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LOOKED BUT FAILED TO SEE: THE ROLE OF GENDER, DRIVER TYPES, ACCIDENT HISTORY, AND LICENCE TENURE IN HAZARD PERCEPTION

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ABSTRACT

Hazard perception is a complex process and a better understanding of the salient contributing factors for its failure could improve the existing hazard perception tests, policies, and training programmes. However, extant literature has not tackled this issue sufficiently. Using the predictive hazard perception paradigm, this study compares motorcycle hazard perception scores and total hazard perception scores of 67 participants based on gender (male, female), driver types (car drivers, dual drivers), accident history (had accident, no accident), and licence tenure (one year or less, two years, three years, four years, five years or more). The results demonstrate that males (M = 5.96, SD = .98) scored higher on the overall hazard perception task than females (M = 5.23, SD = 1.12), $t(65) = 2.64$, $p = .01$, Cohen's $d = .69$. In addition, the interaction effects between gender and driver types ($F(1, 67) = 3.90$), indicate that higher total hazard perception scores are obtained from male participants who are dual drivers. All other comparisons are not statistically significant. Possible explanations of the results are discussed and recommendations for improving the existing hazard perception tests, licensing policies, and training programmes are offered.

Keywords: *Hazard Perception, Gender, Driver Types, Accident History, Licence Tenure, Road Safety*

INTRODUCTION

The evolution of road traffic in Malaysia is already well-known to many, but for the wrong reasons. For one, the country has among the highest fatality rates for traffic accidents in Asia and Southeast Asia (World Health Organization, 2018), despite having one of the best road systems in these regions. For another, this rate has remained consistently high since 2007 even though various efforts have been made to alleviate it. This notion is corroborated by the latest statistics from the Road Safety Department of Malaysia (2020), which recorded 6,167 deaths in 2019 and 6,284 deaths in 2018. Even more unfortunate, these accidents have ended up costing the country about Ringgit Malaysia 9.16 billion each year (Road Safety Department of Malaysia, 2020) – and that is without factoring in other social costs and non-monetary losses.

The report by the Road Safety Department of Malaysia (2020) further highlights that approximately 80.6% of road accidents in Malaysia are caused by human error. Past studies have long considered the failure to recognise hazards as one of the major factors attributed to human error. The roots of the research in this area go back to as early as 1981 with a study by Quimby and Watts (1981) that drivers who performed poorly on a hazard perception test are more likely to commit errors while driving. Also known as "*looked but failed to see*" (Herslund & Jørgensen, 2003), or "*sorry, mate, I didn't see you*" (White, 2006), this phenomenon involves failing to perceive the presence of a hazard even when the hazard is visible from the perceiver's position of looking at the road. Recent works, such as those by Boufous et al. (2011) and Horswill and McKenna (2004), have also found that repeated failure in perceiving hazards is related to increased accident risk. Similarly, at the national level, Syed Shazali, Selvam, and Bujang (2014) showed that drivers tend to miss potential hazards caused by vulnerable road users, such as pedestrians. These results further demonstrate the relationship between crash involvement and accident likelihood due to the inability to identify hazardous situations on time.

Given that the association between hazard perception failure and drivers' errors has been well established, it would be natural to expect that factors influencing it would have been identified. However, the existing literature does not give clarity regarding which factors are the most salient contributors to this failure. The majority of reviews conducted in this area have addressed only the issues of: (i) methodology, i.e., how to develop or incorporate hazard perception tests in licensing systems (e.g., Moran et al., 2019; Takahashi et al., 2017); (ii) measurement, i.e., how to assess hazard perception skills (e.g., Hird et al., 2016; Moran et al., 2019); (iii) interventions, i.e., what interventions can improve hazard perception and detection (e.g., Castellucci et al., 2020); and (iv) applications, i.e., how hazard perception relates and applies to human factors and road safety (e.g., Brams et al., 2019; Robbins & Chapman, 2019). Although these reviews are both detailed and synoptic, they have not fully explored the factors that are associated with the high rate of hazard perception failure. This, in turn, has left the questions of which factors, and why, play vital roles in understanding the failure to perceive hazards, unanswered. Examining these questions and finding their answers are important because it has implications for the development of hazard perception tests and their related policies.

