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Design considerations and efficacy of raised safety platforms in urban traffic management

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1 Introduction

Raised Safety Platforms (RSPs) serve as speed-calming measures that play a crucial role in urban traffic management by enhancing safety for both motorized and non-motorized users. These platforms are effective in reducing vehicle speed and crash occurrences, particularly at intersections, roundabouts, pedestrian crossings, and slip lanes (Agerholm et al., 2017; Austroads, 2020a). However, RSPs also have drawbacks, such as increased riding discomfort, potential vehicle damage, and challenges for emergency services (Gitelman et al., 2017). This paper presents an abridged version of the study on the design considerations and efficacy of RSPs in urban traffic management. It aims to provide insights into improving their design to maximize safety and comfort for all road users, guided by a comprehensive literature review of 52 studies.

Globally, a significant portion of road fatalities involves vulnerable users, such as pedestrians and cyclists (World Health Organization, 2018). Speed-calming measures like RSPs have been shown to mitigate these risks effectively, especially in urban areas where traffic conflicts are frequent (Gitelman et al., 2017; Pechteep et al., 2022). The objective of this research is to identify best practices for the geometric design of RSPs to enhance user safety and comfort while minimizing their potential drawbacks.

2 Methodology

This study used a systematic review methodology to evaluate the current design considerations of RSPs. Databases including Scopus, ScienceDirect, and Web of Science were searched using keywords related to raised safety platforms. The search was complemented by reviewing grey literature, such as standards and guidelines relevant to RSPs. The systematic review process, following PRISMA guidelines (Page et al., 2021), aimed to identify studies that address the effectiveness of RSPs in speed and crash reduction, their impact on different user groups, and the associated design considerations.

The initial search identified 1,283 records, which were screened to exclude duplicates, non-English publications, and articles outside the scope of RSPs. This resulted in 52 relevant studies being selected for a full review. The data were synthesized to provide an overview of the effects of different RSP designs on motorized and non-motorized users, including pedestrians, cyclists, and motorcycles.

3 Main findings

The review indicated that RSPs are generally effective in reducing vehicle speeds and enhancing pedestrian safety (Agerholm et al., 2017; Gitelman et al., 2017). The speed reduction effect of RSPs varies depending on factors such as the width of the platform, its location, and the type of vehicles crossing. The findings highlighted that wider RSPs are more effective at reducing speed, with buses experiencing the highest reduction and motorcycles the lowest (Vuong, 2021).

RSPs not only reduce speeds but also improve pedestrian visibility, particularly at intersections and midblock crossings (Gitelman et al., 2017; Jateikienė et al., 2016). The design of RSPs must consider the safety of vulnerable road users while minimizing discomfort for drivers. The literature showed that different types of RSPs, such as sinusoidal, circular, and trapezoidal shapes, have varying impacts on speed and safety. For instance, trapezoidal RSPs combined with circular humps have been found to be particularly effective in reducing vehicle speed at midblock crossings (Gitelman et al., 2017).

One notable finding is the trade-off between safety benefits and riding discomfort. RSPs can cause vertical acceleration, which may be problematic for vehicles such as buses or emergency vehicles (Loprencipe et al., 2019). Proper design, including appropriate ramp slope and width, is essential to mitigate these drawbacks. Furthermore, RSPs must be designed to accommodate all road users, including motorcycles, which are often at higher risk due to instability when crossing raised platforms (Densu and Damoah-Afari, 2022).

4 Discussion

The implications of these findings highlight the importance of balancing the safety benefits of RSPs with their potential drawbacks. Proper geometric design is key to ensuring that RSPs provide maximum safety with minimal discomfort. The effectiveness of RSPs in urban areas can be enhanced by incorporating user-friendly elements that align with the concept of "self-explaining roads" (Mackie et al., 2013). Signage, visibility, and maintenance are crucial aspects to consider for maximizing the benefits of RSPs (Austroads, 2020a).

The review also identified several gaps in current practices. For instance, there is limited literature on the long-term effectiveness of RSPs, especially in rural settings (Smith et al., 2002). Moreover, the impact of RSPs on different vehicle types, such as heavy trucks and motorcycles, requires further investigation to ensure the platforms are safe and comfortable for all users (Densu and Damoah-Afari, 2022).

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