups. We employed a 1:1 randomisation sequence. Baseline characteristics of the stations, including average mean USB at baseline, geographical location, and overall crime rates, were similar between the two groups, suggesting the randomisation produced two relatively equal experimental arms in terms of the primary outcome measure—USB—at baseline ($t(49) = .079$, $p = .937$), based on [($M_{\text{Treatment}} = 14.84$, $SD_{\text{Treatment}} = 18.11$, $N_{\text{Treatment}} = 25$), ($M_{\text{Control}} = 15.23$, $SD_{\text{Control}} = 17.06$, $N_{\text{Control}} = 26$)].

The allocation sequence was generated by an independent statistician, whilst station enrolment and assignment to interventions were conducted by different members of the research team to ensure blinding. Due to the nature of the intervention, blinding of station staff was not feasible. However, outcome assessors were blinded to group allocation, and the treatment providers were not informed of the location of the control conditions.

Statistical procedure

An intention-to-treat analysis was performed. We exhibit the gain scores, representing the difference in outcome measures between the before and after periods for both the treatment and comparison groups for the three primary outcomes under investigation: USB, violence, and all other incidents. The 'before' data correspond to the 6 months 1 year before the experiment, during which security staff presence to prevent USB was not implemented, whilst the 'after' data includes the 6 months when security staff intervention was implemented in the treatment arm only. As noted, these outcomes are measured as rates per 100,000 passengers.

We then used negative binomial regression models to estimate the treatment effect because our dependent variables are over-dispersed count data (see Table 1). We ruled out Poisson models because the Bayesian Information Criterion (BIC) was lower under the negative binomial distribution models for all three outcome measures (see Ariel et al., 2022). Each statistical model included the treatment as the independent variable, the outcome variable at its pre-test values and the train station footfall (number of visitors to the station) as the covariates. We present the coefficients, standard errors, and the exponential value of the coefficients and their respective 95% confidence intervals (CI). When *Exp(B)* is less than 1, increasing values of the independent variable correspond to decreasing odds of the event's occurrence—or, in this case, an incident at the train station. This process was repeated three times for each outcome variable of interest—USB, violence, and all other incidents.

Table 1 Comparison of incidents reported at participating train stations (51): footfall, unwanted sexual behaviours (usb), violence, and all other incident types: pre and post random assignment

Stations	Random assignment	Six months of footfall	All other incidents reported to security pre	All other incidents reported to security post	All violence incidents reported to security pre	All violence incidents reported to security post	All USB incidents reported to security pre	All USB incidents reported to security post
Blackburn	Treatment	532,681	64	56	1	1	1	1
Bolton	Treatment	1,172,058	50	113	2	4	0	1
Burnley	Treatment	210,804	8	28	1	0	0	0
Chester	Treatment	1,721,684	0	0	0	0	0	0
Chesterfield	Treatment	602,498	0	0	0	0	0	0
Chorley	Treatment	246,601	17	61	0	2	0	0
Dinting	Treatment	43,736	0	41	0	0	0	0
Earlestown	Treatment	115,665	3	55	0	0	0	0
Grimsby Town	Treatment	159,243	0	0	0	0	0	0
Harrogate	Treatment	605,923	4	29	0	0	0	0
Kirkham and Wesham	Treatment	134,564	1	21	0	0	0	0
Leeds	Treatment	9,631,736	236	439	11	14	1	3
Lime Street	Treatment	5,232,106	91	178	5	12	2	1
Macclesfield	Treatment	498,120	0	0	0	0	0	0
Preston	Treatment	2,082,566	22	19	2	0	1	0
Scarborough	Treatment	420,497	0	0	0	0	0	0
Sheffield	Treatment	3,602,942	10	39	0	1	0	0
Southport	Treatment	1,547,198	1	0	0	0	0	0
Stockport	Treatment	1,393,107	0	0	0	0	0	0
Stoke	Treatment	1,151,084	0	0	0	0	0	0
Sunderland	Treatment	192,911	18	57	0	0	0	0
Thornaby	Treatment	221,804	15	66	0	1	0	1

Table 1 (continued)

