

Research Paper

The Relationship between Perceived Traffic Congestion, Commute Stress & Aggressive Driving in College Students

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ABSTRACT

Bengaluru being one of the most congested cities in the world, traffic congestion is a problem that affects various aspects of people living there. It has been stated in several studies previously that traffic congestion is associated with commute stress and aggressive driving. The current study mainly focused on the relationship between perceived traffic congestion, commute stress, and aggressive driving in college students. As Bengaluru has some of the best universities in India, the number of students that come to Bengaluru is high. This study provides relevant scientific data that can be used to guide the actions to deal with the problem of traffic congestion in Bengaluru. There was a total of 64 participants (M=27, F=37) and Pearson correlation and independent t-test was used for statistical analysis. The results showed significant positive correlation between perceived traffic congestion and aggressive driving ($p < .01$); commute stress and aggressive driving ($p < .05$). The results also found significant difference on commute stress and aggressive driving among drivers and non-drivers. The present study by exploring the relationship between perceived traffic congestion, commute stress, and aggressive driving, highlights the implications that traffic congestion has on mental health of the college students. It points to the need for change and governmental involvement in the issue to abate the negative consequences of traffic congestion in Bengaluru.

Keywords: *Traffic Congestion, Commute Stress, Aggressive Driving, College Student*

Bengaluru is one of the most sought-after cities in India because of its rapid growth in the IT sector and it has top universities and colleges which attract students from all over the world. This has led to an increase in the population of Bengaluru and with the rise in population the vehicular population has also increased with an annual growth rate of 7-10% (Venkatesh & Pushpa, 2014). According to TomTom, which is a Netherlands-based global provider of traffic and map products, Bengaluru was the “world’s most traffic-congested city” in 2019. Bengaluru beat 415 other cities across 57 countries to earn the title in 2019. In 2019, people spent an average of 71% extra time stuck in traffic. Traffic congestion is one of the biggest problems of commuters in Bengaluru as it can take more than 2 hours for travelers to reach their destinations. Reports have shown that an average

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citizen spends more than 240 hours (about 1 and a half weeks) stuck in traffic jams (BBC, 2016). Traffic expert Prof MN Sreehari estimates that traffic delays cost the city 65bn rupees (\$950m; £760m) a year. "In 2005, traffic moved at the speed of 35km (22 miles) an hour; in 2014, it had slowed down to 9.2km (5.7 miles)," says Pawan Mulukutla of the non-profit World Resource Institute. According to the Karnataka Transport Department, as of July 2019, 82, 53,218 vehicles have been registered in Bengaluru including non-transport (two-wheelers, cars, omnibus) and transport (trucks, lorries, taxis) vehicles. A total of 15,72,185 registered vehicles are cars, and 57, 30,388 are two-wheelers (The News Minute, 2019).

Traffic congestion is a situation or condition on roads that are characterized by slow-moving vehicles, longer trip times, and increased vehicular queuing because there is too much traffic on the road. Traffic congestion results in an increase in fuel consumption, cost of traveling, and it leads to adverse impacts on the quality of life and economic productivity in metropolitan cities. Apart from these, there are adverse effects on the mental health of commuters also. Loud honking, road rage, over speeding, long waiting periods in traffic can affect the person and other commuters as well. Traffic congestion has been linked with disturbed mood, frustration, and an increase in work absenteeism. One of the biggest consequences of traffic congestion is stress. Stress is a feeling of emotional or physical tension and it is the body's response to a challenge or demand. The stress because of traffic congestion can lead to many negative consequences. In Bengaluru, people spend more than 2 hours stuck in traffic every day. This might lead to stress and frustration and a sense of helplessness because when you find yourself in a traffic jam stuck in between hundreds of people and the knowledge of the fact that you cannot do anything about this may lead to a feeling of helplessness. Spending so much time in traffic jams, people may become irritable and there may be a reduction in productivity. The stress and frustration because of traffic jams have the potential to affect an individual's relationships with family and peers and result in a lack of motivation to meet friends and extended family.

