

Linking drivers' knowledge and perceived road safety: the mediating effects of theoretical and practical driving course

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Abstract. This study examined the relationship between drivers' knowledge and perceived road safety, with emphasis on the mediating effects of the Theoretical Driving Course and Practical Driving Course among licensed drivers in Oriental Mindoro. Specifically, it determined the respondents' socio-demographic profile, level of drivers' knowledge, level of perceived road safety, extent of exposure to TDC and PDC, relationship between knowledge and perceived road safety, and the mediating effects of TDC and PDC. The study employed a descriptive-correlational research design with mediation analysis. A total of 300 licensed public and private vehicle drivers from the 14 municipalities of Oriental Mindoro participated in the study. Data were gathered using a validated and reliable research instrument composed of a socio-demographic profile sheet, a drivers' knowledge test, a perceived road safety questionnaire, and an exposure to TDC and PDC questionnaire. The data were analyzed using frequency, percentage, weighted mean, correlation analysis, Kendall's Tau-b, and mediation analysis through path analysis. Findings revealed that the respondents generally had high to very high levels of drivers' knowledge, perceived road safety, and exposure to both TDC and PDC. The results also showed a significant but weak positive relationship between drivers' knowledge and perceived road safety, indicating that knowledge contributes to safety perception but does not strongly explain it by itself. Further analysis showed that TDC partially mediated the relationship between drivers' knowledge and perceived road safety, while PDC fully mediated the relationship. This means that theoretical instruction strengthens the connection between knowledge and perceived safety, while practical driving training serves as the stronger pathway through which knowledge is translated into safety perception. Based on the findings, a Traffic-Community-Based TDC-PDC Access Initiative was proposed to improve access to formal driver education, strengthen road safety awareness, and enhance practical driving readiness among drivers in Oriental Mindoro.

Introduction

Road traffic accidents are a serious public safety problem worldwide. According to the World Health Organization (2022), about 1.35 million people die from road-related accidents each year, and around 20 million more suffer from non-fatal injuries. In 2018, WHO ranked road accidents as the tenth leading cause of death globally. In the Philippines, the situation is just as alarming. Data from the Metropolitan Manila Development Authority (MMDA, 2022) showed that eight out of ten road accidents are caused by human error. Despite the government's traffic regulations and educational campaigns, road-related incidents continue to rise (MMDA, 2021). Lu et al. (2022) observed that vehicle crashes in the Philippines increase by an average of 25.58% each year, with 121,771 road-related cases recorded in one year alone, almost double the number in 2005.

Human factors such as inattention, lack of focus, and poor understanding of road rules are among the top causes of these accidents. Limited knowledge of traffic signs is one of the most prioritized risk factors for accidents, highlighting the need for better understanding and education. Similarly, unlicensed drivers often struggle with anxiety and poor concentration,

making them more prone to accidents. The abovementioned findings point to the importance of knowledge and training in shaping responsible driving behaviors.

The Philippine government has responded to road-safety concerns by strengthening driver education and licensing requirements through the Land Transportation Office (LTO). Pursuant to LTO Memorandum Circular No. 2019-2176 and related licensing reforms, including Memorandum Circular No. 2020-2134, applicants are required to complete a Theoretical Driving Course (TDC) and a Practical Driving Course (PDC) as part of the licensing process. The TDC consists of a mandatory 15-hour instructional program covering traffic regulations, road-safety principles, hazard awareness, and responsible road conduct, while the PDC requires at least eight hours of hands-on driving instruction to assess an applicant's practical competence in vehicle operation and road use. These requirements are anchored in the broader regulatory framework of Republic Act No. 4136, or the *Land Transportation and Traffic Code*, and Republic Act No. 10930, which mandates the LTO to establish stricter prerequisites for the issuance of driver's licenses to ensure that applicants possess sufficient driving skills, road-safety knowledge, and proper road courtesy. Collectively, these measures aim to ensure that licensed drivers possess both technical driving competence and an informed understanding of traffic laws, road courtesy, and public-safety responsibilities.

