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ROAD CRASH CHARACTERISTICS OF YOUNG DRIVERS IN SLOVENIA: AN ANALYSIS OF POLICE-REPORTED DATA FROM 2021 TO 2025

Anamarija Poll [a], Matjaž Šraml [a], Chiara Gruden [a*]

[a] University of Maribor, Faculty of Civil Engineering, Transportation Engineering and Architecture, Smetanova ulica 17, 2000 Maribor, Slovenia.
Anamarija Poll: anamarija.poll@um.si, ORCID: 0009-0003-2669-3052;
Matjaž Šraml: matjaz.sraml@um.si, ORCID: 0000-0002-0638-2703;
Chiara Gruden: chiara.gruden1@um.si, ORCID: 0000-0002-2554-937X.

Abstract: Young drivers represent a particularly important group in road safety due to their limited driving experience and specific behavioural characteristics. Understanding the circumstances and factors associated with road crashes involving young drivers is therefore essential for developing effective and targeted road safety measures. This study analyses road crashes caused by young passenger car drivers aged 18–24 in Slovenia during the period 2021–2025. The analysis is based on national police-reported road crash data and examines the temporal, environmental and spatial characteristics of crashes, as well as crash causes, crash types and injury severity. Attention is given to factors related to driving experience and alcohol involvement. Descriptive and comparative statistical analyses are used to identify the most common crash patterns and circumstances associated with young drivers. The study aims to provide a comprehensive overview of road crash characteristics among this age group and to identify factors that may contribute to increased crash risk and severity. The findings are expected to support a better understanding of young-driver crash patterns in Slovenia and provide a basis for the development of targeted preventive measures aimed at improving road safety among novice and young drivers

Keywords: young drivers; road crashes; road safety; crash characteristics in Slovenia

1. INTRODUCTION

Road traffic crashes remain an important road safety problem, especially among young drivers (Cassarino & Murphy, 2018). Young drivers are more likely to be involved in road crashes because they have less driving experience and may also show different driving behaviour compared with more experienced drivers (Cassarino & Murphy, 2018; McCartt et al., 2009). At the European level, people aged 18–24 are recognised as one of the higher-risk groups in road traffic (EC, 2024). In 2022, this age group accounted for 12% of all road fatalities in the European Union and had the highest mortality rate among all age groups (EC, 2024). Young people aged 18–24 were also more often killed as car occupants and were more frequently involved in fatal crashes during weekend nights than people aged 25 years and older (EC, 2024).

The higher crash risk among young drivers is linked to both age and limited driving experience (McCartt et al., 2009). During the first years of driving, young drivers are still developing skills such as recognising hazards, predicting the behaviour of other road users and reacting correctly in complex traffic situations (Evans et al., 2022). McCartt et al. (McCartt et

* Corresponding author. Tel.: +38622294366; chiara.gruden1@um.si: (C. Gruden).

al., 2009) found that driving experience has a strong effect on crash risk, especially during the first period after obtaining a driving licence. At the same time, age was also shown to have an independent effect on crash involvement (McCartt et al., 2009). Similar results were reported by Curry et al. (Curry et al., 2015), who found that crash rates decrease as driving experience increases. These findings show that both age and driving experience should be considered when studying road safety among young drivers.

Driving behaviour also plays an important role: previous studies (Scott-Parker et al., 2013; Scott-Parker et al., 2014) have shown that young drivers are more likely to be involved in risky driving behaviours such as speeding, driving after drinking alcohol and driving while tired. Personal characteristics, including a greater tendency to take risks, may also affect driving behaviour (Scott-Parker et al., 2013; Zhang et al., 2019). Zhang et al. (Zhang et al., 2019) found that sensation seeking was related to risky and aggressive driving behaviour as well as to crash involvement. When such behaviour is combined with limited driving experience, young drivers may have more difficulty recognising dangerous situations and responding to them correctly.

The time and conditions in which crashes occur are also important (Cassarino & Murphy, 2018; Houwing & Twisk, 2015). European road safety data show that crashes involving young people have clear patterns related to night-time and weekend driving (EC, 2024). Factors such as speed and alcohol may further increase crash risk among young drivers (Houwing & Twisk, 2015; Scott-Parker et al., 2014). Therefore, studying only the total number of crashes is not enough to understand young-driver safety. It is also important to examine when and where crashes occur, under which road and weather conditions they happen, what causes them and how serious their consequences are.

