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ASSESSMENT OF STRESS LEVELS AMONG PUBLIC TRANSPORT (BUS) USERS IN TAMIL NADU AND KERALA

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Abstract:
The public bus transportation system is a crucial component of the transport sector, recognized for its affordability and reliability. This research focused on identifying and validating several stress-inducing factors for regular bus commuters, specifically in Tamil Nadu and Kerala. Utilizing a validity study design and convenience sampling, the study included participants aged 18 and older, with a total sample size of 500 individuals. A questionnaire consisting of 28 items was developed, and the data was analyzed using a five-point Likert scale. The results indicated that the highest levels of stress among bus users in Kerala and Tamil Nadu were primarily due to the poor condition of the roads, while the least stress was reported in relation to vendors on the buses. Stress plays a significant role in everyday life, impacting both mental and physical health, as well as overall well-being. This research sheds light on the various factors contributing to stress among public transportation users.

Key words: Public transportation, Stress, Kerala, Tamil Nadu, Public transport user.

INTRODUCTION:

Individuals that rely on public transport for their daily commute to and for work are faced with physical and emotional challenges that are associated with the use of public transport. Enduring these challenges on a daily basis has a tendency to raise commuter levels of stress. Mexico has a population of over 106 million people and over 27 million registered automobiles, or roughly one vehicle for every four persons, over its 360,000 km of highways [1, 2]. The discomfort and cause of stress gradually trickle into the workplace infringing on occupational performance. Public transportation is a vital part of our society, providing a safe and affordable way for people to get around. However, public transportation can also be a source of anxiety for some people, particularly women and people with disabilities. This is why it is important to have tools that can be used to assess the safety of public transportation users [3].
One of the social concerns that best capture the issues of the 20th century is the imbalanced rise in urban populations and the extension of urban life. People's health has suffered as a result of progress, which has led to problems like noise, pollution, and traffic that may cause stress reactions [4]. Stress is typically divided into three distinct stages: alarm, resistance, and exhaustion. The first stage is often viewed positively, as it involves the release of adrenaline, which boosts alertness, creativity, productivity, motivation, and readiness for action. In the second stage, individuals employ coping mechanisms to maintain and restore balance within the body. Once the stressor is removed, the body can return to its normal state, effectively resolving the physiological stress response. The third stage occurs when stressors dominate, leading to health problems, feelings of hopelessness, and challenges in concentration.
Commuters frequently experience elevated stress levels while traveling in crowded train cars, standing in congested buses, or maneuvering through busy traffic. Research by Jimenez-Vaca and colleagues [5], along with studies by Koslowsky and his team in 1995 [6], highlights the significant impact of transportation-related stress on the economically active population. The mental well-being of these individuals can profoundly influence their entire family, especially those living with financially dependent parents, partners, and children [7, 8]. Additionally, recent research has identified several common factors contributing to transport-related stress, including overcrowding, long travel times, and inconsistent service quality [9, 10, 11].

METHODOLOGY:

Study Design:
Public transport bus users from the two states were chosen according to specific inclusion and exclusion criteria. In the present study, a total of 500 participants above the age of 18 were included, and it was carried out at bus depots and stops in parts of Tamil Nadu and Kerala. The participants were classified into four age groups: younger, young adults, middle-aged adults, and older adults, with sampling conducted through a convenience sampling

method. The stress levels of the participants were assessed using a set of evaluation tools consisting of 28 items, each rated on a Likert scale ranging from 1 to 5.

Sample:

The study is expected to take approximately 6 weeks of data collection.

Inclusion Criteria:

- People who using bus users.
- Both male and female and other genders.
- Participants above the age of 18years.

Exclusion Criteria:

- Other public transport users.

Independent Variable:

- Public transport (bus) users
- Inventory of stressful situation of public transport bus users
- Age.

