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Latent Factors of Severity in Truck-Involved and Non-Truck-Involved Crashes on Freeways

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Abstract : Truck-involved crashes have higher crash severity than non-truck-involved crashes. There have been many studies about the frequency of crashes and the development of severity models, but those studies only analyzed the relationship between observed variables. To identify why more people are injured or killed when trucks are involved in the crash, we must examine to quantify the complex causal relationship between severity of the crash and risk factors by adopting the latent factors of crashes. The aim of this study was to develop a structural equation or model based on truck-involved and non-truck-involved crashes, including five latent variables, i.e. a crash factor, environmental factor, road factor, driver’s factor, and severity factor. To clarify the unique characteristics of truck-involved crashes compared to non-truck-involved crashes, a confirmatory analysis method was used. To develop the model, we extracted crash data from 10,083 crashes on Korean freeways from 2008 through 2014. The results showed that the most significant variable affecting the severity of a crash is the crash factor, which can be expressed by the location, cause, and type of the crash. For non-truck-involved crashes, the crash and environment factors increase severity of the crash; conversely, the road and driver factors tend to reduce severity of the crash. For truck-involved crashes, the driver factor has a significant effect on severity of the crash although its effect is slightly less than the crash factor. The multiple group analysis employed to analyze the differences between the heterogeneous groups of drivers.

Keywords : crash severity, structural structural equation modeling (SEM), truck-involved crashes, multiple group analysis, crash on freeway
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