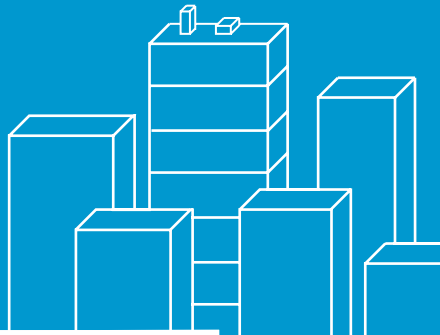


VITAMINS FOR THE 21ST CENTURY

Valuing design as a tool for primary prevention

Jocelyn Widmer
Nirupa Goel
Alina Baci



Authors

Jocelyn Widmer¹

Nirupa Goel²

Alina Baciu^{3*}

¹ Urban Affairs and Planning
School of Public and International Affairs
Virginia Tech University
140 Otey Street
Blacksburg, VA 24061, USA

² University of British Columbia
Department of Cellular and
Physiological Sciences
2350 Health Sciences Mall
Vancouver, BC V6T1Z3, Canada

³ Roundtable on Population Health Improvement
Institute of Medicine
National Academy of Sciences
Keck Center
500 5th Street NW
Washington, DC 20001, USA

* Corresponding Author

This manuscript was submitted in conjunction with a national professional conference, “The Value of Design: Design & Health,” hosted in Washington, D.C., April 22-24, 2014, by the American Institute of Architects Foundation, the American Institute of Architects, and the Association of Collegiate Schools of Architecture. Conference staff have edited manuscripts for clarity and style. This project was made possible in part by a grant from the National Endowment for the Arts.

Visit www.aia.org/DesignHealth

Introduction

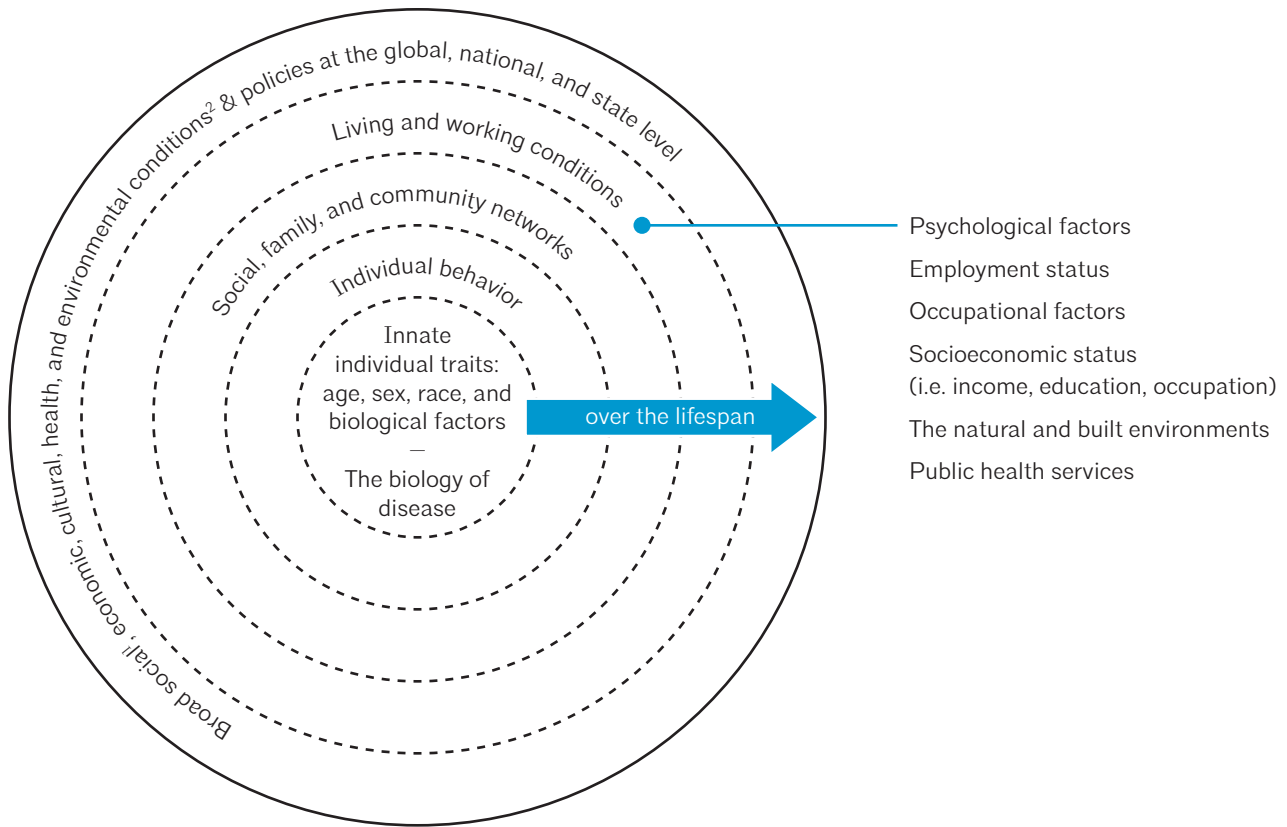
Vitamins are essential, naturally-occurring micronutrients. They are added to individual foods to provide a level of protection to an entire population. Their contribution to health is a type of primary prevention: they protect against the development of certain diseases and stave off infections. Like vitamins, design is an essential tool for improving the quality of life, meeting the human need for aesthetic fulfillment, efficiency, and optimal function. Design should also be considered a means to shape the physical and social environment for improved health at the population level. Thoughtfully and strategically implementing principles of design at different scales—from the home, school, and workplace to neighborhoods and communities—can protect and improve the public’s health by augmenting features of the built environment that are known to be associated with an increase in health-promoting behaviors. Although the particular combination of health-promoting characteristics of place is not fully understood, over the past two decades both the design and health fields have come to better recognize the positive and negative impacts of the built environment on the health and the wellbeing of people. This recognition also indicates a need to better understand how practitioners in the fields of health (public health and health care) and design (architecture, landscape architecture, and urban planning) can work synergistically to derive from the built environment health-enhancing effects and seek to apply the knowledge gained toward more effective public policy aimed at improving community wellness.

