

## **Active Transport: A Pathway to Greener Planet, Healthier and Happier Lives**

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### **Abstract**

Active transport is characterized by the passenger's physical effort, which directly contributes to movement. This includes walking, cycling, and other activities like swimming, canoeing, and skateboarding. The most common topics under active transport study are the health benefits of this form of movement and the risks and safety that active transportation entails. Cohort studies demonstrated significant health benefits of active transport, particularly in preventing diabetes and improving mental health. Active transport satisfies the participants, facilitates socialization, and significantly reduces air pollution, contributing to a greener planet. According to national data from 2019 in Serbia, 75.2% of adults walk for at least ten minutes daily. On the contrary, only 9.0% of adults ride a bicycle daily, mainly in Vojvodina. The environmental benefits of active transport outweigh its dangers and risks. New designs of active transport vehicles provide opportunities and challenges in their implementation and spatial arrangement.

**Keywords:** active mobility, non-motorized transport, walking, cycling

## Introduction

Cook and colleagues defined active transport as transport “in which the sustained physical exertion of the traveler directly contributes to their motion.” (Cook et al., 2022). In practice, this would mean that in addition to walking and cycling, active transportation includes a whole series of disciplines with their variations: swimming, canoeing, kayaking, and rafting; skateboarding, rollerblading, and roller skating; traveling in a manual wheelchair, riding a bicycle with an electric motor and kick-scooting; ice skating, nordic skiing, etc... Forms of transportation that do not qualify as active travel include using any means of transportation entirely powered by a motor. Horse riding is not an active transport for a person but for an animal. However, maintaining a horse requires considerable physical effort; even riding requires the rider's entire body activity (Elmeua Gonzalez and Sarabon, 2020).

Active transport, or active travel, is the original form of people transport and fosters a sense of community and social interaction. It is a term gaining popularity, especially among decision-makers and public policymakers, as an alternative to “motorized transport,” the original form of people transport; it is a new term especially popular with decision-makers and public policymakers as an alternative to “motorized transport” (Allen and Nolmark, 2022). The review from 2022 found 658 papers in English in the Web of Science database published from 2000 to 2020, with the keyword “active transport” focusing on human transportation. This review is significant as it provides a comprehensive overview of the research related to active transport, highlighting the growing interest and the diverse range of topics being explored (Cook et al., 2022). Overall, about two-thirds of the works belong to the field of public health, and one-third to the transport field (Cook et al., 2022). Outside the

field of public health, terms such as “non-motorized transport” and “active mobility” are more commonly used in discussions about transportation or urban planning (Pisoni et al., 2022). This area of research, focusing on the benefits and challenges of active transport, has seen a significant surge in interest since 2010. The increasing interest in sustainable transportation and the health benefits of physical activity have contributed to this growth, with a particularly notable increase in research output since 2020, when epidemiological measures rested public transport, pointing out the importance of other forms of transportation (Allen and Nolmark, 2022).

In this paper, we will present some advantages and disadvantages of active transport with local Serbian data and compare them with the international prevalence of such transport.

### **Benefits of active transport**

As it was said, active transport is a rising topic in public health. Therefore, it's hardly surprising why so many researchers evaluate the benefits of active mobility to human health, making this subtopic the most intriguing one within all active transport. This interest is based on the proven increase in obesity, a disease per se and a risk factor for other diseases, and the simultaneous increasing use of motorized traffic at the expense of walking. Therefore, active transport sounds like a logical way to increase physical activity. World Health Organization (WHO) reminds us that a regular walk of at least 30 minutes or a bicycle ride of at least 20 minutes reduces the frequency of cardiovascular diseases and diabetes, as well as cancer deaths (World Health Organization, 2022).