Young-driver road safety is also an important issue in Slovenia. However, the characteristics of road crashes involving young drivers may differ between countries due to differences in road networks, traffic conditions, driving habits and other factors. An analysis based on national police-reported data can therefore provide a clearer picture of the circumstances in which young drivers cause road crashes in Slovenia. Such an analysis can also help identify the main patterns and factors that should be considered when planning road safety measures for this age group.

Therefore, the aim of this study is to analyse the characteristics of road crashes caused by young passenger car drivers aged 18–24 in Slovenia during the period 2021–2025. The analysis is based on national police-reported road crash data (Javna agencija Republike Slovenije za varnost prometa, 2026) and focuses on temporal, environmental and spatial characteristics, crash causes and types, injury severity, driving experience and alcohol involvement. The main purpose is to identify the most common crash patterns among young drivers and to provide information that could support the development of more targeted road safety measures in Slovenia.

2. METHODOLOGY

This study was based on a retrospective descriptive analysis of police-reported road traffic crashes in Slovenia over the five-year period from 2021 to 2025. Data were obtained from the Slovenian Road Traffic Accident Map (Javna agencija Republike Slovenije za varnost prometa, 2026), a publicly available national road crash database managed by the Slovenian Traffic Safety Agency. The database is based on road traffic crashes recorded by the Slovenian Police and provides information on crash circumstances, involved road users, locations, causes, collision types, environmental conditions, and crash consequences.

For the purpose of this study, the original database was filtered according to predefined inclusion criteria. The analysis included road traffic crashes occurring between January 2021 and December 2025 in which a passenger car driver aged 18–24 years was identified by the police as the at-fault driver. Crashes involving young drivers who were not responsible for the crash,

as well as young drivers of other vehicle types, were excluded. As the original database contains separate records for individual crash participants, each road traffic crash was identified using its unique crash identification number and was counted only once in the final dataset.

The selected crashes were analysed using descriptive statistics to identify the main characteristics and patterns of crashes caused by young passenger car drivers. The analysis focused on their temporal and spatial distribution, crash causes and collision types, weather conditions, alcohol or other substance involvement, and crash severity. Frequencies and percentage distributions were used to describe the occurrence of crashes across the selected variables.

3. RESULTS

Between 2021 and 2025, a total of 15.332 police-reported road crashes involving young passenger car drivers aged 18–24 years were recorded in Slovenia. Of these, 9.794 crashes (63.9 %) were caused by young drivers, while 5.538 crashes (36.1 %) involved young drivers who were not responsible for the crash. Since the present study focuses on crashes caused by young drivers, the following analyses are based on the 9.794 at-fault cases.

Figure 1 shows the annual number of road crashes caused by young drivers during the study period. The number of at-fault crashes increased from 1.743 in 2021 to 1.848 in 2022 and 2.019 in 2023, followed by a further rise to 2.089 in 2024 and 2.095 in 2025. Overall, the results indicate a gradual upward trend in the number of crashes caused by young drivers over the five-year period. The largest year-to-year increase was observed between 2022 and 2023, whereas the number of crashes remained relatively stable between 2024 and 2025. Over the entire study period, the number of at-fault crashes increased by 20,2 %, from 1.743 in 2021 to 2.095 in 2025.

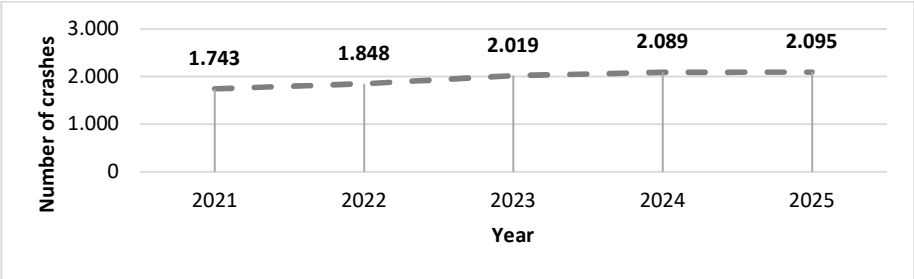


Figure 1. Annual number of road crashes caused by young passenger car drivers aged 18–24 in Slovenia, 2021–2025.