In view of this gap, the present study investigates this "*looked but failed to see*" phenomenon. In particular, we investigated four factors that may influence hazard perception ability; i.e., gender, driver types, accident history, and licence tenure. By examining these factors, we hope to contribute to the literature on how these factors may explain differences in the detection of hazards. The findings of this study could also assist in improving the existing hazard perception tests as well as in informing and improving driver licensing policies and training programmes.

GENDER, DRIVER TYPES, ACCIDENT HISTORY, AND LICENCE TENURE IN HAZARD PERCEPTION

Studies have found that an individual's proficiency in detecting hazards on the road may vary with a number of factors, most notably age (e.g., Borowsky, Shinar, & Oron-Gilad, 2010); experience (e.g., Liu, Hosking, & Lenné, 2009); and more recently, culture (e.g., Lim, Sheppard, & Crundall, 2013). Despite these efforts, less understood is the extent to which gender, the experience of manoeuvring different types of vehicles, accident history, and licence tenure, may influence hazard perception ability. The justifications for examining these specific factors are elaborated below.

Gender: Gender differences have been consistently highlighted in the broader literature on driving behaviour and attitude. In particular, males undertake more risky driving behaviour (Oviedo-Trespalacios & Scott-Parker, 2018); have less concern for traffic laws (Johnson et al., 2011); are more likely to exceed speed limits (Yannis et al., 2013); are more likely to report distractions on the road (Barr et al., 2015); are more likely to be involved in accidents (Constantinou et al., 2011); and are more likely to drink and drive (Xiao et al., 2017), compared to females. Nevertheless, several studies have shown mixed results. For example, Scrimgeour et al. (2011) found no significant differences between gender and hazard perception ratings across various driving scenarios. Similarly, Vogel and colleagues (2003) did not find any differences between male and female drivers in terms of their hazard perception.

Driver Types: Experience of manoeuvring different types of vehicles also plays an important role. Studies have shown that when compared to car drivers, motorcyclists are better at car-perspective hazard perception (Horswill & Helman, 2003); have fewer stalls and higher safety and skills scores (Shahar et al., 2010); and perform better in video-based hazard perception tests (Rosenbloom, Perlman, & Pereg, 2011). There is evidence that car drivers who also have a motorcycle licence (i.e., dual drivers), are less likely to collide with motorcycles than those without a motorcycle licence (Magazzù, Comelli, & Marinoni, 2006). Shahar et al. (2012) explained that this happens because dual drivers would pay more attention to hazards than the novice or experienced car drivers. In particular, they reported that dual drivers have a better attitude towards motorcyclists, better hazard perception skills than car drivers, and are not prone to crash into other motorcycles when they are driving a car.

Accident History: Studies, such as those by Kouabenan (2002) and Ngueutsa and Kouabenan (2017), have found that involvement in accidents is positively associated with the perception of risk and reported safe behaviour. This is understandable, considering that personal experience of an accident would yield more awareness of road hazards and a greater sense of fear of accidents. This, in turn, could prompt people to behave more responsibly on the road. However, the experience of multiple crashes (i.e., more than three) can produce an opposite effect, such that people tend to take more risks (Lin et al., 2004), and have less awareness of road safety (Ivers et al., 2009) compared to those who have previously been involved in fewer accidents. This possibly occurs because the individuals have become habituated to the dangers on the road, and thus, perceive road travel as less risky, which then prompts them to neglect basic safety measures (Ngueutsa & Kouabenan, 2017).

