INTRODUCTION

Being a capital city of Indonesia, Jakarta tends to be represented in its enormousness and a total hotchpotch of concrete, vehicles, and people. Jakarta and its metro area span 4,384 km^2 and have a population density of around 13,000 people per km^2 (Martinez & Masron, 2020). It overlaps neighbouring cities and transforming Jakarta into a megacity, known locally as Jabodetabek (Daerah Khusus Ibukota [DKI - Capital Special Region], Bogor City, Bogor District, Depok City, Bekasi City, Bekasi District, Tangerang City, and Tangerang District). To give a more precise perspective, the second largest metropolitan area, Surabaya, have a population density that is only 1/8 of Jakarta with around 1,539 people per km^2 (Katherina & Indraprahasta, 2020).

The phenomenon of commuting within Jabodetabek can be beneficial for both the satellite cities as well as Jakarta because it would lead to the development of the satellite cities and can reduce the population density within Jakarta. However, this phenomenon also precipitates negative effects such as traffic congestion. One plausible consequence of being in a community with high population density is the traffic being heavily congested. Jakarta is ranked as the 10^{th} World's Most Congested Cities list in the world according to a study that was conducted by TomTom Traffic Index (Roberts, Gil Sander & Tiwari, 2019). As for 2019, there were 3.2 million people that commute on a day-to-day basis (Badan Pusat Statistik, 2019). Approximately 11% of new motorcycles, buses, cars, and trucks dense Jakarta's traffic annually. Such a dramatic and constant increase leads to Jakarta

motorists spending as much as 400 hour per year on the road, and when they commute during rush hour traffic, their speed is limited to 5 km per hour ("Jakarta Macet Gila, Jarak 5 Km Butuh Waktu 1 Jam", 2015). The COVID-19 pandemic has come with a silver lining. The city which was ranked as 10th World's Most Congested Cities in 2019 is now ranked 46th on a study that was conducted by TomTom in 2021 (TomTom, 2022). However, the government has started to ease up the restrictions as the COVID-19 has hurtled. The author believe that the traffic congestion level would return to normal as people ought to go to work, school, and all.

Commuting Modes in Jakarta

Jakarta has seen a considerably long history of the reformation and diversification of mass transportation, despite its low effectiveness in solving traffic congestion. There are several state-owned public transportations that exists in Jakarta such as, BRT (Bus Rapid Transit) also known as Transjakarta. Secondly, the KRL commuter line. The commuter line has 80 stations and 1.100 fleets (Krl.co.id, 2020). Maximum passenger of each commuter line unit is 250 persons. Thirdly, Mass Rapid Transport (MRT). It is operated by the Jakarta MRT Corp. Lastly, Light Rapid Transport (LRT). The LRT first line spans 5.8 kilometres from Kelapa Gading in North Jakarta to the Jakarta International Velodrome in Rawamangun, East Jakarta.

Besides these state-owned public transportations there are privately run public transportation such as, online motorcycle taxi and taxicab. There are two operators

of online motorcycle taxi in Indonesia, Grab and Go-Jek. Go-Jek started the online ojek trend in 2015 (Gojek ,2022). It was launched with only three services: GoRide, GoSend, and GoMart. Following Go-Jek success another companies, Grab also launched online ojek services in 2016. Taxicab in Jakarta is operated by private companies. The most trusted and popular taxi companies are Blue Bird and Express ("Taxi", 2019).

I would also like to corroborate on how the conventional corporations are being replaced by startup and tech-based companies. According to Noni Purnomo, the CEO of Blue Bird the company has been getting less profit to the price disruption that were brought out by Grab and Go-Jek. The disruption has been leading the masses to favour online taxi over conventional taxi (Sutianto, 2019).

A survey conducted in April 2019 to 12,960 households (Badan Pusat Statistik, 2019) demonstrated that 91.6% private commuters does not want to switch to public transport. Some of their excuses are impractical, long travel time, uncomfortableness, unsafe, and laboriously access to public transportation. A number of 80.5 % of these commuters are commuting to work. This research was conducted in April 2019.

Psychological Effects of Commuting: Commuting Stress

Stress has been widely documented as feelings or thoughts perceived by an individual with regards to how much they are pressured in each time (Lazarus & Launier, 1978). While some literature focused on defining stress as an internal process by focusing on the individual's perception, some other literature considers

the important environmental factors that trigger an individual's perceived stress. Nevertheless, stress literature has been chastised as being overly categorized since it neglects environmental factors (Gee & Takeuchi, 2004).