Figure 2 presents the temporal distribution of crashes caused by young drivers according to month, day of the week, and time of day. The monthly distribution (Figure 2a) was relatively balanced throughout the year, although somewhat higher numbers were observed in the second half of the year. The highest proportion of crashes was recorded in September and October (9.3 %), whereas the lowest proportion occurred in February (6.6 %). From June onwards, the monthly number of crashes generally remained above 800, with no substantial decline towards the end of the year.

Regarding the day of the week (Figure 2b), the highest proportion of crashes occurred on Fridays (17.9 %), followed by Saturdays (14.8 %), Thursdays (14.5 %), and Mondays (14.4 %). The lowest proportions were observed on Sundays (12.3 %) and Tuesdays (12.6 %).

For the time-of-day analysis (Figure 2c), the day was divided into six periods: morning (05:00–09:00), late morning (09:00–12:00), early afternoon (12:00–15:00), afternoon (15:00–18:00), evening (18:00–21:00), and night (21:00–05:00). The distribution showed more pronounced differences, with the highest proportion of crashes occurring during the night (20.3 %), followed by the afternoon (19.8 %) and early afternoon (18.1 %). In contrast, the late morning accounted for the lowest proportion (11.0 %). Overall, the results indicate that crashes caused by young drivers were particularly frequent during the afternoon and night-time periods.