Licence Tenure: Haworth and Mulvihill (2006) argued that there is a significant relationship between how long a licence has been held and the level of experience gained for car drivers. The conventional norm suggests that when an individual holds a licence for an extended period, it is expected that he/she has greater experience and ability to effectively identify hazards while on the road. This notion is significant, as studies have consistently shown that hazard perception skills relatively improve as experience increases (Horswill & McKenna, 2004), and that novice drivers are more likely to suffer from hazard perception deficiencies than experienced drivers

(Borowsky, Shinar, & Oron-Gilad, 2010; Crundall, 2016; Shahar et al., 2012). On the other hand, prior studies have also suggested that people may have little driving or riding experience despite having been in possession of a licence for a long time (Haworth & Mulvihill, 2006). This is most likely to happen because they: (i) do not have a car or motorcycle; (ii) are unfamiliar with the roads; (iii) are reluctant or lack confidence to drive or ride; or (iv) simply prefer to use public transport.

It is clear from the literature reviewed that there are mixed findings regarding the role of these four factors in hazard perception abilities of individuals. Therefore, the present study examines whether differences in gender, driver types, accident history, and licence tenure, affect the hazard perception ability of individuals. To conduct the study in a more controlled setting, we experimented the predictive hazard perception paradigm by Lim, Sheppard, and Crundall (2014), that utilises the "*What Happens Next*?" test, where video clips are paused before the appearance of a hazard, and participants are required to predict what would happen next. The utility of this paradigm as a good measure of hazard perception has been validated and illustrated in studies by Castro et al. (2014), Gugliotta et al. (2017), and Ventsislavova et al. (2016).

METHODS

Design and Participants

Sixty-seven participants (M_{age} = 23.12, *SD* = 2.95) with normal or corrected-to-normal vision were recruited through advertisements on university notice boards and social media as well as from classes for this experiment. They were assigned to between-subjects conditions based on driver types, i.e., car drivers (*n* = 36) and dual drivers (*n* = 31).

Car drivers, with type D Malaysia driving licence (i.e., cars with unloaded weight not exceeding 3500 kg. only), are on average 23 years old (*SD* = 3.14). Meanwhile, dual drivers have both type D and B2 (i.e., motorcycles not exceeding 250 cc) Malaysia driving licences. The mean age of this group is also 23 years (*SD* = 2.69). The majority of the participants have been in possession of their respective licences for five years or more. Out of the total sample, 49% reported having accident history, while another 51% reported that they had not experienced a road accident (see Table 1 for the demographics information).

Materials and Apparatus

The experiment took place within a classroom, arranged as a typical lecture hall, with 10 writing tablet wood chairs and a liquid-crystal display (LCD) projector at the front of the room. A 19.47-minute video recording, comprising the instructions for the experiment, two practice video clips, eight test video clips, and a debriefing script, was prepared. This video recording was displayed on a laptop and then projected onto the LCD projector mounted on the ceiling of the room. A portable stereo speaker was also used to present the video clips.

Table 1 Demographics information (*n* = 67)

		Driver Types		Total
		Car Drivers	Dual Drivers	
n		36	31	67
Gender	Male	6	17	23
	Female	30	14	44
Age		*M* = 22.75 *SD* = 3.14	*M* = 23.55 *SD* = 2.69	*M* = 23.12 *SD* = 2.95
Accident history	Yes	13	20	33
	No	23	11	34
Licence tenure	1 year or less	7	2	9
	2 years	9	4	13
	3 years	10	3	13
	4 years	3	4	7
	≥ 5 years	7	18	25

The practice and test video clips were adapted from two sources, i.e., nine clips from Lim, Sheppard, and Crundall's (2014) study and one clip on hazard perception test from YouTube (Driving Test Success, 2006). Table 2 outlines the description of the video clips that served as visual stimuli in this experiment.

Table 2 Description of the hazard perception video clips used in this study

No.	Video clip content	Duration
Practice video 1	Car cuts across three lanes at once.	140 ms
Practice video 2	Bus is moving with a motorcycle on the right side.	30 ms
Test video 1	Incoming motorbike and pedestrian block lane.	90 ms
Test video 2	Car in L lane signals and changes lanes.	540 ms
Test video 3	Motorbike pulls in front.	180 ms
Test video 4	Car in L lane signals and changes lanes abruptly.	520 ms
Test video 5	Car from right joins quickly.	190 ms
Test video 6	Pedestrian walks out from behind bus.	100 ms
Test video 7	Incoming motorcycle crosses the road.	130 ms
Test video 8	Incoming car overlaps into driver's lane.	150 ms

Out of the eight test clips, four contained hazards associated with motorcycle use, while another four contained non-motorcycle hazards. After each clip ended, participants were asked to choose the best prediction of what will happen next from among four options in a multiple-choice format. The options were listed in complete sentences with three components: (i) the hazard, e.g., approaching vehicle; (ii) its location, e.g., on the left lane; and (iii) the events occur, e.g., pulls into your lane.

