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Macro Data Analysis on Situations Under Which Pedal Misapplication Accidents Occur

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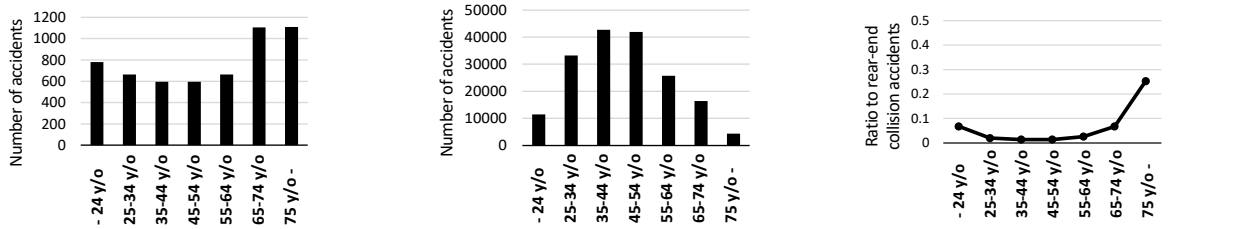
"Pedal misapplication accidents," in which drivers mistakenly press the accelerator pedal instead of the brake pedal, resulting in sudden acceleration and collisions with other vehicles or pedestrians, have become a social concern. In general, elderly drivers are more prone to pedal misapplication owing to the decline in their physical and cognitive functions. Various investigations and countermeasures have already been conducted on pedal misapplication accidents; however, these accidents continue to occur. Therefore, it is necessary to continue investigations into the causes and vehicle countermeasures against pedal misapplication accidents for the time being.

In this study, we analyzed primary-parties' number of accidents classified as "accelerator and brake pedal misapplication" in the past decade using accident data for passenger vehicles and light passenger vehicles from the Japan Traffic Accident General Database (J-TAD (macro)) owned by the Institute for Traffic Accident Research and Data Analysis (ITARDA).

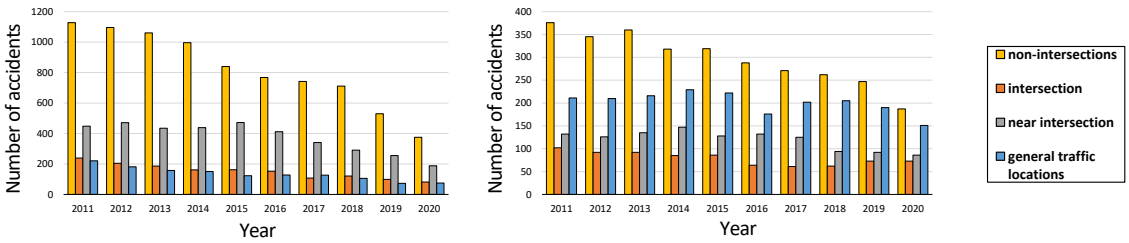
Our research shows that although the number of pedal misapplication accidents has decreased over the past decade, the decrease in the number of accidents involving elderly drivers aged 65 years and older was smaller than for other age groups. Fig. 1(i) shows the number of pedal misapplication accidents for 2018–2020 combined by age groups. When the effects of driving frequency were offset by using the number of secondary-parties in rear-end collisions (Fig. 1(ii)), which is a typical type of traffic accident, it was confirmed that young drivers under the age of 24 and elderly drivers over the age of 65 are more likely to be involved in pedal misapplication accidents relative to their driving frequency (Fig. 1(iii)). In addition to basic characteristics like drivers' age, we analyzed the relationship between factors, such as road types, driving movements, collision parts, and hazard-perception speed, and compared elderly drivers aged 65 and older with non-elderly drivers aged 64 and younger. The results showed that elderly drivers had a higher frequency of accidents in general traffic locations (parking lots and similar locations) (Fig. 2) and elderly drivers had a higher hazard-perception speed. In addition, this study analyzed primary-parties number of accidents classified as "brake application is too weak or late," which are drivers' foot operation errors like pedal misapplication accidents, and examined the similarities and the differences in characteristics between these accidents and pedal misapplication accidents. Accidents classified as "brake application is too weak or late" occurred in all age groups, mostly at low speeds of 10 km/h or less, confirming that the occurrence conditions of these accidents are different from those of pedal misapplication accidents.

As mentioned earlier, this study analyzed and discussed occurrence causes of pedal misapplication accidents based on accident data. Future research should also investigate the relationship between the multiple collisions, the type of the secondary-party, the injury level, etc.



(i) Number of primary-party drivers of pedal misapplication accidents (ii) Number of secondary-party drivers of rear-end collision accidents (iii) Ratio to rear-end collision accidents ((i)/(ii))

Fig. 1 Accident data by age group for 2018–2020 combined



(a) Non-elderly (b) Elderly

Fig. 2 Number transitions of primary-party drivers of pedal misapplication accidents in passenger vehicle by road type