HHS Public Access

Author manuscript

JAMA. Author manuscript; available in PMC 2018 February 01.

Published in final edited form as:

JAMA. 2016 May 24; 315(20): 2175–2177. doi:10.1001/jama.2016.5635.

Can Walkable Urban Design Play a Role in Reducing the Incidence of Obesity-Related Conditions?

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Most adults in developed countries are too inactive, accumulating on average far less than the recommended 30 minutes of moderate-intensity physical activity on at least 5 days every week. [1,2] Insufficient walking and low levels of other physical activities are key risk factors for developing chronic diseases such as obesity and type 2 diabetes, [3] and lack of exercise and obesity are significantly associated with reduced life expectancy at 40 years of age.[4] Physical inactivity can account for 6% to 10% of all deaths from noncommunicable diseases.[5]

Why are people so inactive in modern societies? Advances in technology, urban/suburban sprawl, jobs that increasingly require less physical activity, and living environments that do not afford opportunities to safely walk or cycle all contribute to the physical inactivity pandemic.[3] In many resource-rich countries, urban design and "built environment" trends over the past several decades have led to vehicle-oriented suburban development that discourages engagement in active transportation (walking/cycling) and increases dependence on private motor vehicle transportation.

One way to counter this modernization trend is to design new work and living environments with an emphasis on wellness and health. Healthy People 2020 physical activity objectives seek to increase population levels of walking and physical activity through policies and interventions targeting built environment features of neighborhoods.[6] Similarly, several New York City municipal departments collaborated to publish a series of Active Design Guidelines for using urban design and planning to promote physical activity with a focus on using the built environment to encourage walking and cycling.[7]

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Conflict of Interest Disclosures: The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr Heymsfield reports membership on the MediFast Advisory Board. Dr Rundle reports membership in the American Institute for Architects (AIA) Design and Health Research Consortium, which receives expense reimbursement from AIA for travel to an annual meeting and provides resources to the consortium for collaborative work; and reports being a consultant for the WELL Building Institute, which certifies buildings and real estate developments as meeting certain health-related criteria. The WELL Building Institute is associated with Delos Living, a company that builds "Wellness"-designed buildings.

Role of the Funder/Sponsor: The funding agencies had no role in the preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

The research base that supports these recommendations and guidelines, however, is limited. Earlier studies have suggested that people who live in more walkable neighborhoods engage in, on average, significantly more physical activity[8] and that physiological measures such as aerobic capacity and blood pressure improve when people who are sedentary increase their time spent walking.[9] However, rigorous prospective studies are lacking, such as investigations across multiple communities that examine the relationship between features of the built environment and health outcomes such as the risk of developing cardiovascular disease or diabetes.[10]

In this issue of *JAMA*, Creatore and colleagues[11] attempt to close these gaps by tracking the associations between neighborhood walkability and the prevalence of overweight, obesity, and the incidence of diabetes over a 12-year period in Ontario, Canada. Neighborhood walkability was quantified by the authors as an index that captures the traditional “D variables” described in the urban planning literature: Density of population, Density of residences, Design of street networks, and Destination accessibility.[12] Canadian national health survey and administration data were used to create small area estimates of the prevalence of overweight/obesity and the incidence of diabetes for adults residing in 15 municipalities over the 12-year period. Area overweight/obesity prevalence and diabetes incidence were analyzed and plotted by quintiles of neighborhood walkability.

From 2001 to 2012, the prevalence of overweight/obesity increased in areas in the 3 lowest quintiles of walkability (absolute change, 5.4% [95% CI, 2.1% to 8.8%]; 6.7% [95% CI, 2.3% to 11.1%]; and 9.2% [95% CI, 6.2% to 12.1%,], respectively) but did not significantly increase in areas in the top 2 quintiles of walkability (2.8% [95% CI, −1.4% to 7.0%] and 2.1% [95% CI, −1.4% to 5.5%]). Correspondingly, the incidence of diabetes was lowest in the highest walkability neighborhoods throughout the study and declined significantly in the top 2 walkability quintiles between 2001 and 2012 (from 8.7 to 7.6 per 1000 persons in quintile 4 [absolute change, −1.1; 95% CI, −2.2 to −0.05] and 7.7 to 6.2 per 1000 persons in quintile 5 [absolute change, −1.5; 95% CI, −2.6 to −0.4]). In addition, engagement in walking or cycling and use of public transit was highest and private car use was lowest in areas in the top walkability quintile.