Association between Traffic Congestion and Commute Stress

Commute Stress is a feeling of emotional or physical tension that is elicited during commuting and it is the body's response to challenges or demands posed by the commuting environment. The association between traffic congestion and stress is well-researched and most often, leads to findings of a positive association between traffic congestion and stress. People experiencing high traffic congestion report elevated levels of state stress and stress levels are highest for people who experience highly congested traffic conditions and those who have elevated levels of trait stress (Hennessy and Wiesensthal, 1997). While there is an association between traffic congestion and stress there are a few studies that emphasize the causes that underly this association. Awosusi and Akindutire (2010) found that urban traffic congestion is stressful and frustrating for drivers, commuters, and pedestrians because it leads to gridlocks, distorts incentives, and causes pollution. This association also seems to be more prevalent for people who drive in the traffic conditions, drivers (bus drivers) and non-drivers (bus conductor) in the same environment both showed a high level of stress in highly congested conditions but the level of stress was higher for drivers than non-drivers (Venkatesh and Pushpa, 2014). Among different modes of commuting, driving is reported as the most stressful commute when compared to commuting via public transport or by walking. (Legrain et al., 2015) Various factors affect the level of stress perceived by an individual. One of the factors is commute length, higher commute length leads to a higher level of psychologically-mediated strain (Kluger, 1998). Control while commuting is also an important factor, drivers having more control (internal and external environment) reports

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less level of stress than the drivers who have less control (Schaeffer et al., 1988). The correlation between these two variables is high and future studies are also expected to show the same findings as to the consequences of experiencing a high level of traffic congestion are high and hazardous physically as well as mentally.

Association between Traffic Congestion and Aggressive Driving

Aggressive driving is any behavior by an individual while driving that place another person, property, or self in danger through willful action and with little or no regard for safety. Aggression can be understood as a byproduct of stress due to traffic congestion. It is expected that as a person is experiencing heavy traffic congestion, it will lead to an elevation in the level of stress and frustration. The mounting stress and frustration will result in a high tendency of an individual to engage in aggressive driving. It has been shown that people who experience a high level of traffic congestion report a high level of stress than people who experience a low level of traffic congestion (Hennesy and Wiesenthal, 1999). Driving in and experiencing a high level of traffic-congested conditions can lead to elevated annoyance and inconvenience leading to a low level of satisfaction with a commute that might result in aggression (Stokols et al., 1978).

Traffic Congestion, Commute Stress, and Aggressive Driving in Bengaluru

The negative consequences of traffic congestion are many. As the number of students in Bengaluru is high and, it will only increase, it is important to look at the relationship between traffic congestion, commute stress, and aggressive driving in college students in Bengaluru. The relationship between these variables will increase our knowledge about the negative consequences of the environment on the students. They are the working population and they are affected heavily by traffic congestion. The students who live a little far from their colleges spend about 2 hours to reach their college/university and after being stuck in traffic for so long, their productivity may die and the excitement of work is minimal by the time they reach. In a related population of techies (engineers), it is seen that they are now looking for work based on their home locations. They choose work that is close to their homes as this decreases the stress related to driving in congested traffic and gives them more time to spend with their family (Mehrotra, 2020). By exploring the impact of traffic congestion on the mental health of college students, the negative impact can be found and emphasized. With adequate research and literature, the issue of high traffic congestion in Bangalore city can be presented in front of the government to emphasize the importance of the development of policies or rules to mitigate the impact on the students and the population in general.

While numerous studies have explored the association between traffic congestion, commute stress, and aggressive driving in the general population as well as student population, there are minimal studies that have been conducted in India to explore these variables on the general or student population. The objective of the current study is to explore the association between perceived traffic congestion, commute stress, and aggressive driving. As mentioned above, Bengaluru has the highest level of traffic congestion in India, and studying the relationship between the current studies' variables will be significant and relevant to the literature.

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METHODOLOGY

Hypotheses

- H1: There would be a positive correlation between perceived traffic congestion and commute stress.
- H2: There would be a positive correlation between perceived traffic congestion and aggressive driving.
- H3: There would be a positive correlation between commute stress and aggressive driving.
- H4: There would be a significant difference in the levels of commute stress between drivers and non-drivers.
- H5: There would be a significant difference in the levels of aggressive driving between male and female.

