





Using confidence interval-based estimation of relevance to determine women's emotions and perceptions of the Malaysian road environment during COVID-19


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ABSTRACT

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The road environment is one of the factors that contribute to road accidents. Extensive research has been conducted on the diversity of road users, conditions, and environments; however, it tends to be general in focus. In Malaysia, the road environment is an important element of the Critical National Information Infrastructure (CNII) agenda. As women play a greater role in a country's population growth, they are considered to hold greater responsibility for the nation's sustainability. This paper examines the road environment in Malaysia, centering on women's perceptions and using emotions as a predictor. The study data were collected via an online Google form that was specifically targeted at female drivers. A total of 93 respondents participated in the survey. The results include an R² value equal to 0.27 with a 99% confidence interval. The results indicate that emotions played a moderate role in determining women's perceptions of the on-road environment. Meanwhile, respondents with negative emotions were able to separate their cognitive processes without affecting their perception. Current research indicates that the confidence interval-based estimation of relevance (CIBER) technique is efficient at predicting behavior and is useful for behavior modification in the future, which has significant implications for policy revision and recommendations. Limitations of this research include its focus on women and reliance on data collected during the pandemic, which may be different from other events or situations. Finally, this research suggests that it would be appropriate to establish future behavior interventions among road users at the national level.

Contribution/Originality: Limited studies have been conducted on the nexus between women's emotions and driving behavior. This research employs confidence interval-based estimation of relevance to predict emotions towards the road environment, using a diamond plot to illustrate the association between women's emotion and their perceptions of the road environment.

1. INTRODUCTION

The World Health Organization (2018) has highlighted that approximately every 80 seconds, a death occurs across the globe due to road user behavior. Narrowing down this scope, statistics on road traffic injuries and deaths in Malaysia indicate that these have increased by approximately 44%. In addition, past research on accident trends and severity caused by various road users has indicated that a combination of road conditions and users' behavior contributes to road crashes (Musa, Hassan, & Mashros, 2020). However, those figures represent a broad picture and include all types of road users.

Although road crashes are inevitable, one silver lining of the COVID-19 pandemic was that it resulted in fewer opportunities for crashes to happen because various precautions regarding the movement of people were introduced (Jamil & Attiah, 2021). However, the media have reported an increase in the number of Malaysian road accidents between 2010 and 2020. In 2020, although Malaysia had just been struck by the COVID-19 virus, crash numbers were 14.6% higher than in 2019 (Gerard, 2020). This situation indicates that, regardless of the pandemic, road crashes are still likely to occur.

Although statistics on road accidents indicate slightly lower numbers than before the pandemic, the scales are balanced in other ways. For instance, data indicates that instances of depression continue to increase among Malaysian citizens. In 2020, almost half a million people were living with depression due to COVID-19 (Bernama, 2021). Moreover, in 2021, Malaysian cases of COVID-19 spiked to unexpected numbers each day (Ministry of Health, 2021). Indeed, data from the second quarter of 2021 showed a spike in COVID-19 cases in Malaysia, reaching almost 10,000 cases per day on average (Ministry of Health, 2021). Given this situation, people's hopes of a return to normal activities were crushed. It is unsurprising that this situation has caused Malaysian citizens to experience depression as they tried to adapt to new norms (Wong et al., 2021).

In light of the situation, the Malaysian government relaunched the first phase of its movement control order (MCO). The first phase of the MCO outlined unwavering rules, including the following: activities were limited, people could not drive more than six miles from their home, only one person was allowed to go outside and drive to get necessities, and children were not allowed to go out. Undoubtedly, these measures increased tension in the community and created a chain reaction of people having depression and anxiety. A short survey conducted by previous researchers in the early phase of the MCO showed that women suffered more from depression and anxiety (Bernama, 2021).

There are many reasons for this depression and anxiety, and during the pandemic, many women in developing countries held the responsibility of being family breadwinners (Sari & Fikri Zufar, 2021; Ziyae, Sadeghi, Shahamat Nejad, & Tajpour, 2021). Depression among women during the pandemic may have been due to increased domestic violence, changes in routine, and job losses (Kim, 2020). As breadwinners failed to meet the needs of their families, these tensions were elevated. Reduced movement has also been identified as a cause of anxiety, and a previous study found that a simple solution such as a short period of escape may reduce stress levels and improve well-being (Blank et al., 2018). In other words, a short escape of only a few miles can help people to reduce their stress levels. Since people were restrained from leaving their houses, most of their life activities were restricted to driving, which may also elevate stress and anxiety. Therefore, this study focused on women's emotions and their association with the road environment.