Warrington Bank Quay	Treatment	479,266	0	2	0	0	0	0
Wigan North Western	Treatment	584,102	5	1	1	0	0	0
York	Treatment	4,045,773	0	0	0	0	0	0
Stations	Random assignment	Six months of footfall	All incidents reported to security pre	All incidents reported to security post	All violence incidents reported to security pre	All violence incidents reported to security post	All USB incidents reported to security pre	All USB incidents reported to security post
Accrington	BAU^ only	192,802	20	9	0	1	0	0
Bank Top (Darlington)	BAU only	1,037,528	14	40	0	3	0	1
Barrow In Furness	BAU only	261,091	0	1	0	0	0	0
Blackpool North	BAU only	890,852	85	219	3	11	1	0
Blackpool South	BAU only	48,992	2	7	0	0	0	0
Blackrod	BAU only	66,022	0	0	0	0	0	0
Castle (Lancaster)	BAU only	829,681	1	2	0	0	0	0
Crewe	BAU only	1,358,516	0	0	0	0	0	0
Dewsbury	BAU only	530,672	0	0	0	0	0	0
Doncaster	BAU only	1,759,893	2	14	0	0	0	0
Ellesmere Port	BAU only	187,896	0	0	0	0	0	0
Frodsham	BAU only	70,972	0	0	0	0	0	0
Halifax	BAU only	582,505	28	107	1	1	1	0
Huddersfield	BAU only	1,520,908	0	2	0	0	0	0
Hull	BAU only	996,682	4	5	0	0	0	0
Keighley	BAU only	575,000	34	49	0	1	0	0

Table 1 (continued)

Manchester Oxford Road	BAU only	1,935,812	67	86	0	2	0	0
Manchester Piccadilly	BAU only	9,790,721	27	62	2	3	1	0
Manchester Victoria	BAU only	2,910,216	599	1323	16	58	3	9
Middlesbrough	BAU only	605,453	66	23	0	1	0	0
Newcastle Central	BAU only	3,520,036	153	222	0	13	0	5
Rochdale	BAU only	578,737	15	22	0	1	0	1
Shipley	BAU only	502,403	33	57	0	3	0	3
Thorne North	BAU only	47,635	0	0	0	0	0	0
Wakefield Kirkgate	BAU only	190,002	19	39	0	1	0	0
Wakefield Westgate	BAU only	894,894	1	1	0	0	0	0
		Six months of footfall	All incidents reported to security pre	All incidents reported to security post	All violence incidents reported to security pre	All violence incidents reported to security post	All USB incidents reported to security pre	All USB incidents reported to security post
Mean (SD)[¥]—treatment		1,465,146.760 (2,164,322.961)	21.800 (50.096)	48.200 (91.791)	0.920 (2.379)	1.400 (3.617)	0.200 (0.500)	0.280 (0.678)
Mean (SD)—control		1,226,381.577 (1,950,037.78)	45.000 (118.422)	88.077 (259.130)	0.846 (3.171)	3.808 (11.514)	0.231 (0.652)	0.731 (2.031)

[^] BAU=Business as Usual Conditions; [¥] *SD* = standard deviation

Outcomes

Unadjusted descriptive statistics

The train stations in both the treatment and control groups exhibited similar baseline characteristics (see the Methods section). No statistically significant disparities were observed in terms of station size, average daily foot traffic, or USB crimes in the three years prior to the experiment, although the control group exhibited more criminogenic attributes during the six months at the pretest, though none at the $p \leq .10$ threshold. Table 1 lists the unadjusted data on all participating stations (treated and control conditions) during the six months of the trial and the baseline pretest scores. Most stations are relatively safe, with many stations experiencing zero USB during the six months of the experiment, whilst some stations experience a relatively heightened incidence of crime—with an explicit over-dispersed nature of the data. As shown, we also exhibit the footfall during the 6 months, for each station, which varies significantly between the units ($M_{\text{Treatment}}$ = 1,465,146.76, $SD_{\text{Treatment}}$ = 2,164,322.96), (M_{Control} = 1,226,381.58, SD_{Control} = 1,950,037.78)].

