INTRODUCTION

Problem Statement
Rear-end collisions are one of the most frequently occurring crashes. An understanding of the contributing factors and their significant association with rear-end collisions is of practical importance.

Method
The objective of this study is to identify significant association with rear-end collisions in an urban network. To discover the underlying patterns of contributing factors to rear-end collisions, an explanatory analysis is employed. The Multinomial Logit (MNL) is employed to provide an initial overview of the effects of the traffic parameters and vehicle type configuration on driving behavior and therefore rear-end collision potential.

METHODOLOGY

The study utilizes disaggregated vehicle information and car-following concepts to evaluate rear-end collision potentials in an urban network. To establish a rear-end collision potential, a Risk Index (RI) is developed based on stopping distance calculations using individual speed and temporal headway. The proposed Risk Index (RI) can be derived. Drivers are assumed to adopt a specific driving behavior in response to the potential rear-end collision threatening their vehicle.

RESULTS

Data Collection
Data was collected from the urban network of Nicosia, Cyprus, including data from 15 inductive loop detectors totalling 450 lanes. The total volume collected for one day was 409,920 vehicles.

Rear-End Collision Classification
Following the proposed classification method, it was shown that: 50% of the observed car-following events were classified as Class_0, 19% were classified as Class_1, 20% were classified as Class_2, and 19% were classified as Class_3. In total, 78% of the observed car-following events would be identified as potentially unsafe.

CONCLUSIONS

Rear-end collisions have been identified as a frequent type of traffic crash and have long been studied in the road safety science. The development of effective countermeasures is based on the understanding of the contributing factors of these types of collisions. In order for a collision to be avoided, the distance between two consecutive vehicles should be such that the following vehicle will have the necessary distance to safely stop in the case of a sudden brake or any other emergency situation down the line of the same way. The proposed methodology utilizes easily available data from Inductive Loop Detectors to evaluate rear-end collision potential. It is shown that traffic parameters and vehicle type configuration affect driving behavior and therefore rear-end collision potential. Behavioral modeling analysis shows that not all considered variables are found to be significant determinants of rear-end collision potential and furthermore, variation exists in the significance of the variables in an hourly analysis.