History of the Relationship Between Health and the Built Environment

Empirical studies focusing on the relationship between health and the built environment originated in response to urban challenges that adversely affected industrializing societies. Solutions to the 1854 London cholera epidemic were found at the intersection of techniques to improve the built environment and public health when British physician John Snow discovered the role water-related infrastructure and spatial movement patterns played in the spread of the disease. Snow’s discovery led to further knowledge of how poor housing conditions, inadequate sanitation and ventilation, and dangerous working conditions contributed to large-scale disease outbreaks. The two areas of inquiry diverged in the early 20th century. Public health practice overlooked the social dimensions of disease and worked at the microbiological scale, whereas the design disciplines contributed to successive movements of urban sprawl and suburbanization (Corburn, 2004).

Although challenges associated with health and the built environment manifest differently today, there is no shortage of opportunities to integrate public health principles into overarching actions and reactions to community change that design so often facilitates. Americans tend to think of health as the result of medical interventions occurring in the doctor’s office or similar setting. However, research indicates that the influence of health care on our health at best accounts for 50% of what makes us healthy. Estimates that may be more accurate range from 10% to 20% (Institute of Medicine [IOM], 2010a). That is because health is the result of a set of complex and

FIGURE I. An Ecological Model of Health (Source: IOM (2003a))



interconnected factors that operate at different levels both internal and external to the individual:

- genes and biology in the individual;
- health-related behaviors;
- the environment (natural and built);
- social and economic factors (such as education and employment); and
- medical care.

Conceptual models used in public health practice illustrate the built environment as one of the outermost of a set of concentric circles that frame human health (Figure 1).

Individual-level factors such as genes and behaviors are considered in the nucleus of this model. More distal influences include the environments people inhabit and the policies that shape those environments. In recent years, policy attention to the non-medical influences on health has increased at all levels of government and in the private sector. Public sector examples include the Sustainable Communities Initiative that is a joint program of the Department of Housing and Urban Development, the Environmental Protection Agency, and the Department of Transportation; the state of California Strategic Growth Council’s Health in All Policies Taskforce, and myriad local-level coalitions, many of which include a focus on design as a tool for making places (e.g., schools, neighborhoods, businesses) more health-promoting. Design is intentional, strategic, and

systems-based and shapes the built environment in ways that can influence other levels of the ecological model, especially behavior. That explains why policy engagement with design decisions can have powerful effects on both people and their surrounding environs.