Gain scores

Gain scores on the pretest and post-test data on the three outcome variables are presented in Fig. 2. As shown, the gain scores for the rate of USB incidents per 100,000 passengers [($M_{\text{Treatment}}$ = .0007, $SD_{\text{Treatment}}$ = .0053); (M_{Control} = .0047, SD_{Control} = .0163)], violence incidents per 100,000 passengers [($M_{\text{Treatment}}$ = .0040, $SD_{\text{Treatment}}$ = .0158); (M_{Control} =.0276, SD_{Control} = .0837)], and all other incidents per 100,000 passengers [($M_{\text{Treatment}}$ = .2210, $SD_{\text{Treatment}}$ = .4302); (M_{Control} =.4010, SD_{Control} = 1.4088)] are all lower in the treatment relative to the no-treatment arms.

Modelling

Table 2 presents the results of the negative binomial models for the three outcomes. The intervention has reduced the odds of a reported USB in the treatment relative to the control arm, statistically significant at $p = .09$ (Exp(B) = .335, 95% CI .094, 1.198). When controlling for the model's covariates (fixed at the pretest score = .22 and footfall = 1,343,423.33), the estimated marginal means reflect a 66% change relative to control conditions [($M_{\text{Treatment}}$ = .15, $S.E._{\text{Treatment}}$ = .085); (M_{Control} = .45, $S.E._{\text{Control}}$ = .165).

Furthermore, the intervention caused a significant reduction in the odds of reported violence incidents (Exp(B) = .332, 95% CI .142, .776). Considering the estimated marginal means [($M_{\text{Treatment}}$ = .52, $S.E._{\text{Treatment}}$ = .183); (M_{Control} = 1.56, $S.E._{\text{Control}}$ = .402)], with covariates fixed at pretest value = .88 and footfall =1,343,423.33, the intervention caused a 66% change relative to the no treatment arm in reported violence as well.

Finally, Table 2 shows that the intervention did not lead to a substantive reduction in all other reported incidents, with differences in the estimated marginal means of -20% [($M_{\text{Treatment}}$ = 33.09, $S.E._{\text{Treatment}}$ = 6.812); (M_{Control} = 26.28, $S.E._{\text{Control}}$ =

