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The Role of Emotional Intelligence and Social Cognitive Variables in Driving Behavior: A Simulator Study

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ABSTRACT

The present study was explored whether emotional intelligence and social cognitive variables were related to risky driving behavior (speed and lane deviation). Driving behavior was considered as a key predictive factor in road traffic accidents. In this study, the sample were comprised 75 adults between 20- 30 years old (M = 26.80, SD = 3.175) who currently held a valid driver's license. Emotional Intelligence was assessed via self-report using the EQ-i - Bar-on Emotional Quotient Inventory (EQ-i), and driving behavior was measured using a driving simulator. Different driving behaviors were recorded including speed and lane deviation. The objective data obtained from the simulator were compared to scores result from the emotional Intelligence. Spearman correlations were revealed that age, driving experience and accident cases were related to driving behavior. There was a significant negative relationship among the average speed on roads with subscales of EI except in assertiveness (r=.448). The average speed was correlated positively with assertiveness. The lane deviation score showed significant negative relationship with subscales of EI except in assertiveness (r=.873). This study proposed that programs should be developed to change the attitude of drivers to engage in risky behavior and encourage safe and responsible. It may lead to safer behavior in traffic and a reduction in the number of accidents.

Keywords: *Driving Behavior, Emotional Intelligence, Social Cognitive Variables*

INTRODUCTION

The traffic safety problem and the role of Risky Driving Behavior (RDB): Road traffic accidents and fatalities represent a serious social, economic and public management problem worldwide[1]. This problem constitutes a significant source of morbidity and mortality among the drivers, and both the economic and personal costs of these accidents are notable. According to World Health Organization (WHO) report, 1.25 million people lost their lives due to traffic accidents in 2015[2]. The World Health Organization (2015) report about Iran showed that motor vehicle rashes were the third leading cause of mortality in 2012.

According to the intensive consequences caused by traffic accidents, efforts have been put on the investigation regarding accident causes. Having considered these, some factors were documented to explain root causes of traffic accidents, such as vehicular and roadway factors and individual factors [3].

Drivers' behaviors were highlighted as a key contributor in road crashes. Evidence was demonstrates that not all drivers behave in the same way in road. Researches on differences between drivers were proved the drivers individual differences.

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Drivers behavioral tendencies consist of driving speed, lane deviation, distance to a preceding vehicle, overtaking other vehicles and tendency to commit traffic violations [4]. These driving tendencies were usually mentioned using the term "driving style" [5]. Accordingly, drivers were typically specified as, for instance, careful, risky or aggressive drivers [6].

Many individuals engage in driving behaviors that are risky either unintentional or with the intention to ''take the risk" [7]. RDB is a considerable contributor in motor vehicle crashes [8]. RDBs are known as one of the major preventable road traffic incidents causes which increase the possibility of injuries and damages both drivers and other road users. RDBs defined as any driver's behavior that may increase the probability of car accident in road [9]. Risky driving behaviors were firmly recognized as a key contributor to road accident, and many studies have observed a relationship among RDBs and road crashes[8]. Unauthorized speed and lane deviation are two important risky driving-related behaviors in terms of their contribution to road crashes.

Emotional intelligence and risky driving behavior (RDB): The roles of a number of external contributory factors in engagement in RDB were investigated in some studies. However, emerging research was highlighted the possible modifiable role of individual differences (e.g., emotional intelligence) as a determinant of these behaviors [10, 11]. Emotional intelligence has long been recognized as important individual factors that are closely linked with RDBs and road incidents. Emotional Intelligence (EI) construct is ability to understand people's emotions and to regulate one's own emotions seem to be very important in drivers that introduced by Salovey and Mayer [12]. In other words, EI refers to one's ability to be aware of one's own feelings, to be aware of other feelings, to differentiate among them, and to use the information to guide one's own thought and behavior [13].