Relevance of the Institute of Medicine

The Institute of Medicine (IOM) was established in 1970 and functions as the health arm of the National Academy of Sciences, chartered by Congress in 1863. The IOM is “an independent, nonprofit organization that works outside of government to provide unbiased and authoritative advice to decision makers and the public.” Publications generated by the IOM and the National Academy of Sciences’ National Research Council (NRC) inform action at the interface between health and design through (1) consensus studies with findings and recommendations and (2) workshops that showcase useful and timely ideas and models to inform work in the field. The information in IOM/NRC products addresses several audiences; most notably policymakers and practitioners in the design and health fields who possess the authority and capabilities to make decisions that promote healthier, more livable community spaces. IOM/NRC reports have made specific recommendations on physical activity; food and nutrition; smart infrastructure and transportation systems; and environmental quality and protection. Recommendations are made by leading academics and practitioners in the interdisciplinary fields allied concerned with health and the built environment, where membership champions synergy rather than opposition. The survey described below highlights the IOM/NRC’s scientifically-grounded understanding of systems of influence on health outcomes that can be integrated into design decisions.

Methodology

We surveyed publications of the IOM and NRC from approximately 1990 to the present^a. We framed our survey around the emergence of the term “sustainability” as laid out in the World Health Organization’s 1986 Ottawa Charter for Health Promotion that spurred the Healthy Cities/Healthy Communities movement, the 1987 Bruntland Report (Bruntland, 1987) and 1992 UN Earth Summit (United Nations, 1992). The purpose of our survey is to: 1) highlight relevant messages and themes that have informed science, policy and practice around determinants of health such as physical activity, nutrition and food systems, transportation, and environmental quality, protection and justice; and 2) indicate the design scales at which actions on these determinants are applied.

We reviewed several dozen reports and workshop summaries published by the IOM, the NRC, or jointly by the IOM and NRC. The review was not intended to be systematic or comprehensive. We applied several criteria to identify the most pertinent reports, including:

- Date of publication (see footnote above)
- Quantity of information that was highly relevant to our investigation (containing substantive discussions of the interface between design and health)
- Relevance to the public health dimensions and design scales described in Table 1

Findings

There are two types of publications produced by the IOM and NRC: consensus studies that offer evidence-based findings and recommendations and workshop summaries that showcase and explore highly relevant and often cutting-edge work in the field. The 20 publications that met our criteria were published between 2000 and 2014.

^a Although we established this time interval in our initial research design, we found few relevant reports prior to the year 2000.

TABLE I: IOM and NRC publications and their contributions by public health dimension and design scale

Public Health	Designed scales			
	Interiors	Buildings (nodes)	Landscapes (networks)	Communities (polygons)
Dimensions				
Physical Activity	8, 17	8, 10, 17	3, 4, 7, 8, 9, 10, 14, 15, 17, 18	1, 3, 4, 6, 7, 9, 10, 14, 18, 19, 20
Food Systems				2, 6, 10, 17, 18, 19
Transportation			1, 7, 17,	1, 3, 6, 7, 15, 14, 20
Environment (quality, protection, justice)	3, 11, 12, 13, 14, 15, 16	1, 5, 11, 12, 13, 14, 15, 16	5, 11, 14, 15	1, 6
Mental health/cognition		13, 14	14	

NOTE: 1 = IOM (2002); 2 = IOM (2009b); 3 = IOM (2013c); 4 = NRC (2011a); 5 = NRC(2010); 6 = IOM (2011a); 7 = NRC and IOM (2005); 8 = IOM (2013b); 9 = IOM (2013a); 10 = IOM (2012a); 11 = IOM (2011a); 12 = NRC (TRB) and IOM (2005); 13 = IOM (2007); 14 = IOM (2003b); 15 = IOM (2012b); 16 = IOM (2000); 17 = IOM (2009a); 18 = NRC (2011b); 19 = IOM (2014); 20 = IOM (2011b)

We identified public health dimensions of each publication (e.g., physical activity, food systems) along four different design scales (building interiors, buildings, landscaped contexts surrounding buildings, and communities).^b Of the 20 publications we identified as highly relevant, ten were consensus studies with findings and recommendations, and ten were workshop summaries. The contributions of each publication by public health dimension (such as physical activity) and design scale (such as communities) are shown in summary form in Table I.

We reviewed the reports and identified some key recommendations and themes in order to illustrate the important contributions of the IOM and NRC to an understanding of the evidence base that links design and health, and to provide guidance to decision makers on this topic.

^b Most reports reviewed contributed minimal or no information pertinent to two design scales: industrial design/products and the regional scale (beyond an urban context).

HIGHLIGHTS FROM CONSENSUS STUDIES

The 2005 report *Does the Built Environment Influence Physical Activity? Examining the Evidence* was produced by the Transportation Research Board of the NRC and the IOM. The authoring committee recommended that:

Those responsible for modifications or additions to the built environment should facilitate access to, enhance the attractiveness of, and ensure the safety and security of places where people can be physically active.