Dependent Variable:

- Quality of life

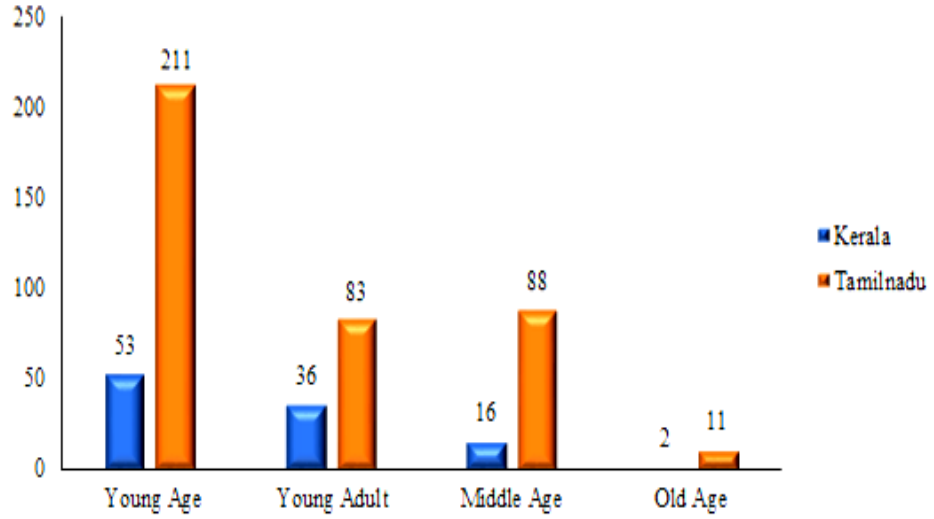
Statistical Analysis:

The analysis of the results was carried out using statistical software, focusing on descriptive statistics for the evaluation process. The data was categorized into four age groups: Young Age, Young Adult, Middle Age, and Old Age. For the evaluation, t tests were conducted, and both the mean and standard deviation were computed. A p-value threshold of less than 0.05 was set to determine statistical significance.

RESULTS:

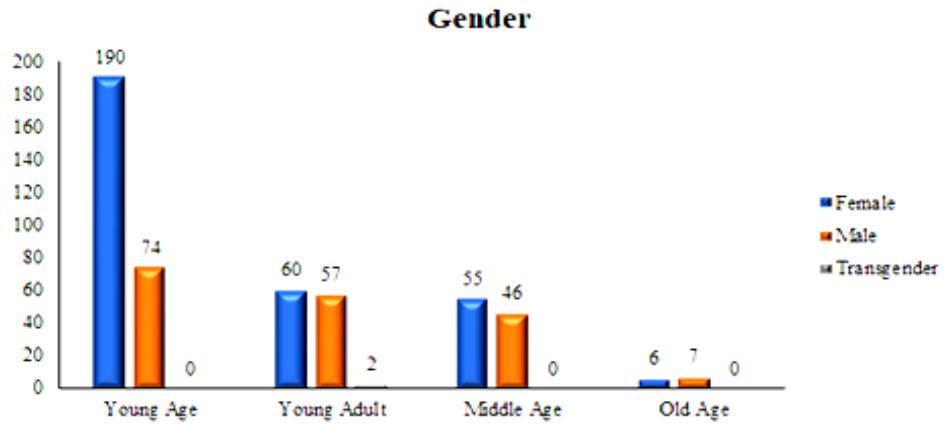
A bar diagram presents the distribution of age categories for 500 samples sourced from Tamil Nadu and Kerala. It is noteworthy that the youngest age group constituted the largest portion among the four age groups examined in this research. Furthermore, when assessing the distribution by state, Tamil Nadu outnumbered Kerala in participant count (**Fig 1**).

Figure 1: Age category-wise distribution of sample of both Tamil Nadu and Kerala



The bar graph shows the gender distribution of the samples involved in the research across Tamil Nadu and Kerala. The results demonstrate that female passengers represented the majority in both states, exceeding the counts of male and transgender bus passengers (**Fig 2**).

Figure 2: Gender-wise distribution of sample size of both Tamil Nadu and Kerala.



Factors influencing the stress level in different age group:

The data comprises 264 samples for young age, 119 samples for Young Adult, 104 samples for Middle age and 13 samples for old age for the study. The results were validated with this consistent sample size. Ratings for the stress level were given on a scale of 1 to 5 based on various factors. The mean values provide an indication of central tendency, with "Road in Bad State" receiving the highest average rating (mean = 3.65), while "Small Bus" obtained the lowest (mean = 2.70) for young age group. Whereas factors like “Road in Bad State" and “Heat" received relatively higher average ratings, with means of 3.71 and 3.61, respectively. On the other hand, factors like “Small Bus" and “Personal Space" had lower average ratings, with means of 2.63 and 2.97, respectively for the age group young adult.

