

Araştırma Makalesi

## The Relationship between Dispositional Affect and Traffic Locus of Control in Driving

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### Abstract

The locus of control and dispositional affect of drivers has been claimed to influence driver behaviors. The positive affect and internal locus of control were usually claimed to be related to safety behaviors, whereas negative affect and external locus of control were shown as related to risky behaviors. To investigate the locus of control in the traffic context, multidimensional traffic locus of control (T-LOC) was developed with four dimensions; self, other drivers, vehicle/environment, and fate. In the current study, these four dimensions were used to investigate traffic locus of control. Even though traffic locus of control and affect factors are widely referred to as related to driver behaviors, their relationship has not been investigated. The aim of this study is to investigate the relationship between drivers' traffic locus of control and dispositional affect. The results showed that positive affect was related to attributing to other drivers and fate rather than their behaviors. On the other hand, negative affect led drivers to attribute causes of accidents to their behavior. The implications of the results, the limitations of the study, and the future directions were discussed.

*Keywords:* road safety, driver safety, traffic locus of control, negative affect, positive affect

## Sürücülerin Genel Duygu Durumu ve Trafik Kontrol Odakları Arasındaki İlişki

### Öz

Sürücülerin kontrol odaklarının ve genel duygu durumlarının sürücü davranışları üzerinde etkisi olduğu düşünülmektedir. Genel olarak, pozitif duygu durumu ve içsel kontrol odağı güvenli davranışlarla ilişkilendirilirken, negatif duygu durumu ve dışsal kontrol odağı riskli davranışlarla ilişkili bulunmuştur. Kontrol odağı faktörünü sürücülük kapsamında incelemek için Çok Boyutlu Trafik Kontrol Odağı Ölçeği geliştirilmiştir. Bu ölçekte dört boyut ortaya çıkmıştır; benlik, diğer sürücüler, araç/çevre ve kader oluşturmaktadır. Literatürde genel duygu durumu ve trafikte kontrol odağı faktörlerinin sürücü güvenliği ile ilişkisi sıkça bahsedilmiş olmasına rağmen bu faktörler arasındaki ilişki henüz çalışılmamıştır. Bundan yola çıkarak, çalışmanın amacı sürücülerin trafik kontrol odakları ile duygu durumları arasındaki ilişkiyi incelemektir. Çalışmanın sonuçlarına göre, pozitif duygu durumu, sürücülerin kaza sonuçlarını kendi davranışlarından ziyade diğer sürücüler ve kader faktörlerine atfetmeleri ile ilişkili bulunmuştur. Diğer yandan, negatif duygu durumu ise sürücülerin kazaları kendi davranışlarına atfetmesi ile ilişki bulunmuştur. Sonuçlar ile birlikte çalışmanın kısıtlılıkları ve gelecek çalışmalar için öneriler tartışılmıştır.

*Anahtar Kelimeler:* yol güvenliği, sürücü davranışları, kontrol odağı, pozitif duygu durumu, negatif duygu durumu

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## The Relationship between Dispositional Affect and Traffic Locus of Control in Driving

According to the latest report of the World Health Organization on Road Safety (2018), 1.35 million people died on roads in 2018. Even worse, the fatalities due to traffic accidents are the leading cause of deaths of children and young adults (age of 5-29). According to the monthly reports of the Turkish Security General Directorate (Emniyet Genel Müdürlüğü, 2021), 42283 traffic accidents with 254 fatalities occurred in Turkey in September 2021. Moreover, 99% of defective fractions belong to the road users (drivers, pedestrians, cyclists), and 1% is related to environmental and vehicular factors. Several factors such as age and gender of drivers (Taubman-Ben Ari & Yehiel, 2012), the experience level (Borowsky, Shinar & Oron-Gilad, 2010; Deery, 1999), and personality characteristics contributed to the possibility of involving serious traffic accidents. Personality factors related to involving in an accident ranged variedly. It was suggested that personality characteristics such as neuroticism (Taubman-Ben Ari & Yehiel, 2012), thrill-seeking, and impulsiveness (Beirness, 1993) were significantly related to aberrant driver behavior, in turn, serious traffic accidents. These personality characteristics were stable; thus, their effect on driver behavior might have resistance to change. However, other personality characteristics may change over time, so they should be focused on, such as control beliefs.

