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ABSTRACT **It is increasingly well recognized that the design and operation of the communities in which people live, work, learn, and play significantly influence their health. However, within the real estate industry, the health impacts of transportation, community development, and other construction projects, both positive and negative, continue to operate largely as economic externalities: unmeasured, unregulated, and for the most part unconsidered. This lack of transparency limits communities' ability to efficiently advocate for real estate investment that best promotes their health and well-being. It also limits market incentives for innovation within the real estate industry by making it more difficult for developers that successfully target health behaviors and outcomes in their projects to differentiate themselves competitively. In this article we outline the need for actionable, community-relevant, practical, and valuable metrics jointly developed by the health care and real estate sectors to better evaluate and optimize the "performance" of real estate development projects from a population health perspective. Potential templates for implementation, including the successful introduction of sustainability metrics by the green building movement, and preliminary data from selected case-study projects are also discussed.**

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Improving the design and operation of community environments to promote health and wellness is emerging as a top health care[1] and public health priority[2,3] in the United States and is one of four core strategies recommended by the National Prevention Council.[4] This growing focus on developing healthy communities stems from the recognition that the physical and operational characteristics of personal environments—homes, workplaces, public spaces, schools, and transportation systems—significantly influence health by affecting people's ability to access health care resources and to integrate healthy behaviors into their daily lives.[5]

Access to healthy and safe community environments varies greatly in the United States and contributes to major disparities in health outcomes between and even within metropolitan areas.[6] For example, recent studies demonstrate dramatic differences in life expectancy for adjacent neighborhoods in many cities—as much as nine years in Washington, D.C.[3] As James Marks, senior vice president of the Robert Wood Johnson Foundation's Health Group, observed, "As it relates to our health, our ZIP code may be more important than our genetic code."[7]

Opportunities For Partnership With The Real Estate Industry

The geographic health disparities seen across the United States are not explained by differences in socioeconomic factors alone.[1] They also

reflect community-level variation in the availability, quality, and operation of built-environment resources such as healthy housing, public parks, pedestrian and bicycle facilities, fresh food outlets, and medical services. All have been shown to be associated with a broad range of health-related behaviors and outcomes such as rates of daily physical activity,[8] traffic injury,[9–13] respiratory disease,[14] and violence.[15–18]

There is growing interest within the real estate industry to partner with the health care and public health sectors to help address the environmental determinants of these and other health issues.[6,19] However, achieving the vision of equal access to healthy and safe community environments nationwide will require new tools, capacities, and incentives to accelerate a marketwide shift in the consideration of and accountability for health and wellness outcomes within the real estate industry.

Industry-Specific Health And Wellness Metrics

An important hurdle that must be overcome is the limited availability of data and metrics to define and measure the health "performance" of real estate development projects. Historically, the negative impacts of a project, including environmental as well as health and wellness outcomes, have largely been treated as unmeasured and unregulated economic externalities.[20] This lack of transparency creates a classical economic market failure since the comprehensive population-level health costs of poorly designed built-environment projects cannot be efficiently assessed by investors and other stakeholders.[21] At the same time, the current lack of industry-specific health and wellness metrics also makes it difficult for real estate developers that intentionally target improved health outcomes to efficiently demonstrate the "value" of these choices. This limits incentives for investing in healthy building practices as a strategy for competitive market differentiation.[20] The green building movement's success in bringing sustainable building practices into more standard use provides a powerful example of what can be achieved when long-standing market inefficiencies within the real estate industry are reversed.[20,22]

In this article we consider how an analogous investment in health and wellness metrics for use within the real estate industry can help drive increased consideration and targeting of health outcomes stemming from built-environment development projects as well. We outline suggested performance criteria to help guide development of real estate industry health and wellness metrics. Finally, we discuss preliminary insights from early use of health metrics within real estate development projects.

Performance Criteria For Health And Wellness Metrics

Successful development of practice-relevant health and wellness metrics for the real estate industry will require careful balance and calibration to achieve both validity and practicality. Inherent challenges related to measuring health impacts of the built environment will require consideration. For example, many of the most important benefits derived from built-environment improvements, such as improving the availability of parks and walking trails to promote daily physical activity or night-time street lighting to improve real and perceived safety, are most effectively demonstrated at a community level.[23] This can make measurement of health benefits from a single infrastructure investment, such as a new affordable housing project, more challenging, or at least labor-intensive, as a result of the need to recruit a sufficient number of demographically and geographically diverse study participants.

Real estate developers also generally require relatively short-term "proximal" performance measures (for example, financial return on investment or improved occupant experience) calculated project by project and generally at the measurement scale of a building or neighborhood development. However, data from most widely available public health surveillance systems are generally measured at a county or city scale and focus most directly on longer-term or "distal" population health outcomes, such as infant mortality or incidence of adult-onset diabetes—metrics that often reflect factors beyond the direct control of real estate industry investors and developers.

There is growing demand to address the frequent mismatch between research-oriented health metrics and data sources and the practical needs of real estate professionals.[19] Given the diversity of practice contexts within the real estate industry, it is unlikely that a single set of health metrics and data standards will be able to fully satisfy the needs of every relevant stakeholder. However, interoperability between metric frameworks and co-benefit from data collection efforts can be maximized through co-development and adoption of performance criteria prioritizing four key attributes: actionable and mutable, community relevant, practical, and valuable.