Macasinag and Paraiso (2021) examined how the TDC affects drivers' behavior, particularly in preventing road rage. Their study concluded that the course helps make drivers more knowledgeable and calm in traffic. However, their research only focused on perceptions of public and private drivers in Lucena City and mainly tackled emotional responses, not broader road safety outcomes. Their findings support the value of the TDC, but they did not explore the relationship between driving knowledge, perceived road safety, and the role of the Practical Driving Course.

Notably, in Oriental Mindoro, a province in Region IV-B, Philippines, the Philippine Statistics Authority (PSA) reported that in 2023, accidents involving motor or non-motor vehicles resulted in the deaths of 151 individuals at Oriental Mindoro. Calapan City and other areas in Oriental Mindoro have seen a rise not just in physical injuries from crashes, but also in psychological trauma. The Department of Health – Center for Health Development (DOH-CHD) MIMAROPA stressed the urgent need for mental health care among survivors and bereaved families (Sapit, 2025). This situation is a call for a broader impact of road crashes, extending beyond physical harm to emotional and mental suffering. Yet, despite this reality, few studies have explored how preventive education, such as mandatory driving courses, might contribute not just to accident reduction but also to shaping drivers' confidence, sense of control, and psychological readiness on the road.

Researchers have examined young drivers' traffic-rule knowledge and its association with both driving experience and formal driver training. In a study of young drivers, Shaaban (2021) found that participants who had completed a driving course before obtaining a license performed better on traffic-knowledge assessments than those who had not. The same study reported that drivers with greater driving experience achieved higher knowledge scores, although many respondents still showed limited understanding of fines and demerit points, suggesting that driver education should be reinforced beyond initial licensure requirements. Locally, Bicara et al. (2024) investigated the factors affecting perceived safe-driving behavior among Filipino private-car drivers using Protection Motivation Theory and the Three Broad Domains of Ergonomics. Their study identified driving experience, geographical perception, level of understanding, perceived severity, perceived vulnerability, physical ergonomics, and cognitive ergonomics as significant predictors of perceived safe-driving behavior, with perceived vulnerability emerging as the most influential factor. However, the study did not examine completion of formal driving courses as a variable, indicating a gap in the local literature on the relationship between structured driver education and safe-driving behavior.

Methodology

This study employed a quantitative descriptive-correlational research design with mediation analysis to examine the relationship between drivers' knowledge and perceived road safety, and to determine the mediating effects of the Theoretical Driving Course (TDC) and Practical Driving Course (PDC). The study was conducted in the 14 municipalities of Oriental Mindoro, Philippines, during the first quarter of academic year 2025–2026. The respondents were 300 licensed public and private vehicle drivers who were residents of Oriental Mindoro, actively driving, and had completed both TDC and PDC from Land Transportation Office-accredited driving schools. Purposive sampling was used because the study required respondents with specific qualifications.

Data were collected using a validated researcher-made test and survey questionnaire. The instrument consisted of four parts: socio-demographic profile, drivers' knowledge test, perceived road safety questionnaire, and exposure to TDC and PDC questionnaire. The drivers' knowledge test contained 60 items covering traffic laws, traffic signs, traffic rules, traffic regulations, pavement markings, and handling driving situations. Perceived road safety was measured in terms of roads and roadsides, speed, road users, and vehicle condition. Exposure to TDC and PDC was measured using separate 10-item indicators for each course.

The instrument was validated by five experts in criminal justice education, traffic law enforcement, and driver education. A pilot test involving 30 licensed drivers was conducted to determine reliability. Test-retest reliability values for the drivers' knowledge test ranged from 0.82 to 0.89, while Cronbach's alpha values were 0.82 to 0.89 for perceived road safety, 0.84 for TDC exposure, and 0.86 for PDC exposure.

