# Engaging police to identify challenging school crossings and potential improvements

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## ABSTRACT

This paper discusses the value of police officers as vital sources of information regarding pedestrian safety in their communities by presenting results from a survey of traffic safety police officers. The survey requested information on school crossings that the officers considered most challenging for pedestrians. Officers specified the intersections or mid-block locations with school crossings, and answered questions about elements of the locations, such as what makes the locations challenging, and what might be done to improve conditions at these locations. A key finding from the survey is the police officers' identification of challenging intersections or other crossing locations by criteria other than the occurrence of crashes, including reported pedestrian-vehicle near-miss incidents. A broad literature review of pedestrian safety studies provides context for the use of near-miss data in discussions of improvements to pedestrian crossings. Although not typically considered a primary resource for pedestrian safety information, police officers are most often very familiar with their communities, work in locations where pedestrian and motor vehicle traffic can be experienced and observed, and receive information from their staff and members of the public who use pedestrian crossings. The survey findings demonstrate that police officer insights and near-miss data may serve as important supplementary sources of information in the effort to identify locations in need of interventions before crash occurrence.

## 1. Introduction

A common way for local governments to address pedestrian and vehicular traffic safety concerns is through deployment of police officers. The experience and observations of police officers in the community are critical to understanding pedestrian experiences. The NJ Safe Routes to School Resource Center (SRTSRC) at the Alan M. Voorhees Transportation Center at Rutgers University (VTC) conducts research, and develops and supports programs that address pedestrian safety concerns at school crossings. As part of the SRTSRC program, researchers work with police officers around the State on pedestrian safety issues.

Studies and data collection efforts that include surveys, interviews, or focus groups of police officers regarding pedestrian safety issues appear to be rare in the research literature. However, the input of police officers has been considered an important source of information on other subjects in safety research, such as fatigued driving (Khattak and Mohlman, 2012; Radun et al., 2011), driving under the influence of drugs or alcohol (Jia et al., 2013; Jonah et al., 1999), and distracted driving (Deka and Brown, 2016). The survey employed in the study on distracted driving asked police officers to assess the seriousness of the problem, and to rank possible solutions. In another study, police officers participated in both focus groups to discuss effectiveness of booster seat laws and a brainstorming session to formulate strategies to improve effectiveness of booster seat laws (Decina et al., 2008). These studies point to the value of gathering police officers' perceptions on topics related to public safety.

Crash data has frequently been used as the basis for research and analysis into pedestrian safety issues (Koopmans et al., 2015; Svensson and Hyden, 2006; Fitzpatrick and Park, 2010). However, crash data alone may not be sufficiently descriptive to present an accurate map of hazardous locations for pedestrian crossings. In discussions of pedestrian safety, the reliance upon crash data exclusively has several drawbacks. Crash data is information recorded by police officers at the scene of a crash, and is therefore subject to variability in the police procedures for recording information, and potentially to inaccuracy and omission of detail (Koopmans et al., 2015; Svensson and Hyden, 2006; Fitzpatrick and Park, 2010). In addition, many crash databases include only those incidents for which geolocation information is available and this information is lacking in many crash reports. Potentially, areas

along roadways with crashes are thereby excluded from any analysis.

In addition, pedestrian crashes are rare events and researchers may find zero to one crash at a given location over several years (Koopmans et al., 2015). When crash data is segmented, for example by age in a study on youth pedestrian injury, crashes appear as extremely rare and the importance of each crash is amplified. Crash data also focuses attention on areas where a crash has occurred in the past. The reported information is dated, and any analysis reliant on these data may not reflect current conditions, including physical improvements that may have been implemented since the crash (Fitzpatrick and Park, 2010).

In light of the limitations of crash data, researchers have looked at pedestrian-vehicle near misses, synonymously referred to as pedestrian-vehicle conflicts, to evaluate the effects of pedestrian safety countermeasures. Use of these conflicts in lieu of crash data has been considered since 1967 (Sayed and Zein, 1999). A definition of "near-miss incident" was agreed upon in 1977 by an international committee and has been commonly understood for the past several decades as "an observable situation in which two or more road users approach each other in space and time to such an extent that there is a risk of collision if their movements remain unchanged" (Amundsen and Hyden, 1977). Research into pedestrian-vehicle conflicts includes consideration of factors that may contribute to crashes and can be used to provide a valid estimate of crashes (Hauer and Garder, 1986).

Researchers have utilized the traffic conflicts technique (TCT), which employs trained observers to record pedestrian-vehicle conflicts. A study that examined conflict counts and crash history from 115 intersections determined that a one-day conflict count is a more effective predictor of crashes than a one-year crash history under certain conditions (Garder, 1989). In a study examining the interaction of left-turning vehicles and pedestrians at T-intersections and X-intersections with traffic flows of over 100 vehicles per hour, the researcher found a positive correlation between traffic conflicts and anticipated number of crashes (Lord, 1996).