ACTIONABLE AND MUTABLE Widespread adoption of health and wellness metrics within the

The challenge is to move past constraints and make data collection more practical for real estate industry professionals.

real estate industry will depend upon the ability of chosen measures to effectively guide decisions and demonstrate impact. Requiring measures that do not directly inform project development (that is, not actionable) or that do not predictably and demonstrably change as a result of project management decisions (that is, not mutable) are likely to be interpreted as purely regulatory and an impediment in terms of time and resources. Additionally, requiring metrics for health-related factors beyond the control or scope of a project risks creating the perception that individual decision makers do not have the capacity to influence important changes in the health of their communities.

COMMUNITY RELEVANT Communities vary greatly in terms of physical context, demographics, and social dynamics. Moreover, community needs, available resources, as well as political and environmental constraints vary greatly from one project to the next. As a result, health and wellness metrics for real estate projects, such as affordable housing development, cannot be purely "form based"—optimized to drive design decisions toward a single "ideal" architectural aesthetic or planning configuration. Instead, metrics should be employed to help define, measure, and incentivize a structured process for developers and other decision makers to help identify relevant and feasible opportunities for health promotion in the context of each proposed project.

Fortunately, efforts to develop these types of community-relevant metrics can take advantage of other long-standing public health efforts, such as those to advance the use of a health impact assessment. Such an assessment is defined as "a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, program or project on the health of a population and the distribution of those effects within the population."[24]

The use of health impact assessments as a component of real estate development and larger-scale built-environment projects is increasing in the United States.[25] For example, a two-year health impact assessment conducted as part of planning for the multibillion-dollar BeltLine transit, park, and neighborhood project in Atlanta, Georgia,[26] led directly to increased inclusion of affordable housing and prioritization of trail and green-space construction over residential and retail development because of anticipated impacts on population health.[27]

Formal public health evaluation and decision support processes, such as a health impact assessment, will likely need to be adapted to a smaller scope and scale for more generalized use within the real estate industry. However, insights gleaned from previous built environment and health impact assessments can greatly inform these efforts going forward.

PRACTICAL The potential value of and need for health-related data is increasingly well understood within the real estate industry. However, the cost and complexity of collecting relevant project-specific data can be a challenge. For example, community surveys, a mainstay of traditional public health surveillance, or other manual auditing of populations are generally too time-intensive and costly for use in general real estate development practice.

Similarly, it must be recognized that data availability varies widely among states, cities, and municipalities. Remarkable new and publicly available metric sets, such as the Sustainable Communities Index created, maintained, and used by the San Francisco Department of Public Health,[28] are increasingly available and provide highly specific data-driven metrics for a broad variety of health indicators. However, their generalizability is often limited by the fact that many (or even most) US communities do not currently capture or make available data to the same degree that larger cities do.

The challenge, then, is to move past these constraints and make data collection more practical for real estate industry professionals and other stakeholders nationwide. An important first step should be replication of the Open Data portals launched by several city governments, such as San Francisco (https://data.sfgov.org) and New York (https://data.ny.gov), in communities across the United States. These new publicly accessible information platforms for sharing real-time data about city services and metrics create new opportunities for community members, developers, and other real estate industry stakeholders to more easily obtain relevant data to

inform project planning and enable more efficient and effective evaluation.

The growing availability and capability of mobile and web-based communication technology (for example, mobile phones and smart phones) for conducting population health evaluations, such as community health surveys, offer another important opportunity to make health data collection less costly, more practical, and less daunting for nonresearchers.[29] As of January 2014, 90 percent of US adults owned a mobile phone, and 58 percent owned a smart phone.[30] Most of these devices, in addition to providing Internet access, now possess GPS location services and the ability to run custom software, most notably social media. These trends suggest that mobile health (mHealth) data collection approaches may increasingly be able to maintain, and in some cases even expand, geographic, temporal, and demographic representation compared to traditional survey methods.[31] Moreover, the types of health data available for use through adoption of mHealth tools are likely to expand as a result of the tremendous growth in consumer products and analytics for tracking and sharing health information, ranging from daily physical activity[32,33] to emerging measures such as subjective well-being.[34,35]

Web-based services providing data relevant to real estate development and health are also proliferating. A good example is Walk Score, an increasingly popular commercial software product and website using publicly available built-environment measures (for example, street network information, points of interest, and transit data) and weighted algorithms to provide estimates of walkability, bikeability, and transit access for nearly every US address.[36]

Walk Score is not a replacement for full-scale formal environmental audits.[36–38] However, its algorithmic estimates of neighborhood walkability demonstrate good correlation with frequently used research measures at a fraction of the cost and complexity of measurement.[39,40] This has allowed residential and commercial realtors to easily incorporate Walk Score (usually only if they are favorable) into their listings—an increasingly common practice given mounting evidence of positive correlation between a property's Walk Score and selling price.[41]

VALUABLE Demonstrating financial return on investment is a critical metric for real estate developers but often is not included as an outcome measure within built-environment and health research.[42,43] However, this is beginning to change. For example, a recent study by the Brookings Institution demonstrates that more walkable neighborhoods (as measured by Walk Score) perform better economically in terms of residential and retail real estate values but also in terms of vitality metrics such as foot traffic for local businesses.[41] Another recent study funded by the Active Living Research program demonstrated the economic and health co-benefits of maintaining open space.[44] Built-environment and health researchers should seek to apply an explicit economic perspective more consistently, in terms of both financial and social benefit, to assist real estate industry decision makers in weighing options and substantiating recommendations to prioritize health as a project goal to their investors.[21]

Web-based services providing data relevant to real estate development and health are proliferating.