Sampling and Data collection

The participants of the study were 64 college students with the mean age of 22.58. Out of 64 college students, there were 34 people (46.8%) who drive and 30 people (53.2%) were non-drivers. The study had 37 female participants (57.8%) and 27 male participants (42.2%). For data collection, convenient and snowball sampling was used. The sample was, collected from universities in Bengaluru.

Inclusion Criteria

- College Students of 18–30-year age group.
- People who drive on their own to get to college.
- People who take public transport, carpool, drive car or bike to get to college.
- People who spend at least 20 minutes in traffic in a day.

Exclusion Criteria

- People with any neurological or psychiatric disorder.

Instruments

Three measures were used in this study,

- **Perceived Traffic Congestion** – The perceived traffic congestion questionnaire is a measure consisting of 16 items to assess an individual's perception of traffic congestion. The questionnaire was developed for the purpose of the current study and the items in the questionnaire was validated by experts in the field of traffic and congestion. The questionnaire uses a 5-point Likert scale that ranges from (1) "Never" from (5) "Always". An individual with high level of raw score indicates high level of perceived traffic congestion and vice versa.
- **Driving Behavior Inventory – General (DBI – G)** - The Driving Behavior Inventory – General (DBI-Gen; Gulian, Matthews, et al., 1989), which consists of 11-item was used to measure the variable, Commute Stress. DBI-Gen uses a rating scale ranging from 0 to 100 and for scoring mean is calculated and higher mean score indicates high level of stress. Previous research has reported DBI-Gen as a valid, robust, and reliable measure (Glendon et al., 1993; Matthews et al., 1991).
- **Aggressive Driving Behavior Questionnaire** - For assessing an individual's likelihood of engaging in aggressive driving behavior, the current study used Aggressive Driving Behavior Questionnaire (ADBQ). It is a 20-item paper and pencil questionnaire and measures a driver's likelihood for engaging in aggressive driving behavior. It was developed using a factor analytic approach, which combined five previously developed aggressive driving behavior scales. In a previous study,

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the ADBQ demonstrated relatively high internal consistency (Cronbach's $\alpha = 0.77$) (Brill & Mouloua, 2011). In a controlled laboratory environment, the ADBQ demonstrated that it is a valid predictor of aggressive driving behavior in a simulated environment (Brill, Mouloua & Shirkey 2009).

Data Analysis

Data was analyzed using SPSS version 25. The data was tested for normality. Pearson correlation was used to analyze the relationship between Perceived Traffic congestion, Commute Stress and Aggressive Driving. T-test was used to compare commute stress and aggressive driving between drivers and non-drivers, and males and females.

RESULTS

Table No. 1 Descriptive and correlation statistics of study variables

Variables	Perceived traffic congestion	Commute Stress	Aggressive driving
Perceived traffic congestion	1	.146	.249*
Commute stress	.146	1	.676**
Aggressive driving	.249*	.676**	1
Mean	59.00	63.08	53.11
S.D.	11.08	16.37	13.43

$N = 64$ * $p < .05$, ** $p < .01$

Table 1 represents the correlation matrix and descriptive statistics for the study variables. The results indicate that there is a significant positive correlation between commute stress and aggressive driving ($r = .676$, $p < .01$) and perceived traffic congestion and aggressive driving ($r = .249$, $p < .05$). Also, there is a positive correlation between commute stress and perceived traffic congestion ($r = .146$, $p > .05$ and $.01$) but it is not significant and the correlation is comparatively weaker.

Table No. 2 Independent Sample t-test showing the difference on perceived traffic congestion, commute stress, and aggressive driving between drivers and non-drivers

Variable	Groups	Mean	SD	t
Commute stress	Drivers	67.65	14.48	-2.471*
	Non-drivers	57.90	17.07	
Aggressive driving	Drivers	58.09	13.97	-3.415*
	Non-drivers	47.47	10.37	

* $p < .05$

Table 2 represents descriptive and t-test score on perceived traffic congestion, commute stress, and aggressive driving among drivers and non-drivers. The results indicate that drivers ($M = 67.65$, $SD = 14.48$) and non-drivers ($M = 57.90$, $SD = 17.07$) differ significantly on commute stress ($t = -2.471$, $p < .05$). Also, there is a significant difference between drivers ($M = 58.09$, $SD = 13.97$) and non-drivers ($M = 47.47$, $SD = 10.37$) on aggressive driving ($t = -3.415$, $p < .05$).