Although, understanding about the role of EI in driving behaviors is limited. But, studies show a negative link between EI and other affective factors which have a proven relationship with RDBs, such as higher stress and aggression levels. It seems that individuals with poor emotional skills are more likely to ineffectually deal with stressful situations which may increasingly lead them to acting out in an aggressive manner by disobey rules or adopting risky behaviors [14]. Current studies on safe driving were focused mainly on the model of Emotional Intelligence ability. These studies showed that the construct negatively relates with variables commonly associated with RDBs, including illegal drug use and alcohol drinking [15-16], and with variables more in line with the construct of risky driving, such as physical conflict [15]. However, there are limited studies specifically investigated the relationship between EI and outcomes representing the actual driving behaviors [17]. For instance, it seems that risky drivers have lower EI levels than safe drivers [18], and that low levels of EI are positively associated with self-reported risk driving behaviors such as unauthorized speed, risk-taking tendency, alcohol and other drugs consumption [17]. Therefore, higher EI can be presumed to be associated to less emotional interferences with driving and, in turn, to a greater road safety [19]. Evidence was demonstrated that Emotional Intelligence is a special mental ability that can be reliably measured. However, there is yet little clarity to what EI predicts [20-23].

While several studies were demonstrated a link between EI and some RDBs, but there is a lack of knowledge about the effect of EI on the RDBs such as: unauthorized speed and lane deviation. Worldwide, the use of inappropriate or excessive speed and lane deviations by drivers is widely recognized as one of an overall safety problem. Many accident reports, studies and researches approved that lane deviation and unauthorized speed are primary factors in more than one third of fatal accidents and aggravating factors in all incidents [24-27]. Therefore, it is very important to focus on studies pinpointing effective measures that could tackle this fatal safety problem and reduce accident.

Objectives:

One of the main objectives of the present study was to identify individual's driving styles. This study was focused on driving behaviors consist of: speed and lane deviation.

Another important objective of the present study was to assess whether the individual dimensions of EI were implicated in risky driving behavior (RDB). In this research, driving behavior was measured on the road "using questionnaire (completed by the driver) or checklist (completed by the researcher)" or recording the events in a driving simulator. The use of a driving

simulator in research has several advantages than the use of a vehicle on public roads [28]. A driving simulator provides the same situation and more control among different drivers and allows eliciting particular behaviors in conditions that may be difficult to realize, unsafe or impracticable in the real world [29]. Driving simulator provides condition of risky behavior or positions without common threats for the drivers themselves, and also allows participants to practice trends that are difficult to practice on the roads, because of the limitations on real-life style. A controlled environment creates special conditions. Finally, makes it easier to elicit data for analyses regarding driver, the vehicle and the environment. Although, driving simulator application may have disadvantages that may affect the test. But, the fidelity of the simulator may influence the performance of the driver. Some drivers explicate events and conditions in a simulator as less dangerous compared to the same type of events and conditions on the road, since no one will be injured when occurred an accident in the simulator [28]. Nevertheless, many studies were demonstrated that a driving simulator is a valid instrument for the study of driving behavior. For instance, the study found good agreement between the output of a driving simulator and the behavior at the entrance of an underground road [30]. Another study obtained good agreement between average corridor-level of travel time, Low speed and high speed and the number of lane deviations in a driving simulator and on the road [31]. Meuleners, L. and M. Fraserfound concluded good agreement between the speed at intersections, maintaining speed, obeying traffic lights and stop signs in a simulator and on the road [32]. Having considered all above, in this study decided to use a driving simulator as a valid measurement tool for driving behavior.

In the following, a method was described that is used to characterize driving behavior within a driving simulator and evaluation of the relationship between EI and RDB.

METHODOLOGY

Procedure: The study involved two tasks, completing the EQ-i questionnaire by participants and driving in the driving simulator. The test scenario included an inter-urban road that participants, depending on the average speeds, took different times to complete. The implementation of the test was individual. Approximate distance driven in the test scenario was 10 km. Participants were instructed to drive in the simulator as they would normally drive in their own vehicle.

