

A Review on Cost Effective Physical Activity Using Bike

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ABSTRACT: *A cost-benefit study of utilizing bike/pedestrian paths in Lincoln, Nebraska, to decrease health care expenses related with inactivity was performed from a public health viewpoint. The information was gathered from the city's Recreational Trails Census Report from 1998 and the literature. The trails cost \$209.28 per person per year (\$59.28 for construction and upkeep, \$150 for equipment and travel). The yearly direct medical benefit per capita from utilizing the trails was \$564.41. The cost-benefit ratio was 2.94, meaning that every dollar spent on paths for physical exercise resulted in \$2.94 in direct medical benefit. According to the sensitivity studies, the ratios varied from 1.65 to 13.40. As a result, constructing trails is cost-effective from the standpoint of public health. Equipment and travel expenses were the most sensitive factors influencing the cost-benefit ratios; nevertheless, even at the greatest cost, every \$1 invested in trails led in a higher return in direct medical benefit.*

KEYWORDS: *Community, Environment, Economic Analysis, Inactivity.*

1. INTRODUCTION

Many researchers have looked into inactivity as an independent risk factor for many chronic diseases, including coronary heart disease, obesity, diabetes, hypertension, some cancers, and some mental disorders, and the surgeon general's report on physical activity and health summarized their findings. Several studies have also shown the economic cost of physical inactivity. According to one research, if 10% of people started a regular walking regimen, they might save \$5.6 billion in 1994 from the expense of coronary heart disease alone. In 1987, another research projected that the direct medical costs linked with physical inactivity may have reached \$76.6 billion (in year 2000 dollars). Despite the significance of physical exercise in lowering health expenditures and morbidity and mortality from chronic illnesses, physical inactivity among adults has stayed about 30% for the last decade, while attaining the recommended levels of physical activity for health benefits has remained around 25% [1]–[3].

Physical activity promotion has become a public health priority due to the health and economic costs of inactivity. Lifestyle treatments have been found to be just as effective as formal programs in promoting physical activity in studies. The availability of sidewalks and bike/pedestrian paths for activities like walking and cycling may be a critical component in incorporating physical exercise into daily life. The absence of readily available facilities has been highlighted as a barrier to leading a physically active lifestyle. Environments have been shown to affect physical exercise habits. Physical environments are the least-studied area of impact on physical activity, and research on the cost-benefit of environmental and policy interventions (such as trails) is limited.

Physical activity is defined as any physical movement that requires energy expenditure and is generated by skeletal muscles. The terms "physical activity" and "exercise" are not synonymous. Exercise is an organized, repeated, and intentional subset of physical exercise. "A healthy body equals a healthy mind." It implies that if a person is weak, dull, or unwell, he will be unable to do

his job effectively and efficiently. It is critical to have a clear mind before beginning any task, whether it be office job, study, or creative activity. People who make fitness a priority in their lives are happier and more productive than others. Exercise does not imply that you must go to the gym or join a club on a daily basis; it just implies that you must engage in some kind of physical exercise, regardless of how or where you do it. Coronary heart disease, osteoporosis, weakness, diabetes, obesity, and depression may all be prevented or treated by exercise. Strengthening exercises supply the muscles with the right amount of resistance to help them gain endurance and strength. Heart rehabilitation exercises are created and tailored to the individual's needs in order to enhance the circulatory system and prevent and treat cardiac illnesses and diseases. A well-balanced exercise routine may enhance overall health, increase endurance, and delay the aging process in numerous ways. Exercise improves not just your physical health but also your mental well-being [4]–[6].