However, there is a clear need for more comprehensive studies to provide unequivocal evidence of the health benefits of

active transport through interventional, cohorts, and case-control studies (Saunders et al., 2013). One of the reasons for such unclear results is the short duration of the studies and the type of studies with a predominance of cross-sectional studies where it is difficult to separate cause from effect. The most unmistakable evidence was found for walking longer than 20 or 30 minutes to prevent type 2 diabetes, supporting WHO recommendations (Sato et al., 2007, Hu et al., 2007). Kroesen and De Vos analyzed a Dutch cohort of adults over ten years and found that a high Body Mass Index was associated with avoiding active transport. On the other hand, walking and cycling are strongly associated with better mental health (Kroesen and De Vos, 2020). This cohort research agrees with previous findings suggesting that walking or cycling to work are the forms of transport that contribute the most to our positive mood (De Vos et al., 2016, St-Louis et al., 2014).

Additionally, active transport significantly contributes to fun and satisfaction, which are legitimate children's and adults' needs. Those who walked or cycled to work reported better moods and work performance than passive transport users. This not only enhances personal well-being but also inspires personal growth and development (Fyhri et al., 2023). Cycling to work, but not walking, was associated with reduced sickness absence, a promising finding for employers concerned about absenteeism (Mytton et al., 2016). Therefore, if business owners invest in bicycle parking spaces, lockers, and changing rooms, they might attract happier, healthier, and more efficient employees who will be less absent.

Sometimes, it is not easy to separately analyze the satisfaction achieved by active transportation from situations where transportation is the primary goal of the activity that brings happiness and satisfaction to the participants. Besides all the benefits of moderately intensive exercise on the mood, other

components cause high commute satisfaction amongst cyclists. Those are 1) A high level of commuting control, "arrival-time reliability" with a sense of "self-efficacy" early in the day; 2) Pleasant levels of sensory stimulation from a combination of internal sensations due to muscular effort with sensory input from the different landscapes, blue and green spaces; and 3) Greater opportunities for social interaction and neighborhood satisfaction (Toner et al., 2021, Wild and Woodward, 2019). We have all witnessed rivalry or even unpleasant situations between motor vehicle drivers in traffic or public transport drivers and passengers at least once in our lives. Such inconveniences are almost non-existent between cyclists, and riding together provides an opportunity for "flexible" social interaction. The use of electric bicycles in commuting can further increase all these benefits.

According to Lelieveld et al., the global mortality due to ambient air pollution from fossil fuels is more than five million annually (Lelieveld et al., 2023). Transport is a major source of emissions that contribute to outdoor air pollution (Anenberg et al., 2019). Therefore, active transportation unequivocally contributes to health indirectly through a cleaner environment. Evidence from a study conducted in eight European cities showed that replacing one trip per day during 200 days by car with one trip by bicycle would decrease mobility-related lifecycle CO<sub>2</sub> emissions by about 0.5 tonnes over a year (Brand et al., 2021). This study demonstrates an excellent potential for reducing ambient air pollution due to switching from motorized to active transport. The results become more critical if the frequency of car driving is known for short distances that can be overcome by walking or cycling up to a distance of 8 or 16 kilometers. These short routes disproportionately contribute to air pollution, especially in the northern hemisphere and during winter (Neves and Brand, 2019, Brand, 2021).

The final benefit that we will present is decreasing social exclusion, defined in mobility and transport as circumstances that make it challenging to access services, goods, and opportunities and to be involved in society (MacLeod et al., 2022). Active transport contributes to the inclusion of a broader range of people, children, the poor, and people with disabilities in social life, making social activities (work, schooling, social events...) accessible to people who, due to age, disability, or modest financial possibilities, cannot afford "classic forms of transport" or they live in areas without suitable transport infrastructure (Yuan et al., 2022). The importance of transport as a vital need of people was seen during the lockdown period of 2020 when a large part of public transport stopped working. Such a measure may have limited the spread of the virus, but it significantly contributed to isolation, alienation, and feelings of sadness and loneliness, especially among older people (Yang et al., 2021).

With the development of new active vehicles, the benefits of active transportation are growing. A good example is electric-assist bicycles (e-bikes) (Castro et al., 2019). Contrary to popular belief, e-bikes require more physical engagement than regular bikes. In addition, such bicycles were found to cover longer distances in total and per day. However, this mean of transport is associated with higher speed. Therefore, if stakeholders would like to accommodate or promote this way of sustainable transport and avoid clashes with other traffic participants in urban areas, they need to adapt and expand cycling infrastructure according to their demands and special safety needs.