Participants: The study was utilized a sample of 75 Iranian adults (100% male) aged between 20- 30 years, of which they drive in the Tehran, completed the EQ-i questionnaire and volunteered to participate in the driving simulator part. This research project was conducted at the Iran University of Medical Sciences laboratory. Inclusion criteria for the current study required participants to be willingness to participate in the study, the lack of psychotherapy, drug addiction and alcohol consumption, holding a valid Iranian driver's license, at least 40 h driving per week as a job and at least one year of driving experience [33].

Questionnaire: The EQ-i - Bar-on Emotional Quotient Inventory[34, 35] was utilized to assess each participant's level of EI and its dimensions. The EQ-i was standardized in Iran by Dehshiri [36] and the number of items reduced to 90 questions, where respondents indicate on a 5-point Likert scale (1= "Very seldom or not true of me"; 5="Very often true of me"). Higher scores indicate better performance in the EI and its dimensions.

The EQ-i comprises fifteen sub-scales; Problem Solving, Happiness, Independence, Stress Tolerance, Self-Actualization, Emotional Self-Awareness, Reality Testing, Interpersonal Relationship, Optimism, Self-Reliance, Impulse Control, Flexibility, Social Responsibility, Empathy and Assertiveness. Each subscale has 6 items. Finally, this section describes the meaning of scores for the Total EQ-i scale and each of the EQ-i content scales. In general, high results identify areas of relative strength. Results in the midrange on these scales indicate satisfactory functioning. Low results indicate areas that need to be improved in order to increase overall emotional and social intelligence. If all the results are high or all results are low, it is useful to identify the scales with the highest and lowest results; this will help pinpoint areas of relative strength or weakness.

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Simulated road scenario: A driving simulator was used to assess driving behavior, the body of a Pride car manufactured by Saipa company with actual equipment consist of a car seat, steering wheel, pedals, indicators, graphics card, displays and the mirrors, gear lever and a handbrake. The renderings process were visualized on three 29 in. Speed and lane changes were logged by the simulator (Figure 1).

In the driving simulator section, the average and maximum speed in km/h and the average and maximum lane deviation in meter were calculated per participant. ***Statistical analyses:*** Measures of driving behavior were included the mean and standard deviation of speed and lane deviation recorded by the driving simulator. A large value of the standard deviation of lane deviation shows poorer lane-keeping behavior with a higher risk of lane deflection and clash with other vehicles in the near lanes.

Fig. 1. Screenshot of driving simulator environment

RESULTS

The participants were selected between 20-30 years old, and age mean of 26.80 years (SD: 3.175) (see Table 1

The means and standard deviations of the scores resulting measured variables, as well as the mean, standard deviation and maximum of speed (M=100.77 km/h, SD=9.49 and MAX=112.61 km/h) and mean, standard deviation and maximum of lane deviation (M=1.106 m, SD=0.449 and MAX=3.246 m) have presented in Table 2.

The means and standard deviations for the EQ-i sub-scales were calculated and have shown in Table 3.).

The spearman correlation coefficients between the driving behavior scores resulting from the driving simulator and some social cognitive variables were calculated and indicated in Table 4. Age is negatively correlated with speed (r=-0.874) and lane deviation (r=-0.739). So, it means that older drivers tend to have lower average speed and less deviation within the lane.

Accident cases were positively correlated with score for speed (r=0.603) and with lane deviation (r=0.128). This means that with increasing speed and lane deviation, road accidents are also rising.

Table 5 provides an overview of the spearman correlations between the driving behaviors scores resulting from the measured variables in driving simulator and EI scores resulting from EQ-i questionnaire.