Permission was secured from concerned local government units prior to data gathering. Informed consent, voluntary participation, confidentiality, and data privacy were observed. Data were analyzed using frequency, percentage, weighted mean, Pearson *r*, Kendall's Tau-b, and mediation analysis through lavaan path analysis.

Results and Discussion

1. Demographic Profile of the Respondents

The results show that the respondents were predominantly young, male, single, low-income, and active drivers. Most respondents were aged 18–25 years, representing 71.00% of the total sample, while 80.33% were male. In terms of family type, 60.34% were single and living alone, and 71.34% reported a monthly income below ₱10,000. Nearly half of the respondents learned to drive through family members, relatives, or friends, while 29.33% were self-taught. Only 21.00% learned through formal driving school.

In terms of driving experience, most respondents had 4–6 years of driving experience, while the majority reported driving daily. This indicates that the respondents were active road users with regular exposure to actual road conditions. The dominance of young, male, low-income, and informally trained drivers suggests that many respondents may have acquired their initial driving habits through observation, family instruction, peer influence, or self-practice before completing formal driving requirements.

These findings are important because they show the context in which drivers develop their knowledge and road-safety perceptions. Since many respondents learned to drive informally, formal driver education becomes necessary in correcting misconceptions, reinforcing proper driving practices, and standardizing knowledge of traffic laws, traffic signs, road markings, and safe-driving behavior.

2. Level of Drivers' Knowledge

The respondents generally demonstrated high to very high levels of drivers' knowledge. Knowledge of traffic rules, traffic regulations, and handling driving scenarios were interpreted as very high, while knowledge of traffic laws, traffic signs, and pavement markings were interpreted as high.

The strongest performance was observed in traffic regulations, where 67.34% of respondents were classified under the very high category. This was followed by handling driving scenarios at 58.67% and traffic rules at 55.67%. These results indicate that many respondents were familiar with common rules, regulatory requirements, and appropriate responses to different driving situations.

However, the findings also reveal that knowledge was not evenly distributed across all areas. In traffic laws, 26.33% of respondents fell under the very low category, while 22.00% were under the low category. This means that although the overall result was interpreted as high, a considerable number of drivers still had limited understanding of specific legal provisions related to road safety.

The findings suggest that drivers may be more familiar with rules and situations they commonly encounter on the road, but they may still need stronger reinforcement in legal and technical areas such as traffic laws, traffic signs, and pavement markings. This supports the need for continuous and structured driver education.

3. Level of Drivers' Perceived Road Safety

The respondents reported a high level of perceived road safety. All dimensions—roads and roadsides, speed, road users, and vehicle condition—were interpreted as “Always.” This means that the respondents generally perceived themselves as practicing safe driving behaviors.

Among the dimensions, roads and roadsides obtained the highest overall mean of 3.77. This suggests that drivers were highly responsive to visible road hazards such as uneven roads, damaged surfaces, poor lighting, roadside obstacles, and low visibility. Speed obtained an overall mean of 3.68, while road users obtained 3.67. Vehicle condition obtained the lowest overall mean of 3.55, although it was still interpreted as “Always.”

The results indicate that drivers tend to be more cautious when faced with immediate and visible road risks. For instance, reducing speed on uneven roads, slowing down near intersections, yielding to pedestrians, and checking mirrors before driving were among the highly rated safety behaviors.

However, some practices were less consistent. Keeping speed within the allowed speed limit was interpreted only as “Often,” and bringing the vehicle for regular maintenance or servicing was also interpreted as “Often.” This suggests that while drivers respond well to immediate road conditions, compliance with formal speed limits and long-term vehicle maintenance may require further improvement.

4. Relationship Between Socio-Demographic Characteristics and Drivers' Knowledge and Perceived Road Safety

The findings show that some socio-demographic characteristics were significantly related to selected dimensions of drivers' knowledge and perceived road safety. However, all correlation coefficients were negligible in magnitude. This means that although some relationships were statistically significant, the strength of these relationships was very weak.

