Title: Safety effects of traffic calming on roads through villages: proactive evaluation using GPS data

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Background: Speeding is an international road safety problem; a set of potential measures include physical speed management devices (also known as traffic calming or local area traffic management). However, the safety effects (i.e. expected reductions of speed, and/or frequency/severity of accidents) of these measures are not always known; in addition, they may be highly variable, given the differences in design, configuration, or surroundings conditions. Given these challenges, the presented research focuses on two-lane road sections through small towns or villages. These roads are characterized by high speed prior to built-up area, mixed local and through traffic, and high share of heavy vehicles. These characteristics lead to overlap of commuter/through traffic with local traffic leading to interruptions, dispersions in speed and in result changes in road safety levels. Traffic disruptions and speed changes may also be caused by: intersections located along the road section (with low traffic volumes on entries), numerous accesses (entries and exits to/from the main road), bus stops or pedestrian crossings. As a result, there are more collision points, and the need for speed reduction, stopping, accelerating, etc. In addition, the frequency of the disruptions depends on the land use character, which mainly generates additional traffic.

Aim: The aim of the study is to test a proactive safety evaluation approach, based on GPS data collected from vehicles on selected roads through a sample of small towns or villages in two Central European countries (Czech Republic and Poland), using various measurement techniques. The approach will be applied to compare the effects of selected traffic calming measures; the effects will include impacts on speed, speed variations and safety.

Methods: The collected GPS data will be used to obtain representative speed profiles. These will further enable estimation of speed changes, induced by the studied traffic calming measures, as well as other influential variables, related to cross-section, road surroundings, access, etc. However, while GPS data present a valuable emerging big data source, they have also limitations, e.g. sampling rate, uncertain estimation of free-flow speed, or generalizability to driving population. In order to collect data on drivers’ behaviour, test drives for each section will be conducted and analyzed. The measurements will be based on necessary number of vehicle passages through the villages in both driving directions.

Results: The results are expected to show:
- Feasibility (and challenges) of using GPS data for safety evaluations.
- Estimates of speed changes and their relationship to accident changes and/or changes in severity (via so called Power Model).
- Variability of these estimates across different traffic calming scenarios.

Conclusions: If successful, the developed method will enable using GPS data to obtain speed-based metrics. If these prove to be valid against accident changes, they will in turn provide a valuable surrogate safety measure, applicable for proactive safety evaluations.