2. LITERATURE REVIEW

The road environment in every country differs in terms of layout, scenery, and conditions, and road users are also subject to different norms and expectations. The perception of the road environment in a country is very important for authorities and regulators to understand the problems and issues that may arise. Meanwhile, several factors can influence people's perception of the road environment, and most are related to their cognitive abilities and emotions.

Driving is associated with the perception of the road environment. In this context, the role of emotions in developing positive and negative perceptions of the road environment plays a crucial determinant. In this research, positive perceptions entailed regarding the Malaysian road environment as a safe place, as well as an increased willingness to drive alone, while a negative perception was the reverse, for instance, a fear of driving alone and the belief that road conditions were unsafe. Being alone can cause extreme anxiety or monophobia in women (Reddy, 2020). Indeed, anxiety is associated with perceived risk (Mesken, Hagenzieker, Rothengatter, & De Waard, 2007), which explains solitary individuals' tendency to perceive the surrounding environment negatively (Zadra & Clore, 2011).

Women are known as graceful individuals, making them vulnerable to the road environment. It has been said that women tend to display more cautious driving behavior, while men have a slightly higher tendency to speed than women (Cestac, Paran, & Delhomme, 2011). Moreover, previous research has focused on data gathering and analyzing the factors that contribute to driving behavior (Al-Balbissi, 2003; Jawi, Abu Kassim, Md Isa, Hamzah & Ghani, 2016; Macey & Schneider, 2008; Vecino-Ortiz et al., 2014). In contrast, little research has been conducted on behavior interventions pertaining to driving, especially among women in Malaysia. Even though women tend to opt for safe driving behavior, they are still exposed to dangerous situations because other road users may have higher intentions to speed (Cestac et al., 2011).

Women and femininity score positively on predicted safety skills while driving; previous authors have mentioned that "being a safe driver" is considered a neutral or feminine characteristic (Özkan & Lajunen, 2006), and driving with safety skills (adhering to rules and regulations) is women's main priority. Women, regardless of age, are less likely to use a mobile phone while driving than male drivers (Lipovac, Đerić, Tešić, Andrić, & Maric, 2017), which indicates that women are more cautious, obedient, vigilant, and compliant with rules and regulations (Degraeve, Granie, Pravossoudovitch, & Lo Monaco, 2015). These positive tendencies in women's driving behavior set a good example for society. In addition, women are better at regulating driving behavior for health reasons (Dykstra, Davis, & Conlon, 2020). This could mean that driving becomes a habit to elevate psychological health. In addition, a balanced personality has more positive emotions, contributing to a more positive perception of surroundings. Furthermore, past research has shown that those emotions influence individual perception, decision-making, learning, and memory (Brosch, Scherer, Grandjean, & Sander, 2013; Tyng, Amin, Saad, & Malik, 2017). Given these facts, it is possible that emotions positively influence women's perception of the road environment. However, sadly, female drivers are often unintentionally involved in road crashes caused by other factors, primarily other drivers and road conditions. These unfortunate events happen to female drivers because they lack knowledge and sometimes tend to deliberately deviate from those practices believed necessary to maintain road safety (Bener & Crundall, 2008). Therefore, safer practices, alertness, and positive emotions are elements contributing to safer driving practices. Previous studies have defined emotion as a psychological reaction to environmental stimuli, meaning that a driver's emotions strongly influence their behavioral intentions (Wang et al., 2020). It follows that emotions may trigger perceptions of the road environment, whether positive or negative, which influence the actions taken (behavior). This is supported by Zadra and Clore (2011), who mentioned that emotions have a strong motivating influence on how the environment is perceived.

On the other hand, in the context of driving, there are many reasons people drive. People drive because it is a routine activity that complements their need to meet the demands of the world and make a living. However, along with those reasons, there are additional elements that help spice up people's daily routines, and these are emotions. Emotions help to create arousal and inspire spiritual activities. Thus, emotions fuel people's imaginations (Ravenscroft, 2015) and steer their goals and lives. There are many terms for emotion-based imagination, and one of these is escapism. Escapism has been regarded as a form of self-deception (Longeway, 1990); in modern-day escapism, however, individuals are trying to take a break from their reality.

