Measure Name Platform gates and doors

Definition Sliding transparent panels along the length of the platform's edge.

Tags

Incident Type	Both trespass and suicide
Location	Station only
Intervention Strategy	Engineering: technological and physical deterrents
Measure Group	Physical barriers

Description

The goal of this measure is to separate the train from the platform to restrict access to the tracks while allowing passengers to get on and off the train safely. These sliding transparent panels remain closed and open only after the train enters the station and comes to a complete stop. Panels automatically open and close simultaneously with the train doors.

There are three main types of panels that vary by height: platform screen doors, platform edge doors, and platform gates. Platform screen doors extend to the ceiling, enclosing the track and tunnel area and do not allow for the circulation of air between the station and the tunnels. Platform edge doors are full height but do not reach the ceiling. These two types of doors completely restrict physical access to the track area. Platform gates are half the height of platform screen doors and two-thirds of the height of platform edge doors [1]. Platform gates are cheaper than edge doors and allow ventilation; however, with lower height, some individuals may be able to jump over the gates [1].

Platform edge doors and gates are common around the world, particularly in Asia and Europe. They are less commonly used in the U.S. rail environment, although there are a few examples in the transit domain, such as the monorail in Las Vegas. As of May 2024, there are no known implementations of these deterrents by rail carriers within the United States, which in part may be due to higher costs associated with constructing and installing these barriers.

Additional search terms: *barrier, deterrent, passengers*

Advantages

- Research supports the use of platform screen doors to prevent accidental falls [2][3], suicide attempts [4], and criminal acts, such as one individual pushing another individual onto the track [1].
- Platform gates and doors help to prevent accidents involving trains that pass though station at a higher speed, and to improve safety by keeping people out of restricted areas, including tracks or tunnels [5].

- Full-height platform screen doors can provide better climate control in stations without the tunnels exposed. These doors can also lessen ambient sound in a station from trains or tunnels, which can help passengers to better hear public service announcements [1].
- Shorter gates may reduce installation cost and provide additional ventilation for enclosed stations without climate control [1].

Drawbacks

- Rarely, an individual can become trapped between the platform door and the train or fall onto the tracks, which can be fatal [6].
- It may be possible for individuals to climb or jump over shorter doors [1][3][6].
- Although costs vary for this measure, installing a system is estimated to cost several million dollars due to the precision needed when setting the spacing between the train and platform doors [1].
- In some instances, installing platform gates and doors involves having to heavily reconstruct or renovate rail tunnel stations to accommodate [7].

Notable Practices

- It is important to educate the public about what platform gates/doors are and their benefits before implementation.
- Consider deigning the platform edge barriers to include higher doors for stations where suicides are known to occur, since people may be able to climb over lower heights [8].

References

[1] Railsystem. (n.d.) *Platform Screen Doors (PSD)*. Railsystem.net.

Description: Website describes the types of platform screen doors/edge doors and their uses.

[2] Law, C. K., & Yip, P. S. F. (2011). An economic evaluation of setting up physical barriers in railway stations for preventing railway injury: Evidence from Hong Kong. *Journal of Epidemiology and Community Health*, 65(10), 915-920.

Abstract:
Background: Setting physical barriers, for example platform screen doors (PSDs), has been proven to be effective in preventing falls onto railway tracks, but its cost-effectiveness is not known. For economic evaluation of public health interventions, the importance of including non-health factors has been noted despite a lack of empirical studies. This study aimed to investigate the effectiveness and cost-effectiveness of PSDs, which are installed in part of the Hong Kong railway system, for preventing railway injuries.

Methods: Data on railway injuries from 1997 to 2007 were obtained from the railway operators. Poisson regression was used to examine the risk reduction. Two incremental cost-effectiveness ratios (ICER) were calculated to assess the cost-effectiveness based on (1) disability-adjusted life years (DALYs) only and (2) DALYs with potential fare revenue and passengers' waiting time lost due to railway circulation collapse.
Results The PSD installation has effectively reduced railway injuries (adjusted 5-year average percentage change: −68.8%, p<0.0001) with no apparent substitution effect to the other platforms observed. To be cost-effective, the cost of gaining a healthy life year (ICER) should not exceed three times the per capita GDP (US$74 700). The PSD installation would only be cost-effective if the loss of fare revenue and passengers' waiting time, in addition to DALY, were included (ICER: US$65 400), while the ICER based on DALY only would be US$77 900.
Conclusion: The challenges of complexity for economic evaluation appear in many community-based health interventions. A more extensive perspective for exploring other outcome measurements and evaluation methods to reflect a fair and appropriate value of the intervention's cost-effectiveness is needed.

[3] Ueda, M., Sawada, Y., & Matsubayashi, T. (2015). The effectiveness of installing physical barriers for preventing railway suicides and accidents: evidence from Japan. *Journal of Affective Disorders*, 178, 1-4.