For drivers' knowledge, age, family type, manner of learning to drive, and length of driving experience were significantly related to knowledge of traffic laws. Manner of learning to drive and length of driving experience were significantly related to traffic rules. Gender and length of driving experience were significantly related to traffic regulations. Family type and manner of learning to drive were significantly related to pavement markings, while length of driving experience was significantly related to handling traffic scenarios.

For perceived road safety, age, gender, and family type were significantly related to roads and roadsides. Gender, family type, and monthly income were significantly related to speed. Gender was significantly related to road users, while monthly income and length of driving experience were significantly related to vehicle condition.

Despite these significant relationships, the negligible correlation values indicate that demographic characteristics do not strongly determine drivers' knowledge or perceived road safety. Therefore, road-safety education should not be limited to one demographic group. Instead, programs should be made available to all drivers regardless of age, gender, income, family type, or driving experience.

5. Extent of Exposure to the Theoretical Driving Course and Practical Driving Course

The respondents reported very high exposure to the Theoretical Driving Course, with an overall mean of 3.57. The highest-rated item was attendance in an LTO-accredited institution or official Driver Education Center. This was followed by attendance in the required 15-hour sessions and comprehension of topics related to traffic signs, laws, and road markings. These results indicate that the respondents were generally exposed to formal and standardized theoretical instruction. The TDC helped provide structured knowledge on traffic laws, road signs, road markings, hazard awareness, defensive driving, and responsible road behavior.

However, the lowest-rated items were asking questions during TDC lectures and reviewing modules outside class hours. Although both were still interpreted as high, these findings suggest that respondents were more compliant with formal course requirements than actively engaged in independent or participatory learning.

The respondents also reported very high exposure to the Practical Driving Course, with an overall mean of 3.43. The highest-rated items were practicing actual driving maneuvers under supervision and feeling safer when driving on busy roads. These findings suggest that PDC helped improve hands-on skills, vehicle control, and driving confidence.

However, the lowest-rated item was practicing night driving or low-visibility driving. Exposure to different weather conditions and receiving instructor feedback also received relatively lower ratings. This means that although respondents were highly exposed to basic practical driving activities, their preparation for more complex driving situations may still be limited.

6. Relationship Between Drivers' Knowledge and Perceived Road Safety

The results show that drivers' knowledge had a statistically significant but weak positive relationship with perceived road safety. Overall drivers' theoretical road safety knowledge was significantly related to overall perceived road safety, with Kendall's Tau-b of 0.162 and $p < .001$.

Among the knowledge indicators, traffic laws showed the most consistent significant relationships with all dimensions of perceived road safety. This means that drivers who had higher knowledge of traffic laws also tended to report higher perceived safety in terms of roads and roadsides, speed, road users, and vehicle condition.

Handling driving scenarios was also significantly related to roads and roadsides, speed, and road users. This suggests that drivers who were more knowledgeable in responding to different driving situations also perceived themselves as safer in actual road use.

However, the overall relationship was weak. This means that knowledge contributes to perceived road safety, but it does not strongly explain it by itself. Drivers may know traffic laws, rules, signs, and safe-driving principles, but this knowledge may not automatically translate into a strong sense of road safety unless supported by practical experience, formal training, and real-life application.

Therefore, the null hypothesis stating that there is no significant direct relationship between drivers' knowledge and perceived road safety is rejected.

7. Mediating Effect of the Theoretical Driving Course

The Theoretical Driving Course was found to partially mediate the relationship between drivers' knowledge and perceived road safety. The direct effect of knowledge on perceived road safety was significant, and the indirect effect through TDC was also significant.