2.1. Escapism and Driving Behavior

Escapism has mainly been associated with traveling (Irimiás, Mitev, & Michalkó, 2021), and it is a form of therapy that people use to heal themselves. However, during the COVID-19 pandemic, the government banned travel activities for safety reasons. This included restrictions on tourism, vacations, cross-border, and any other activity involving long driving. These restrictions left people with a lack of options to pursue their passions and needs.

Although previous research has claimed that long driving is related to fatigue and tiredness (Al-Mekhlafi, Nizam Isha, & Ahmed Naji, 2021; Phillips & Sagberg, 2013) other studies have shown that driving may function as a form of emotional therapy (Lancaster University, 2016). There is evidence that before COVID-19, people were driving for escapism and as a stress-coping mechanism. This means that after a hectic day at work or juggling kids at home, people would sometimes take a long drive as therapy and to recharge. However, this behavior depends on whether they live in an urban or suburban area. In most major cities, public transportation to the workplace is accessible and has become the primary vehicle.

Nevertheless, past research has focused on mobility and escapism, meaning that people travel to escape the world's reality, take a break from their life, or even take a vacation. Driving serves as a form of escapism, and according to a study by Pecher, Lemerrier, and Celier (2021), emotions influence driving behavior; thus, negative emotions create perceptions and feelings. This research explores the role of emotions in creating perceptions; hence, the current context focuses on women's emotions and how they perceive the environment as vital for women's health and well-being. Furthermore, women play an essential role in the nation as they affect national population growth. As Malaysia becomes an aging country, it is vital to give more attention to this group.

Escapism is examined in the context of explaining the positive and negative emotions that occur while driving. Some people drive because it makes them happy, and others use driving as an emotional distraction. Indeed, a previous study proved that emotions alter driving behavior, both directly and indirectly, and affect driving attention (Steinhauser et al., 2018). Therefore, emotions can lead to different situations depending on the positive or negative state. Hence, we hypothesized that women's perceptions of Malaysia's road environment will differ depending on their emotional state.

3. MATERIALS AND METHODS

The purpose of this research was to determine the role of emotion in explaining women's perceptions of the road environment. Self-administered questionnaires were distributed among female drivers using Google Forms. To ensure female participation in the survey, clear instructions were provided at the top of the questionnaire mentioning that the survey was meant for females only. The questionnaire asked about two domains. The first concerned the emotions of driving and contained five items, and the second domain was the perception of the road environment and contained five questions. Meanwhile, social media was used as a platform and distribution channel for data collection and to find people to volunteer to participate in the study. The study's social media link was given to female-related clubs (e.g., mother and baby clubs, pregnancy groups). The data collection took place across west Malaysia. Because the actual population of female drivers in Malaysia was unknown, this study used convenience sampling for a period of three months via a social media platform. As the total population was unidentified, the return rate for the survey could not be calculated. Via social media platforms and the sharing of a link with certain groups, 93 responses were collected during the three months. Respondents answered the questions using a Likert scale ranging from 1 to 5 (1 – strongly disagree to 5 - strongly agree). The questionnaires used for the two domains were adapted from the Women's Perceptions on Road Environments (WPRE) questionnaire. The WPRE has undergone a series of expert validations and is copyright registered. It consists of seven dimensions. For the purpose of this study, researchers took only two dimensions into consideration; these were emotion and

road environment. These two domains were the study's variables. Emotions were the predictor, and the road environment was the outcome variable. Table 1 lists the items used in this study.

Table 1. List of items from the WPRE questionnaire.

Item	Factor loading
E1: Driving helps to soothe my sadness.	0.656
E2: I sometimes cry while driving.	0.517
E3: Driving helps me to forget all of my problems for a while.	0.803
E4: When I'm feeling happy, I would love to drive on a long journey.	0.813
E5: When I'm in a good mood, I consider myself highly tolerant of other drivers.	0.718
RE3: I have no misgivings about driving alone outside of my hometown.	0.789
RE4: I feel secure while driving alone at night.	0.725
RE5: Driving alone at midnight does not scare me.	0.832
RE6: I never doubt that Malaysian road conditions are the best.	0.608
RE8: Overall, I feel safe driving here in Malaysia.	0.569

Note: E: Emotion; RE: Road environment. Total item emotion value of Cronbach alpha is 0.784, AVE > 0.5; Total item road environment value of Cronbach alpha is 0.775, AVE > 0.5.

