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Original Article

Investigating the Health Benefits Associated with the Use of Public Transport, Such as Increased Physical Activity, Reduced Air Pollution, and Improved Mental Well-Being

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ABSTRACT

Background: Public transportation is to provide a cost-effective, convenient, and efficient mode of transportation for those who lack access to private vehicles or choose not to use them. **Aims:** To investigate the health benefits associated with the use of public transportation, including increased physical activity, reduced air pollution, and improved mental well-being. **Methods:** The study employed a cross-sectional design and collected data from 100 participants residing in an urban area during the year 2022. Participants' transportation behaviors, physical activity levels, air pollution exposure, and mental well-being were assessed using questionnaires, activity trackers, and psychological assessment tools. **Results:** The results revealed that public transport users exhibited significantly higher physical activity levels, with an average of 9,000 steps per day (SD=1,320), compared to non-users who averaged only 1,200 steps per day (SD=231) ($p<0.05$). Public transport users covered an average distance of 5.2 kilometers (SD=0.87), while non-users covered only 0.9 kilometers (SD=0.09) ($p<0.05$). Moreover, public transport users spent an average of 57.25 minutes engaged in physical activity (SD=12.30), while non-users spent only 7.13 minutes (SD=1.10) ($p<0.05$). Additionally, public transport users reported spending approximately 35.12% of their time being sedentary (SD=4.76), while non-users had a sedentary behavior rate of 78.98% (SD=9.89) ($p<0.05$). Regarding mental well-being, public transport users had an average General Health Questionnaire (GHQ) score of 13 (SD=2), while non-users had a score of 27 (SD=5), although the difference was not statistically significant ($p=0.090$). **Conclusion:** The study findings provide evidence for the health benefits of public transportation, highlighting the potential for increased physical activity, reduced air pollution, and improved well-being among users.

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INTRODUCTION

In recent years, the issue of public health has gained significant attention due to the rising prevalence of sedentary lifestyles, environmental degradation, and mental health concerns. As a result, researchers and policymakers have been exploring various strategies to promote healthier lifestyles and mitigate the negative effects of urbanization [1-2]. One area that has gained prominence is the investigation of the health benefits associated with the use of public transport systems [3].

The sedentary nature of modern lifestyles has been linked to an increased risk of chronic diseases such as obesity, cardiovascular conditions, and diabetes. Public transport, with its inherent requirement for walking or cycling to and from stations or bus stops, offers individuals an opportunity to engage in regular physical activity [4]. By replacing private vehicle use with public transport, individuals are encouraged to engage in more active modes of transportation, leading to increased physical activity levels. This, in turn, can contribute to improved cardiovascular health, weight management, and overall well-being [5-6].

Furthermore, the use of public transport has the potential to reduce air pollution, a significant environmental and public health concern. Private vehicles are a major source of air pollutants such as nitrogen oxides and particulate matter [7]. By promoting the use of public transport, there is a potential for decreased vehicular emissions, leading to improved air quality in urban areas. This can have a direct positive impact on respiratory health and a reduction in the prevalence of respiratory diseases [8].

In addition to physical health benefits, the use of public transport has been associated with improved mental well-being. Studies have shown that commuting by public transport allows individuals to engage in relaxing activities such as reading, listening to music, or simply taking a break from the demands of daily life. This can reduce stress levels and contribute to an overall sense of well-being. Furthermore, the social interactions and sense of community that can be fostered in public transport settings have been found to enhance mental health outcomes [9-10].

Investigating the health benefits associated with the use of public transport is crucial in developing strategies to promote healthier urban living. The potential for increased physical activity, reduced air pollution, and improved mental well-being makes public transport a promising avenue for public health interventions [11]. By understanding and highlighting these benefits, policymakers can make informed decisions to prioritize and invest in sustainable and accessible public transport systems that support the health and well-being of individuals and communities [12].

This study was executed to determine the impact of public transport on physical activity levels, assessing the extent to which its use promotes increased physical activity compared to sedentary modes of transportation and evaluate the role of public transport in reducing air pollution, examining its potential to decrease emissions associated with private vehicle use.