### 1.1. The Locus of Control (LOC)

The drivers' control belief about who/what controls the life events was addressed as a notable factor leading drivers to aberrant or safe driver behaviors (Beirness, 1993). Recent studies showed that control beliefs could determine individuals' behaviors on many conditions, such as business/career-related issues (Asante & Affum-Osei, 2019; Mulki & Lassk, 2019; Ulas & Yıldırım, 2019; Xiao, Wu & Liao, 2018); academic-related issues (Bang, Chang, Lee, Kim & Taliaferro, 2019; Chukwuorji, Ituma & Ugwu, 2018; Prihadi et al., 2018); health-related issues (Cheng & Fumham, 2019; Hovenkamp-Hermelink et al., 2019; Golding et al., 2019; Radcliff et al., 2018) and safety behaviors (Dave, Mesarosova, Siegling, Tremblay & Saklofske, 2019; Haas & Yorio, 2019; Nykänen, Salmela-Aro, Tolvanen & Vuori, 2019).

According to Rotter (1966), individuals believed what/who controls the reinforcements of punishments they will get. These beliefs could be categorized into two groups: internal locus of control where individuals believed in their own control over events and outcomes, and external locus of control where they believed in external factors' control over events and outcomes. Rotter (1975) suggested that novel or ambiguous situations heighten the effect of the locus of control on people's behavior. When information is insufficient, individuals try to give meaning to what is going on based on their inferences (Folkman, 1984) on who controls the situation. Even though the number of accidents worldwide is at an alarming rate (1.35 billion people per year) (WHO, 2018), the occurrence rate in proportion to the number of cars in traffic might be seen as a rare event. Thus, accident-leading situations could be considered as novel situations. In accordance with Rotter's statement, the locus of control should take an essential role in determining driver behavior in traffic. Anderson (1977) also suggested that the experience can empower the beliefs about control over situations. That is, the reinforcements increase the internal locus of control, whereas the failures increase the external locus of control. The more individuals face negative behavioral outcomes, the more they attribute the reasons to external factors.

Individuals with high internal LOC were known to perform better since they considered more about their performance than those with high external LOC because of leading them to be more cautious for following events (Parkes, 1984; Rotter, 1966). In parallel to this statement, Hoyt (1973) found that drivers with a higher tendency for the internal locus of control used seat belts

more and reported the anxiety of driving less than drivers with a high tendency for the external locus of control.

According to Montag and Comrey (1987), drivers who attribute causes of accidents to their behavior or skill involved in accidents less than those who attribute to external factors, such as other drivers or luck. According to Jones and Foreman (1984), high-risk drivers reported more external LOC than safe drivers. However, Lemarie et al. (2019) reported that internal locus of control is related to risky driving behaviors. Similarly, Özkan and Lajunen (2005) found a relationship between high-risk drivers and high internal LOC. These contradicting results could be entailed from the different measurement means.

Özkan and Lajunen (2005) developed the Traffic Locus of Control Scale (T-LOC). According to the authors, the T-LOC factors should have been more extended than the original two-dimensional locus of control while examining this phenomenon in traffic settings. The findings of this study revealed four distinct factors; Self, Other Drivers, Vehicle and Environment, and Fate factors of driving-related locus of control. The self LOC referred to attributing the causes of the accident to drivers' behavior and skills, whereas the other drivers LOC referred to attributing it to other drivers' behavior and skills. The vehicle and Environment LOC indicated that vehicular or environmental factors are causes of accidents in traffic. Lastly, the fate LOC reflected attribution of accidents' causes to luck and fate.

The multidimensional T-LOC factors were found as related to driver behaviors. The self LOC was found as related to accident involvement, offenses, errors, and aggressive and ordinary violation. The other drivers LOC was, on the other hand, were found negatively related to errors. The vehicle and environment LOC was found as negatively related to offenses and positively related to errors (Özkan & Lajunen, 2005). Also, Öz (2016) stated that the fate LOC was related to higher errors and lower positive driver behavior. Doğan (2006) found that the risk evaluation is affected by T-LOC. Drivers who think their risk of accident involvement was high were more likely to attribute accidents' cause to their behavior and skills. Gianfranchi and Tagliabue (2018) stated that the fate factor of T-LOC was an important factor for discriminating reckless drivers from cautious drivers. Drivers with the high fate LOC seemed to have a more defensive driving style. Reckless drivers attributed the causes of accidents to unknown or unmanageable events so that they do not hesitate to take risks on the road.