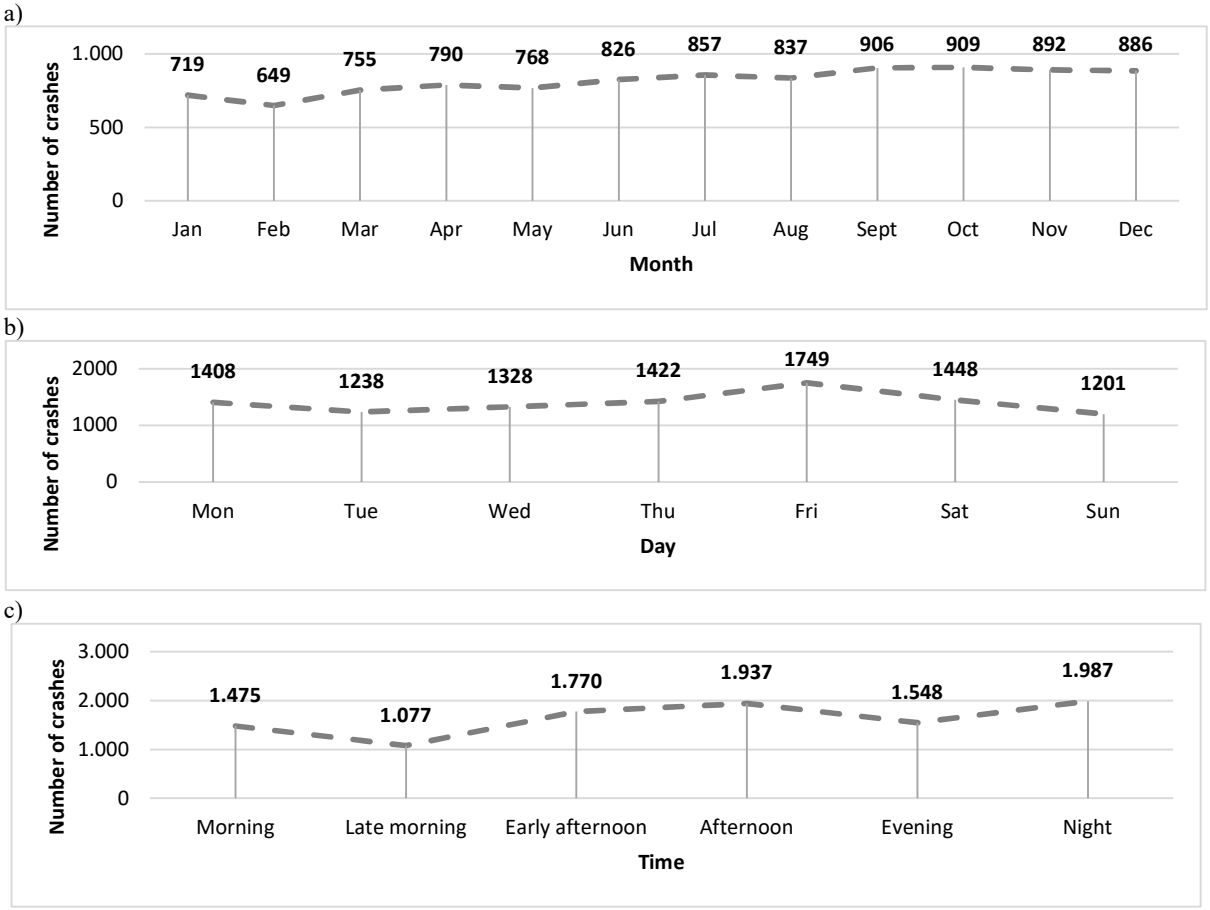


Figure 2. Temporal distribution of road crashes caused by young passenger car drivers aged 18–24 years according to: a) month, b) day of the week, and c) time of day.

Figure 3 presents the distribution of crashes according to weather conditions. More than half of the crashes occurred in clear weather (51.4 %), followed by cloudy (28.1 %) and rainy conditions (14.2 %). Crashes occurring under other weather conditions accounted for only a small proportion of the total.

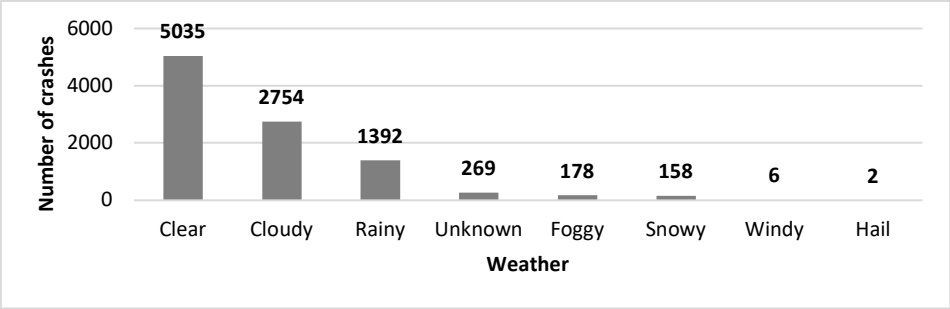
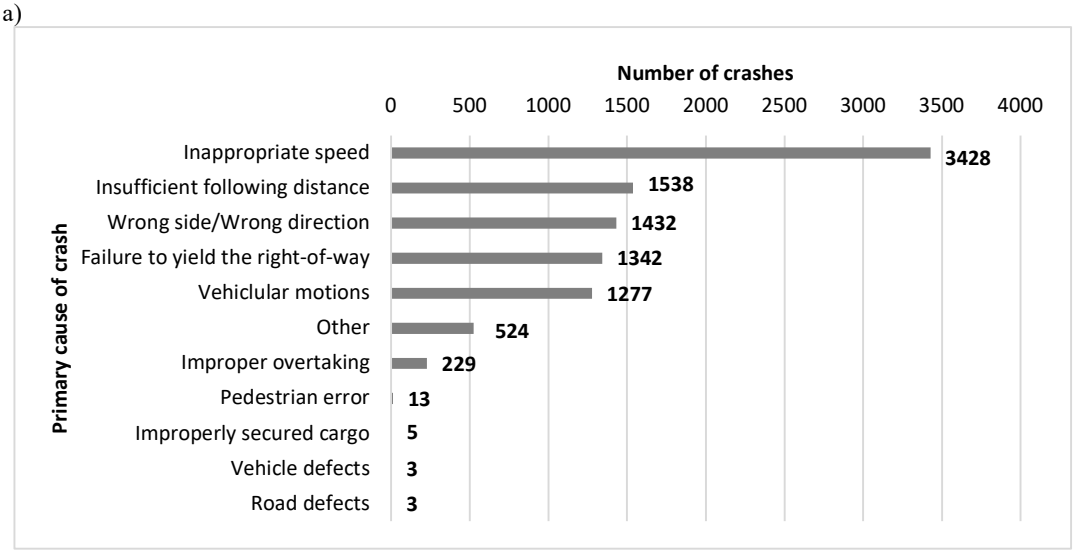


Figure 3. Distribution of road crashes caused by young passenger car drivers aged 18–24 years according to weather conditions.