Abstract: Background. Installing physical barriers, such as platform screen doors (PSDs), on train platforms is considered to be one of the most effective measures to prevent railway suicide. However, there is little evidence on the effectiveness of such barriers. In particular, the effectiveness of half-height, as opposed to full-height, PSDs has never been assessed.
Methods. Using suicide and accident data between 2004 and 2014 provided by a major railway company in the Tokyo metropolitan area, this study examines whether the installation of half-height PSDs has contributed to the reduction of the incidents of fatal and non-fatal railway suicide. In addition, the study tests whether the installation of PSDs has resulted in the reduction of unintentional falls onto railway tracks.
Results. Our estimation using a Poisson regression model showed that the introduction of PSDs resulted in a decrease in the number of suicides by 76% (CI: 33–93%). Yet, the installation of PSDs has not completely prevented suicide, as there were cases in which passengers climbed them over. As for unintentional accidents, no fall accidents occurred at stations with PSDs.
Limitations. Our data come only from one train operator, and thus the generalizability of our results may be limited. We do not fully examine potential substitution effects.
Conclusion. Platform screen doors are effective in reducing the number of railway suicides. However, half-height PSDs are less effective than the full-height PSDs in preventing intentional entry to the train tracks. Installation of PSDs is an extremely effective method to prevent fall accidents.

[4] Law, C. K., Yip, P., Chan, W., Fu, K. W., Wong, P., & Law, Y. W. (2009). Evaluating the effectiveness of barrier installation for preventing railway suicides in Hong Kong. *Journal of Affective Disorders*, 114(1-3), 254-262.

Abstract: Background: Railway suicide is a serious mortality issue. Most attempters are unmarried psychotic young men under psychiatric care having a high level of lethal intent. Installation of platform screen doors (PSDs) to limit access to the track has been suggested as an effective way for prevention. This study aims to examine the effectiveness of installing PSDs for preventing railway suicides; any sign of substitution of suicide location; and changes in psychiatric profile of suicide deceased after the PSD installation in the subway system of Hong Kong. Methods: Cases of railway suicide and related information from 1997 to 2007 were provided by the railway operators and the Coroner's Court. The effectiveness of installing PSDs was assessed through a quasi-experimental setting. Poisson regression and chi-squared test were used. Results: Over the 11-year study period, a total of 76 railway suicide cases

(0.71% of all suicides) were reported. A significant reduction of 59.9% (p=0.0003) in railway suicides was found after the PSD installation. Analyses confirmed that there was no significant sign of substitution by displacing potential attempters to unsealed platforms (p=0.9051). Those having psychosis would be better protected as no suicide cases with such psychiatric background were reported after the installation of PSDs. Limitations: It has not considered the potential economic benefits of PSD. It is difficult if not possible to examine whether the potential attempters would substitute to an alternative method of suicide. Conclusions: This study shows that PSDs can effectively prevent suicides with no substitution by "delethalizing" the image and altering people's perception about the desirability of railway suicide. Railway operators should extend the coverage of PSD to all railway stations in Hong Kong without any delay.

[5] Intelligent Transport. (2007, April 19). *Platform Screen Doors: No barrier to success*.

Description: Web article describes the types of platform gates and doors, and examples of implementations with limited detail.

[6] The Associated Press. (2007, July 16). Man caught between subway train and safety doors dies in Shanghai. *International Herald Tribune*. Retrieved from Internet Archive on June 10, 2020.

Description: Web article describes an accident involving platform doors.

[7] Warner, J. E., Lee, D., Trueblood, A. B., Cline, J. C., Johnson, N. A., & Christjoy, A. (2022). Strategies for deterring trespassing on rail transit and commuter rail rights-of-way, volume 1: Guidebook. *Washington, D.C: The National Academies Press.*

Objective: This guidebook is intended to provide information on strategies to deter trespassing on rail transit and commuter rail exclusive and semi-exclusive rights-of-way, including within station areas outside designated pedestrian crossings. In general, trespassing is accessing rail transit and commuter rail restricted areas without permission or proper authorization, intentionally or unintentionally. The guidebook documents the extent of trespassing in the United States; existing decision-making guidance that agencies can utilize; causes, consequences, and risks associated with trespassing; mitigation countermeasures to reduce trespassing risks; and tools that agencies can utilize to identify possible mitigation strategies for a particular trespassing problem or concern.

[8] Chung, Y. W., Kang, S. J., Matsubayashi, T., Sawada, Y., & Ueda, M. (2016). The effectiveness of platform screen doors for the prevention of subway suicides in South Korea. *Journal of Affective Disorders*, *194*, 80-83.

Abstract: Background. Subway suicide can significantly impact the general public. Platform Screen Doors (PSDs) are considered to be an effective strategy to prevent suicides at subway stations, but the evidence on their effectiveness is limited. Methods. We assessed the effectiveness of installing half- and full-height platform screen doors in reducing subway suicides using Poisson regression analysis. Ten-year monthly panel data for 121 subway stations between 2003 and 2012 in the Seoul metropolitan area were used for the analysis. Results.
We found that installing PSDs decreases fatal suicide cases by 89% (95% CI: 57–97%). We also found that the installation of full-height PSDs resulted in the elimination of subway suicides by completely blocking access to the track area; however, half-height PSDs, which do not extend to the ceiling of the platform, were not as effective as full-height ones. Limitation. Our findings were based on the data from a single subway operator for a limited period of time. Accordingly, we did not consider the possibility that some passengers choose to die at a station run by other operators. Our study did not examine the potential substitution effects of other suicide methods. Conclusion. Installing physical barriers at subway stations can be an effective strategy to reduce the number of subway suicides; however, half-height PSDs are not

as effective as full-height ones, even when they are as high as the height of an adult. Thus, these barriers should be made high enough so that nobody can climb over them.

Related Measures

- Anti-suicide pits
- Fencing between tracks at stations
- Identify funding opportunities
- Incident cost estimation
- Platform fencing
- Station design considerations