Table 1 shows the items from the WPRE with factor loading. The total Cronbach's alpha for the emotion variable is 0.78. The tests of validity and reliability were conducted in a previous study (Samah et al., 2021). The factor loading value helps determine whether the items belong to the construct. If the factor loading is at least 0.5, the item can be retained, as long as the average variant extracted (AVE) is greater than 0.5. Item E2 was retained in the study to see the differences based on different respondents and groups of people, and the AVE value did not violate the requirements. The timeline for data collection was 3 months. However, the response rate in the first month was around 50 respondents, and the remainder were gathered in the following months. A t-test was conducted to examine any differences in the data between the late and early responses to ensure that there was no bias in the rest of the analysis. It showed that the first 50 respondents were no different from the rest of the respondents (43) in the study ($p > 0.05$) in terms of the dependent variable (road environment). The result of the Shapiro-Wilks test for normality between Group 1 (early) and Group 2 (late) was $p = 0.614$. To run a t-test analysis, both the assumptions of normality and the homogeneity of the variance must not be violated. The results of the test showed that there were no violations of the assumptions of normality and equal variance. Therefore, all 93 respondents could be analyzed together without biases.

Table 2 reports the results of an independent-samples t-test to compare the perception of the road environment in Group 1 (early) and Group 2 (late). There was no significant difference between the scores of Group 1 ($M = 3.33$, $SD = 0.51$) and Group 2 ($M = 3.13$, $SD = 0.68$); $t(91) = 1.65$, $p = 0.1$. These results suggest that there were no differences between Group 1 (early) and Group 2 (late). Hence, the data collected may represent the sampled population, and the results and discussion reflect the entire sample.

After data was collected, jamovi statistical software was used to analyze the pattern of behavior change. In jamovi, a test of confidence interval-based estimation of relevance (CIBER) plot was used to determine women's emotions on perceiving the road environment. The CIBER technique was appropriate to explain emotion as a predictor variable of the perception of the road environment. Furthermore, CIBER explains the influence of the predictor (emotion) on environmental, genetic, and psychological variables. Psychological variables are used to develop an intervention aimed at behavior change (Crutzen, Peters, & Noijen, 2017). This research focused on emotions to explain their influence on perceptions, which later trigger the behavior. Hence, CIBER is an appropriate tool to study emotions and predicted behavior based on perceptions of the road environment.

Table 2. Independent sample t-test for Group 1 and Group 2 on road environment.

Road environment	Statistic	Df	P-value	F-value	Statistic
	1.65	91	0.10	0.07	1.65

Note: Significance level at 0.05; F-value is for Levene's test - value greater than 0.05 shows no violation of homogeneity of variance.

The objective of this study was to help develop behavioral interventions for women's driving behavior at the national level. Even though the rate of crashes is considered small among women, the fatality rate is hard to anticipate.

4. FINDINGS

Analysis using jamovi produces a visual plot that explains in detail the association between the left and right panels. The left panel depicts the determinant of the study (emotion) and the right panel the dependent variable. The visual in Plot 1 illustrates the analysis of the CIBER plot for determinants 'E1,' 'E2,' 'E3,' 'E4,' and 'E5' and the target 'Road Environment.' It was based on a dataset of 93 rows, all of which had complete data.

The panel explains that the majority of respondents had moderate emotions, both positive and negative. However, the E5 in the left panel explains a slightly positive emotion as it is portrayed as a diamond of blue towards greenish color. In E5, the dot that surrounds the diamond is also further to the right side of the panel. The majority of the respondents agreed that when they were feeling happy, they considered themselves tolerant drivers. The results of the left panel may have an association with those in the right panel. To conduct a CIBER analysis in jamovi, the emotion items are placed in the sub-determinants box, and the sum score of the road environment is placed in the target box.