Figure 4 presents the distribution of crashes according to the primary crash cause and collision type. In graph 4a, we can see, that inappropriate speed was the most frequent primary cause, accounting for 35.0 % of all crashes. This was followed by insufficient following distance (15.7 %), wrong side/wrong direction (14.6 %), failure to yield the right-of-way (13.7 %), and vehicular motions (13.0 %). Other causes represented considerably smaller proportions.

Regarding collision type (Figure 4b), the distribution was more balanced. Side collisions were the most frequent (18.8 %), followed by object collisions (17.9 %) and rear-end collisions (17.1 %). Head-on collisions accounted for 12.2 % of all crashes, while the remaining collision types individually represented less than 10 %.

a)



b)

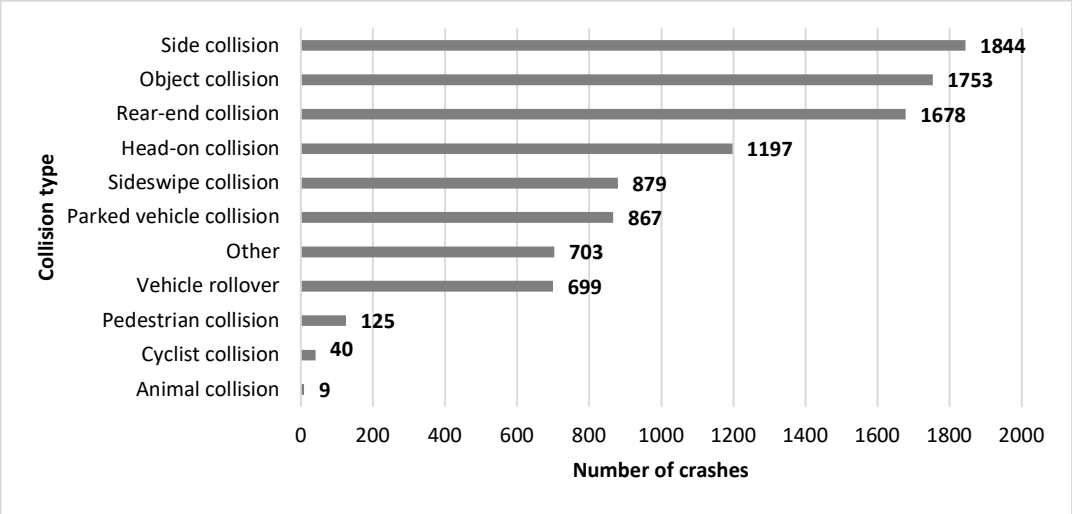


Figure 4. Distribution of road crashes caused by young passenger car drivers aged 18–24 years according to a) primary crash cause and b) collision type.

Table 1 presents the distribution of crashes according to crash severity. Most crashes resulted in no injury (68.8 %), while slight injuries accounted for 28.2 %. Crashes involving serious injuries (2.7 %) or fatal outcomes (0.3 %) were considerably less frequent.

Table 1. Distribution of crashes caused by young passenger car drivers aged 18–24 years according to crash severity.

Classification	Number of crashes
No injury	6741
Slight injury	2760
Serious injury	262
Fatal	31

Figure 5 shows the distribution of crashes according to road type. The majority of crashes occurred on local roads (59.9 %), followed by regional roads (18.6 %) and motorways (12.1 %). Main roads accounted for the smallest share (9.4 %).

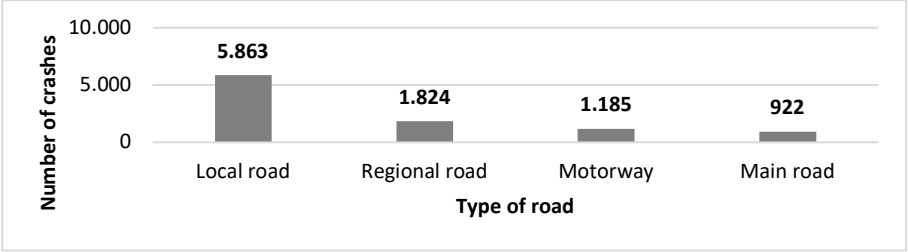


Figure 5. Distribution of road crashes caused by young passenger car drivers aged 18–24 years according to road type.