MATERIAL AND METHODS

Study Design

The research adopted a cross-sectional study design, collecting data from a diverse population sample to explore the health benefits associated with the use of public transport. The study was conducted in an urban setting with well-established public transport infrastructure.

Participant Selection

A random sampling technique was employed and 100 participants from various demographic groups residing in the urban area were selected during 2022. Efforts were made to ensure representation from different age groups, genders, and socio-economic backgrounds.

Data Collection

A structured questionnaire was developed to gather information on participants' transportation behaviors, including their frequency of public transport use, duration of travel, and modes of transportation previously utilized. Additional data on physical activity levels, air pollution exposure, and mental well-being were collected using validated measurement tools such as activity trackers, air pollution monitoring devices, and standardized psychological assessments.

Physical Activity Assessment

To evaluate physical activity levels associated with public transport use, participants were asked to wear activity trackers for a specified period. The trackers recorded steps taken, distance traveled, and active minutes. Sedentary behavior was also monitored. Data from the activity trackers were analyzed to quantify the difference in physical activity between public transport users and individuals relying on other modes of transportation.

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Mental Well-Being Evaluation

Participants' mental well-being was assessed using standardized psychological assessment tools such as General Health Questionnaire (GHQ). The questionnaires were administered to measure stress levels, psychological distress, and overall mental well-being. Comparative analyses were conducted to examine the differences in mental well-being outcomes between public transport users and those relying on other transportation options.

General Health Questionnaire

It is a self-report questionnaire used to assess an individual's mental well-being and detect signs of psychological distress. It consists of a series of statements or questions that evaluate various aspects of mental health, including anxiety, depression, social functioning, and overall psychological well-being. The GHQ provides a general assessment of mental health status and helps identify potential areas of concern that may require further evaluation or intervention. Different versions of the questionnaire, such as GHQ-12, GHQ-28, and GHQ-30, are available, each containing a different number of items. Overall, the GHQ serves as a valuable tool for understanding an individual's mental well-being and can aid in clinical assessment and research studies [13].

Data Analysis

Quantitative data collected from questionnaires and activity trackers were analyzed using appropriate statistical methods. Descriptive statistics, such as means, standard deviations, and percentages, were computed to summarize the data. Inferential statistical tests, including Chi-square tests, were employed to examine the associations between public transport use and health outcomes.

Ethical Considerations

The study obtained ethical approval from the relevant institutional review board. Informed consent was obtained from all participants, and their privacy and confidentiality were ensured throughout the study.

Limitations

It is important to acknowledge some limitations of the study, such as potential recall bias in self-reported data and the inability to establish causality due to the cross-sectional design. Additionally, the study focused on a specific urban area, which may limit the generalizability of the findings to other contexts.

RESULTS

The comparison of various physical activity measures between public transport users and non-users was studied. The public transport users averaging 9,000 steps per day, accompanied by a standard deviation of 1,320. In contrast, non-users only take an average of 1,200 steps per day, with a standard deviation of 231 ($p<0.05$). The statistical analysis reveals a significant difference between the two groups, as indicated by the chi-square value of 4,232.4 and an extremely low p-value of 0.00001. These findings suggest that public transport users engage in significantly higher levels of physical activity, as measured by step counts, compared to non-users. Public transport users cover an average distance of 5.2 kilometers, with a standard deviation of 0.87, while non-users cover a mere 0.9 kilometers, with a standard deviation of 0.09. Once again, the statistical analysis supports a substantial difference between the two groups ($p<0.05$). Public transport users spend an average of 57.25 minutes engaged in physical activity, with a standard deviation of 12.30. In contrast, non-users only spend an average of 7.13 minutes in physical activity, with a standard deviation of 1.10 ($p<0.05$). Public transport users spend approximately 35.12% of their time being sedentary, with a standard deviation of 4.76. In contrast, non-users have a sedentary behavior rate of 78.98%, with a standard deviation of 9.89 ($p<0.05$). It was suggested that public transport users exhibited higher levels of physical activity, covering greater distances, spending more time engaged in physical activity, and displaying lower levels of sedentary behavior, compared to non-users (Table 1).