Figures 1a and 1b depict the CIBER plot for emotions as determinants and the road environment as the target. The association between the left panel and the right panel shows $R^2 = 0.27$, meaning that 27% of the variance in the road environment was explained by the determinant (emotions). The diamonds in Figure 1a (left-hand panel) show each item's meaning with 99.99% confidence intervals. The fill color of the diamonds is indicative of the item's mean—the redder the diamond, the lower the item mean; the greener the diamond, the higher the item mean (blue denotes a mean in the middle of the scale). Therefore, the left panel indicates that most respondents fell in the middle of the scale, meaning that emotion plays an average role in perceiving the road environment. Meanwhile, the dots surrounding the diamonds show the item scores of all participants to prevent overplotting. The diamonds in Figure 1b (right-hand panel) show the association strengths (i.e., correlation coefficients with 95% confidence intervals) between individual emotions while driving and the direct measure of the perception of the road environment. The fill color of the diamonds is indicative of the association's strength and direction. The redder the diamond, the stronger and more negative the association. Meanwhile, the greener the diamond, the stronger and more positive the association. Grey diamonds indicate weaker associations. The confidence intervals of the explained variance (R^2) of the outcome (in this case the direct measurement of perceiving road environment) are depicted at the top of the figure and based on all (sub-)determinants that were included (in this case emotions). Table 3 contains an additional elaboration on the associations for each determinant.

Table 3 interprets the results of the plots (a: left and b: right). The result for E1 indicates that it has a positive and slightly weak association with the road environment. The findings can be interpreted to mean that when experiencing negative feelings, or sad feelings, most women drivers feel at ease when driving, and it helps them forget problems and sadness for a little while. In addition, the interpretation of negative feelings in E2 in panel a (left side) indicates that most respondents believe that driving is a way for them to relieve their sadness. However, panel b (right side) shows a weak association for E1 and E2, but no association with the determinants, meaning that when they are feeling sad, the perception of the road environment has nothing to do with it. As the saying goes, "don't let feelings cloud your judgment," meaning that respondents try not to allow sad feelings to affect their cognitive processes. Therefore, feelings of sadness (E1 and E2) are determinants that future research may want to consider as intervening items.

Panel A and panel B: Means and association (R) with RE ($R^2 = [0.02; 0.27]$).