Alcohol involvement was identified in 654 of the 9.794 crashes caused by young drivers, representing 6.7 % of all at-fault crashes included in the analysis. In contrast, 9.140 crashes (93.3 %) involved drivers for whom alcohol involvement was not recorded. Thus, approximately one in fifteen crashes caused by young drivers involved an alcohol-positive driver. Although alcohol-related crashes represented a relatively small proportion of the total, they constituted a distinct subgroup of crashes within the analysed population.

4. DISCUSSION

The results indicate that crashes caused by young passenger car drivers represent a relevant road-safety issue in Slovenia. Between 2021 and 2025, the annual number of crashes caused by drivers aged 18–24 increased by 20.2 %, suggesting that the problem has not diminished during the observed period. This finding supports previous research highlighting young and novice drivers as a particularly vulnerable road-user group due to the combined effects of limited driving experience and risk-related behaviour.

The temporal distribution showed relatively small seasonal differences, although the highest proportions were recorded in September and October (both 9.3 %). This period coincides with the beginning of the academic year and may be associated with changes in mobility patterns among part of the young adult population (Haggar et al., 2019). Friday also clearly stood out as the day with the highest proportion of crashes (17.9 %). Together with the observed time-of-day distribution, this pattern is consistent with previous research showing that young drivers are particularly exposed to crash risk during weekend evenings and nighttime, when leisure activities, peer passengers, fatigue, and other lifestyle-related factors may play a greater role (EC. 2024; Houwing & Twisk, 2015). However, as information on trip purpose and driving exposure was not available, these explanations should be regarded as possible contextual factors rather than direct causal relationships.

The most notable finding concerns the primary crash causes. Inappropriate speed accounted for 35.0 % of all crashes and was by far the most frequent cause, followed by insufficient following distance (15.7 %) and driving on the wrong side or in the wrong direction (14.6 %). This is consistent with previous research identifying inappropriate speed and loss of vehicle control as important characteristics of young-driver crashes (EC, 2024). Young drivers have also been found to adopt shorter following distances and riskier gap-acceptance behaviour than older drivers (Horswill et al., 2020). The collision-type distribution reflects these behavioural patterns, with side collisions (18.8 %), collisions with objects (17.9 %), and rear-end collisions (17.1 %) being the most common. Similar patterns, particularly rear-end collisions, loss-of-control crashes, and turning-related collisions, have previously been reported among young drivers (Cassarino & Murphy, 2018; Evans et al., 2022). Together, these findings indicate that speed selection, safe following distance, and appropriate interaction with other road users should remain important targets of young-driver safety measures.

Most crashes occurred in clear weather (51.4 %), while the majority resulted in no injury (68.8 %) or slight injury (28.2 %). The predominance of crashes under favourable weather conditions indicates that adverse environmental conditions alone do not explain the observed crash occurrence. Instead, the findings point primarily towards driver-related and behavioural factors. From a preventive perspective, the results therefore support measures focusing on speed management, hazard perception, safe following distances, and practical experience during the first years of independent driving (Cassarino & Murphy, 2018; Evans et al., 2022). The main limitation of the study is that police-reported crash data do not provide information on driving exposure, while some behavioural characteristics, particularly alcohol and drug involvement, require further clarification before they can be reliably interpreted.

5. CONCLUSION

This study analysed police-reported road crashes caused by young passenger car drivers aged 18–24 in Slovenia between 2021 and 2025. The results show that crashes involving young at-fault drivers occur across a wide range of traffic and environmental conditions, while several recurring patterns were identified with regard to crash timing, location, road characteristics, crash type, and contributing causes. The findings indicate that young-driver road safety cannot be attributed to a single factor, but rather to the interaction between driver behaviour, traffic environment, and situational conditions.

The results provide an evidence-based overview of the main characteristics of crashes caused by young drivers in Slovenia and can support the development of more targeted road-safety measures. In particular, preventive actions should focus on the most frequently observed crash circumstances and risky driving behaviours, while combining driver education, enforcement, and infrastructure-based measures. Future research should further examine the role of additional driver-related factors, including alcohol and drug involvement, and compare young-driver crash patterns with those of other age groups.

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