Conversely, the prevalence of other likely factors associated with rates of overweight/obesity —inadequate fruit and vegetable consumption, sedentary leisure-time activities, and smoking—did not vary by walkability quintile. However, the studied urban design features are not theorized to influence these behaviors, thus providing a conceptual negative control within the analyses. This prospective study thus provides good evidence in support of the hypothesis that neighborhood walkability is related to population-level differences in engagement in active transport and, in turn, differences in health outcomes such as overweight/obesity and diabetes.

An important consideration in interpreting this study[11] is that the unit of analysis was the area-level prevalence of overweight/obesity and incidence of diabetes over time, by level of neighborhood walkability, not the changes in body weight or the onset of diabetes experienced by individuals followed over this time period. The relative prevalence of health conditions in an urban area is influenced by contextual characteristics such as walkability

and by the characteristics of the individuals who migrate into and out of the area, the dual effects of urbanicity and urbanization.[13] Thus, while Creatore et al[11] demonstrated that the burden of obesity and diabetes in a given area varied by the level of neighborhood walkability, the authors did not directly describe the changes in health experienced by individuals as neighborhoods changed around them or that occurred after moving to a new neighborhood context.

A second consideration, one that also applies to earlier studies, is that Creatore et al[11] described neighborhood walk-ability from purely an urban design perspective and did not consider social environment issues such as pedestrian safety, crime, displeasing aesthetic conditions, and physical disorder as contributing to neighborhood walkability. These social characteristics may interact with, or perhaps overwhelm, urban design features that support pedestrian activity. For instance, comparisons of high- and low-poverty neighborhoods in New York City that are deemed equally walkable based on urban design considerations show that high-poverty neighborhoods have higher rates of crime and pedestrian injuries, streets with higher levels of noise, more events of hostile behavior, more signs of building and sidewalk disrepair, and more garbage on the sidewalk, characteristics expected to deter pedestrian activity. [14]

Creatore et al[11] also did not observe interactions between area poverty and walkability in relation to diabetes incidence and statistically adjusted for area-level income in their analyses of overweight/obesity. However, earlier studies[15] have reported that neighborhood poverty appears to nullify the effects of supportive built environments on physical activity and body size; associations between neighborhood walkability and body mass index and physical activity are often only observed among individuals living in higher-income neighborhoods. Thus, the goals codified in Healthy People 2020[6] and the interventions described in the New York City Active Design Guidelines[7] may be less effective in low-income communities, the very communities at the highest risk for obesity.

The study by Creatore et al[11] reinforces that urban design for neighborhood walkability is an attractive avenue for public health interventions to reduce the risk of developing obesity or diabetes. In many cities there is not enough undeveloped space to create new large urban parks that support exercise and recreational physical activity. Local governments have some policy mechanisms for influencing neighborhood retail food access: tax and loan incentives can be used to promote the development of new supermarkets, but efforts to restrict access to unhealthy foods have been controversial and sometimes face legal impediments, as in initiatives to ban new fast food outlets. However, improvements in neighborhood walkability can be promoted through permitting, zoning, land use regulations, and street design, activities all under local governmental control.[7] In addition, although public transit receives state and federal funding, key decisions about transit capital investment and operations are made at the local level.[16] Private for-profit and not-for-profit organizations such as the US Green Building Council, through its Leadership in Energy and Environmental Design certification; the WELL Building Institute; the American Institute for Architecture, through its Design and Health Research Consortium; and local business improvement districts are also promoting design solutions to support active transport and physical activity.

Although randomized studies testing built environment health hypotheses that firmly establish causality would be difficult to design and implement, alternative future investigations can confirm and extend the findings reported by Creatore et al.[11] One potential approach is to exploit natural experiments as new communities are built that incorporate contemporary design guidelines that promote physical activity and health. Another approach would be to follow cohorts of individuals through time and assess whether physical activity patterns and health outcomes change as neighborhoods change around the study participants or if physical activity patterns change when participants move to new areas with differing built environment characteristics.

The findings of the study by Creatore et al[11] reported in this issue of *JAMA* provide further large-scale and longitudinal support for the hypothesis that urban design choices promoting pedestrian activity are associated with greater engagement in active transport (walking and cycling), lower prevalence of overweight/obesity, and lower diabetes incidence at the population level. This study will make a prominent contribution to the research base that informs the urban design and health policy debates for years to come.

Acknowledgments

Funding/Support: This work was partially supported by NORC Center grant P30DK072476, National Cancer Institute grant 1UMCA182934-01A1, and National Institute of Biomedical Imaging and Bioengineering grant 1R21EB01891701A1.

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