

## Research Article

# Effectiveness of Physical Barriers Installation for Prevention of Incidents in Mexico City's Subway System

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Nowadays, suicides inside the installations of subway platforms are considered a public health problem in Mexico City. One solution to prevent them is the installation of physical barriers, but their high cost is unattractive for governmental authorities. Traditional approaches of research on the effectiveness of physical barriers for preventing suicides have been limited to analyzing statistically the effects of installing platform screen doors and blue lights on subway platforms. Although considerable progress has been made in this field, many important issues remain unexplored. This study investigates the effectiveness of physical barriers installation for prevention of incidents in Mexico City subway system by means of an agent-based simulation model. Firstly, the design of physical barriers for prevention of incidents in Mexico City subway system is described. Secondly, a conceptual model of the Zócalo station subway platform is presented. Thirdly, an agent-based simulation model of Zócalo station subway platform is implemented using AnyLogic™ software considering normal operations of the subway station. This study shows that physical barriers installation on the Zócalo subway platform can effectively prevent 76% of passenger's suicides.

## 1. Introduction

Mexico City subway system (MCSS) started operating in 1961 and currently 12 lines serve the metropolitan area of Mexico City, including some municipalities in Mexico State. In 2015, the MCSS served 1.6 billion passengers placing it as the public transport preferred by citizens. In the last few years, an increase of the incidents in MCSS has been observed. According to the governmental authorities, while passengers are walking or running on the platform and cross the safety yellow line, they fall into the tracks, in some cases due to distraction, excessive and immoderate intake of toxic substances, and psychological problems. For instance, in 2014, at Copilco subway station (Line 3), a pair of friends were under the influence of alcohol, so one of them threw the other to the subway tracks while they were playing. No less important are the homicides or suicides considered as planned acts that cause, on the one hand, high operational costs and delays in conveyors scheduling and, on the other

hand, psychological effects on conveyor's drivers and passengers [1, 2]. Also fashion in social networks influences the incidents on the subway platform of MCSS.

Some years ago, a fashion trend called "jump the subway tracks" encouraged younger people to jump from subway platform to subway tracks. This kind of fashion had a big impact worldwide and was adopted by young people. Through some videos distributed via social networks, young passengers showed how others practiced the jump inviting others to perform them, which caused the adoption of such actions by others. Unfortunately, practitioners presented high risk to be involved in a mortal accident. As [3] explains, jumping the subway tracks is a behavior generated by young people who do not have access to education, who cannot get the access to university, or who do not get a satisfactory job. Following [3], it is so much the desire of young people to be noticed that is why they tend to try much more dangerous and risky things such as jumping the tracks of the train without considering the possibility of falling and receiving an