Regular physical activity is still an important habit for maintaining good health, delaying or preventing common musculoskeletal disorders like mechanical low back pain, neck and shoulder pain, and lowering the risk of coronary heart disease, hypertension, diabetes, osteoporosis, obesity, and colon cancer. Adolescence marks the transition from childhood to adulthood, and it is at this time that many lifelong habits, such as regular exercise, are established. Unfortunately, research has shown that physical activity levels decrease steadily throughout adolescence. You should exercise every day, regardless of your age or form. Exercise not only allows you to wear your favorite dress, but it also develops your muscles, keeps your bones healthy, and enhances your skin, as well as allowing you to relax, sleep better, and have a stronger immune system. Exercise helps to strengthen the cardiac muscles on a daily basis. It aids in the maintenance of healthy cholesterol levels. Physical exercise on a daily basis lowers the risk of stroke and heart disease. Exercise helps to reduce blood pressure and enhance circulation. Exercise aids in the loss of extra body weight, lowering blood pressure.

Calories are burned as a consequence of exercise. Exercise, when combined with appropriate diet, is the most effective method to avoid obesity. If a healthy individual does not exercise on a regular basis, he may become physically unfit. If we do not engage in regular physical activity, our muscles' efficiency decreases. As a result, we must engage in daily physical activity. Exercise has been linked to a variety of physical and physiological advantages that may help a person perform more efficiently and feel better. Exercise is a fun way to spend time with friends and family. People of all ages who are sedentary may enhance their health and well-being by getting more active on a regular basis at a moderate intensity. Regular exercise lowers blood pressure, lowers the risk of heart disease, stroke, certain cancers, and diabetes, and may also help to relieve stress, worry, and sadness. Being physically active is beneficial to your overall health at any age [7]–[9].

There have been a number of cost-benefit and cost-effectiveness studies on physical activity programs, but none have looked at the economics of environmental amenities like bike/pedestrian paths. A research found that building walking paths may be a feasible intervention method for increasing physical activity, but it did not offer any economic rationale for doing so. A cost-benefit analysis of physical activity via the construction and maintenance of bike/pedestrian paths in Lincoln, Nebraska, was performed in the present research [10].

1.1. Construction and Maintenance of Trails:

The community, local government, or other groups are typically responsible for construction and upkeep expenses. A census survey and personal contacts with Lincoln's Department of Parks and Recreation provided information on the construction and yearly maintenance expenses of five bike/pedestrian paths in Lincoln, Nebraska. In addition to the cost data, the investigators gathered information on the trail's surface kinds, construction date, and length. The paths are expected to be utilized for at least 30 years, and the building expenses were spread out equally throughout that time. In 1998 dollars, the yearly total trail cost (building and maintenance) was modified.

1.2. Trail Use and Per-Use Costs:

The census data was used to determine the number of users on each of the five trails on a given day. The census started at 7:00 a.m. and ended at 9:00 p.m. on that day. Bicyclists, runners, walkers, skaters, and other users were tallied by census volunteers who worked two-hour stints (such as persons with skateboards, wheelchairs, horses, etc.). The number of users may be incorrect for the study since the census was performed on a Sunday in the summer. The investigators looked at the number of users throughout the course of a week to see whether it was acceptable. They discovered that the number of users was lowest on Saturdays and Sundays and largest on Wednesdays and Thursdays. In fact, in Missouri, the number of users on Wednesdays may be more than twice as high as on Sundays (a state adjacent to Nebraska; personal communication). The number of users reported in the census was deemed appropriate for the study based on this information and the Nebraska climate (3 to 4 months of winter). The number of times each trail was used in a year was calculated by multiplying this number by 365 days. The yearly total trail cost was divided by the number of trail usage per year to arrive at the trail cost per use.

1.3. Travel and Equipment:

Trail users have to purchase equipment and travel to and from the trails in order to utilize them for physical exercise. Trail users are generally responsible for such costs, which were estimated to be \$100 per year in 1988. In 1998, this amount was raised to \$150. Because time is one of the most often stated reasons for being physically inactive, the indirect cost of physical activity, such as the monetary worth of time spent performing physical activity, should ideally be evaluated. The bulk of trail usage, however, is thought to have occurred during leisure time. Furthermore, the present research only looked at direct medical cost savings and did not take into account the psychological advantages of physical exercise. As a result, no indirect costs, such as time value, were included in this research.