A form requesting demographics information, licence types, driving experience, informed consent, and answer sheet, was also distributed to the participants before the experiment began.

Procedure
Before embarking on the main study, a pilot experiment was carried out with eight participants (Car drivers: n = 4; Dual drivers: n = 4) at the experimental setting. This procedure was conducted for three reasons: (i) to test the functionality of the video recording; (ii) to ensure the lag times between stimuli were sufficient for participants to answer the questions; and (iii) to clarify the instructions and overall administration of the experiment. Feedback from the participants was generally positive, and only minor changes to the wording of the instructions and sound quality were made. Following the pilot experiment too, 10 sets of the video recording were created for counterbalancing of potential order effects. In particular, the test video clips were arranged in a different order in each set, and a different set was presented to different groups of participants in the main study.

The main study was conducted one week after the pilot experiment. Due to restrictions of space and apparatus, the experiment was conducted in groups of five to nine participants. After a brief welcoming note from the researchers, all participants completed the informed consent form. They were then given standard instructions that appeared on the LCD screen, which required them to make a guess after watching the video clips; each of which contained a driving scenario on approaching a hazard, with the clips ending just before the hazard occurred. Eight test video clips followed the two practice clips, with all clips being played only once. After watching each clip, the participants wrote down their answers on the answer sheet provided.

At the end of each group session, the participants were debriefed, and light refreshments were served as a token of appreciation. Participants were blind to the study's objectives and were free to withdraw at any time during the experiment.

Data Analysis
After all participants had been tested, their answer sheets were marked. Each correct answer was given a score of '1', while an incorrect answer was scored '0'. Since four clips of hazard perception on the motorcycle were used, the maximum possible score for motorcycle hazard perception is 4. Meanwhile, the overall score for total hazard perception can range from 0 to 8. The scores were analysed using IBM SPSS Statistics version 21, first by normality tests, and then, by independent-samples t-tests as well as by a series of analysis of variance (ANOVA) to locate significant differences.

RESULTS

Normality tests: Visual inspections of Q-Q plots indicated that total hazard perception and motorcycle hazard perception were normally distributed for all group comparisons. Levene's test for equality of variances was met for each condition by gender (p = .22 for total hazard perception, p = .48 for motorcycle hazard perception); by driver types (p = .70 for total hazard perception, p = .81 for motorcycle hazard perception); by accident history (p = .26 for total hazard perception, p = .36 for motorcycle hazard perception); and by licence tenure (p = .05 for total hazard perception, p = .07 for motorcycle hazard perception). The assumption of independent observations was also met because participants filled in the answer sheet independently of each other. Given that total hazard perception scores and motorcycle hazard perception scores tend to correlate with one another, a Pearson product-moment correlation analysis was performed, and its results show that both scores were indeed significantly correlated, r = .607, p = .001 with r^2 = .37.

Gender: Independent-samples t-tests were used to compare the motorcycle hazard perception scores and the total hazard perception scores by gender. Results show that there were no significant differences in the motorcycle hazard perception scores between males (M = 3.09, SD = .67) and females (M = 2.80, SD = .73), $t(65)$ = 1.59, p = .12 (see Table 3). There was however, a significant difference between male (M = 5.96, SD = .98) and female (M = 5.23, SD = 1.12) participants' total hazard perception scores, $t(65)$ = 2.64, p = .01, Cohen's d = .69 (see Table 4). This result indicates that males performed better than females in the overall hazard perception task.