Besides behavioral effect, the control beliefs of individuals were stated as having a role on individuals' cognitive processes, such as stress coping and dispositional affect. (Diehl & Hay, 2010; Karstoft, et al., 2015). Internal LOC had a protective role on chronic stress and led people to adopt more effective coping strategies (Karstoft et al., 2015). The patients with an internal LOC were observed to seek information about the illnesses (Strickland, 1978). On the other hand, the external locus of control was suggested to be related to coping with stress via aversive coping strategies, such as the consumption of alcohol (Brosschot et al., 1994; Gianakos, 2002). Similarly, affective wellbeing was claimed to be related to control beliefs. Berg et al. (2011) suggested that higher life satisfaction was seen in people with a higher number of diseases and a higher internal LOC. So, the internal LOC has a protective function in the face of negative life events. Furthermore, Rubio et al., (2018) studied the relationship between personal control beliefs and subjective wellbeing in older people of Spain. They found that the internal LOC may increase the negative affect. They justified that the negative emotions increased if people believed that they were responsible for the predicted outcome, especially in the case of negative life events.

## 1.2. Dispositional Affect

Dispositional affect refers to individuals' approach to a situation with positive or negative emotions (Watson, Clarke & Tellegen, 1988). It was considered pervasive and stable in different conditions. It included two dimensions; positive and negative affect. Positive affect indicated to which extent people feel enthusiastic, alert, or awoken. High positive affect indicated high pleasure and engagement toward the environment, whereas low positive affect indicated low vigor, the tendency to depression. On the other hand, high negative affect refers to aversive moods such as disgust, fear, nervousness, and distress, while low negative affectivity refers to a calm and relaxed state (Watson et al., 1988).

There were very limited studies addressing the role of dispositional affect on driver behaviors. Dispositional affect was shown to influence the driver's safety. Rhodes and Pivik (2010) stated that the positive affect could increase risky driving. The reason could be that the positive affect is related to the self-enhancement bias (Robin & Beer, 2001). High positive affect might lead individuals to overestimate their skills. This overestimation may lead to taking more risks in traffic.

On the other hand, it was suggested that the negative affect might have an effect on reducing the speeding of drivers (Lawton et al., 1997). These results can be interpreted as positive affect may increase drivers' willingness to show mastery over the situation or other drivers, while negative affect may increase drivers' anxiety or fear toward consequences of having an accident. Few studies showed that the affective traits of drivers predict how drivers handle stressful situations on roads. Confrontive coping, where drivers react aggressively to stressful situations, was accompanied by negative affect (Machin & Hoare, 2008), whereas task-focused coping, where drivers focus on safe driving, was related to positive affect (Desmond & Matthews, 1997).

The relationship between locus of control and dispositional affect of drivers has not been studied, even though it was stated that they have a role in driver safety. Consequently, this study aims to investigate whether the dispositional effect of drivers is associated with the driver's traffic locus of control. It was expected that drivers' dispositional affect would be related to their control beliefs. Internal equivalent T-LOC, self LOC, is expected to be related to negative affect, whereas external equivalent T-LOC, namely other drivers, vehicle-environment, and fate LOC, is expected to be related to positive affect.

## 2. Method

### 2.1. Participants

Three hundred forty-four drivers were recruited for the study. 45.1% of drivers were female, and 54.9% were male with a mean age of 24.22 ( $SD = 6.16$ ). 49.1 % of participants were graduated from high school, and 39% of drivers were received a bachelor's degree. The average mileage of drivers was 85661 km ( $SD = 553453.403$ ). 34.3% of participants never had an accident ( $M = 1.48$ ,  $SD = 2.13$ ). 98% of accidents reported by drivers did not include any injury or fatality.

### 2.2. Instruments

#### 2.2.1. Demographic Information Form.

This form contains questions on age, sex, education level, experience, total mileage, accident involvement (active and passive accidents).

### 2.2.2. Positive and Negative Affect Schedule (PANAS).

The PANAS was developed by Watson, Clark, and Tellegen (1988) in order to measure individuals' affect state or trait. It has 20 adjectives, referring to 2 factors; negative affect (NA) and positive affect (PA). Drivers were asked to rate their frequency of experiencing the general states of mood with the 7-point Likert type scale (1 = never, 7 = always). Gençöz (2000) adopted the scale into Turkish. Cronbach's alpha of the PA and NA in the current study was .78 and .84, respectively.

### 2.2.3. Multidimensional Traffic Locus of Control Scale (T-LOC).

The T-LOC was developed by Özkan and Lajunen (2005) to measure the driver's attribution of accidents to either their behavior/skill or external factors such as other drivers, vehicular/environmental factors, and fate/luck. The scale has 17 items with a 5-point Likert type scale (1 = not likely, 5 = most likely). Cronbach's alpha of Self, Other drivers, Vehicle-Environment and Fate factors were found as .83, .78, .70, and .72, respectively.