Factors such as "Place" and "Road In Bad State" received relatively higher average ratings, with means of 1.85 and 3.47, respectively and factors like "Small Bus" and "Inefficiency" had lower average ratings, with means of 2.75 and 2.99, respectively for Middle age group and for old age group factors like "Vehicles That Do Not Obey The Law" and "Road In Bad State" received higher average ratings, with means of 3.46 and 3.38, respectively. On the other hand, factors like "Vendors in the Bus" and "Small Bus" showed the lowest average ratings, with means of 2.31 and 2.69, respectively for further details refer (**Table1**).

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Table 1: Descriptive Stress Assessment analysis among different age groups of Tamil Nadu and Kerala population.

Young age (264 no.)					Young Adult (119 no.)			Middle age (104 no.)			Old age (13)		
S.No	**Descriptives**	**Range of Stress**	**Mean**	**Std. Deviation**	**Range of Stress**	**Mean**	**Std. Deviation**	**Range of Stress**	**Mean**	**Std. Deviation**	**Range of Stress**	**Mean**	**Std. Deviation**
1.	Place	1-2	1.80	.401	1-2	1.70	.461	1-2	1.85	.363	1-2	1.85	.376
2.	Gender	1-2	1.28	.450	1-3	1.51	.535	1-2	1.47	.502	1-2	1.54	.519
3.	Heat	1-5	3.46	1.367	1-5	3.61	1.121	1-5	3.40	1.137	1-5	2.77	1.363
4.	Noise	1-5	3.42	1.144	1-5	3.46	.998	1-5	3.35	1.031	1-5	2.85	1.068
5.	Corruption	1-5	2.98	1.224	1-5	3.56	1.125	1-5	3.14	1.218	1-5	2.69	1.182
6.	Road In Bad State	1-5	3.65	1.117	1-5	3.71	.951	1-5	3.47	1.174	1-5	3.38	1.261
7.	Drivers That Are Not Careful	1-5	3.33	1.234	1-5	3.48	1.149	1-6	3.27	1.271	1-5	2.85	1.281
8.	Rude People	1-5	3.43	1.128	1-5	3.39	.950	1-5	3.38	1.064	1-5	3.38	1.121
9.	Abuse Of Authority	1-5	3.38	1.233	1-5	3.50	1.111	1-5	3.14	1.074	1-5	2.69	1.109
10.	Bus Drivers That Race	1-5	3.17	1.267	1-5	3.61	.967	1-5	3.14	1.202	1-5	3.00	1.354
11.	Uncomfortable Seats	1-5	3.27	1.267	1-5	3.45	1.056	1-5	3.24	1.153	2-5	3.15	1.405
12.	Rude Drivers	1-5	3.27	1.254	1-5	3.39	1.122	1-5	3.28	1.161	1-4	2.54	1.127
13.	Personal Space	1-5	3.08	1.329	1-5	2.97	1.255	1-5	3.13	1.223	1-5	3.08	1.320
14.	Badly Trained Drivers	1-5	3.20	1.299	1-5	3.47	1.103	1-5	2.99	1.186	1-5	3.15	1.144
15.	Arrogance	1-5	3.30	1.284	2-5	3.35	.944	1-5	3.32	1.117	1-5	2.77	1.235
16.	Talking Too Loudly Or Yelling	1-5	3.36	1.231	1-5	3.36	1.071	1-5	3.08	1.121	2-5	3.46	1.050
17.	Vehicles That Obstruct Traffic	1-5	3.50	1.167	1-5	3.31	1.006	1-5	3.34	1.076	1-5	2.77	1.235
18.	Excessive Use of Car Corn	1-5	3.52	1.186	1-5	3.30	1.161	1-5	3.39	1.074	1-5	2.85	1.214
19.	Small Bus	1-5	2.70		1-5	2.63	1.134	1-5	2.75	1.002	1-5	2.69	1.316