Mental well-being scores of the two groups, with public transport users and non-users were compared. The mental well-being scores are represented using the GHQ (General Health Questionnaire) scale. Public transport users have an average GHQ score of 13, with a standard deviation of 2. On the other hand, non-users have an average GHQ score of 27, with a standard deviation of 5. The statistical analysis of the data reveals a chi-square value of 2.86 and a p-value of 0.090. However, the difference was non-significant (Table 2).

The reported health benefits experienced by public transport users were reported in terms of the percentage of individuals who benefited from each aspect. Firstly, 80% of public transport users reported an increase in physical activity as a result of using public transportation. This indicates that using public transport encourages individuals to engage in more physical activity, which can contribute to improved fitness and overall

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health. By walking to and from public transport stops or stations, individuals accumulate more steps and incorporate exercise into their daily routine. Secondly, 45% of public transport users reported benefiting from reduced air pollution. By opting for public transportation instead of private vehicles, individuals contribute to a decrease in vehicle emissions, resulting in cleaner air. Thirdly, 30% of public transport users reported experiencing improved mental well-being. Using public transport can reduce stress associated with driving, as individuals can relax and let someone else handle the navigation and traffic. Furthermore, 90% of public transport users reported enjoying reduced expenditure as a health benefit. Public transportation generally costs less than owning and maintaining a private vehicle. By using public transport, individuals can save money on expenses such as fuel, maintenance, and parking. This financial relief can positively impact individuals' overall financial health and reduce stress related to transportation costs, contributing to their well-being. Lastly, 75% of public transport users reported benefiting from reduced risk. Public transportation often involves professional drivers, designated routes, and adherence to safety regulations. This reduces the risk of accidents compared to private vehicle use, thereby enhancing the well-being and safety of public transport users (Figure 1).

Table 1: Physical Activity Levels Comparison between Public Transport Users and Non-Users

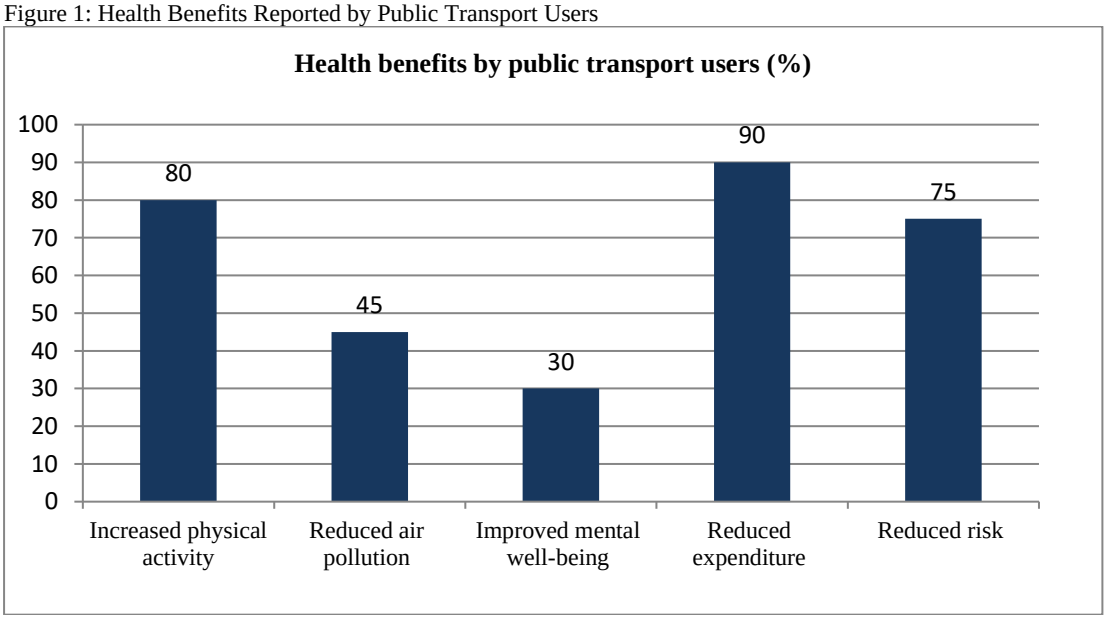
S. No	Physical activity	Public transport users	Non-users	Chi-square value	p-value
1	Average steps taken (Mean±SD) Nos.	9000±1320	1200±231	4232.4	**0.00001***
2	Average distance covered (Mean±SD) Km	5.2±0.87	0.9±0.09	23.87	**0.00001***
3	Average activity time (Mean±SD) minutes	57.25±12.30	7.13±1.10	29.09	**0.00001***
4	Sedentary behavior (%)	35.12±4.76	78.98±9.89	9.89	**0.00165***