Environmental stressors (i.e., pollution, noise, crowding) can be acute or chronic (i.e., living near a congested road) (World Health Organization, 2000). According to Sagerstrom and Miller (2004). chronic environmental stressors can be more consequential for humans, in example an association between chronic stressors and impaired immunological responses. However, acute stressors have few consequences. According to Balfour (2002) problematic neighborhood environment influence the functional health of elderly person. The contributors are excessive noise, poor lighting, heavy traffic, as well as access to public transportation. The contributors above may influence the elderly functional health by interfering with few things such as safety, self-care tasks, physical activity, as well as community participation.

Commuting stress was first coined by Koslawsky, Kluger and Reich (1995). They developed the impedance concept in which it has brought in larger ecological models. Many variables are affecting commuting stress. The variables that affecting commuting stress are control, predictability, the duration of the commute and impedance. According to Evans, Wener and Phillips (2002) there is an elevated physiological stress for commuters that perceived their commute as being less predictable. Impedance occurs when people are trying to move between two or more points and are hampered. Impedance is related to job satisfaction, illnesses, absences from work and duration of commute (Wener, Evan, Phillips & Nadler, 2003). Predictability occurs when a commute is perceived as more predictable.

Control is a variable moderating the journey (Schaeffer, Street, Singer & Baum, 1988).

The association between an individual's experience of being in a prolonged traffic congestion and their psychological status could be understood through Brofenbrenner's (2009) Ecological Theory. According to his theory, Brofenbrenner (2009) argues that social and community system (exosystem) also contributes to how an individual lives their life. Therefore, focusing on improving an exosystem could be one of the strategies to improve individual well-being.

Study Focus

While promoting the use of public transport could arguably be the solution to solve traffic, little is known regarding its impact on an individual's perceived stress. Existing Western literature suggested inconclusive findings regarding which transportation modes that lead to lower stressful experience among commuters. White and Rotton (1998) found that among college students, higher stress is experienced by car commuters than bus commuters. This is supported by Wener and Evans' (2011) study that compares the stress of driving and stress of commuting on a train and come up with a conclusion that driving is way more stressful. On the contrary, Williams, Murphy, and Hill (2008) found that the higher levels of control through driving leads driving commuters in the UK experience lower levels of stress than those who commutes using public transportation. Higher control enables drivers to choose the route, time of departure, and road speed, which leads to less stressful experience. According to Legrain, Eluru and El-Geneidy (2015) driving is

more stressful than public transit because they would have to budget a considerable amount of extra time to deal with unexpected delays (their additional time budget has a mean of 21 minutes) and are more likely to be stressed when they cannot arrive their destination in time. On the contrary, public transit users are less stressed due to the nature of public transport being predictable. Due to lack of similar studies in Indonesia, currently we do not have data of how much time delay those accounts for the use of public transportation in Jakarta. However, considering Jakarta is packed, it is reasonable to argue that the delay would be more than 21 minutes.

The relationship of stress and traffic congestion are rarely studied. It is hypothesized that there may be relationship between stress and traffic congestion on different type of commuters. Hence, the study aims to fill the gap on how these commuters differ in their perception of stress, in which relevant data is obtained, and a series of statistical models are tested.

Based on the backgrounds on the passage above, research question was formulated:

Is there any difference on perception of stress on those who commute by private transportation mode or those who take public transportation modes?

The study is expected to contribute to current literature about how the environment and social settings influence an individual stress level. Aligned with the Brofenbrenner's (2009) Ecological Theory, the findings may provide interdisciplinary insights to enhance psychological well-being by elaborating knowledge from the disciplines of city planning, sociology, and cultural studies. In particular, the study may also contribute to develop theoretical strategies in

alleviating the stress and psychological symptoms of worker's by considering the environmental cues associated with their chosen modes of commuting.

On the practical sides, this study has a potential to provide valuable information to several parties such as, government as well as commuters. Firstly, the government can alleviate traffic congestion in an appropriate way such as, reflecting on what is working and what is not, understanding where the problem is and what are residents' thoughts on it since residents' opinions are often a powerful influence on city authorities. The administration often makes an ambiguous policy related to the transportation sector such as, the introduction of progressive vehicle taxes in 2015 ("Higher progressive vehicle tax takes effect in June", 2015) and LCGC (Low-Cost Green Car) (Rimadi, 2013). Secondly, the commuters on how to commute more efficiently so that they may feel at ease since stress has several implications that might impair other aspects of their lives.

