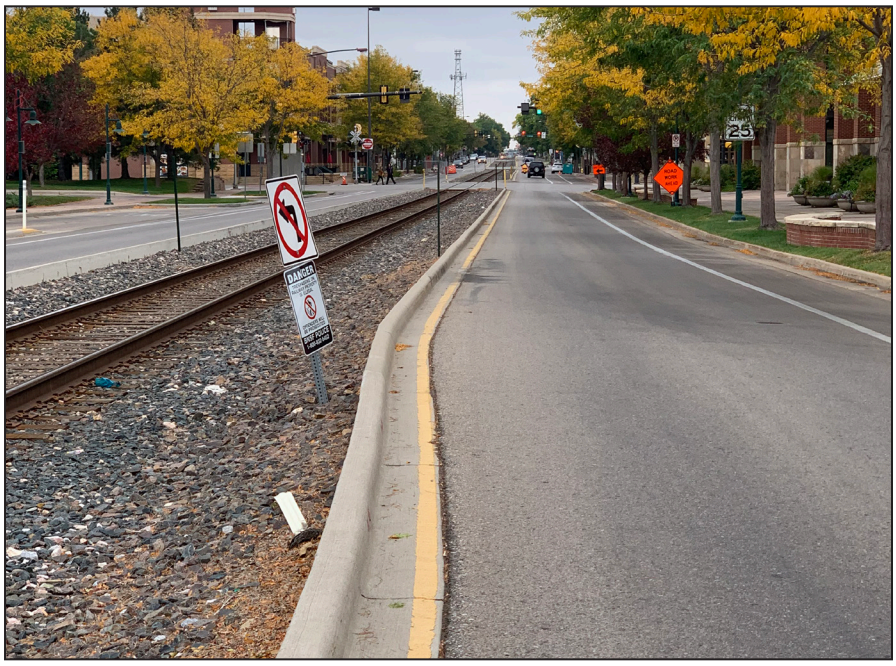
MOUNTAIN-PLAINS CONSORTIUM

RESEARCH BRIEF | MPC 24-557 (project 681) | September 2024

Effectiveness of Mitigation Methods and Signage in Reducing Railway Trespassing Events



the ISSUE

Each year in the United States there are more than 700 fatalities due to railroad rights-of-way crossings. Many of these fatalities are preventable. In addition to the annual fatalities, these collisions lead to trauma experienced by railway staff, rescue personnel, passengers, and eyewitnesses. Signs indicating safe and permissible behaviors near railroad rights-of-way are commonly relied upon to mitigate collisions. Research is needed to improve the effectiveness of signs and reduce the number of injuries and fatalities due to train-pedestrian conflicts and improve transportation rail-related safety.

the RESEARCH

The objective of this research is to identify misconceptions in public knowledge about railroad right-of-way crossings in a variety of contexts and identify how mitigation and messaging can best reduce railroad right-of-way crossings.

Researchers conducted a survey study with 1,011 participants across the United States. These participants were recruited using a paid survey panel through Qualtrics. Participants were shown various sign designs, including messaging strategies (information only, action conveying, emotionally motivated), shapes (square, circle), and colors (black on yellow, black on white, red on white), under various scenarios (e.g., presence of a train or status of crossing gates). They were asked about their likelihood of crossing and clarity of the different sign designs. Additional information on demographics, frequency of encountering railroad tracks, and general risk-taking propensity were collected. Statistical analysis was assessed at $p < .05$.

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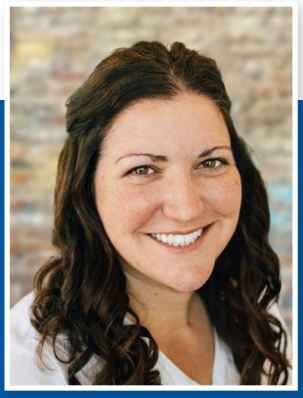

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Project Title

Effectiveness of Mitigation Methods and Signage in Reducing Railway Trespassing Events

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the **FINDINGS**

The results reveal that action-conveying signs (such as “Stop Railroad Crossing” or “Do Not Cross”) and emotionally motivated signs are generally more effective in discouraging pedestrian crossings in high-risk situations compared with information-only signs. Action-conveying signs were found to be particularly impactful when a train was present, while emotionally motivated signs elicited stronger responses when warning lights were flashing or gates were down. The MaxDiff analysis of sign design effectiveness highlighted that black symbols on yellow backgrounds were perceived as the most effective in conveying safety information, while signs with black on white or red on white backgrounds were rated less favorably. The study further found that square-shaped signs were slightly more effective than circular ones.

the **IMPACT**

This study provides insights into the effectiveness of various sign messaging strategies and designs at pedestrian-railroad crossings. The findings emphasize the importance of using action-conveying and emotionally motivated signs to enhance pedestrian safety and decision-making. By considering the specific needs of high-risk populations, such as younger individuals and males, targeted interventions can be developed to address the unique challenges they face when navigating railroad rights-of-way.

Implications of this research for policy and practice include revising signage guidelines to prioritize the use of action-conveying and emotionally motivated signs, allocating resources for targeted education and awareness campaigns, conducting comprehensive safety assessments, monitoring and evaluating interventions, and encouraging cross-sector collaboration. By integrating these evidence-based strategies into policy and practice, transportation authorities, policymakers, and local communities can work together to improve safety at pedestrian-railroad crossings and reduce the incidence of accidents and fatalities.

For more information on this project, download the Main report at https://www.ugpti.org/resources/reports/details.php?id=1233

For more information or additional copies, visit the Web site at www.mountain-plains.org, call (701) 231-7767 or write to Mountain-Plains Consortium, Upper Great Plains Transportation Institute, North Dakota State University, Dept. 2880, PO Box 6050, Fargo, ND 58108-6050.

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