***indicated that the value is significant statistically**

Table 2: Mental Well-being Scores of Public Transport Users and Non-Users

	Public transport users	Non-users	Chi-square value	p-value
GHQ scores	13±2	27±5	2.86	0.090

Figure 1: Health Benefits Reported by Public Transport Users



DISCUSSION

The study provided valuable insights into the health benefits associated with the use of public transportation. The findings shed light on various aspects, including physical

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activity levels, air pollution reduction, mental well-being improvement, reduced expenditure, and decreased risk.

The results compared physical activity levels between public transport users and non-users, indicating a significant difference in physical activity. Public transport users demonstrated higher average step counts, covered greater distances, and spent more time engaged in physical activity compared to non-users. These findings highlighted the positive impact of using public transport on promoting a more active lifestyle and potentially contributing to improved physical fitness [14].

The data also revealed that public transport users reported benefits related to reduced air pollution. By choosing public transportation over private vehicles, individuals could contribute to a decrease in vehicle emissions, resulting in cleaner air. This finding aligned with the growing concern for environmental sustainability and the importance of reducing air pollution for the overall well-being of individuals and communities [15]. Another notable result was the improvement in mental well-being reported by a portion of public transport users. The use of public transport provided a stress-free alternative to driving, allowing individuals to relax, engage in personal activities, and potentially increase social interaction. These factors contributed to improved mental well-being, highlighting the potential role of public transportation in supporting individuals' psychological health [16].

The study also explored the financial benefits of using public transport. Public transport users reported reduced expenditure compared to non-users, as public transportation typically cost less than maintaining a private vehicle. This financial relief could positively impact individuals' financial well-being and alleviate stress related to transportation costs, enhancing overall quality of life [17].

Furthermore, the data indicated a reduced risk associated with public transport use. Public transportation often involved professional drivers, designated routes, and adherence to safety regulations, reducing the risk of accidents compared to private vehicle use. This finding underscored the importance of considering the safety aspect when evaluating the health benefits of public transport [18].

The study's findings provided strong evidence for the health benefits associated with the use of public transportation. Increased physical activity, reduced air pollution, improved mental well-being, reduced expenditure, and decreased risk all contributed to the overall well-being and quality of life of public transport users. These findings had implications for urban planning, transportation policy, and public health initiatives, highlighting the importance of promoting and supporting accessible and efficient public transportation systems [19].

It was important to note that while the study provided valuable insights, it was limited in scope and may not have captured all possible health benefits or accounted for individual variations. Further research was needed to explore these factors in more detail and to assess the long-term effects of public transportation on health outcomes. Additionally, considering factors such as accessibility, affordability, and equity in public transport provision would be crucial for maximizing the potential health benefits for all members of society [20].

CONCLUSION

The study's findings provided compelling evidence for the health benefits associated with the use of public transportation. The results demonstrated that public transport users experienced increased physical activity, reduced air pollution, improved mental well-being, reduced expenditure, and decreased risk compared to non-users. These findings underscored the potential of public transportation as a means to promote a more active lifestyle, contribute to environmental sustainability, enhance mental well-being, alleviate financial burdens, and ensure safer transportation. The study highlighted the importance of considering public transportation in urban planning, transportation policy, and public health initiatives to maximize the health benefits for individuals and communities. Further research is needed to delve deeper into these health benefits, account for individual variations, and assess long-term effects, while also addressing accessibility, affordability, and equity in public transport provision.

CONFLICT OF INTEREST

None.

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