Government Regulations aimed to Reduce Traffic Congestion

The Government has introduced several regulations to reduce traffic congestion. Firstly, car limitations on key roads during rush hour such as, 3-in-1 policy. This program was started back in 2003. The policy applies on weekdays during 07.00 AM – 10.00 AM and 16.30 PM – 19.00 PM. Under the three-in-one restriction, only cars with three or more occupants can use the key roads during rush hour. This policy has led to an industry of "jockeys". There was an accusation that some jockeys are sedating their children to keep them quiet in the cars ("Child labour, sedation concerns prompt Jakarta traffic rule change", 2016). Nevertheless, this policy was changed with an odd-even traffic policy in 2016 ("What you need to know about Jakarta's odd-even traffic policy", 2018). This policy specifies that

cars whose license plate ends in an odd number are only allowed through certain roads on odd numbered dates and inversely. The policy was a success (Supriana, Siregar, Tangkudung & Kusuma, 2020) Secondly, the introduction of progressive vehicle taxes to reduce the ownership of cars. According to the bylaw, an owner first vehicle is charged with 2% of the vehicle sale value, and additional vehicle is charged with an 0.5%. To illustrate this a second vehicle is charged 2.5% and the third vehicle is charged with 3%. The former Governor of Jakarta Basuki 'Ahok' Tjahaja Purnama argues that the city administration is aiming to limit vehicle ownership ("Higher progressive vehicle tax takes effect in June", 2015).

Table 1. Government Regulations aimed to Reduce Traffic Congestion

Imposed year	Government Regulations aimed to reduce Traffic Congestion	Description
2003	Three-in-one policy to reduce congestion in Jakarta's road	• Started with three-in-one and changed to odd-even policy later. • The policy was a success.
2015	Progressive vehicle taxes to reduce the ownership of cars	• The idea was to persuade people to think twice

	before buying another vehicle. • The city administration wants to limit vehicle ownership in the city.

Government Controversial Regulations that Contribute to Traffic Congestion

The Government also comes up with a few of contradictory policies such as, the introduction of LCGC (Low-Cost Green Car). This policy was introduced back in 2013. The policy eliminates the of luxury-goods sales tax. This frivolous policy was met with a load of controversies. The current sitting president Mr. Joko Widodo wrote a letter to the former Vice President Boediono back in 2013 while he was still sitting in as the governor of Jakarta. In his arguments Jokowi argues that "We are speeding up the preparation of the facilities and infrastructure to reduce traffic, and then suddenly there's this cheap car policy," (Rimadi, 2013). According to Minister of Finance Sri Mulyani LCGC is not what Indonesia needs for its economy but, infrastructure investment to support the public ("Sri Mulyani Komentari Kebijakan Mobil Murah |Republika Online", 2013). Secondly, the government has temporarily cut the luxury tax purchase (PPnBM) on new car purchases to boost consumer spending. The Coordinating Economic Minister Airlangga Hartarto argues that the tax cuts were expected to encourage car sales

(Eloksari & Harsono, 2021). From March to May, the government would remove a luxury tax for sales of sedans as well as two-wheel drive cars with a displacement below 1,500 cc ("Indonesia to give tax incentives for sales of some cars", 2021). The next three months, the government would give a 50% discount for luxury tax payments and the following three months. The policy would be evaluated every three months. In his arguments the economy ministry argues that the automotive industry is very important for Indonesia's economy "The automotive support industry alone supports more than 1.5 million people and contributes to a GDP of Rp700 trillion," ("Gov't to Relax Sales Tax on Luxury Goods for Motor Vehicles", 2021).

Table 2. Government Controversial Regulations that Contribute to Traffic Congestion

Imposed Year	Government Controversial Regulations that Contribute to Traffic Congestion	Description
2013	The introduction of LCGC (Low-Cost Green Car)	• It was launched to bring more affordable cars to the masses. • According to Minister of

		Finance Sri Mulyani LCGC is not what Indonesia needs for its economy, but infrastructure investment to support the public ("Sri Mulyani Komentari Kebijakan Mobil Murah |Republika Online", 2013).
2021	Relaxing luxury tax sales on luxury goods (PPnBM) for motor vehicles	• Relaxation can increase people's purchasing power and jumpstart the economy.

METHODS

Design

In order to give evidence towards the hypothesis that has been made, data collection need to be conducted. This study would be utilizing an *independent-measures research design*. According to Gravetter and Forzano (2016) the design involves separate and independent samples and make a comparison between two group of individuals.

There would be two variables in this study being perception of stress and commuting modes.