As shown in Table 5, some of EI subscales showed a significant relationship between speed and lane deviation. There was a significant negative relationship between the average speed on roads with Happiness (r=-.683), Stress Tolerance (r=-.717),

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Reality Testing (r=-.707), Interpersonal Relationship (r=-.851), Impulse Control (r=-.696), Flexibility (r=-.761) and Social Responsibility (r=-.761). This means that drivers who had a higher score for EI score had a lower average speed on roads. In contrast, the average speed correlated positively with Assertiveness (r=.448). Lastly, the lane deviation score showed significant negative relationship with Happiness (r=-.754), Independence (r=-.363), Stress Tolerance (r=-.787), Emotional Self-Awareness (r=-.109), Reality Testing (r=-.924), Interpersonal Relationship (r=-.751), Self-Reliance (r=-.229), Impulse Control (r=-.750), Social Responsibility (r=-.544).Similar to the average speed, the average lane deviation correlated positively with Assertiveness (r=.873).

Table 1. Characteristics of drivers (N=75)

Variables	Groups	%	Mean±SD
Age	20-25	21.3	26.80±3.175
	26-30	78.7	
Education	<diploma	51	
	diploma	21.3	
	academic	10.7	
Marital status	Single	28	
	married	72	
Driving experience			9.33±1.563
Accident Cases	0	20.0	
	1	32.0	
	2	29.3	1.52±1.119
	3	13.3	
	4	5.3	

Table 2. Mean, Standard Deviations, Min and Max scores for behavioral measures

Variable	Mean	Median	SD	Min	Max
Average Speed (Km/H)	100.77	97.43	9.49	86.28	134.56
Max Speed (Km/H)	112.61	104.55	16.44	91.49	143.61
Average Lane Deviation (M)	1.106	0.968	0.449	0.570	2.90
Max Lane Deviation (M)	3.246	3.110	0.917	1.930	4.610

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Table 3. *Means and Standard Deviations (SD) of the EQ-i questionnaire indices.*

EQ subscales	Mean	SD
Problem Solving	21.89	3.025
Happiness	14.60	4.635
Independence	22.57	2.858
Stress Tolerance	14.17	4.409
Self-Actualization	21.80	3.869
Emotional Self-Awareness	23.13	3.569
Reality Testing	16.40	4.448
Interpersonal Relationship	17.27	4.328
Optimism	22.09	3.180
Self-Reliance	22.67	2.924
Impulse Control	13.65	4.434
Flexibility	15.33	4.160
Social Responsibility	13.87	4.038
Empathy	17.00	4.034
Assertiveness	20.84	4.905

Table 4. *Correlation coefficients between the driving behaviors and social cognitive variables*

Variables	Average speed	Average lane deviation
	Correlation Coefficient (r)	Correlation Coefficient (r)
Age	-0.874**	-0.739**
Driving Experience	0.335	-0.244*
Accident Cases	0.603**	0.128**

** Significant at the 0.05 level, ** Significant at the 0.001 level*

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Table 5. Correlation coefficients between the driving behaviors and three emotional intelligence scores

Behavioral measures	**Average speed**	**Average lane deviation**
EQ subscales	**Correlation Coefficient (r)**	**Correlation Coefficient (r)**
Problem solving	-.041	.081
Happiness	-.683**	-.754**
Independence	-.198	-.363**
Stress Tolerance	-.717**	-.787**
Self-Actualization	-.180	-.028
Emotional Self-Awareness	-.110	-.109**
Reality Testing	-.707**	-.924*
Interpersonal Relationship	-.851**	-.751**
Optimism	-.202	-.120
Self-Reliance	-.132	-.229*
Impulse Control	-.696**	-.750**
Flexibility	-.761**	-.747**
Social Responsibility	-.761**	-.544*
Empathy	-.675	-.307
Assertiveness	.448**	.873*

** Significant at the 0.05 level, ** Significant at the 0.001 level*

DISCUSSION

Actually, the major interest was to examine which dimensions of EI that was most important to understand driving behavior in traffic using a simulating study design. A driving simulator plays a considerable role in studying traffic safety. This study was used a driving simulator with necessary capabilities. Consistent with prior research [19, 37-41], the findings from the current study showed that age is strongly negative related to average speed and lane deviation. Although, according to result of Arnau-Sabatés et al. study, age could have an indirect effect on risky driving behaviors [17]. The relationship between driving experience with average lane deviation was weak. This finding is also supported by Tao et al[40].The results of Arnau-Sabatés et al.[17] study showed that driving experience and age are not correlated with risky driving behavior. Similar with Scott-Parker et al. (2017) study, this study also found that participants with a high score in average speed and lane deviation reported the greatest proportion of accident cases.