## 2.3. Procedure

Online survey programs were used to collect data. Participants were asked to sign the informed consent before being given the questionnaire package. Informed consent form included information about researchers and the aim of the study. Participants were ensured participants' anonymity and that their results will be used solely for research purposes.

## 3. Results

### 3.1. Bi-Variate Correlation Analysis

Table 2 showed the correlations among the demographic variables (age, sex, active accidents, total mileage), the Multidimensional T-LOC Scale factors (Self, Other Drivers, Vehicle-Environment and Fate), and the PANAS factors (Negative and Positive Affect). Significant correlations were found between PANAS factors and demographic variables. Sex correlated negatively with Negative Affect ( $r = -.11$ ), which was interpreted as female participants reported more negative affect than male participants. Finally, total mileage correlated positively with Positive Affect ( $r = .12$ ).

“Self” and “Vehicle-Environment” correlated significantly with Negative Affect ( $r = .17$ ,  $r = .10$ ), whereas “Vehicle-Environment” correlated negatively with sex ( $r = -.16$ ), and total mileage ( $r = -.11$ ). “Fate” and “Other Drivers” factors did not correlate with demographic variables and PANAS factors.

### 3.2. Hierarchical Regression Analysis

Four separate hierarchical regression analyses were performed on each Multidimensional T-LOC Scale factor (Self, Other Drivers, Vehicle and Environment and Fate). In each analysis, sex and total mileage were entered into the model in the first step as control variables because only these variables were found as correlated with any T-LOC factors. The Negative and the Positive Affect factors were forced into the model in the second step.

As presented in Table 3, sex ( $\beta = -0.14$ ,  $p < .05$ ) and total mileage ( $\beta = -0.12$ ,  $p < .01$ ) was not found related to any T-LOC factors but Vehicle-Environment LOC. Female participants reported more Vehicle-Environment LOC than males. Also, drivers' experience was negatively related to the attribution of accident causation to vehicular or environmental factors.

After controlling age and total mileage, some relationships between the dispositional affect factors and the multidimensional traffic locus of control factors were discovered. Self LOC factor was detected as positively related to Positive Affect,  $\beta = 0.17$ ,  $p < .01$ . Other Drivers LOC ( $\beta = 0.13$ ,  $p < .05$ ) and Fate LOC ( $\beta = 0.13$ ,  $p < .05$ ) factors were found as related to Negative Affect.

**Table 2. Correlations among demographic variables, total number of active accidents, total mileage, year of license, T-LoC factors, and PANAS factors**

	1	2	3	4	5	6	7	8	9	10	11
1. Age	1										
2. Sex	.11*	1									
3. Active Accident	-.04	-.07	1								
4. Total Mileage	.13*	-.02	-.03	1							
5. Year of Licence	.88*	.10	-.03	.32**	1						
6. Positive Affect	.08*	-.05	-.03	.12*	.10	1					
7. Negative Affect	-.05	-.11*	.10	-.06	-.07	-.32**	1				
8. Self	-.02	-.06	-.03	.03	-.05	-.05	.17	1			
9. Other Drivers	.08	-.10	-.10	-.00	.06	.10	.08	.36**	1		
10. Vehicle-Environment	.03	-.16**	-.07	-.11*	-.03	.03	.11*	.43**	.43**	1	
11. Fate	-.05	-.06	.06	-.09	-.08	.08	.07	-.06	-.16**	.05	1

Note: \* $p < .05$ , \*\* $p < .01$

#### 4. Discussion

The hierarchical regression analysis indicated that the traffic locus of control was related to the dispositional affectivity of the drivers. Only, self LOC was positively related to the negative affect. Attributing the causes of accidents to one's skills and behaviors were seen more in drivers who have a high negative affect. Since negative affect was related to negative emotions such as guilt or shame (Watson et al., 1988), it was suggested that individuals with high negative affect could perceive negative life events as their responsibility, and mostly remember these events, rather than events where external factors are responsible (Rubio et al., 2018). It was possible that drivers with high negative affect mostly remembered accidents or near-accident which they are responsible for; thus, they constructed a belief that the accidents happen because of their behavior and skills. Even if they did not have any accident history, their intrinsic negative feelings (e.g., guilt) could lead them to attribute the causes of the accident to their behavior. In addition, Ambak et al. (2016) found that the internal control beliefs were associated with anxiety and dissociation among drivers. These emotions were also underlying negative affect. Thus, the positive relationship between negative affect and self LOC was found due to emotions involved in both variables.