Participants

The technique of collecting the data is purposive sampling. Purposive method sampling means that the subject is limited since they should fit in with the criteria that has been set by the researcher. Individuals are eligible for inclusion if they live in Jabodetabek area and commute to their office. There are 166 participants in this study.

Procedures

Preceding the data collection the researcher would use the adapted Bahasa version of PSS-10 that was done by Himawan (2020). Later, data collection is being done through google forms.

Analysis Techniques

This study would use a differential research design. It's a study that compares pre-existing groups. The goal of this study is to compare on one group is consistently differ from the scores of another group. Hence, the study would compare the score on the public transport commuter groups with the private transportation commuter group.

Instruments

Stress would be measured using Perceived Stress Scale PSS-10. It is based on the PSS-14 (Cohen, Kamarck & Mermelstein, 1983). According to Lee (2012) the PSS-10 metric properties are superior to those of the PSS-14. The PSS-10 is a 10-item self-assessment report of perceived stress. The PSS-10 that will be used has an alpha coefficient of .828 (Himawan, 2020). It suggests that the items have high internal consistency.

DATA COLLECTION AND ANALYSIS

Demographics Data

This study compares private and public transportation users. Private transportation(n=99) and public transportation users (n=67) were recruited through: WhatsApp, Instagram, words of mouth. The demographics data of the participants is presented in Table 3.

Table 3. Participants' Demographics Data

Characteristics		Total	Percentage
Transportation Modes	Private Transportation	99	59.6%
	Public Transportation	67	40.4%
Gender	Male	105	62%
	Female	62	38%
Private Transportation Users	Driving their own vehicle	86	86.9%
	Being driven by a driver	13	13.1%

Normality Test

The normality test using Kolgomorov Smirnov that was conducted to the two samples found that the distribution of the two groups were diverse. The private transportation users' group were normal. However, the public transportation users' group were not normal. According to Kwak & Kim (2017) in general, as the sample size from the population increases, its mean gathers more closely around the population mean with a decrease in variance. Thus, as the sample size approaches infinity, the sample means approximate the normal distribution with a mean, μ, and a variance. SUM1 refers to the sum PSS score of private transportation users. SUM2 refers to the sum PSS score of public transportation users.

Table 3. Normality Test

Items	P
SUM1	.200
SUM2	.000

Hypothesis Test

There are no differences t(164)=-1.79, p=.076 . on one's perception of stress of those who commute by public transportation mode (M=16.0; SD=6.21) in contrast with the private transportation mode. (M=17.66; SD=5.41).

The alternating hypothesis is refuted since the p value is over p >0.05. Since there are no difference found in terms of stress by those who commute with public transportation mode compared to private transportation mode.

Moreover, within the private transportation user group, there are no differences on one's perception of stress on those who commute by driving themselves(M=21.3; SD=5.17) and participants who are chauffeured around (M=20.9; SD=4.75).

Therefore, the analysis suggest that there are no differences t(164)=.638. p=.524 . in terms of stress by those who commute by driving or by being driven by their own chauffeur.

The analysis also found that, there are no differences on male's perception of stress (M=16.9; SD=5.89) compared to female's perception of stress (M=63; SD=6.06).

Hence, there are no significant different in terms of stress perceived by male commuters and female commuters.

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DISCUSSION

The current chapter will discuss the study result in relation to the initial hypothesis that has been developed based on the literature review. The present study aims to fill the gap on how public transportation and private transportation users in the Jabodetabek area differ in their perception of stress.

The initial hypothesis assumed that there is a difference in perception of stress in between public transportation and private transportation users.

However, the current study found that there are no differences in the stress level between Jabodetabek commuters who use public and private transportation. Hence, the null hypothesis is accepted.

The finding of this research is different from the study that Wener and Evans (2011) conducted in New York which found that train commuters experience lower stress levels compared to those who use private transportation. Commuting by private vehicle is perceived as more difficult and unreliable than commuting by train. Moreover, another study by William et al. (2008) conducted in London found that that the higher levels of control through driving leads driving commuters in the UK experience lower levels of stress than those who commutes using public transportation.

Arguments on why the current study's finding contradicts the previous studies will be discussed in the next paragraphs.

First, the previous studies are conducted in countries with levels of congestion lower than Jakarta. The number of Jakarta's population is 11.2 million in the day and 10.1 at nighttime (Budiari, 2015). On the contrary New York's

population is 8.47 million and London's 8.80 million.This makes Jakarta rated as 10th most congested cities in the world. The previous studies recruited participants who live in London and New York which ranked are at 45th and 51st respectively, in the world most congestive cities level. Compared to Jakarta's population the number of people who live in London and and New York is definitely fewer.