Driver types: Independent samples t-tests were also performed to compare the means of the two scores by driver types. No significant difference in motorcycle hazard perception scores was found between car drivers (M = 2.89, SD = .71) and dual drivers (M = 2.90, SD = .75), $t(65)$ = -.081, p = .94. Analysis with the total hazard perception scores yielded similar non-statistically significant results with $t(65)$ = -1.83, p = .07.

Accident history: A comparison between those who had experienced an accident and those who had not also showed no significant difference in both motorcycle hazard perception scores, $t(65)$ = -.49, p = .63, and total hazard perception scores, $t(65)$ = -1.15, p = .26.

Licence tenure: Motorcycle hazard perception scores (*F*(4, 62) = 1.45, *p* = .23) and total hazard perception scores (*F*(4, 62) = 1.50, *p* = .22), did not significantly differ between the five levels of licence tenure. See Tables 3 and 4 for a summary of these results.

Table 3 Motorcycle hazard perception results

		Motorcycle hazard perception				
		n	*M*	*SD*	*t*	*p*
Gender	Male	23	3.09	.67	1.59	.12
	Female	44	2.80	.73		
Driver Types	Car Drivers	36	2.89	.71	-.081	.94
	Dual Drivers	31	2.90	.75		
Accident History	Yes	33	2.94	.66	-.49	.63
	No	34	2.85	.78		
		n	*M*	*SD*	*F*	*p*
Licence Tenure	1 year or less	9	2.44	1.01	1.45	.23
	2 years	13	2.92	.49		
	3 years	13	2.92	.64		
	4 years	7	3.29	.76		
	≥ 5 years	25	2.92	.70		

Table 4 Total hazard perception results

		Total hazard perception				
		n	*M*	*SD*	*t*	*p*
Gender	Male	23	5.96	.98	2.64	**.01**
	Female	44	5.23	1.12		
Driver Types	Car Drivers	36	5.25	1.05	-1.83	.07
	Dual Drivers	31	5.74	1.15		
Accident History	Yes	33	5.64	.99	-1.15	.26
	No	34	5.32	1.22		
		n	*M*	*SD*	*F*	*p*
Licence Tenure	1 year or less	9	5.11	1.54	1.50	.22
	2 years	13	1.50	.22		
	3 years	13	5.08	.86		
	4 years	7	5.86	.69		
	≥ 5 years	25	5.80	1.12		

To further verify the extent to which the scores differed across gender and driver types, a series of two-way between-subject analyses of variance (ANOVA) was performed. It was found that the interaction effects between gender and driver types were not statistically significant for motorcycle hazard perception scores, *F*(1, 67) = .69, *p* = .41 (see Table 5). The main effects for gender, *F*(1, 67) = 2.17, *p* = .15, and driver types, *F*(1, 67) = .07, *p* = .79, were also not statistically significant. However, the profile plots in Figure 1 indicate that males, particularly those who are dual-drivers, scored higher compared to females for the motorcycle hazard perception scores.

The results also reveal no significant effects of gender and driver types on total hazard perception scores (see Table 5). Interestingly, the interaction effects on these two variables indicate that higher total hazard perception scores were obtained from male participants who are dual drivers (see Figure 2). Nevertheless, we are cautious of this result as its *p*-value is .05.

Table 5 Two-way ANOVA results (*df* = 1, 67)

	Motorcycle hazard perception			Total hazard perception		
	F	*p*	ηp^2	*F*	*p*	ηp^2
Gender	2.17	.15	.033	2.70	.11	.041
Driver Types	.07	.79	.001	2.45	.12	.037
Gender*Driver types	.69	.41	.011	3.90	.05	.058