20.	Obstructive People	1-5	3.06	1.214	1-5	3.04	1.045	1-5	3.11	1.123	1-5	3.38	1.121
21.	Windows in Bad State	1-5	3.27	1.281	1-5	3.13	1.078	1-5	3.08	1.212	1-4	2.62	.870
22.	Jay-Walking	1-5	2.92	1.273	1-5	2.98	1.089	1-5	2.95	1.210	1-5	2.62	1.557
23.	Vendors in the Bus	1-5	2.61	1.341	1-5	2.63	1.088	1-5	2.77	1.217	1-4	2.31	.855
24.	Rain	1-5	2.76	1.503	1-5	2.99	1.255	1-5	3.09	1.255	1-5	2.92	1.498
25.	Vehicles that Do not obey the Law	1-5	3.32	1.189	1-5	3.22	1.036	1-5	3.32	1.036	2-5	3.46	.877
26.	Music At High Volume	1-5	2.91	1.254	1-5	3.08	1.082	1-5	3.12	1.082	1-5	3.15	1.144
27.	Bus Drivers that Speed	1-5	3.06	1.259	1-5	3.28	1.192	1-5	3.23	1.192	2-4	2.92	.760
28.	Old Bus	1-5	3.19	1.321	1-5	2.98	1.210	1-5	3.17	1.210	1-5	3.15	1.144
29.	Inefficiency	1-5	3.04	1.205	1-5	3.18	1.145	1-5	2.99	1.145	1-5	2.69	1.109
30.	Not Using Pedestrian Areas	1-5	3.13	1.323	1-5	3.33	1.170	1-5	3.27	3.05	1-5	2.77	1.301

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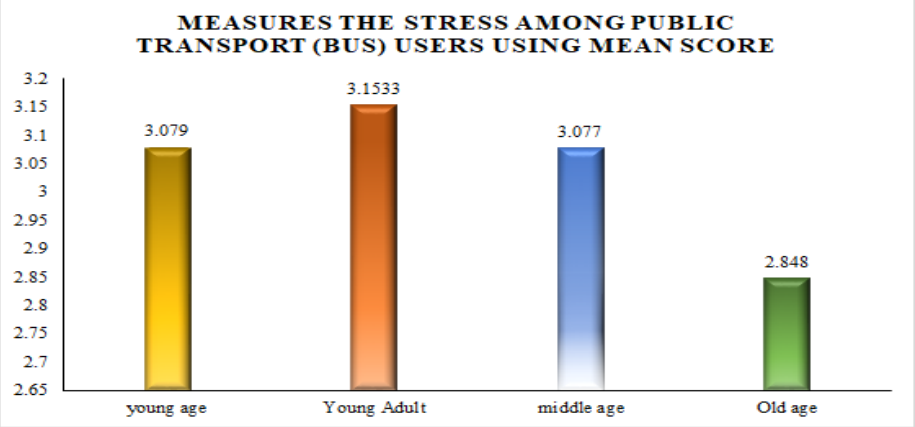
While looking into the stress level based on the different underlying factors it is was interesting to note that out of the four classified sub group young age seems to have the highest stress level of 3.1533 among the public transport bus users in both Tamil Nadu and Kerala and for further details view (**Fig 3)**. These results were based on the different statistical evaluation procedures.

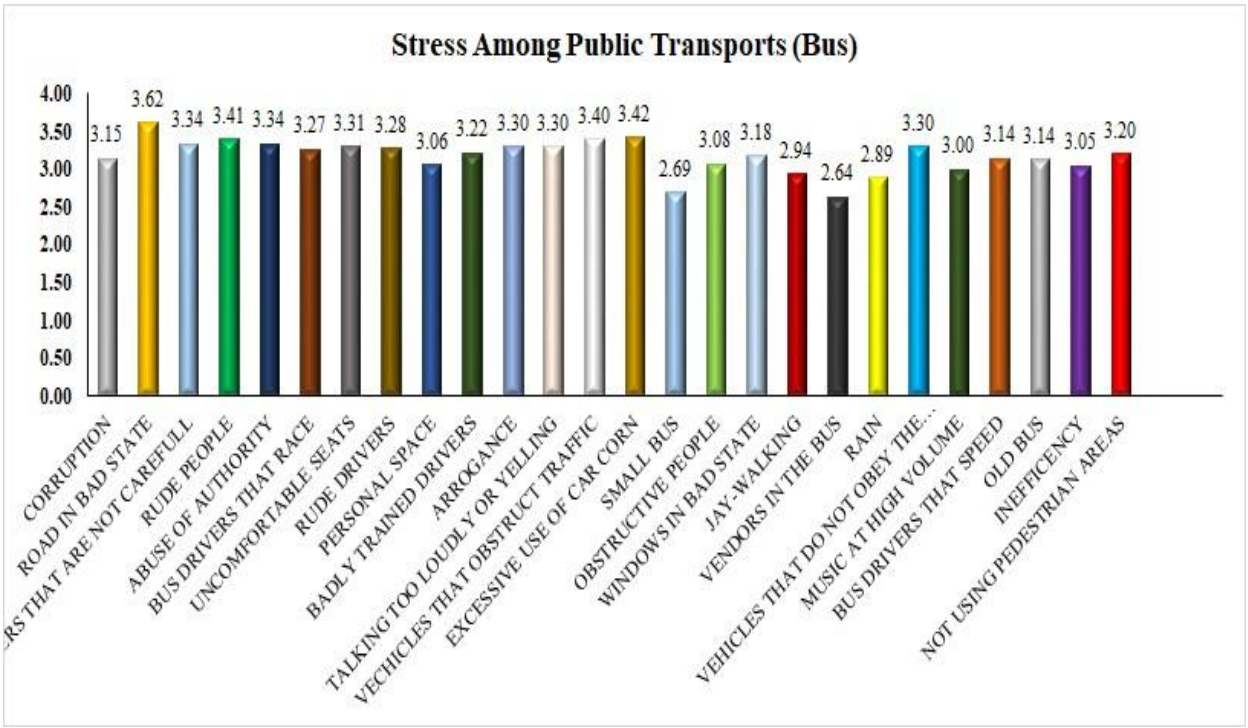
Figure 3: Level of Stress among the Public Transport bus user in Tamil Nadu and Kerala