The assumption, that EI influence driving behavior, is supported in the present study. In Hayley [19] study, EIemerged as a significant predictor of driving behavior. This relationship is also supported

by Sani et al.[42], Tabibi et al.[43],Özkan et al. [44]and Rivers et al.[10], Arnau-Sabatés et al.[17], Brackettet al. [15], Scott-Parker [45] and Smorti et al. This study showed that some differences were also observed between EI subscales and each driving behavior factor. In this relationship, higher happiness, stress tolerance, reality testing, interpersonal relationship, impulse control, flexibility and social responsibility scores were associated with lower scores for the speeding factor, and greater happiness, independence, stress tolerance, emotional, self-awareness, reality testing, interpersonal relationship, self-reliance, impulse control, flexibility and social responsibility scores corresponded to less scores for the lane deviation factor. This is consistent with the observations of Arnau-Sabatés.

From EI subscales, assertiveness has a direct relationship with speed and lane deviation. One possible explanation to this result is that people with high assertiveness, in heavy traffic conditions and etc. tend to display their skills, such as speed and lane deviation.

CONCLUSION

This study was examined relationships between EI and social cognitive variables with driving behaviors. EI as an ability of perceiving, using, understanding, and managing emotions, was measured by the EQ-i questionnaire; driving behaviors were measured by a driving simulator.

This study highlights that EI has a significant effect on average speed and lane deviation in the road. Individuals with lower scores for the EI had a higher average speed and lane deviation than Individuals with higher scores for the EI. Drivers with high speeds could not drive within the defined line range, so it can be concluded that with increasing speed and consequently increasing the lane deviations to the left and right, the chance of accidents would also increase. This study's suggestion is to inform the drivers for a better understanding of the role of EI on dangerous driving and their ability to control emotions, which may assist in identifying and implementing better ways to manage safe driving behaviors and to sum up, programs should be developed for change the attitude of road users that are more likely to engage in risky behavior and encourage safe and responsible drivers with the aim of facilitating safer behavior in traffic and reducing the number of accidents.

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CONFLICTS OF INTEREST

The authors have no conflict of interests to declare.

REFERENCES

1. Fernandes, R, Hatfield J & Soames Job R.F. A systematic investigation of the differential predictors for speeding, drink-driving, driving while fatigued, and not wearing a seat belt, among young drivers. *Transport Res F Traffic Psychol Behav*, 2010. 13(3): p. 179-196.
2. Organization WH, Global Status Report on Road Safety 2015. Geneva, Switzerland: *World Health Organization*. 2017.
3. Berdoulat E, Vavassori D & Sastre MTM. Driving anger, emotional and instrumental aggressiveness, and impulsiveness in the prediction of aggressive and transgressive driving. *Accid Anal Prev*, 2013. 50: p. 758-767.
4. Elander J, West R & French D. Behavioral correlates of individual differences in road-traffic crash risk: An examination of methods and findings. *Psychol Bull.* 1993. 113(2): p. 279.
5. Ishibashi M, Okuwa M, Doi Sh & Akamatsu M. Indices for characterizing driving style and their relevance to car following behavior. *SICE, 2007 Annual Conference IEEE*. 2007.
6. Taubman-Ben-Ari O, Mikulincer M, & Gillath O. The multidimensional driving style inventory-scale construct and validation. *Accid Anal Prev,* 2004. 36(3): p. 323-332.
7. Clarke, DD, Ward P, & Truman W. Voluntary risk taking and skill deficits in young driver accidents in the UK. *Accid Anal Prev,* 2005. 37(3): p. 523-529.
8. Iversen H. Risk-taking attitudes and risky driving behaviour. *Transport Res F Traffic Psychol Behav*. 2004. 7(3): p. 135-150.
9. Dula Chris S. Validity and reliability assessment of a dangerous driving self-report measure. *Virginia Tech.* 2003.