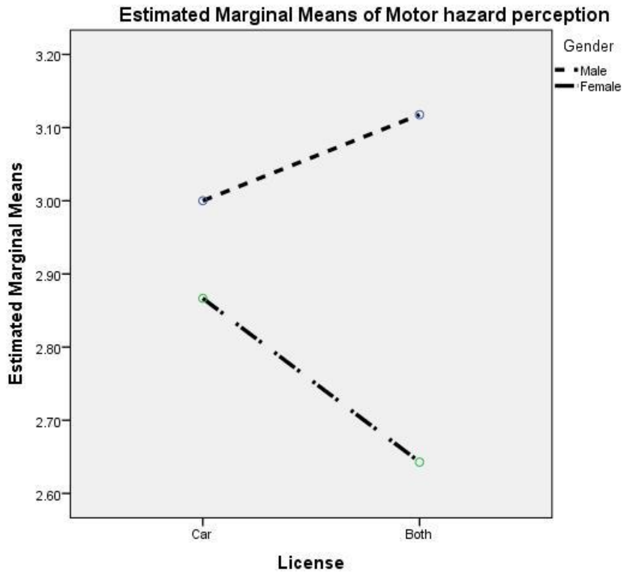

Figure 1 Profile plots for motorcycle hazard perception scores

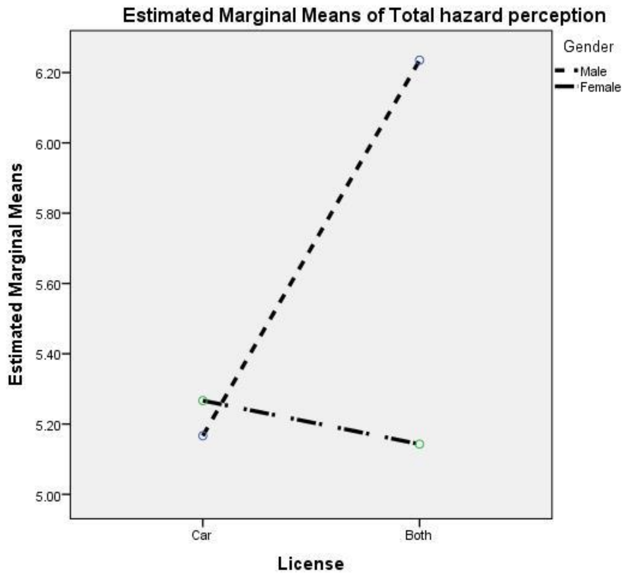

Figure 2 Profile plots for total hazard perception scores

DISCUSSION

Previous studies on hazard perception have mostly focused on differences in age, experience, or culture, leaving other factors such as gender, driver types, accident history, and licence tenure remain understudied. To the best of our knowledge, this study offers the first experimental evidence that gender, and to some extent, the interaction of gender and driver types, influence hazard perception abilities. In particular, we found that males scored higher on the overall hazard perception task than females, and this was more apparent when the male participants are also dual-drivers.

One possibility that could explain these results is that the mechanism for visual motion processing between males and females may not be homogeneous. In a series of studies on sex differences in visual functions, Abramov and colleagues (2012[a]; 2012[b]) found that men are better at perceiving changes in brightness across space as well as more adept than women in resolving images that are changing rapidly. This ability is especially useful for reading a letter on an eye chart, recognising a face, or in this case, detecting a hazard. In a more recent study by Murray et al. (2018) that involved 263 men and women, male participants were found to have shorter motion discrimination thresholds than females. This result further highlights the perceptual differences between sexes by indicating that on average, men process visual motion significantly faster than women. Taking these findings together, it is reasonable to suggest that men may have a more acute visual perception of fine details and rapid movement than women; hence, conferring them a better ability to detect hazards.

Having both car and motorcycle licences may also enhance the ability of male participants to understand the risks faced by drivers and riders. Malaysian roads have been found to be more visually cluttered (Lim, Sheppard, & Crundall, 2014), and not all road users can give sufficient attention to an immediate hazard. Dual drivers, however, often have more technical knowledge and experience about riding a motorcycle and driving a car, and this knowledge might help them to detect hazards, pay attention to multiple changes, and predict vehicular manoeuvres. It is also likely that regular exposure to motorcycles and other vehicles in their daily travel makes dual drivers more familiar with the roads they use. This familiarity, in turn, may help in developing a better understanding of the demands of other road users and influence the degree of empathy felt for the road users.