Case Study: Mariposa Project

The challenge will be to translate evidence from health-sector research and combine it with emerging technological and intellectual resources into practice within the real estate industry. Fortunately, real-world experiments are already under way, with prototypical projects becoming available for study and potential replication.

One example is the Mariposa project—a fifteen-acre transit-oriented development in the La Alma/Lincoln Park neighborhood near downtown Denver, Colorado, developed by the Denver Housing Authority in collaboration with Mithūn Design and Enterprise Community Partners.[45] The project, initiated in 2010 and now in its first phase of construction, used grant funding to develop and implement a community engagement plan and conduct a health impact assessment.[46]

A key innovation of the project was its inclusion of a robust evaluation plan incorporating a curated set of health metrics adapted from a variety of sources including the San Francisco Sustainable Communities Index, Enterprise Community Partners' Green Communities framework, and the US Green Building Council's LEED for Neighborhood Development (LEED-

Realizing the vision of equal access to healthy community environments nationwide will require cross-sector collaboration to become standard practice.

ND) certification system.[47]

Health metrics for use in the project were chosen through a structured collaborative engagement with community members based on assessed need, project relevance, and the availability of a specific design intervention deemed capable of short-term impact (such as improvement of corresponding health metric). For example, at baseline (2010) the total crime rate per 1,000 people was 248 for this section of Denver (compared with 69 for the city of Denver overall).[48] This was identified as a health promotion priority for the project by the community and addressed during design development through application of evidence-based "Crime Prevention through Environmental Design" principles for public spaces and retail establishments.[49] In 2012, when the Denver Housing Authority prepared a Mariposa Indicator report card, total crime per 1,000 people had dropped to 157 in Mariposa.[48] Other examples of project components targeting health outcomes with specific metrics include communitywide traffic calming, installation of access stations for Denver's recently established bike share system, and expanded availability of local (within a half-mile) healthy food outlets.[50]

The modified tool set used in the Mariposa project has been further refined and is now publicly available online as the Mariposa Healthy Living Initiative Tool for download, use, and adaptation.[50]

Health Outcomes As A New Norm

Projects such as Mariposa in Denver demonstrate both the feasibility and the potential impact of expanded availability and use of health metrics and data resources within the real estate industry. However, realizing the vision of equal access to healthy community environments nationwide will require these examples of cross-sector collaboration to become standard practice within the broader real estate industry.

As mentioned previously, one potential template for success, in terms of making health a more intentional focus of real estate development, is the green building movement. Over the past twenty years green building has developed the capacity to drive broad-scale adoption of sustainable building practices, largely by providing user-friendly design guidelines, metrics, and demonstrable return on investment for developers through its certification processes. For example, since March 2000 more than 33,000 residential, commercial, and industrial projects have been certified using the US Green Building Council's Leadership in Energy and Environmental Design (LEED) framework in the United States alone,[22] with nearly half of LEED-certified residential projects in the United States providing affordable housing.[51]

Targeted integration of health and wellness metrics within green-building market transformation tools could greatly accelerate adoption within the real estate industry. Green-building certification, through systems like LEED, has established market value (such as increased property value). Moreover, the green building industry also maintains a robust education and accreditation system for real estate industry professionals—an excellent platform to introduce the use of health-focused community development metrics into mainstream practice. Early examples of partnerships between public health and green building are already beginning to emerge, including the multiyear ongoing Green Health initiative focused on childhood obesity prevention supported by the National Collaborative on Childhood Obesity Research.[22]

Investing in strategic partnerships between the health sector and the green building industry to promote better integration of health outcomes within the real estate industry can also leverage growing demand and initiatives within the green building industry itself. For example, the US Green Building Council now offers a LEED pilot credit based on the New York City Active Design Guidelines[52] in addition to longer-standing products such as the LEED-ND credit system targeting walkability, health food access, and provision of healthy affordable housing as central themes.

Conclusion

Partnerships among health care, public health, and the real estate industry represent an important and tangible opportunity to expand the availability of safe, healthy, and vibrant communities nationwide. However, health and wellness metrics designed for practical use within the real estate industry are needed to make this vision a reality. Investment from multiple sectors, particularly health care and public health, is needed to help drive the development and market adoption of these metrics and enable more systematic consideration of health and wellness within the real estate industry. This offers an important opportunity to greatly accelerate improvements in the places we each live, learn, work, and play, and a critical step forward for the health of our nation. ■

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