The overall factors involved in the stress level were evaluated for the sample of both Tamil Nadu and Kerala. Out of the 30 factors screened among all the age group in both the states in India though all the factors had great influence in the stress level among individual the factor Road in Bad State contributed for the highest level of stress with a mean of 3.62 among all the age groups followed by Excessive use of car horn with a mean of 3.42 and vehicles that obstruct traffic had a mean of 3.40 and the rest of the contributing factors are given in the (**Fig 4)**.

Figure 4: The Stress factors validated public Transport bus user in Tamil Nadu & Kerala

The statistical evaluation was performed t -test results show that there were significant differences between the test value of 0 and the observed means for each variable. This suggests



that the variables had a notable impact on people's perceptions or experiences, as they

significantly deviated from zero. The provided statistical data provides robust evidence of these differences and highlights the specific magnitudes and directions of the deviations.

DISCUSSION:

The stress level among the public transport bus users is a novel study especially in India and there are many such studies conducted among bus drivers and there stress level and other factors they face while driving. [12,13,14] .But among the travellers it is a rare concept. This study had tried to justify the interventions out of this study with adequate sample size and the factored influenced were carefully chosen for the study. There was a study among the visually impaired due to transportation and they feel that greatest level of stress was due to navigating unfamiliar bus routes, walking in urban areas without sidewalks, and walking in unfamiliar places. This study also emphasize that the old age persons and persons with physical limitations experienced more transportation-related stress and it is important to note that this study are not among the travellers [15].
A study was conducted in Germany [16, 17] to assess the stress among public transport users in colombia and the factors they screened were lack of control, crime, accidents, cleanness, noise, temperature and space and result stated that the female travellers have the highest stress level which correlated with this study where female candidates of all age group experienced the higher level of stress compared to other groups. A similar study was conducted in Dubilin, Ireland [18] to evaluate the stress level among public transport users (both train and bus) and the result states that the age group of 25 to 35 was study group and similarly female candidate contributed more with 58% when compared to male. The factors of concern used in the study was Crowding on-board public transport and Reliability of your public transport service. Though there are studies to evaluate the stress level but there is no study that have screened various stress factors associated with the public transport bus users. This study had emphasized on the major factors that are associated with the stress level in the range of 1-5. No such study has been reported in India especially in Tamil Nadu and Kerala.

CONCLUSION:

This study had tried to ascertain the factors that cause stress among the public transport bus users of either minibus or metro buses. Though various factors influence the stress level the major factors contributed were Road in Bad State, Excessive use of car horn and vehicles that obstruct traffic common factors irrespective of the age group. The majority of the population affected by stress was female compared to male since them dependent on public transport buses. To conclude if the condition of the road is improved and proper rules are implemented and followed public transport users have a stress free travel experience. Many such studies have to be conducted to create awareness among the travellers.

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