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10. Rivers SE, Brackett MA, Omori M, Sickler Cole, Bertoli MC, & Salovey P. Emotion skills as a protective factor for risky behaviors among college students. *J Coll Student Dev*, 2013. 54(2): p. 172-183.
11. Wozniak RL. Risky sexual behaviors in adolescence: their relationship to social-emotional intelligence. *Alfred University, Alfred, NY*. 2013
12. Salovey P, & Mayer JD. Emotional intelligence. *APA psycnet*. 2004. 9(3): p. 1–27.
13. Nikolaou I & Tsaousis I. Emotional intelligence in the workplace: Exploring its effects on occupational stress and organizational commitment. *Int J Organ Anal*, 2002. 10(4): p. 327-342.
14. Downey LA, PJ Johnston, Hansen K, Birney J & Stough Professor C. Investigating the mediating effects of emotional intelligence and coping on problem behaviours in adolescents. *Aust J Psychol*, 2010. 62(1): p. 20-29.
15. Brackett MA, Mayer JD, & Warner RM. Emotional intelligence and its relation to everyday behaviour. *Pers Indiv Differ*, 2004. 36(6): p. 1387-1402.
16. Trinidad DR, & Johnson CA. The association between emotional intelligence and early adolescent tobacco and alcohol use. *Pers Indiv Differ*, 2002. 32(1): p. 95-105.
17. Arnau-Sabatés L, Sala-Roca J & Jariot-Garcia M. Emotional abilities as predictors of risky driving behavior among a cohort of middle aged drivers. *Accid Anal Prev*, 2012. 45: p. 818-825.
18. Falahi S & Goudarzi M. Comparing the emotional intelligence and driving behaviors between the safe and risky drivers of Marivan Township. *(SCI) Science Arena Publications Specialty Journal of Psychology and Management*. 2015. 1(4): p. 60-69.
19. Hayley AC, Ridder BD, Stough C, Ford TC &. Downey LA. Emotional intelligence and risky driving behaviour in adults. *Transport Res F Traffic Psychol Behav*, 2017. 49: p. 124-131.
20. Brackett MA & Mayer JD. Convergent, discriminant, and incremental validity of competing measures of emotional intelligence. *Pers Soc Psychol Bull*, 2003. 29(9): p. 1147-1158.
21. Ciarrochi J, Chan AYC & Bajgar J. Measuring emotional intelligence. Emotional intelligence in everyday life. *Pers Indiv Differ*, 2001: p. 25-45.
22. Mayer JD, Caruso DR & Salovey P. Emotional intelligence meets traditional standards for an intelligence. *Intelligence*, 1999. 27(4): p. 267-298.
23. Mayer JD, Salovey PCDRB & Sitarenios G. *Measuring emotional intelligence with the MSCEIT V2. 0. APA psycnet.*, 2003. 3(1): p. 97.
24. World Health Organization (WHO). (2017). Managing speed report name. Available at: http://www.who.int/violence_injury_prevention/publications/road_traffic/managing speed/en/. Accessed March 20, 2018.
25. European Transport Safety Council (ETSC). (2017). Ranking EU progress on road safety. In 11th annual road safety performance index (PIN) report. Accessed March 22, 2018.
26. International Transport Forum (ITF). (2017), Road safety annual report 2017, OECD Publishing, Paris. http://dx.doi.org/10.1787/irtad-2017-en. Accessed March 18, 2018.
27. Calvi, A. Investigating the effectiveness of perceptual treatments on a crest vertical curve: A driving simulator study. *Transport Res F Traffic Psychol Behav*, 2018. 58: p. 1074-1086.
28. Helman S & Reed N. Validation of the driver behaviour questionnaire using behavioural data from an instrumented vehicle and high-fidelity driving simulator. *Accid Anal Prev*, 2015. 75: p. 245-251.
29. Reimer B, D'Ambrosio LA, Coughlin JF, Kafrissen ME & Biederman J. Using self-reported data to assess the validity of driving simulation data. *Behav Res Meth*, 2006. 38(2): p. 314-324.
30. Changbin C, Junhua W & Yangming L. Driving simulator validation for research on driving behavior at entrance of urban underground road. *IEEE* (in International Conference on Transportation Information and Safety (ICTIS)) , 2015.
31. Zhao Y, Hou Y, Wagh A, Huang Sh, Hulme K, Qiao Ch & Sadek AW. *A* Partial Reality Experimental System for Human-in-the-Loop Testing of Connected and Automated Vehicle Applications: Development, Validation and Applications, *Road Vehicle Automation journal name*. 2014,. p. 185-196.
32. Meuleners L & Fraser M. A validation study of driving errors using a driving simulator. *Transport Res F Traffic Psychol Behav*, 2015. 29: p. 14-21.
33. Jamalizadeh Z, Variani AS, Asivandzadeh E & Ahmadi S. The association between road traffic noise exposure and annoyance. *Journal of Air Pollution and Health*, 2018. 3(1): p. 17-24.