1.6. Direct Health Benefit:

The projected difference in direct medical costs between active and sedentary people was used to calculate the direct health benefit (excluding persons with physical limitations). Medical expenses may be covered out of cash, via insurance, or through government programs. In 1987, active people spent \$330 (95 percent CI: \$214 to \$446) less on medical care than inactive people, according to a research based on a nationally representative National Medical Expenditure Survey. In 1998 dollars, this amount is \$564 (95 percent confidence interval: \$365 to \$763). Moderate physical activity was defined as spending at least 30 minutes of moderate or severe physical exercise three or more days per week in the National Medical Expenditure Survey. If trail users utilized the trails three or more times each week, it is presumed that they fulfilled this criteria.

1.7. Cost-Benefit Ratios:

By dividing the direct medical cost savings by the overall trail expenses, a cost-benefit ratio was calculated (construction, maintenance, equipment, and travel). The cost-benefit analysis illustrates how much health benefit a \$1 investment in trail use may provide. Using a trail is cost-effective if the ratio is greater than one. Otherwise, the profit is lower than the initial investment.

1.8. Sensitivity Analyses:

For many important parameters, sensitivity assessments were performed using worst- and best-case scenarios. The most and least costly trails were used to calculate the expenses of building and maintaining the five trails included in the census report. The upper and lower limits of the 95 percent CI of the direct health benefit were utilized, the duration of trails was varied by 20 years from the anticipated average, and the number of trail users was changed by 50 percent from the actual number.

2. DISCUSSION

Everyone recognizes the need of exercise in our everyday lives, but many of us are unaware of why or what exercise can do for us. The term "exercise" refers to the regular practice of doing some kind of physical activity. Exercise is essential for maintaining excellent health and a clear mind. The regular practice of some physical labor does not imply that the body is under stress; rather, it is a stress-relieving exercise. A strong work ethic requires excellent health. According to a well-known statement, there is compelling evidence that individuals who live active lives are less likely to get sick and live longer. Exercise improves not just your physical fitness but also your mental health and overall feeling of well-being. Getting in shape doesn't have to mean spending hours on a treadmill at your local gym; it may also mean taking a dancing class or taking up a new activity like fencing or mountain biking. It may be a group or team sport, such as football or karate. Regardless matter the kind of exercise you pick, you will almost definitely meet new people and perhaps establish new connections. These goals may be met by engaging in 30-60 minutes of moderate-intensity activity five times per week, 20-60 minutes of vigorous-intensity exercise three times per week, or a mix of the two. It is also allowed to mix one continuous session with several shorter sessions (each lasting at least 10 minutes).

As far as we know, this is the first research to look at the economics of bike/pedestrian paths from a public health standpoint. The cost of a path varies depending on the kind of surface and the length of the route. The cheapest route had a limestone chip surface with no bridges, while the most costly trail featured a concrete surface with two bridges. Trails may be built in a variety of localities due to the broad range of costs (high-income or low income, rural or urban areas). Depending on their financial limitations, local communities may construct several kinds of paths.

The average trail cost per usage was \$0.27, which included building and maintenance expenses. Even the most costly trail only cost \$0.78 each usage. This is much less than typical health club entrance costs for workout equipment, jogging tracks, and swimming pools. The number of people who used the trails increased as the length and quality of the paths improved (surface type and number of bridges). This finding indicates that longer, more costly trails may be more cost-effective if more people use them, but other factors may also entice people to utilize them (e.g., location, safety, and accessibility).

Less than 22% (\$42 of \$192) of the total cost of utilizing trails per person was spent on construction and maintenance. As a result, the expense of equipment and transportation to and

from the trails accounted for the majority of the total. Furthermore, the equipment and travel expenses had the greatest impact on the cost-benefit ratio. Because these expenses are a significant determinant of trail usage, and because trail users pay these costs out of pocket, increasing people's knowledge of the health benefits of physical exercise should be a key component of public health interventions.

