

Hypothesis

# Active Commuting: An Opportunity to Fight Both Climate Change and Physical Inactivity

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**Abstract:** Global health, climate, and ecological conditions cannot be dissociated, and over the last decade, the impacts of climate change on health have been profoundly felt. In 2010, the transport sector has been responsible for the direct emission of 6.7 Gt of carbon dioxide (CO<sub>2</sub>), and these numbers are expected to double by 2050. Additionally, physical inactivity rates have been growing over the last years, with most individuals in developed countries still relying on their cars for daily transportation, despite the unexplored potential of daily commuting in the promotion of physical activity. Given the well-known link between chronic diseases and sedentary lifestyles, addressing both the upward tendency of public health costs and energy consumption obtained from fossil fuels can be, possibly, one of the greatest public health opportunities over the last century. In this paper, we explore the potential of active commuting as a contemporary approach to address both global issues, considering its benefits on several indicators of health, quality of life, and well-being, as well as environmental-friendly behaviors.

**Keywords:** public health; quality of life; sustainability; environment



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## 1. Introduction

### 1.1. The Paradox of Climate Change on Health: Problem and Opportunity

Global health, climate, and ecological conditions cannot be dissociated [1]. Over the last decade, the health impacts of climate change have been profoundly felt, and this tendency is likely to get worse over the next decade [2]. Therefore, the global climate crisis requires a quick shift on policies and collective actions to reverse the global warming tendency [1].

Climate policies can influence in a positive (co-benefits) or in a negative way the achievement of social goals, such as those that relate to human health, food security, biodiversity, local environmental quality, and access to energy, among several others [3]. Thus, because economic and environmental motives have not been enough to mobilize stakeholders and society's attention towards the urgency of a quick shift on climate change-related policies, and knowing that concerns on human health tend to outweigh all others, it is of most importance to start looking at this problem through a health perspective [1]. This approach is aligned with the Parma Declaration on Environment and Health [4], which aims for the integration of health matters in all measures, strategies and climate change mitigation, and adaptation policies. As a matter of fact, health co-benefits of climate change mitigation policies (e.g., increased physical activity levels related to a change in transport behaviors) are a strong incentive to fasten those policies, since they are experienced in the short-term, as opposed to the long-term benefits of climate change mitigation per se [5].

In this regard, the relation between the current rates of chronic diseases and the increasing tendency of energy consumption obtained through the burning of fossil fuels is a tremendous opportunity to address both challenges at once [1]. Therefore, the urging actions to fight climate change are, possibly, the greatest public health opportunity over the last century [6].

### *1.2. Active Commuting: A Contemporary Strategy to Fight Both Climate Change and Physical Inactivity*

There is wide evidence of the effects of regular physical activity on several non-communicable chronic diseases, prevention of high blood pressure, improvements on mental health, quality of life, and well-being [7]. Still, physical inactivity levels have been rising over the last years, reaching rates as high as 70% in some developed countries, due to changing patterns of transportation, increased use of technology and urbanization [8]; southern European countries are showing smaller rates of physical activity compared to the northern ones [9]. In order to reduce physical inactivity and sedentary behavior, the World Health Organization (WHO) [8] has set four main strategic goals: create active societies, aiming a paradigm shift in all of society towards the benefits of regular physical activity; create active environments by creating supportive spaces and places in cities and communities in which people can engage in regular physical activity; create active people by outlining the multiple settings in which an increase in programs and opportunities can help people to engage in regular physical activity; create active systems by outlining the needed investments to strengthen the systems that allow the implementation of actions to increase physical activity.

In this sense, walking and cycling could play an important role, since the transition to active commuting could go upon the WHO recommendations for daily physical activity, if performed with moderate intensity (4–6 Estimation of Metabolic Equivalents (METs)), for at least 30 min a day [10]. However, walking and cycling for commuting purposes have been losing relevance and popularity in many countries [8], with most individuals in developed countries relying on their cars for daily transportation, despite the unexplored potential of daily commuting in the promotion of physical activity [10].

From an environmental perspective, Edenhofer et al. [3] state that, in the year 2010, the transport sector accounted for 27% of final energy use, being linked to the direct emission of 6.7 Gt of carbon dioxide (CO<sub>2</sub>). Furthermore, projections claim that these values could double by 2050, but the adoption of technical and behavioral mitigation measures regarding the transport sector, infrastructures, and urban planning (e.g., prioritizing pedestrian infrastructures and investing in transit and non-motorized services) could not only reduce energy consumption by up to 40%, but also turn into several social and economic co-benefits [3].

Thus, considering all these facts, investing in active commuting for short distances, whether through the encouragement of walking or cycling, could contribute to enhance public health [5].