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Table No. 3 Independent Sample t-test showing the difference on perceived traffic congestion, commute stress, and aggressive driving between males and females

Variable	Groups	Mean	SD	t
Commute stress	Males	68.22	16.19	-2.213*
	Females	59.32	15.67	
Aggressive driving	Males	59.67	14.47	-3.649*
	Females	48.32	10.42	

* $p < .05$

Table 3 represents descriptive and t-test score on perceived traffic congestion, commute stress, and aggressive driving among males and females. The results indicate that males ($M = 68.22$, $SD = 16.19$) and females ($M = 59.32$, $SD = 15.67$) differ significantly on commute stress ($t = -2.213$, $p < .05$). Also, there is a significant difference between males ($M = 59.67$, $SD = 14.47$) and females ($M = 48.32$, $SD = 10.42$) on aggressive driving ($t = -3.649$, $p < .05$).

DISCUSSION

The current study focused on exploring the relationship between perceived traffic congestion, commute stress, and aggressive driving in the college student of Bangalore. It was found that while perceived traffic congestion is associated with commute stress, the correlation is weak and not significant which is in contrast with previous work (Haider et al., 2013; Hennessy and Wiesenthal, 1997; Hennessy and Wiesenthal, 1999; Wickens et al., 2015). On the other hand, perceived traffic congestion and commute stress were both found to be significantly correlated with aggressive driving. The association between perceived traffic congestion and aggressive driving was stronger in comparison to commute stress and aggressive driving. This is in line with the previous studies which have reported that high level of traffic congestion or commute stress leads to high level of aggression or aggressive driving (Shinar, 1998; Shinar & Compton, 2004). But it is not always necessary that traffic congestion is associated with high level of aggressive driving as reported by Lajunen et. Al., (1999) in his study. It can be assumed that while congestion is associated with aggressive driving, there are other factors also that come together to result in aggressive driving. Other than this, it was found that drivers compared to non-drivers reported higher level of commute stress and aggressive driving behavior and it is in line with literature (Legrain et al., 2015). The results also indicated significant difference on commute stress and aggressive driving between males and females.

The current study emphasizes the impact and the role that traffic congestion can play in a student's life. Bangalore is one of the most congested cities in the world and daily exposure to high levels of traffic congestion can have drastic effects on the lives of students. Previous studies have shown that exposure to traffic congestion leads to decreased satisfaction and well-being (Chatterjee et al., 2019; Higgins et al., 2018). It could lead to lower academic performance and affect the overall well-being of students as they are exposed to these stressful situations almost every day. There is a need for change in the transportation system and policies to deal with the high level of traffic congestion and the government should find ways to deal with this problem. As it is not only the college students that are exposed to this but there are also school students who travel every day for school in the same highly congested traffic environment. Sunyer et al. showed that children whose school was near a highly congested place showed low cognitive development growth than children whose school was near a low congested place. Findings like these suggest high traffic congested

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environment is hazardous for commuters, as well as non-commuters, and the negative physical consequence of traffic congestion, is high and likely to increase.

The following study was conducted during the time of Covid-19 and that resulted in some shortcoming that can be avoided in future research. First, the sample size is small that means that while the results are as expected and provide significant information, it cannot be generalized with high reliability. Second, the study has found the correlation between the variables which does not mean causality. Future research can focus on doing an experiment to establish causal relationship as that will provide more reliable data.

CONCLUSION

Traffic congestion is a situation that affects millions of people all over the world. It can have psychological as well as physical consequences which has been reported by several studies in the past. The current study establishes relationship between perceived traffic congestion, commute stress, and aggressive driving in the college students from Bengaluru. The findings also indicated that commute stress and aggressive driving significantly differ between drivers and non-drivers. The study provides relevant data for future directions as it is one of the first study.

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Conflict of Interest

The author(s) declared no conflict of interest.

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