This means that drivers' knowledge still directly influenced perceived road safety, but part of this influence passed through theoretical instruction. In simpler terms, drivers who had higher knowledge of traffic laws, traffic signs, rules and regulations, pavement markings, and driving situations tended to have higher perceived road safety. However, this relationship became more meaningful when supported by exposure to TDC.

The TDC helps organize and clarify drivers' knowledge. It provides structured instruction on traffic laws, road signs, road markings, hazard awareness, defensive driving, and responsible road conduct. Because of this, drivers are able to connect what they know with proper road-safety behavior.

The mediation is considered partial because TDC does not fully explain the relationship between knowledge and perceived safety. Drivers may also acquire knowledge from other sources such as experience, family members, friends, self-study, and repeated exposure to road situations. However, TDC strengthens this knowledge by giving it a more formal and standardized foundation.

Therefore, the null hypothesis stating that the Theoretical Driving Course does not significantly mediate the relationship between drivers' knowledge and perceived road safety is rejected.

8. Mediating Effect of the Practical Driving Course

The Practical Driving Course was found to fully mediate the relationship between drivers' knowledge and perceived road safety. The direct effect of drivers' knowledge on perceived road safety became non-significant when PDC was included in the model, while the indirect effect through PDC remained significant.

This means that knowledge alone did not strongly explain perceived road safety once practical driving training was considered. Instead, drivers' knowledge influenced perceived road safety mainly through their exposure to PDC. This finding shows that practical training plays a very important role in converting knowledge into confidence, readiness, and safety perception. A driver may know traffic rules, signs, road markings, and safe-driving principles, but these become more meaningful when applied through actual driving practice.

Through PDC, drivers are able to practice parking, turning, reversing, checking mirrors, using signals, controlling speed, responding to hazards, and driving in busy road situations. These activities allow drivers to apply what they know in supervised or actual driving conditions.

The mediation is considered full because PDC fully explains how drivers' knowledge becomes connected to perceived road safety. This suggests that practical driving experience is the stronger pathway through which knowledge is translated into road-safety confidence and awareness.

Therefore, the null hypothesis stating that the Practical Driving Course does not significantly mediate the relationship between drivers' knowledge and perceived road safety is rejected.

9. Proposed Traffic-Community-Based TDC-PDC Access Initiative

Key Finding	Problem Identified	Intervention / Strategy	Responsible Office / Agency	Timeframe	Expected Outcome
Many respondents learned driving through family, friends, relatives, or self-teaching.	Informal learning may result in inconsistent knowledge of traffic laws, signs, and safe-driving practices.	Establish a barangay or municipal TDC-PDC access assistance and referral desk.	Barangay officials, LGU, LTO-linked partners, accredited driving schools	Short-term: 1–3 months	More drivers are referred to accredited TDC and PDC providers.
Some knowledge gaps were observed in traffic laws, traffic signs, and pavement markings.	Drivers may have incomplete understanding of legal and technical road-safety concepts.	Conduct community-based road safety orientations using localized examples and simple learning materials.	Barangay officials, traffic enforcers, driving instructors, LGU road safety focal persons	Short-term to medium-term: 3–6 months	Improved awareness of traffic laws, signs, markings, and safe-driving responsibilities.
TDC partially mediated the relationship between knowledge and perceived road safety.	Theoretical knowledge needs structured reinforcement to become more meaningful to drivers.	Organize TDC refresher sessions or pre-orientation activities in coordination with accredited providers.	LTO-linked partners, accredited driving schools, LGU, barangay officials	Medium-term: 6 months	Drivers gain clearer understanding of road-safety concepts and licensing-related responsibilities.
PDC fully mediated the relationship between knowledge and	Drivers need practical application to translate knowledge into safety confidence.	Conduct practical readiness support activities such as safety demonstrations, maneuver	Accredited driving instructors, traffic personnel, LGU,	Medium-term: 6–9 months	Drivers become more prepared to apply road-safety knowledge in actual driving situations.