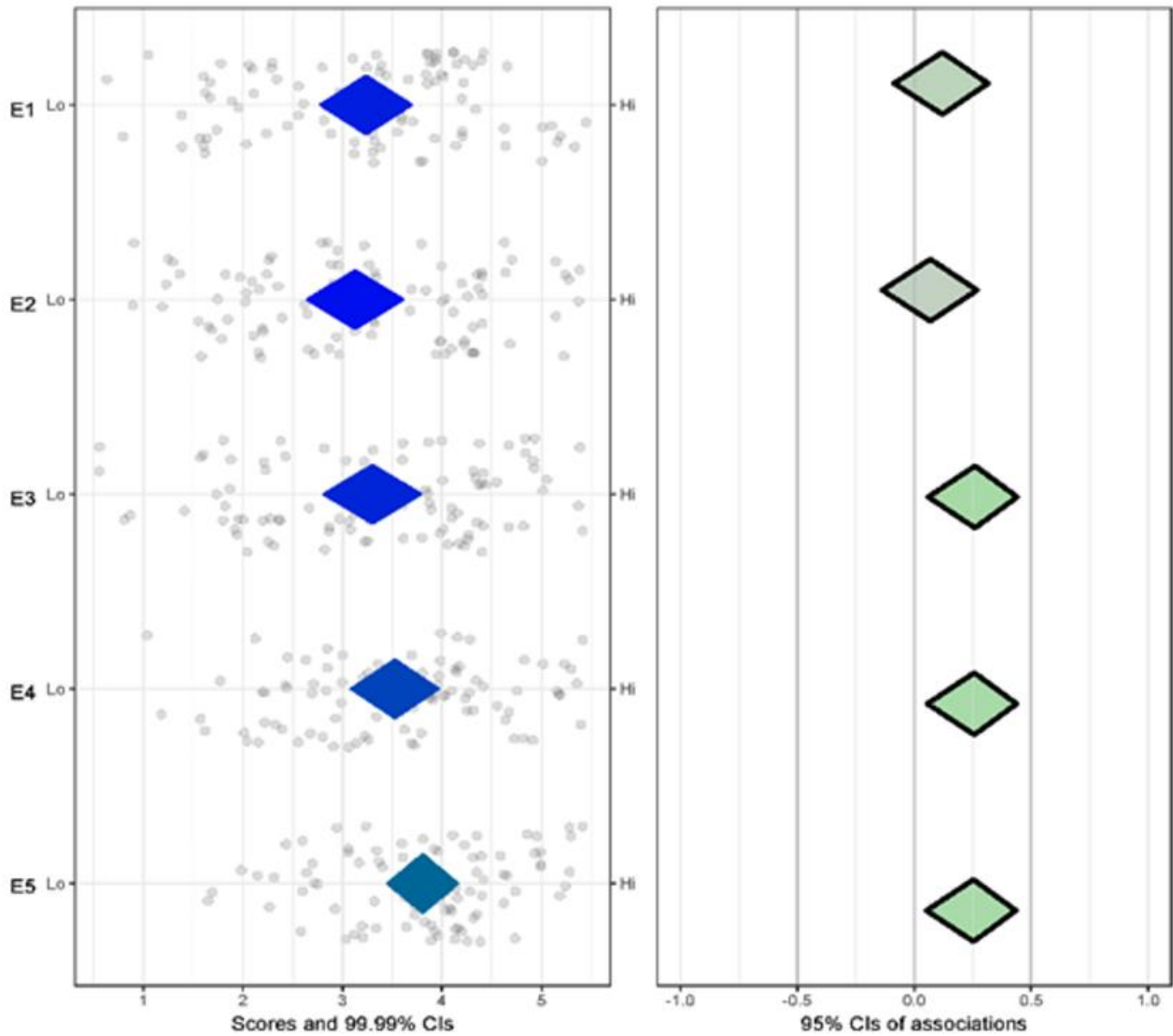


Figure 1a. Left panel CIBER plot.

Figure 1b. Right panel CIBER plot.

In E3, the majority of respondents agreed that driving helps them to forget their problems for a while. While driving, people need to pay attention to the road, and therefore they think less about the problems they have. It reveals that driving is also a means of escapism on a small scale. Meanwhile, short-term escapism is a good form of therapy; thus, there is a positive association with the road environment. Similarly, in E4, long driving is a form of emotional therapy or escapism, and the majority of respondents agreed with that. E4 has a positive association with the road environment. The results of E3 and E4 indicate that the respondents believed that driving increases their happiness and makes them forget their problems and worries. This is crucial at this time when people need to get back to routine activities like before the pandemic, and driving is actually one of the activities that continued throughout the pandemic. The routine helps them kinetically remember the good moments of life before the pandemic. Although the situation is different, the routine of driving is similar.

The results of E5 mean that women who believe that they are tolerant drivers have a more positive perception of the road environment. The result is supported by previous findings in which personality and cognition were associated with driving behavior (Al-Balbissi, 2003; Bener & Crundall, 2008; Crutzen et al., 2017). More positive inducements are needed from the authorities to instill positive perceptions and develop self-esteem among female

drivers to increase their confidence and lessen their anxiety and worry on the road. Feelings of confidence are needed for people to complete tasks and be present in the moment, which is necessary when driving.

Table 3. Association between left panel and right panel.

Determinant	A: Left panel	B: Right panel
E1: Driving helps to soothe my sadness	Blue diamond in the middle of the scale, with the dots surrounding it. It indicates that the determinant has a positive and moderate item mean.	The diamond is green with a slightly grey color. This means that with a 0.01 confidence interval, the determinant is associated with the perception of the road environment. However, the slight greyness means the association with E1 is weak.
E2: I sometimes cry while driving.	Blue diamond in the middle of the scale, with the dots surrounding it. It indicates that the determinant has a positive and moderate item mean.	The diamond is grey. There is a weak association between E2 and perception of the road environment.
E3: Driving helps me to forget all of my problems for a while.	Blue diamond in the middle of the scale, with the dots surrounding it tending more to the right. It indicates that the determinant has a positive and moderate item mean.	The diamond is green, meaning that with a 0.01 confidence interval, the determinant has an association with the perception of the road environment. This diamond plotted furthest to the right of the panel.
E4: When I'm feeling happy, I would love to drive on a long journey	Blue diamond in the middle of the scale, with the dots surrounding it tending to the right. It indicates that the determinant has a positive and moderate item mean.	The diamond is green, meaning that with a 0.01 confidence interval, the determinant has an association with the perception of the road environment.
E5: When I'm in a good mood, I consider myself highly tolerant of other drivers.	Darker blue to dark green diamond indicates a higher item mean, meaning that respondents believe that they are tolerant drivers. Furthermore, the dots surrounding the diamond tend toward the right side.	The diamond is green, meaning that with a 0.01 confidence interval, the determinant has an association with the perception of the road environment.