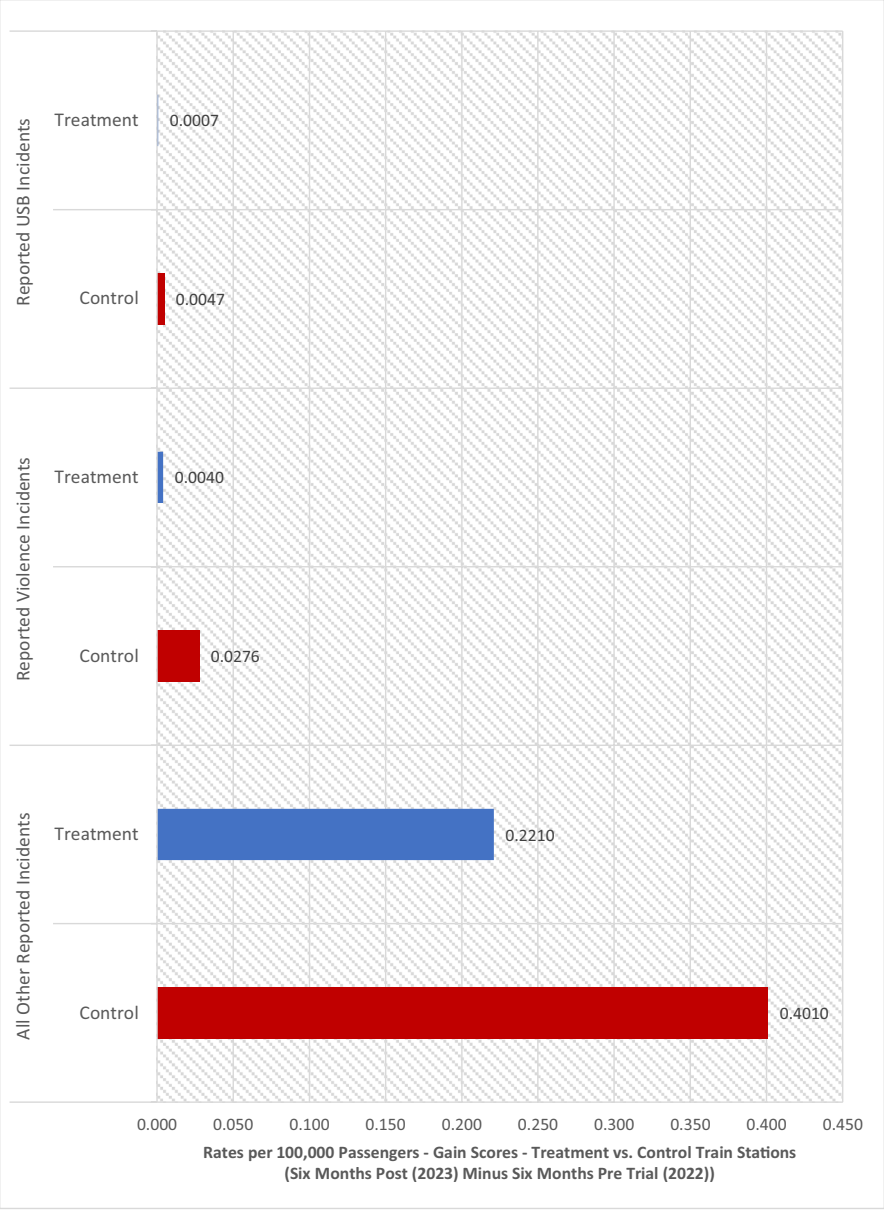

Fig. 2 Treatment vs. control condition gain scores: security data (all other incident counts, violence and USB offences) per 100,000 passengers

5.315)], with covariates fixed at pretest score = 33.63 and footfall =1,343,423.33. The model yielded a nonsignificant treatment parameter effect (Exp(B) = 1.259, 95% CI .711, 2.230), whereas p = .430.

Table 2 Estimating the effect of additional security patrols in USB[Ω] hotspots on reported USB, violence, and all other incidents; negative binomial regression models

		B	S.E.	Exp(B)	95% Wald CI for Exp(b)	
					Lower	Upper
USB	**Treatment**[*]	−1.093	0.649	0.335	0.094	1.198
	[¥]Pre**	0.770	0.318	2.160	1.158	4.028
	Footfall[*]	2.45E−07	1.26E−07	1.000	1.000	1.000
	(Intercept)[***]	−1.283	0.412	0.277	0.124	0.621
Violence	**Treatment****	−1.102	0.433	0.332	0.142	0.776
	Pre***	0.256	0.081	1.292	1.103	1.513
	Footfall[**]	2.69E−07	1.23E−07	1.000	1.000	1.000
	(Intercept)	−0.143	0.305	0.867	0.477	1.577
All other incidents	**Treatment**	0.230	0.292	1.259	0.711	2.230
	Pre***	0.016	0.004	1.016	1.008	1.024
	Footfall	3.89E−07	7.21E−07	1.000	1.000	1.000
	(Intercept)[***]	2.688	0.259	14.699	8.842	24.435

[Ω]*USB*, unwanted sexual behaviours reported in train stations

[¥]Pre, baseline period 6 months 1 year prior to test

[*]$p \leq .10$

[**]$p \leq .05$

[***]$p \leq .01$

$n = 51$

Adverse events

There were no reported adverse events or unintended effects of the intervention in the treatment group.

Discussion

The existing literature has not offered a sufficient understanding of the impact of place-based interventions on reducing USB within the setting of mass transit (Braga et al., 2019). This field trial addresses the contribution of the proactive presence of security in preventing and responding to USBs in public areas, specifically at train stations. Doing so offers insights into a viable approach that may be employed to improve safety, particularly for women and girls who are disproportionately affected by this type of perversive victimisation (Fitzgerald et al., 1995). These findings can serve as a replicable or adaptable model for various contexts.

Mass transit systems play a crucial role in the operational dynamics of urban areas, effectively enabling the regular movement of a substantial number of passengers. The imperative of guaranteeing the safety and accessibility of these systems is of paramount importance in advancing sustainable urbanisation and

cultivating inclusive communities. This research thus contributes to enhancing safety in transit places by identifying practical measures for what many experience far too frequently and limiting their safety in the mass transit system—especially women and girls and even more so underprivileged minorities (2CV, 2020). This is important as it aligns with the broader objectives of fostering safe cities and communities, as articulated in the United Nations Sustainable Development Goals (United Nations, 2023).