## **Problems associated with active transport**

Active travel does not come without issues (Cook et al., 2022). Security of such transport is the second most common topic in active transport within public health. Roadways are constructed according to the needs of motorized traffic. Therefore, users of these motorized means of transport are not used to participating in traffic with “non-motorized” means of transport, nor are they trained enough. That is why they fear meeting cyclists, someone in wheelchairs, or kick-scooting riders. Even with the best protection measures, active transport participants are vulnerable to collisions with motor vehicles, which could lead to fatal outcomes.

That close contact of active travel with the environment and the continuous surrounding of sensations can be pleasant. Still, it can sometimes be so strong that it makes a pedestrian or a cyclist lose their sense of reality, with a consequent loss of concentration, which can be fatal in traffic without collisions with other vehicles.

The public also associates active transport with extreme and risky behavior. It tends to overestimate the prevalence of injuries or deaths of cyclists, skiers, skaters, or canoeists rather than other road users, especially motor vehicle drivers (Fang and Handy, 2017). The traditional statistics classify all these forms among pedestrians, contributing to this, so it is challenging to determine the true extent of national suffering among skateboarders, rollerblades, or Nordic skiers. It should be noted that the behavior of active drivers on the road is different from their behavior on artificial training grounds specially designed for vet skateboarding or freeride BMX (Fang and Handy, 2017).

Ensuring the equality of all types of active transport is a particular group of problems. Considerable resources have already been invested in the development of cycling and

walking, and the question arises whether the community would be willing to promote the development of other forms of active transport similarly. Is the development of paths for other forms of active transport too much of a demand for the community, and will it come at the expense of the deprivation of cycling?

As already said, active travelers are in constant contact with the environment. Therefore, it is considered that active travelers are exposed to environmental factors much more than passengers in motor vehicles. It includes air pollution, also. However, studies show they are less exposed to CO, volatile organic compounds, or PM than other travel modes at shorter distances. Although this exposition is still elevated compared to ambient levels (de Nazelle et al., 2011). Exposure depends on many factors, including population density, traffic density, distance from pollution sources, airflow, etc. It should be remembered that active travelers can choose their routes, which is why most of them select safer roads due to pollution and protection from injuries. Exposure to pollution increases with the length of the road, both due to more prolonged exposure to sources of pollution and the increase in inhalation. Long-term exposure to polluted air decreases but does not cancel out benefits from active transport (Mueller et al., 2015). However, the level of reduction depends on the degree of inundation of a particular area and spece (Chandia-Poblete et al., 2022). Even traffic trauma does not negate the health benefits of active transport (Mizdrak et al., 2019).

Finally, but not less important, is the legal regulation of their participation in traffic in light of the development of new types of active transport. Similar to this are challenges of urban planning and the arrangement of open and closed spaces that could safely accommodate all road users. Improving urban and transport planning will result in more carbon-neutral, liveable,



and healthier cities for both active travelers and inhabitants (Nieuwenhuijsen, 2020).

## **The utilization of active transport in Serbia**

Questions about active transport in Serbia are an integral part of research on the health status of the Serbian population, which is periodically conducted. The last such study was carried out in 2019. There are four questions about active transport:

- FA.2 Question: In a typical week, how often do you WALK for at least 10 minutes a day without interruption (continuously) to go or return from somewhere?
- FA.3 Question: How long do you usually walk during the day to go or return from somewhere?
- FA.4 Question: In a typical week, how often do you CYCLE for at least 10 minutes a day without interruption (continuously) to go or return from somewhere?
- FA.5 Question: How long do you usually spend riding a bicycle during the day to go or return from somewhere?

Data on the frequency of habits are standardized based on sex and age to obtain more representative data. All data refer to a population aged 15 and above.

Regarding question FA.2, about the number of days of walking during the week, 75.2% of the population stated that they walk for 10 minutes or more continuously every day, slightly more men (76.1%) than women (74.3%). Daily walking is the most common among the youngest (age group 15-24), about 84.1% of such population. With each subsequent age group, the frequency of daily walking as a visible form of transportation decreases, so that among those aged 85 and over, this habit is present in only 42.3% of this age group. Among the regions, everyday walking was the most frequent in Southern and Eastern

Serbia (82.8%) and the least frequent in Šumadija and Western Serbia (68.0%). As for the frequency according to household income quantiles, Serbian residents in the first quantile, which includes the poorest households (76.7%), are the most regular walkers and those from the fourth quantile (76.4%) are very close to them.