perceived road safety.		familiarization, and hazard-response discussions.	barangay officials		
Exposure to night driving, low visibility, different weather conditions, and instructor feedback was relatively lower. The proposed program needs to be low-cost, realistic, and sustainable.	Drivers may have limited preparation for complex or high-risk driving conditions.	Include scenario-based discussions and demonstrations on night driving, rainy conditions, emergency response, and hazard awareness.	Driving instructors, traffic enforcers, emergency responders, LGU safety personnel	Medium-term: 6–9 months	Drivers can identify proper responses to difficult driving situations.
	Road-safety interventions may not continue without coordination and monitoring.	Create a simple monitoring and evaluation system using attendance sheets, referral records, feedback forms, and quarterly reports.	LGU, barangay officials, accredited driving schools, LTO-linked partners	Long-term: 9–12 months and continuing	Sustained implementation and improved coordination among stakeholders.

Based on the findings, the proposed Traffic–Community-Based TDC-PDC Access Initiative is justified. The results show that many respondents learned driving informally through family, relatives, friends, or self-teaching. Some knowledge gaps were also observed in traffic laws, traffic signs, and pavement markings. In addition, although exposure to TDC and PDC was very high, there were still weaker areas such as active participation in TDC, independent review of modules, night driving, low-visibility driving, weather-related driving, and instructor feedback.

The proposed initiative may address these gaps by improving access to formal driver education and strengthening community-based road-safety support. It may include barangay or municipal TDC-PDC referral desks, road-safety orientations, TDC refresher sessions, practical readiness activities, hazard-response discussions, and monitoring systems.

This initiative may help drivers, especially those from low-income and geographically distant communities, gain better access to formal driving education. It may also strengthen road-safety awareness, improve practical driving readiness, and encourage responsible driving behavior.

Overall, the findings indicate that drivers' knowledge is important, but it is not enough by itself. Theoretical instruction helps clarify and organize knowledge, while practical instruction helps drivers apply knowledge in real driving situations. Between the two courses, the Practical Driving Course showed the stronger mediating role because it fully explained how knowledge was translated into perceived road safety.

Conclusion and Recommendations

The study concludes that drivers in Oriental Mindoro generally demonstrated high levels of road-safety knowledge, perceived road safety, and exposure to both the Theoretical Driving Course (TDC) and Practical Driving Course (PDC). However, the relationship between drivers' knowledge and perceived road safety was weak, indicating that knowledge alone does not strongly shape safety perception. While respondents were knowledgeable in traffic rules, regulations, and driving situations, some gaps remained in traffic laws, signs, and pavement markings. Likewise, although perceived road safety was generally high, compliance with speed limits and regular vehicle maintenance were relatively less consistent.

The findings further show that TDC partially mediated the relationship between drivers' knowledge and perceived road safety, while PDC fully mediated this relationship. This suggests that theoretical instruction helps organize and reinforce drivers' knowledge, but practical training serves as the stronger mechanism through which knowledge is translated into safety perception. Thus, road-safety knowledge becomes more meaningful when supported by supervised driving practice, vehicle control, hazard response, and actual application in road situations.

These findings imply that formal driver education should not be treated merely as a licensing requirement but as a critical pathway for strengthening road-safety perception and preparedness. The TDC may be enhanced through more interactive,

contextualized, and reflective learning activities, while the PDC should provide broader exposure to complex driving conditions, including night driving, low visibility, adverse weather, emergency response, and interaction with vulnerable road users. The results also support the need for community-based mechanisms that improve access to accredited driver education, particularly among drivers who initially learned through informal means.

Overall, the study highlights the complementary roles of theoretical and practical driver education in promoting safer and more informed drivers. Strengthening both components, particularly the practical course, may improve the translation of road-safety knowledge into confidence, readiness, and responsible driving behavior.

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Competing Interests Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study; all data used were obtained from previously published sources as cited in the reference list.

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Appendices

No appendices are attached to this study.