



## **Pedestrian Safety: Does Having Dual Road User Role Change Behavior?**

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### **Introduction**

The World Health Organization's recent road safety report (2023) highlighted 1.19 million road traffic deaths in 2021, with pedestrians comprising 23% of fatalities globally. In Türkiye, pedestrians accounted for 23.3% of all road fatalities in 2022 (n = 5229), with pedestrian faults contributing to 9.5% of accidents (TÜİK, 2022). Meesmann et al. (2022) found that crossing streets without utilizing pedestrian crossings was a common unsafe behavior among pedestrians across 48 countries.

Pedestrian safety remains an underexplored area despite the alarming fatality rates. This study addresses this gap by examining the relationship between pedestrian behaviors and safety outcomes, such as accidents and near misses. Additionally, it seeks to investigate whether displayed pedestrian behaviors differs between two groups of road users: 1) pedestrians who are also drivers (driver-pedestrians) and 2) pedestrian who are not drivers (pedestrians).

### **Research methodology**

#### *Participants*

The study sample consisted of 313 pedestrians, with an average age of 31 (SD = 9.64), ranging from 18 to 68. Gender distribution was even, comprising 157 females and 156 males. On average, participants reported involvement in accidents over the past three years at .15 (SD = .58), while near misses averaged 2.06 (SD = 3.9). Among the pedestrians, 239 held driver's licenses, while 74 did not.

#### *Measures*

##### *Pedestrian Behavior Scale (PBS).*

Initially developed by Granié et al. (2013) to study pedestrian behaviors, the questionnaire was adapted into Turkish by Demir (2017), comprising 20 items. It assesses four factors: violations, lapses, aggressive behavior, and positive behavior. Participants rated the frequency of each behavior on a 7-point Likert scale ranging from 1 = Never to 7 = All the Time.



### *Demographic Information Form.*

This form included questions about age, sex, driving license ownership, accident involvement, and near-miss involvement.

### *Procedure*

Before data collection, ethical permission was obtained from the Middle East Technical University Department of Psychology Ethics Committee. The online survey was conducted using Qualtrics, and a convenience sampling method was employed via social media platforms like Facebook, Twitter, and WhatsApp. Participation was voluntary, responses were anonymous, and participants were informed of their right to withdraw from the study at any time. The survey duration was approximately 5 minutes.

### **Results**

Simple linear regression analyses were conducted to explore the relationship between pedestrian behaviors and accident and near-miss involvement. In the first model, PBS factors were predictors, with accidents as the outcome. The model was significant ( $F(4, 308) = 2.43, p < .05$ ), explaining 3% of the variance. Lapses ( $\beta = .17, p = .007, 95\% \text{ CI } [0.03, 0.2]$ ) were positively associated with accidents, while other factors did not yield significant results. In the second model, with near misses as the outcome, the overall model was significant ( $F(4, 308) = 5.4, p < .001$ ), explaining 7% of the variance. Both lapses ( $\beta = .12, p = .04, 95\% \text{ CI } [0.02, 1.09]$ ) and aggressive behaviors ( $\beta = .14, p = .02, 95\% \text{ CI } [0.09, 1.05]$ ) were positively associated with near misses. After controlling for age, which significantly and negatively correlated with near-misses, hierarchical regression analysis indicated that only aggressive behaviors remained positively associated with near misses ( $\beta = .14, p = .02, 95\% \text{ CI } [0.1, 1.06]$ ).

Additionally, to understand whether there were differences in pedestrian behaviors based on dual road user roles, the sample was divided into two driver-pedestrians vs pedestrians. The dual road user role was identified via ownership of the driving license. Only active drivers who had driven more than 3000 km in the past year ( $n = 110$ ) were included in the comparison. A MANCOVA was conducted with license ownership as the fixed factor and the four PBS factors as dependent variables, controlling for age and gender. The results showed that license ownership significantly affects pedestrian behaviors [ $F(4, 177) = 3.59, p = .008, \text{ Wilks' Lambda} = .93, \eta^2 = .08$ ]. Driver-pedestrians showed lower levels of engagement with violations ( $M = 2.54, SD = .99$ ) and lapses ( $M = 1.55, SD = .70$ ) than pedestrians ( $M = 3.01, SD = 1.18$  for violations;  $M = 2.02, SD = .99$ , for lapses), [ $F(1, 180) = 6.04, p = .02, \eta^2 = .03$ ;  $F(1, 180) = 7.07, p = .009, \eta^2 = .04$ ], respectively.

### **Discussion and conclusions**

In line with previous studies (e.g., Esmaili et al., 2021), lapses predicted pedestrian accidents. Moreover, lapses and aggressive behaviors predicted near-miss involvement in the current study. Like lapses, pedestrian inattention was identified as a risk factor in pedestrian-cyclist incidents (Gkekas et al., 2020). Studies on near-miss involvement are scarce, but research on



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Concepts in Traffic Safety**

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drivers found that aggressive driving behaviors almost tripled accident likelihood (Adavikottu & Velaga, 2021).

Furthermore, driver-pedestrians showed less risky behaviors than pedestrians, suggesting a protective effect of dual road user roles in safety in the current study. Although dual roles research is limited, it yielded conflicting results. Some studies support higher risk perception among driver-pedestrians (Hamed, 2001), while others show increased risk (Taubman-Ben-Ari & Shay, 2012) than pedestrians. Supporting the findings of the current study, studies on multi-modal mobility experiences (e.g., Beanland & Hansen, 2017; Crundall et al., 2012) showed that driver-motorcyclists and cyclist-drivers have better hazard perception relating to the other road user roles.

Since risky pedestrian behaviors link to accidents and near misses, adopting multiple road user roles may mitigate them via heightened risk awareness and safety knowledge (Johnson et al., 2014). Further research on dual road user combinations is recommended. Green mobility options could be invested to promote multiple road user roles, enhancing safety awareness and behaviors in traffic.