The total yearly trail cost and the amount of years the path may be utilized seemed to have no effect on the cost-benefit ratio. A \$1 investment yielded approximately a \$2 return even on the most costly path with the shortest life span. This result suggests that if a path can be utilized for at least ten years, the value will exceed the cost. Because only direct medical benefits among individuals without physical restrictions were included, the cost-benefit ratios are conservative; nevertheless, all trail expenses (building, maintenance, equipment, and travel) were included. Trail users will get secondary advantages from physical exercise, such as improved quality of life and psychological well-being. The present paths were really constructed as part of the neighborhood development plan. The primary goal of these excursions was not to promote health or save money on health-care expenses. As a result, the health benefit that was included in the study was part of the trail benefits. Furthermore, if individuals with physical limitations were included in the national sample for medical cost analysis, the direct health benefit would be much greater, favoring a higher cost-benefit ratio.

There are a few drawbacks to be aware of. To begin, the trail cost and use data was based on five paths. Because the sample is too small to do a thorough quantitative analysis, the cost and usage data's representativeness is restricted. The cost of trail development and upkeep is thought to vary significantly across towns. Furthermore, some trail data (e.g., trail condition, suitability of combined usage by walkers and bikers, and pedestrian crossing design) is missing. The second restriction is that, although the direct medical benefit is derived from a nationally representative sample, the definition of physical activity used in the study may not be similar to the amount of physical activity acquired via trails. The trails were employed as a measure of moderate physical activity three times a week, which may not be comparable to the physical activity measure in the National Medical Expenditure Survey. Furthermore, the direct medical benefit was obtained from a nationwide sample of individuals aged 15 and above; there was no information on the trail participants' age. Finally, the results of this study should be regarded as estimates based on the premise that individuals used trails for the health advantages associated with physical exercise. The effect of trails on health promotion cannot be assessed using more sophisticated models such as trans-theoretical models due to a lack of knowledge regarding changes in trail users' physical activity behavior. As a result, the trails' cost-effectiveness in encouraging physical activity cannot be asserted. The emphasis of future study should be on thorough data gathering. In addition to the cost statistics provided in this research, complete cost-effectiveness analyses need behavioral and health information from trail users. These findings will undoubtedly assist policymakers in making educated resource allocation choices. More data and alternative techniques are clearly required in this respect.

There are many advantages to the present research that should be highlighted. The first step was to utilize real construction and maintenance cost data for five trails. The surface types, lengths, and number of bridges on the five trails vary. Although the findings may not be applicable throughout the country, the diversity of paths studied in this research should increase the generality at the local community level. Second, all direct costs and benefits were converted to per capita costs and benefits. As a result, the costs and benefits were similar, and a cost-benefit

ratio could be calculated. Finally, all five essential parameters were subjected to sensitivity analysis. The parameter ranges may be large enough to cover all conceivable scenarios.

3. CONCLUSION

Physical activity promotion at the population level is a public health issue. Physical exercise should be promoted by creating settings that are more conducive to it. Interventions that aim to alter the environment in order to provide chances for physical exercise have been highly recommended. However, one major stumbling block to generating these possibilities is that constructing such settings requires a lot of resources. The present research found that constructing bike/pedestrian paths can accommodate a broad variety of financial constraints. The cost-benefit analysis provided in this research shows that constructing bike/pedestrian paths may be cost-effective. The immediate health benefits alone may exceed the resource costs of utilizing the trails. Furthermore, the findings indicate that the per-use costs of building and maintenance are modest, and that the direct medical benefit of utilizing trails is almost three times that of the direct cost. Building trails may be a cost-effective way to promote physical activity in a community. This data should aid policymakers and community groups in making choices about how to implement such initiatives.

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