34. Bar-On R. Development of the Bar-On EQ-i: A measure of emotional intelligence and social intelligence. *Toronto: Multi-Health Systems*, 1997.
35. Bar-On R. The emotional intelligence inventory (EQ-I): Technical manual. *Toronto, Canada: Multi-Health Systems*, 1997.
36. Dehshiri GHR. Relationship between emotional intelligence and student academic achievement. *Counseling Research And Development*, 2006. 5(18): p. 97-106.
37. Weng J & Meng Q. Effects of environment, vehicle and driver characteristics on risky driving behavior at work zones. *Saf Sci*, 2012. 50(4): p. 1034-1042.
38. Sarma KM, Carey RN, Kervick AA & Bimpeh Y. Psychological factors associated with indices of risky, reckless and cautious driving in a national sample of drivers in the Republic of Ireland. *Accid Anal Prev*, 2013. 50: p. 1226-1235.
39. Van Huysduynen HH, Terken J & Eggen B. The relation between self-reported driving style and driving behaviour. A simulator study. *Transport Res F Traffic Psychol Behav*, 2018. 56: p. 245-255.
40. Tao D, Zhang R & Qu X. The role of personality traits and driving experience in self-reported risky driving behaviors and accident risk among Chinese drivers. *Accid Anal Prev*, 2017. 99: p. 228-235.
41. Scott-Parker B & Oviedo-Trespalacios O. Young driver risky behaviour and predictors of crash risk in Australia, New Zealand and Colombia: Same but different? *Accid Anal Prev*, 2017. 99: p. 30-38.
42. Sani SRH, Tabibib Z, Fadardi JS & Stavrinos D. Aggression, emotional self-regulation, attentional bias, and cognitive inhibition predict risky driving behavior. *Accid Anal Prev*, 2017. 109: p. 78-88.
43. Tabibi Z, Borzabadi HH, Stavrinos D & Mashhadi A. Predicting aberrant driving behaviour: The role of executive function. *Transport Res F Traffic Psychol Behav*, 2015. 34: p. 18-28.
44. Özkan T, Lajunen T, .Chliaoutakis JEl, Parker D & Summala H. Cross-cultural differences in driving behaviours: A comparison of six countries. *Transport Res F Traffic Psychol Behav*, 2006. 9(3): p. 227-242.
45. Scott-Parker B. Emotions, behaviour, and the adolescent driver: a study review. *Transport Res F Traffic Psychol Behav*, 2017. 50: p. 1-37.
46. Smorti M, Andrei F & Trombini E. Trait emotional intelligence, personality traits and social desirability in dangerous driving. *Transport Res F Traffic Psychol Behav*, 2018. 58: p. 115-122.

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