Other studies have emphasized the usefulness of automated video analysis development of pedestrian-vehicle conflict techniques due to its cost-efficiency, replicability and objective means for analysis. In a 2009 video-based observational study of crosswalks, researchers used TCT and three other conflict indicators in order to identify events that may lead to collisions, and to evaluate the severity of each event (Ismail et al., 2009).

Factors such as vehicle speed management, pedestrian separation from vehicles, and pedestrian visibility and conspicuity enhancement measures have been found to influence the frequency of pedestrian-vehicle conflict incidents. Researchers have used the various techniques as crash data surrogates to provide situational and behavioral information in the assessment of the effectiveness of various traffic safety countermeasures (Retting et al., 2003). These techniques have been used in one study to look at yield behaviors and conflicts at roundabouts for pedestrians and bicyclists (Harkey and Carter, 2006). Other researchers have undertaken a before-and-after conflict study to examine the effect of a "Turning Traffic Must Yield to Pedestrians" sign (Abdulsattar et al., 1996) and a before-and-after study with automatic pedestrian detection (Hughes et al., 2010). Studies have combined a perception survey of pedestrians and drivers with crash data (Kwigizile et al., 2015) and a pedestrian survey with an observational study (Eccles et al., 2004) in an examination of pedestrian countdown signals.

In this study, the SRTSRC focused on the value of police officers as sources of information on challenging crossings, and in particular, their knowledge of pedestrian-vehicle near-miss incidents. This information could augment crash data, and serve as a predictive tool for crashes and the identification of challenging school crossings for improvement before crash occurrence.

## 2. Material and methods

To identify, and gather information on, challenging school crossings, VTC researchers surveyed New Jersey municipal police officers about school crossings at intersections, or at mid-block locations, that the officers considered most challenging for pedestrians. The authors surveyed police officers who have knowledge of pedestrian safety conditions in their communities and are involved in traffic safety duties for their respective departments. These duties include analysis of traffic patterns and conditions, traffic control needs, investigation of traffic crashes and other incidents, and attention to pedestrian safety concerns, and typically include hiring, training, and supervising school crossing guards in communities that utilize crossing guards. Police officers generally have familiarity with the FHWA Manual on Uniform Traffic Control Devices (MUTCD), which sets standards and provides guidance for the use of traffic control devices.

The Federal Highway Administration (FHWA) has identified New Jersey as a pedestrian and bicycle focus state. Pedestrian and bicycle focus states are those states that contain a pedestrian focus city. FHWA identifies focus cities as those cities that have more than 20 average annual pedestrian fatalities or more than 2.33 fatalities per 100,000 pedestrians. The National Highway Traffic Safety Association (NHTSA) reports that while the nation's traffic fatalities declined by one percent in 2014 from the previous year, the number of pedestrian fatalities increased by two percent. Nationally, child pedestrians, aged 14 and under, accounted for 19 percent of all pedestrians killed and 5 percent of all pedestrians injured. In 2014, New Jersey had 168 pedestrian fatalities representing 30 percent of all motor vehicle fatalities. The national average is 15 percent. New Jersey ranks 3rd among all states, Puerto Rico and the District of Columbia, in pedestrian fatalities as a percentage of total fatalities. New Jersey ranks 10th in pedestrian fatalities for all age groups per 100,000 population (NHTSA, 2017). In New Jersey, between 2006 and 2011, child pedestrians aged 14 and under accounted for 4 percent of all pedestrians' fatalities and 9 percent of all fatal and severe injuries (The RBA Group et al., 2014). In addition, since 1993, 16 New Jersey crossing guards have been killed by motor vehicle drivers while at work at school crossings. School crossing guards are employed to assist children in safely navigating traffic situations in school zones.

The survey questionnaire was distributed to police officers throughout the State. Survey respondents were asked to report if they have challenging school crossings in their municipalities, and if so, to identify how many, and to rank the top three most challenging school crossings. Respondents were able to provide details on these three crossings by answering questions on elements of the intersections or mid-block locations and describing the characteristics that make these locations challenging. Respondents reported on whether they were aware of crashes, near misses, and/or complaints at these locations, and provided suggestions for possible improvements to these locations.

A convenience sample of officers was used due to several factors: a complete list of all police officers in the State is difficult to obtain; some NJ municipalities lack police departments; some NJ municipalities lack school crossings; and email correspondence from the study team directed to the Chief of Police or a particular police officer may not have reached the officer best equipped to answer the survey questions.

The survey was conducted during November - December of 2015. Survey participation was initially promoted through an email notification letter sent by the authors to municipal traffic safety officers who had participated in the New Jersey crossing guard train-the-trainer courses offered by VTC. This selection ensured that surveys were sent to communities where students walked to school and crossing guards were in place to assist them. The traffic officers represented municipalities of varying sizes, densities, and geographic locations. Several follow-up emails were sent to remind police officers to participate in the survey. In addition, the NJ Police Traffic Officers Association and the NJ State Association of Chiefs of Police notified their membership of the survey and encouraged participation. The Rutgers University Institutional Review Board approved the confidential survey questionnaire and participation was voluntary.