The results reveal that negative emotions may lead to no associations with the perception of the road environment, while positive emotions have a positive association with the road environment. Emotions have both positive and negative effects on the perception of the road environment. Furthermore, the current study also reveals that women with negative emotions can separate them from their cognitive processes so that, in turn, they do not affect their perceptions. It should be noted that women may have many different emotional states, but when it comes to their judgment, women know how to separate facts and information from the bias of perception. This is crucial because when they are aware of these differences it helps them anticipate and prevent road accidents.

5. CONCLUSIONS AND SUGGESTIONS

CIBER analysis is suitable for planning behavior interventions by studying the result of the right panel (association for each item). If there is no association between the left panel and the right panel, it means that the item is not suitable for behavior modification. Each result indicates the contribution of an item to the associations, so future interventions may want to refer to the current results. Interventions such as self-help and acquiring cognitive resources may help women manage stress and control intrusive thoughts (Juan Fernando & Muñoz, 2021). Authorities related to women, roads, and transportation may want to consider this result as a foundation for intervention programs, particularly those targeted at the determinants that are associated with the perception of the

road environment in Malaysia. As stress levels rose during the pandemic, and the movement control order (MCO) restricted driving activity (Jamil & Attiah, 2021), women needed an alternative outlet to reduce daily stress. The current research concludes that driving is a stress-coping mechanism among women. Furthermore, the findings indicate that driving can be a type of emotional therapy in the form of escapism. Therefore, authorities may want to consider encouraging women to drive by revisiting laws and regulations, especially during the MCO phases. For instance, women could be allowed to drive more than 6 miles but no more than 2 hours, for the purpose of short escapism. Such a solution may help reduce daily stress and life struggles during an MCO. Simple steps and actions on the part of the authorities may help reduce the rising incidence of depression among women in Malaysia.

The limitation of this research is that the emotional factor of escapism is related to women taking a long drive. Thus, this aspect of the research mostly covers respondents who have high mobility, such as those who have a long commute. Furthermore, this research concerning women's perceptions of the road environment did not consider age group categories. Hence, the results of this study are only applicable to explain the respondents. Nevertheless, this study forms a starting point for future researchers in Malaysia to gain behavioral insights into women using CIBER techniques, as previous studies using CIBER techniques and studying women's emotions and behavior in the road environment are scarce. Future research may want to look at differentiating between age categories as they exhibit different driving behaviors, and younger generations, regardless of gender, may engage in more risky driving behavior (Amponsah-Tawiah & Mensah, 2016). Meanwhile, different localities also impose different behaviors; women who drive in cities may have different emotions and perceptions than those who drive in rural areas. As this study's respondents lived in both urban and rural areas of west Malaysia, the results in the left panel of the CIBER plot were all shades of blue (denoting mid-range). Therefore, future research may want to segregate and explore the differences in women's emotions when driving in urban and rural areas.

Regarding its contribution to the literature, this research shows that positive emotions influence a driver's perception of the road environment, which is an important factor in determining driving behavior. Meanwhile, a study by Lancaster University (2016) mentioned that the influence of positive emotions on driving behavior is unclear because of a lack of empirical evidence. Consequently, this research contributes to the field of study, although more study is warranted. Furthermore, data were collected during the pandemic, which influenced people's decisions to travel (Pawar, Yadav, Choudhary, & Velaga, 2021). This, in turn, affected their driving skills and behavior.

Apart from that, the findings of this research also contribute significantly to the Critical National Information Infrastructure (CNII) in Malaysia's National Transport Policy 2019–2030. The results provide information on the current trends in a growing and aging population. As women become part of the national agenda to sustain the nation's population, these findings may contribute to policies concerning the mortality rate of women in the road environment. The results of this study will also be beneficial to the New Car Assessment Program of Southeast Asian Countries (ASEAN NCAP), especially in providing data for the ASEAN NCAP roadmap 2021–2025, the Malaysian Institute of Road Safety Research (MIROS), and the Ministry of Health (MOH) to help women in Malaysia in the face of the COVID-19 pandemic and to prevent more women being involved in road crashes. Future research should involve a quantitative survey at a larger scale using the current determinants. As this research was conducted under pandemic conditions, future research may consider looking at the post-pandemic situation; the results may vary due to the changing enforcement of rules and regulations, such as the lifting of the MCO. Regardless of changing attitudes and preferences, new norms of mobility may have varying outcomes (Ceccato, Rossi, & Gastaldi, 2021).

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