On the contrary, the positive affect was positively related to other drivers and fate LOC. The drivers with high positive affect did not relate the causes of accidents to their behavior or skill. In contrary to negative affect, positive affect was related to the reappraisal of past events (Folkman & Moskowitz, 2000) and frequency of positive life events recalled (Beiser, 1974). It can be concluded that the drivers with high positive affect reappraised their accidents or near-accidents in more their favor where they attributed responsibility to external factors. Since high positive affect was associated with overconfidence (Ifcher & Zarghamee, 2014) and high self-efficacy (Brown & Mankowski, 1993), they were likely to overestimate their skills and perceive other factors as responsible for accidents.

**Table 3. Hierarchical regression analysis on age, total mileage, PANAS factors, and T-LoC factors**

Step	$R^2$	Adj $R^2$	$\Delta R^2$	$F$	df	$\beta$
<b>Self LOC as a dependent variable</b>						
1	0.01	-0.00	0.01	0.83	341	
						Sex
						-0.04
						Total Mileage
						0.04
2	0.03	0.02	0.03	2.87*	339	
						Positive Affect
						-0.01
						Negative Affect
						0.17**
<b>Other Drivers LOC as a dependent variable</b>						
1	0.01	0.01	0.01	1.88	341	
						Sex
						-0.2
						Total Mileage
						-0.01
2	0.03	0.04	0.02	2.70*	339	
						Positive Affect
						0.13*
						Negative Affect
						0.11
<b>Vehicle-Environment LOC as a dependent variable</b>						
1	0.04	0.03	0.04	6.64***	341	
						Sex
						-0.14*
						Total Mileage
						-0.12**
2	0.05	0.04	0.01	4.41**	339	
						Positive Affect
						0.08
						Negative Affect
						0.11
<b>Fate LOC as a dependent variable</b>						
1	0.01	0.01	0.01	2.12	341	
						Sex
						-0.05
						Total Mileage
						-0.10
2	0.03	0.02	0.02	2.69*	339	
						Positive Affect
						0.13*
						Negative Affect
						0.10

\* $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Interestingly, vehicle-environment locus of control was not related to any dispositional affect of drivers. It was expected that the drivers with positive affect might also attribute the causes of accidents to vehicular or environmental factors, as they did to other drivers and fate LOC factors. It could be that due to over-confidence (Ifcher & Zarghamee, 2014) of drivers with high positive affect, they might have perceived themselves to perform at their best even in bad weather, hazardous road conditions, or when their vehicle has a problem. They might have appraised the environmental or vehicular conditions as more tolerable by their behaviors and skills than the behavior of other drivers or fate LOC factors.

The locus of control provided a useful roadmap to understanding the driver behaviors (Ambak et al., 2016; Özkan & Lajunen, 2015). For example, several authors stated that self LOC was related to risky driver behaviors, such as violations (Măirean et al., 2017; Özkan & Lajunen, 2005) and speeding (Warner et al., 2010). The findings were explained by that drivers with high self LOC inhibited overestimated perception of their skills. However, the current study showed that in line with the fact that overestimation of skills was an important characteristic of high positive affect (Brown & Mankowski, 1993; Ifcher & Zarghamee, 2014), drivers with high positive affect showed high external LOC equivalent factors; other drivers and fate. So, it can be suggested that the positive relationship between self LOC and risky driver behavior might not have resulted from drivers' overconfidence.

On the other hand, Rhodes and Pivik (2010) reported that positive affect was positively associated with risky driver behaviors, whereas negative affect was negatively associated. However, in the current study, negative affect was positively related to risky behaviors. In contrast, positive affect was negatively related to risky behaviors. An unknown factor might moderate the relationship between drivers' dispositional affect and locus of control.

## 5. Conclusion

The study aimed to understand the relationship between drivers' locus of control and dispositional affective characteristics. The dispositional affect showed an association with the traffic-related locus of control in the current study. Generally, negative affect was related to self LOC, while positive affect was related to the other drivers and the fate LOC. These findings supported some of the literature findings. In order to expand the role of affective characteristics of drivers on their decisions or attribution in traffic, further studies are needed.

## Ethics Committee Approval Statement

Ethics committee approval of the present study was obtained from Middle East Technical University Human Subjects Ethics Committee (Date 21.12.2015 and Protocol Number: 201-SOS-185).



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