The findings demonstrate a significant decrease of 66% in both USB-related occurrences and violence at train stations that implemented enhanced security measures, including heightened visibility and improved interaction, compared to stations that maintained regular security policies. No significant changes were identified for all other crime types as a result of the intervention, suggesting that focusing on one crime category is not necessarily diffused onto other types of crime (Clarke & Weisburd, 1994) and may come with an opportunity cost.

In some ways, the results are unsurprising, as they are consistent with the broader body of criminological research that emphasises the significance of effective guardianship in discouraging potential perpetrators and promoting a secure atmosphere *at hotspots* (Braga et al., 2019). The combination of security personnel being visibly present and implementing proactive engagement tactics in designated areas seems to have resulted in a deterrent impact, hence decreasing the occurrences of USB—much like it was shown for other crime types (Dau et al., 2023). If the results are valid, there are at least two primary contributions to the growing corpus of the efficacy of place-based interventions. First, this is the first that was explicitly designed to reduce a relatively rare and underreported crime—USB. It may be intuitive that USB hotspots can be 'cooled down' through saturated social control mechanisms, but until now, no direct evidence has been available to substantiate this postulation in the context of USB. Secondly, the intervention was delivered strictly by a non-police security team, which has broader implications for crime management and theoretical significance regarding deterrence theory and interagency collaborations.

Understanding the cost-benefit implications of such interventions is essential. Comparing the costs associated with increased security measures, such as personnel, training, and equipment, to the potential benefits of reducing USB as demonstrated by Ariel et al. (2024), it can be seen that whilst the upfront costs of implementing increased security measures are significant, they may be offset by a significant reduction in the social, legal, and accountability costs related to this crime type. These costs encompass psychological, emotional, and behavioural impacts, including feelings of violation, discomfort, anger, shock, embarrassment, anxiety, fear, paranoia, low self-esteem, withdrawal, isolation, depression, and difficulties concentrating or focusing, which can persist for up to two years after the incidents (Ariel et al., 2024). Such consequences may not only burden individuals but also contribute to broader societal costs, including healthcare expenses and loss of productivity, whilst fostering social fear. This underscores the value of proactive security strategies in not only improving safety but also providing long-term economic benefits to communities.

Research implications

The breakdown into crime categories was important because it reaffirmed the need to treat different crimes differently in terms of the effect of hotspot patrols. Sherman and Weisburd (1995) warn against lumping together proactive and reactive police responses to crime, as the former increases recorded crime through various police-public contacts, whilst the latter is reduced once prevention measures are put in place. If the additional presence of security reduces USB and violence, then additional activities by security "increase" fare evasion, drunk and disorderly conduct, and antisocial behaviour offences. The specific crime context in which this type of intervention is effective or not is important, and certain policing interventions are more fit for some crimes but not others. Future police impact evaluations should be mindful of this possible variation in the data, which would require similar subgroup analyses.

It is similarly plausible that the variations between USB and violence and all other crime types have to do with *focusing* the capable guardians on a specific goal: reducing USB. The benefits of a policing strategy to prevent against-the-person offences are not transferrable to far evasion and drugs. This was also shown in a recent hot spot policing experiment in Israel that focused the police on low-harm offences, i.e. quality-of-life problems; a reduction in the low-harm offences was recorded as a result of the intervention, but a generalised deterrent effect was not carried over to moderate or high harm offences (Ariel et al., 2023). The authors offered little explanation for this finding. Are property offenders undeterred by bespoke interventions for specific crime types at hotspots? Are the guardians disinterested in and do not proactively attend to other crime types, given their "mission" to deal with a particular crime problem? The direction of our findings, although not statistically significant, suggests a perverse opportunity cost of targeted enforcement (i.e. a 20% increase in non-violent crimes in the treatment arm, but may be a result of chance). Future research should investigate, preferably with direct evidence on the effect of hotspot policing on both officers as well as offenders' perceptions, choices, and routines (see for example Bernasco, 2009 and Sorg et al., 2017).

