

Economics, Physical Activity, and Community Design

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The direct medical care cost of physical inactivity in North Carolina in 2010 was \$3.67 billion [1]. When lost productivity costs such as those resulting from absenteeism and presenteeism are factored in, the economic tab rises to more than \$8.38 billion. Yet these costs would actually have been even higher had it not been for a slight improvement in physical activity rates among North Carolina adults over the preceding few years [2]. And when medical care and lost productivity costs for excess weight—which typically coexists with physical inactivity—are added into this cost equation, North Carolinians are saddled with additional costs of \$17.60 billion per year [1].

Certainly many factors contribute to the high prevalence of physical inactivity in North Carolina. Social, cultural, economic, and technological factors are commonly cited. We know that the inextricably interwoven nature of these factors shapes our ever-changing built environment and has profound influences on our health. The importance of these factors becomes apparent when one considers the inverse relationship between the substantial growth in our roadways (and dependence on motor vehicles) and the decline in physical activity rates over the past 50 years. Yet in contrast to the well-documented connection between physical activity and health, the effect of the built environment on physical activity levels is a relatively new area of inquiry [3]. Thus, it is fair to ponder the question of whether a community's built environment—its land use patterns, transportation systems, building designs, and natural resources—influences the physical activity patterns and levels of its citizens.

The relationship between the built environment and physical activity is complex and operates through many mediating factors such as social and demographic characteristics, personal and cultural variables, safety and security, and time allocation [3]. Yet, physical activity levels tend to increase when physical activity venues are in close proximity to the places where people live, go to school, recreate, and work [4]. A study on the cost-effectiveness of readily-available bicycle and pedestrian trails found that the per capita annual cost of using the trails was nearly \$210 compared to a per capita annual direct medical benefit of using the trails of approximately \$564.

This benefit-cost ratio of 2.94 to 1 means that every \$1 investment in trails for physical activity led to \$294 in direct medical benefit. The sensitivity analyses indicated the ratios ranged from 1.65 to 13.40. The most sensitive parameter affecting the cost-benefit ratios were equipment and travel costs; however, even for the highest cost, every \$1 investment in trails resulted in a greater return. Therefore, building trails is cost-beneficial from a public health perspective. [5]. Other researchers, using actual construction and maintenance cost values provided by state recreational officials in Colorado, reported a benefit-cost ratio of nearly 3 to 1 (for the local economy) tied to existing bike and pedestrian trails [6]. And, a 2004 study of the annual economic impact of bicycling tourists on the northern Outer Banks of North Carolina found that an initial \$6.7 million expenditure of public funds to construct bicycle facilities was yielding a return each year of 9 times the original investment [7].

Of course, the design and availability of various transportation modes within a built environment is an important consideration when studying physical activity levels. For example, communities adopting "smart growth" street designs (ie, those incorporating designated bike lanes, pedestrian-friendly sidewalks, below-ground utilities, tree-lined streets, a designated median for light rail, and mixed use [residential and commercial] zoning) generally show substantially higher rates of physical activity than areas without a smart-growth approach [3]. Some of the impetus for these particular smart-growth designs is provided by research showing that designated bike lanes can substantially increase the number of commuters bicycling to and from work and are likely to generate substantial health care cost savings and fuel savings [8, 9].

Worksites also make up an important part of our built environment, and their structural design and policies can spur or suppress physical activity. Many larger organizations have onsite fitness centers. Also, many worksites have successfully promoted the use of stairways as a viable strategy for boosting employees' physical activity levels [10]. Innovative building design features such as "skip-stop" elevators, which stop only at every third floor, can increase stairway use [11].

In 2006, Marya Morris, in a Planning Advisory Service Report published by the American Planning Association, reminded planners that public health professionals and advocates are their allies and have useful information about how the built environment affects health:

Supporters of good planning and smart growth have a new ally—public health practitioners and advocates. In the mid to late 1990s, noting the tremendous increase in the rate of obesity in Americans and limited success of the medical profession's efforts to persuade people to change their eating

habits and get regular exercise, public health policy makers and researchers turned their attention to factors of the built environment that affect peoples' eating habits, and exercise habits. In particular, they are focusing on patterns of development at the neighborhood, communitywide and regional level as well as transportation mobility options [14].

After decades of sprawl and poor eating habits, obesity has increased dramatically among adults and children. That emerging trend has compelled the CDC and public health advocates to examine ways that the built environment con-

North Carolina is one of the fastest-growing states in terms of population. This fast growth brings into question the level of prospective planning needed to ensure the built environment keeps pace with the size of the population so that physical activity can be adequately fostered. After all, the slight annual improvement (+1.045%) in physical activity rates over the past few years among North Carolina adults still lags behind the rate of annual population growth in the state (+1.85%). Taken together these trends imply an increase in the absolute number of physically inactive adults, rendering the importance of developing an infrastructure that supports physical activity even more critical. And based on physical activity percentage rates among North Carolina adults over the past decade, there is no guarantee that the slight improvement seen in the past few years will continue. Moreover, as the state's population of older adults continues to grow, the prevalence of chronic diseases will also grow, and the need for increased access to physical activity will become even more important for citizens of all ages. Indisputably, these evolving forces provide us with a provocative opportunity to think about establishing appropriate venues in the built environment.

Of course, creating an expanded built environment that fosters physical activity for all ages is a logical, and essential, first-step toward meeting this challenge. At a minimum, a unified and sustained commitment from key decision makers, policymakers, and individual citizens will be needed to push the needle forward. Now is the time for decision makers in education, government, transportation, real estate, and industry to form nonpartisan partnerships in order to achieve this universal goal. Given that all of these individuals have the potential to positively influence the quality of our ever-evolving built environment, it is absolutely crucial for them to work together for the betterment of all North Carolinians. Of course, physicians and other health care practitioners can play an important role in addressing this evolving challenge as well. They command a high level of respect among their patients and thus should continue to push them to understand that exercise is the best medicine in preventing and mitigating many illnesses. As we navigate a new path to tackle today's lifestyle and health care challenges, is it not time to transform the Good Roads State into a Good Health State? Building an environment for physical activity is a good start. **NCMJ**

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tributes to the problem. Not only are public health, planning, and design professionals coming together, but state and local agencies are also joining forces to collaborate and plan for a more sustainable and healthier future. And the federal government has begun to require collaboration and a regional approach on the part of those seeking to secure certain types of federal funding for planning.

University courses in planning now teach emerging professionals that communities are interconnected and inter-

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related and that social and physical issues are connected and related as well. Clearly, this is a shift away from the philosophy the profession embraced in the early 20th century at Olmsted's urging. It is now clear that ignoring the relationship between social and physical issues can produce poor results and health disparities.

The American Planning Association, an organization of 40,000 members, has created a research center dedicated to planning for healthy communities. The American Planning