### *1.3. Active Commuting, Health, and Quality of Life*

The most significant impacts of active commuting on health are related to the beneficial effects of physical activity, especially on cardiac diseases and on elderly people [11]. Evidence points towards a beneficial effect of active commuting on body composition [12,13] and on cardiorespiratory fitness, as well as on several skills related to overall physical fitness, with cycling for commuting purposes seeming to have a more profound role on the latter [13]. According to a recent study developed in 8 European countries, just commuting to work by bicycle with a frequency of four times a week is associated with a lower risk of being overweight (OR = 0.74 (95%CI 0.57–0.97)) [14].

In a study developed by de Hartog et al. [15], the benefits of a transition from private cars to bicycles have been shown as being greater than the risks. The referred authors estimate that the benefits from physical activity inherent to this transition results in nine times more gains on years of life than the losses related to traffic accidents and to the in-

creased inhalation of pollutants that this transition entails. In turn, Jacob et al. [16] reported a significant increase in both physical and mental health of individuals who changed their commuting habits from cars to active commuting, as opposed to the worsening observed on subjects that made the reverse transition. Besides, those shifting from transit services to active commuting presented increased health satisfaction [16]. On the other hand, the mentioned authors noted that subjects that changed their commuting habits from active commuting to transit services reported a significant decrease in mental health, but, curiously, did not seem to have a significant decrease in their physical health. Jacob et al. [16] hypothesize that this might be explained due to the physical activity required to commute between transit service stations. Further research is critical to examine the magnitude associated with these benefits.

Regarding the relation between active commuting and mental health, there is little evidence and some of it is unclear. For instance, Marques et al. [17] stated that, besides evidence being inconsistent between active commuting and depression symptoms in adults, individuals could, hypothetically, benefit from increasing their physical activity levels through active commuting. In addition, evidence suggests that active commuting contributes to the increase of overall physical activity levels, [13,18,19] whose connection to depression symptoms is well-known [20].

Still related to commuting, a study conducted in 9 countries has shown active commuting to decrease psychological symptoms among teenagers who engaged in active modes of transport to school, especially by using a bicycle [21]. Neumeier et al. [22] observed a positive impact of active commuting on several dimensions related to the quality of life of adult workers, with the results being significant on the dimensions of physical function, general health, vitality, and mental health. Besides, evidence poses that cycling for commuting purposes might not only contribute to the decrease of work sick leave, but also to the improvement and maintenance of the well-being of working-age adults [23].

## 2. Overall Considerations and Perspectives for Future Research

Given the urgent need to reduce CO<sub>2</sub> emissions, and taking the considerable role of the transport sector on those emissions into account, possible mitigation policies to reduce CO<sub>2</sub> must be seriously analyzed. Here lies a great opportunity to fight both climate change, consumption of energy obtained through the burning of fossil fuels, physical inactivity, sedentary lifestyles, and its associated chronic diseases by endorsing active commuting. Therefore, considering its well-established benefits on health and its positive effects on the mitigation of CO<sub>2</sub> emissions, encouraging active commuting programs could contribute to a healthier and more sustainable society, making a valuable contribution towards the promotion of public health.

All around the world, people are being encouraged to make a transition towards active commuting [16]. To our knowledge, literature on active commuting is still scarce, and the number of people engaging in a more active way to commute is still unknown. Considering the decrease in popularity of active commuting mentioned above, and in order to reduce fossil fuel consumption and to increase the levels of physical activity among an increasingly more sedentary society, we suggest more research on why people choose to commute the way they do, as there seem to be paramount questions that need to be addressed.

Due to their research interest, universities, in particular, could provide a good framework to further assess, test, and implement policies regarding urban sustainable transport [24]. With active commuting programs being positively linked to overall physical activity patterns among students of several ages [18,19], we recommend that both researchers and policymakers consider this population as a main intervention target by encouraging the engagement on a more sustainable way to commute since an early age.

Additionally, considering the important role of the built and natural environment on the shaping of physical activity patterns [25], it is of most importance to look at our cities through the eyes of people that actually commute in it, to understand whether our cities are ready or not to support and to encourage active commuting programs. Future research

investigating a possible causal association between active commuting and overall physical activity is needed, incorporating objective measures of environmental costs, and to gain a clearer understanding of whether taking up active commuting results in an increase in overall physical activity and a decrease in overall energy (e.g., fossil fuel) use.

#### *Strategies for Active Commuting As a Mean to Promote Physical Activity*

Taking the previously mentioned high rates of physical inactivity and the relevant role of active commuting on health and quality of life into account, we consider that a set of multiple strategies to promote a shift towards active commuting is needed. In order to overcome possible barriers to the adoption of active commuting, and to increase awareness about the importance of physical activity, we suggest some examples of possible strategies:

- When distance from home to work/school is a problem, people should be encouraged to park their cars within a 15 min walking or cycling distance from their work/school;
- For people using transit services, dropping off a few stations earlier could be an option to increase their physical activity levels;
- Stakeholders could implement thematic days, such as “walk-to-work day”, or “cycle-to-work day”;
- Policymakers should consider offering bicycle-sharing systems, especially nearby peripheral parking lots and other pivotal urban areas, and investing in bicycle lanes and pedestrian access.

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