No differences were found with regards to motorcycle hazard perception and total hazard perception scores between participants who have met with an accident and those who have not, as well as among the five licence tenure groups. On the former, the results confirm the previous studies on the complexity of personal experience as a determinant of self-protective behaviour. More specifically, crash or accident history is not always associated with subsequent safe behaviour (Peltzer & Renner, 2003; Weinstein, 1989). This observation is also consistent with research in the industrial sector (e.g., Gonçalves et al., 2008) that has found workers who are frequently involved in industrial accidents tend to underestimate the risks associated with their work behaviour and are more inclined to neglect safety measures (Ngueutsa & Kouabenan, 2017).

Meanwhile, one plausible explanation for the results on licence tenure might relate to the methodological limitation in assessing driving experience. It is noted that hazard perception ability is strongly related to experience, with studies showing that the more experienced the individuals are, the faster they can detect a potential hazard (e.g., Crundall, 2016; Liu, Hosking, & Lenné, 2009; Shahar et al., 2012). At the end of our experiment, some participants confessed that their driving and riding experience go beyond their licence tenure. It is likely that this unofficial driving or riding experience allowed the participants to acquire their hazard perception ability, hence, rendering them more capable of detecting the hazards.

IMPLICATIONS TO HAZARD PERCEPTION TESTS, DRIVER LICENSING POLICIES, AND TRAINING PROGRAMMES

Hazard detection has been widely recognised as a complex process involving visual detection, appraisal, and classification (Crundall, 2016); thus, failing to detect hazards while on the road can potentially lead to serious complications and even death. From our results, there seem to be differences between men and women as to how they perceive and detect hazards. As such, training programmes that adhere to gender tendencies may be an essential addition to general driving and riding education. Moreover, because the "*looked but failed to see*" phenomenon has partly been explained by the dependence of inattentional blindness on focused attention to another task (Simons & Chabris, 1999; White, 2006), a novel approach to consider gender-specific attention pattern is needed to improve the hazard perception tests in the existing graduated driver licensing systems.

The findings that the total hazard perception scores increase with having multiple skills suggest that individuals can significantly improve their visual search strategy and mental processing. This should motivate us to explore and create effective training programmes by which people can learn to perceive or survey the road situation through the eyes of both riders and drivers. In short, policies and training programmes that emphasise the importance of vigilance towards others would seem to be more relevant than ever in fostering greater awareness of all road users.

It must be noted that our results should be viewed in the context of three constraints placed upon the study. First, the video clips used in the experiment, though validated in other studies (e.g., Lim, Sheppard, & Crundall, 2013; Lim, Sheppard, & Crundall 2014), may be regarded as familiar or easy for the participants; hence, rendering it difficult to differentiate between experiences of the participants. In their study, Lim, Sheppard, and Crundall (2014) cautioned the possibility of the efficacy of the hazard perception test being compromised by the properties of the video clips. Accordingly, we confine the discussion of our results only within the scope of this study, with no attempt at generalisation beyond this particular instance.

Second, as our study only examined hazard perception, it would be interesting also to include decision-making behaviour among the road users. This can be done by looking at their ability to perceive hazards and how they react to the hazard, which is crucial because accidents or collisions happen not only because of the perceived hazard but also because of the way people judge and avoid them. Finally, we also do not discount the possibility for some degree of confounding bias due to the fact that some participants have longer experience riding or driving beyond their licence tenure. Therefore, we suggest that future studies should take into account the real driving and riding experiences of the participants, instead of looking at their types of licence and licence tenure.

CONCLUSION

The present study provides some preliminary data on the differences in hazard perception ability as a function of gender, driver types, accident history, and licence tenure. Together, the results may provide a better understanding as to why some individuals succeed while others fail in perceiving hazards. Nevertheless, considerably more research is needed to identify the exact mechanisms involved as well as to explore other potential factors that could explain the variation in this perceptual ability. Such research will provide critical information that can be used by training providers, licensing authorities, and policymakers, in designing effective hazard perception training tests and programmes.

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COMPETING INTERESTS

This study was self-funded, and the Authors declared no competing interests for this work.

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