Next, we note that the trial hypotheses were bidirectional, meaning that we could not firmly predict ex ante whether the study would yield an increase or a decrease in reported USB. If capable guardians are in the vicinity of USB, then, potentially, victims and bystanders would be more inclined to report victimisation, as the presence of guards is potentially linked to an increased likelihood of apprehension (Barthe & Stitt, 2011; Heinen, 2023; Nagin, 2013; Rouse, 1985). Thus, the presence of guards would increase rather than reduce the reported incidence of USB in the hotspots. In practice, we have not found evidence to support this alternative hypothesis, and the results indicate a reduction in reported USB relative to control conditions.

Finally, whilst outside the scope of this trial, we are intrigued by the complex relationship between crime reporting behaviour and the role of private law enforcement. USB is underreported, and methods of improving reportage seem desirable (see discussion in Ariel & Bland, 2019). Yet, based on the results of our trial, it seems that factors other than the increased presence of capable guardians increase the likelihood of reporting USB. Otherwise, we would have measured an upsurge rather than a decline in reported USB relative to control conditions. If there are

subcategories of USB that are more likely to be reported when capable guardians are present, then our trial was unable to detect them due to the low base rates and the relatively short intervention period. Future research involving longer observation periods explores other types of guardianship (e.g. police officers), and collating information from passengers on the types of USB incidents they are more or less likely to report, how they perceive capable guardians and whether guardianship affects their willingness to report their or others' victimisation is desirable.

Generalisation

Studies have demonstrated the effectiveness of patrol interventions conducted by security guards in various environments, showcasing the versatility of these approaches. For instance, a study by Sarno et al. (1999) in London evaluated the impact of private security patrols in residential areas. Their findings indicated a significant reduction in crime rates, particularly burglaries, due to the increased visibility and rapid response capabilities of private security personnel. This study highlights the importance of trained security guards in supplementing traditional law enforcement efforts and creating a deterrent effect through their presence and proactive engagement.

In the USA, a study conducted by Gill and his colleagues (2005) examined the role of private security patrols in public housing complexes. The researchers found that the presence of security guards led to a substantial decline in violent crime and drug-related offences. The success of this intervention was linked to the guards' ability to establish strong relationships with residents, providing both a deterrent to potential offenders and a support system for the community.

Additionally, a study by Wakefield (2003) explored the effectiveness of private security patrols in urban parks and public spaces in the UK. The findings suggested a significant reduction in anti-social behaviour and property crimes, largely due to the increased surveillance and quick intervention by security personnel. This further supports the argument that security guards play a crucial role in crime prevention by enhancing the perception of safety and actively engaging with the public.

Our study's focus on deploying security patrols in train stations mirrors these successful interventions by emphasising the importance of visible guardianship and proactive engagement. The consistent findings across different settings suggest that the principles underlying our intervention are broadly applicable and effective in reducing crime.

Long-term effects

To address the sustainability and long-term effects of the intervention, it is important to consider both the potential benefits and challenges of maintaining heightened security measures over extended periods. Studies of similar interventions suggest that the continued presence of security personnel can sustain the initial reductions in crime rates (Gill et al., 2005; Wakefield, 2003). Moreover, as demonstrated by the longitudinal study in Pittsburgh, Pennsylvania, chronic hotspots are stable over time, underscoring

the need for continually applying evidence-based prevention strategies (Gorr & Lee, 2012). However, the long-term sustainability of such measures requires ongoing investment in security resources and training, as well as periodic assessments to ensure that the security strategies remain effective and adaptive to changing crime patterns.

First, the financial implications of maintaining a heightened security presence are significant. Securing continuous funding is a critical challenge that must be addressed to avoid a lapse in protection, which could result in a resurgence of USB incidents. Moreover, the effectiveness of security personnel hinges on their training and readiness to adapt to evolving threats. Regular training programmes and updates on best practices are essential to maintain high levels of vigilance and effectiveness among security staff. Another factor to consider is the potential for offenders to adapt to increased security measures. Over time, offenders may develop new strategies to circumvent security, reducing the intervention's effectiveness. Continuous monitoring and adaptive strategies are necessary to address these evolving challenges. This might include rotating patrol patterns, incorporating technology such as surveillance cameras, and engaging in community policing practices to strengthen ties with the public and gather intelligence on emerging threats.