As for the usual time they spend walking, 33.9% of the population stated that they walk from 10 to 29 minutes a day, and an additional 28.8% walk from 30 to 59 minutes. Among those who walk daily for more than 10 minutes, 26.9% walk up to 29 minutes and 29.8% walk from 30 to 59 minutes.

If the majority of Serbs regularly walk, the situation is the opposite when it comes to cycling. Almost four-fifths of the adult population of Serbia (76.8% to be exact) did not ride a bicycle for even 10 minutes at least once a regular week. Those who ride a bike do it daily, so 9.0% of adults rode it daily for more than 10 minutes, mostly men (10.5% compared to women with 7.6%). Adults aged 55-64 (10.9%) travel by bicycle most often daily, whereas those in the younger age group 45-54 do it a little less (10.3%). By far, adults in Vojvodina (23.5%) ride a bicycle daily, while the least common are adults in Belgrade (1.8%). Adults from the poorest households most often ride a bike every day, and those from the wealthiest quantile the least.

When asked how much they ride a bicycle when they travel, 48.5% stated that they ride for up to 29 minutes, and 33.2% intervals of 30-59 minutes. Among daily cyclists, 38.7% travel by bike for up to 29 minutes, and 38.6% travel from 30 to 59 minutes.

## **Comparison with European counties**

Eurostat is the statistical office of the European Union (EU). It regularly publishes data on physical activity for the EU

countries, the European Free Trade Association countries, and the countries that are candidates for membership in the EU, including Serbia (Eurostat, 2022). According to their data, 82.6% of the adult population walks for 10 minutes at least once a week at the EU level. That is significantly less than Serbia, where that percentage is 93.2%. Of the surrounding countries, Bulgaria's population walks more, while Croatia, Hungary, and Romania walk less.

As for cycling, Serbia is slightly behind the EU average. The frequency of bicycle transportation for more than 10 minutes at least once a week in Serbia was 23.2%. At the same time, this prevalence was 23.6% at the EU level among the adult population in 2019. Transportation by bicycle for more than 10 minutes at least once a week is practiced more often in Hungary than in Serbia and less often in Bulgaria, Croatia, and Romania. As expected, the highest cycling frequency was in the Netherlands, followed far behind by Denmark in second place.

The bicycle is one of the symbols of the Netherlands. In 2019, more than a quarter of all trips were made with it, but only about 8% of all distances were covered by bicycle (KiM Netherlands Institute for Transport Policy Analysis, 2020). This means that bicycles are used for frequent trips over short distances. Thus, the average Dutch person travels about 3 kilometers a day by bike. Cycling is a favorite pastime in the Netherlands; about a third of all trips were related to fun and enjoyment. The rest is evenly distributed between shopping, going to and from school, commuting, and other purposes. This popularity of cycling in the Netherlands results from a combination of tradition, favorable climate, and terrain, which has been improved by interventions that have been made to popularize the daily use of bicycles. These interventions include providing adequate cycling infrastructure and reducing the attractiveness of car use (e.g., by increasing parking tariffs and

increasing the area of paid on-street parking) (Harms et al., 2016). Such an approach is figuratively called the "carrot and stick" approach. The effectiveness of the intervention owes its scientific basis to setting achievable and measurable goals. Monitoring the objectives enables tracking the implementation of promotional programs and their correction on the ground in real-time according to interim goals.

## **Conclusions**

Active transportation is one of the ways to build a sustainable, healthy, happier, and cleaner future, especially in urban areas, where participation in social activities and access to goods and services require short trips. Serbia has further potential for the development of active transport, especially cycling. In this sense, the evidence from the literature suggests that the target groups should be younger people who do not use this type of commuting at all. Promotion activities should establish and develop an active mobility culture regardless of the weather or season of the year.

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