Second, still in line with the first reason the previous studies are conducted in cities with less pollution compared to Jakarta. which is ranked as the 10th most congested cities in the world while London is ranked 45th and New York as the 51st World's Most Congested Cities list in the world. According to the Air Quality Index (AQI), Jakarta PM 2.5 averages around 74. On the contrary, London averages around 38 and New York averages around 53 (AQI, 2023). According to Dr. Haidong Kan, the risk of heart disease, diabetes, and other difficulties can be raised over time by greater blood pressure, a poorer reaction to insulin, and signs of molecular stress on body tissues, all of which were found to be connected with higher exposure to PM (Harding, 2017). The high pollution of Jakarta's city and its surroundings, therefore, could contribute to high stress condition among the street user who commute daily.

Third, the current study is conducted in developing countries where the traffic regulation is not strictly followed by its people. Compared to previous studies that are located in developed countries, the streets of Jakarta are messy and disorganised. It could be caused by many street users who disregard the rules, as long as they do not see police in the area. According to Guangzhe Chen, World Bank Senior Director for Transport, "developing countries are responsible for 90% of road traffic fatalities, with only half of the world's vehicles." (Muller, 2019). This

implies that the road situations in developing countries contribute more stress to the commuters, despite the modes of transportation used.

According to the World Health Organisation (2000) environmental stressor scan be acute or chronic. Thus, it may explain on why the finding from the current study is contradicting the previous findings. The congestion, pollution as well as disobedience of traffic users in Jakarta are environmental factors that affect the stress level of both groups.

The stress that is being experienced can be an elevated physiological stress. According to Evans, Wener and Philips (2002) there is an elevated physiological stress for commuters that perceived their commute as being less predictable. Jabodetabek traffic can't be predicted. On the contrary, Schaeffer et al (1988) argued that predictability occurs when a commuter is perceived as more predictable. This situation happens to commuters who deal with Jabodetabek traffic daily. The traffic is hardly to be predicted and therefore affecting the stress levels of the commuters from both groups.

Moreover, Brofenbrenner in his theory argues that social and community system (exosystem) also contribute on how an individual lives their life. One can conclude that the government have a few controversial regulations that contribute to traffic congestion. These regulations are affecting the public transport. It applies to those who commute by private transportation. Hence, this may confirm on why these two groups are equally stressed out.

CONCLUSION AND STUDY LIMITATIONS

In overall, the present paper discusses on how the commuting stress impacted Jabodetabek commuters. Based on writer's literature study, to date, similar kind of study has not been conducted in Jabodetabek yet.

The present study finds that the commuting stress is not affected by commuting modes since there are no differences in the stress level between commuters who use private and public transportation.

The current study contradicts the previous studies that were conducted in London and New York. A study by Williams et al. (2008) found that the higher levels of control through driving leads driving commuters in the UK experience lower levels of stress than those who commutes using public transportation.

Additionally, this study differs from the one that was conducted in New York by Wener and Evans (2011). In the New York study, it is found that commuters who commute by train experience lower stress compared to those who use private transportation. Apparently, in the New York study commuting by car is perceived by participants as more effortful and unpredictable compared to commuting by train.

The present study argues that the high level of city congestion and pollutions, as well as the disobedience of the street users as factors that impacting the equal stress level found in both groups of commuters.

Hence, further studies in other cities located in developing countries need to be conducted since this study contradicts the previous study that was conducted in developed countries.

Moreover, the present study identifies that the participants' data is not diverse enough and future study should recruit more participants from different sources.

This study is also utilising a general stress questionnaire by using a general stress questionnaire that measures genera stress level in participants, instead of specifically asses the level of commuting stress. Therefore, it is suggested that future research should employ a more specific commuting stress questionnaire, that also consider cultural context of the developing country. Finally, the current study suggest that the future study should increase the sample size of participants in order to obtain more valid results.

Reflection

I've learned lot of things during the whole "Skripsi" things. It wasn't as tough as I thought. It feels like a breeze. I can't thank you both Pak Karel and Ms. Febri for being benevolent throughout this process.

I ran into obstacles, but they kept on pushing me. I'll admit that I'm a perfectionist and it's hard for me to do stuffs when I know it won't be as good as the journals and publications that I've been using. Ms. Febri did tell me that "Mistakes are proof that you've tried.". If it weren't for my thesis advisor, I'm sure that this undergraduate thesis is not going to be finished yet.