Therefore, whilst the initial results of heightened security measures in reducing USB are promising, their long-term sustainability and effectiveness require careful consideration and strategic planning. Ensuring continued investment in security resources, adapting to evolving crime patterns, maintaining public support, and fostering community partnerships are essential components for the sustained success of this intervention. Future research should continue to explore these dimensions to provide a comprehensive understanding of the long-term impacts of place-based interventions on USB and other crime types in mass transit environments.

Limitations

The study was carried out exclusively within train stations under the management of a single train operating company in England and Wales. This particular scope of the study may impose constraints on the applicability of the findings to different settings or regions. Thus, future research should endeavour to reproduce these empirical observations in alternative settings and geographical areas, examine the enduring viability of these interventions over an extended period, and scrutinise the underlying processes by which heightened security visibility and involvement manifest their deterrence effect.

Second, a significant limitation of our study is the sparseness of the data. Although we have accounted for this statistically using negative binomial regression, there remains a substantive issue with the data's distribution. Our list of stations included in the study, as shown in Table 1, reveals that 36 out of the 51 stations had no incidents of USB in either the pre- or post-intervention periods. This raises questions about the reliability of estimating the effect of security patrols on incidents that were essentially non-existent in most locations.

To stress, sparse data in randomised controlled trials can lead to challenges in deriving meaningful conclusions, as the limited number of incidents can result in high variability and reduce the statistical power of our findings (Ibrahim & Molenberghs, 2009). In our study, the potential effects of the security patrols are likely influenced by just two

or three stations in the business-as-usual condition where USB incidents increased from pre- to post-intervention. For instance, the biggest change occurred at Manchester Victoria, a very busy station, where incidents increased from 3 to 9 over a 6-month period. Given these numbers, it is difficult to rule out the possibility of random chance affecting our results. This limitation highlights the need for more robust data collection and larger sample sizes in future studies to ensure more reliable and generalisable findings.

At the same time, it is important to recognise that dealing with sparse data is a common challenge in RCTs, particularly in fields such as crime prevention where incidents can be relatively rare. Despite the limitations, our statistical approach using NBR is well-suited for handling such data distributions and can still provide valuable insights. Many RCTs in similar contexts face similar issues and successfully contribute to the body of knowledge (Friedman et al., 2010). Thus, whilst the sparseness of the data is a limitation, it does not invalidate the study's findings. Instead, it underscores the importance of careful statistical analysis and the need for ongoing research to build on these initial insights.

Third, the increased presence of security personnel may introduce biases in the reporting of USB incidents. Studies have shown that the presence of capable guardians can encourage reporting behaviours, which may lead to higher reporting rates (see Barthe & Stitt, 2011; Rouse, 1985). On the other hand, some victims may be reluctant to report incidents due to fear of repercussions, distrust of security personnel, and a variety of other reasons (see Ayres et al., 2009; Woodcock & Osmond, 2015). This dynamic can affect the interpretation of our results, as the presence of security can artificially inflate or deflate the reported USB rates. Therefore, it is not necessarily that the increased security presence directly deterred criminal activity; rather, the intervention may appear to be effective because it led to less reporting of incidents for different reasons. This should be taken into account when interpreting our findings.

Finally, the utilisation of reported occurrences of USB as the principal metric for assessing prevalence has resulted in an underestimation of the actual prevalence and frequency of USB, given that not all cases are recorded. Future research may examine alternative or supplemental methodologies to capture unreported events, facilitating a more comprehensive comprehension of USB in the public transit system.

Conclusions

The findings of our research indicate that non-police security personnel have the potential to act as efficient guardians within the mass transit system, thereby playing a crucial role in mitigating the risk of USB., as well as violence more broadly, by approximately 66%. Other crime categories seem unaffected by this bespoke, specialised intervention. The findings highlight place-based interventions' potential efficacy in mitigating a type of crime that is largely underreported through hot spot enforcement, which until recently has been postulated but is now supported by experimental evidence. More research is needed to support this tactic as an evidence-based approach to USB.

Declarations

Competing interests The authors declare no competing interests.

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