Can Perceived Safety Measure Road Safety? Evidence from School-Zone Interventions in Lusaka, Zambia

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Background

The African region is the worst performing continent in road safety and ranks third in the world for the highest number of fatalities, despite being home to only 15% of the global population. If we consider traffic fatality rate per population, then road traffic fatalities are the highest in the African region, at 26.6 compared to 9.3 in Europe (WHO, 2024). Specific socio-demographic characteristics, terrain topology, weak institutional organization and enforcement, mixed vehicle fleet and predominance of informal transportation such as minibuses, vans, and motorcycles have contributed to this situation

Aim

The aim is twofold: (1) applying several regression-based and non-parametric models to quantify the relationship between school-zone infrastructure interventions and pupil's perceived safety outcomes; and (2) to assess the methodological feasibility of using survey-based data as a construct (proxy) of a perceived-safety indicator for safety evaluation in LMICs school contexts.

Method

This study evaluates infrastructure improvements around three primary schools in Lusaka as part of the EU AfroSafe project. Two schools, Kizito and Daina Kaimba, served as treatment sites receiving measures such as pedestrian walkways, bollards, speed humps, and zebra crossings. Woodlands B served as a control school.

A before-and-after design was used, with data collection occurring in November 2023 (baseline) and February–March 2024 (follow-up). The study focuses on subjective measures collected via web-based questionnaires from 299 pupils (mean age 10.6). The sample included 155 boys and 142 girls.

The questionnaire assessed travel modes, road-crossing behavior, and perceived safety using five-point Likert scales. Three safety perception indicators were collected: (i) How safe do you feel when crossing, (ii) how easy it is to cross the road, and (iii) how afraid you are of being hit by a vehicle. The follow-up survey included additional items to evaluate the specific impact of

the new infrastructure on vehicle speed and ease of crossing. Since respondents remained anonymous, analysis was conducted at the group level rather than at the individual level.

Linear regression models for fixed effect and Difference in difference models were conducted, and an ordered logit model were estimated on the perception indicator ‘how safe do you feel when crossing’. Non-parametric tests were also carried out and finally a one factor analysis was carried out on the three perception indicators to explore whether a one-factor perception score can be construct and capture the safety improvement of the infrastructure changes.

Results

The results show that survey-based perception indicators are able to detect changes associated with school-area infrastructure interventions. Across fixed-effects before–after and difference-in-differences models, non-parametric tests, and an ordered logit specification, pupils in treatment schools reported lower perceived risk after the interventions. This pattern was consistent for the single indicator of perceived safety when crossing the road and for a composite perception score derived from factor analysis. The results align with descriptive findings reported in VTI Report 1226A (Forward et al. 2025) and with observed reductions in vehicle speeds at the treated sites. Factor analysis revealed a lower loading and communality for the fear item compared with task-related indicators (safe and easy crossing), suggesting that fear reflects a partially different process and may not respond directly to physical changes in the crossing environment. However, the one factor score reproduced the same directional effects as the individual indicators, indicating internal consistency in the observed perception changes.

Conclusions

The findings suggest that perception-based survey data can provide meaningful evidence of intervention-related changes in school environments. At the same time, the modelling revealed sensitivity to sample size, coding decisions, and model specification, with convergence issues in ordered models and deviations from normality in linear models, highlighting the need for cautious interpretation. The lower contribution of the fear item indicates that composite scores should be interpreted as general perception metrics rather than safety-only construct. Overall, the consistency of results across multiple model classes indicates that perception indicators contain information for evaluating local infrastructure interventions, but further validation across settings, age groups, and intervention types is required before they can be applied as standardized monitoring tools.