Local zoning officials, as well as those responsible for the design and construction of residences, developments, and supporting transportation infrastructure, should be encouraged to provide more activity-friendly environments (TRB and IOM, 2005: 15).

The report reviewed research on how features of urban and suburban settings influence commuting and travel behaviors. Evidence was presented for distance

sensitivity of walking and cycling, and illustrated the relationship between policies that support parking to encourage driving which thereby decrease opportunities for green spaces and recreational amenities. The report also highlighted challenges inherent in altering the built environment, which range from resource-intensive and logistically/politically complex changes such as overturning zoning and land-use ordinances, to more accessible and narrowly constructed approaches, such as implementing context-sensitive design and traffic calming measures.

The report *Educating the Student Body: Taking Physical Activity and Physical Education to School* recommended that school administrators, teachers, and parents should advocate for and create a whole-of-school approach to physical activity that reflects evidence-based minimums. Factors such as school siting and distance to residential areas play a key role in shaping the level of physical activity of children and families. The authoring committee emphasized that consideration of physical activity is critical in state and local policies on school siting. At the building scale, the report pointed out the role of classroom design, stairwell placement, and building flow in encouraging physical activity during the school day (IOM, 2013b).

In 2012, the IOM report *Accelerating Progress In Obesity Prevention* recommended that communities, transportation officials, community planners, health professionals, and governments prioritize increased access to contexts and opportunities for physical activity. The report described several evidence-based strategies for increasing physical activity, including community-scale and streets-scale urban design and land-use policies and practices that: enhance aesthetic value and the perception of safety, support pedestrian and bike access, and repurpose former infrastructure (e.g. railroad beds) for recreational purposes (IOM, 2012a).

The report *For the Public's Health: Revitalizing Law and Policy to Meet New Challenges* made several high-level

policy recommendations pertinent to the nexus of design and health, including:

Governments should avoid enacting ceiling preemption, referring to cases when a higher level of government restricts or eliminates a lower level of government's ability to regulate on a certain issue.^c Local and state governments can serve as laboratories for policy innovation, and ceiling preemption (as opposed to floor preemption, or setting minimum standards) may forestall further testing of different and potentially better policy interventions.

States and the federal government “should employ a Health in All Policies approach to consider the health effects—both positive and negative—of major legislation, regulations, and other policies that could potentially have a meaningful impact on the public's health” (IOM, 2011b: 9).

As an example of both past and emerging considerations in policy-making, the authoring committee described freeway “deconstruction” as reflective of urban and land-use planning priorities that are shifting from an emphasis on moving people around smoothly and efficiently toward a more systems-based approach that addresses issues of social equity, livability, and economic and environmental sustainability.

HIGHLIGHTS FROM WORKSHOP SUMMARIES

The importance of emerging partnerships and learning across disciplines and sectors was a recurring theme of multiple publications. One workshop summary stated that “[s]cientists, engineers, and architects must become health and environment leaders and decision makers rather than just technical problem solvers” (IOM, 2002).

Equity is another theme found in workshop summaries. *Creating Equal Opportunities for a Healthy Weight*

^c A notable example is the Affordable Care Act's provision that required larger chain restaurants to disclose the calories of all their offerings on the menu, and preempted states from enacting regulations that are stricter than the federal standard.

described some features of the built environment in neighborhoods with primarily low-income and minority populations that could be reconfigured through policy and even redesign to encourage physical activity—from changes that improve the safety of street crossings, to constructing parks and playgrounds in vacant lots (IOM, 2013a). Another IOM (2009) workshop summary included exploration of the legacy of urban and suburban planning and zoning that have led to distinctly different food systems in areas with low-income populations compared to areas with high-income populations—the latter encouraging large supermarkets paired with ample parking, while the former maintains high densities of fast food outlets and small convenience stores offering few or no healthful foods. *Applying a Health Lens to Decisions in Non-Health Sectors* showcased an array of federal, state, and local efforts, and an example of private sector efforts to effect health improvement while achieving other objectives, such as improving equity of opportunity, improving the availability of affordable housing, connecting schools to farms and urban gardens, and redesigning transportation systems to promote physical activity (IOM, 2014).

Discussion

Designers have historically shown the potential to be change agents at different scales of impact. Linking the relevant evidence-based science of IOM/NRC work with principles of design, theories of place-making and the ingenuity of design solutions can contribute to a new era in community wellness. We have identified key publications that call for non-clinical solutions to the nation's poor health burden, including designing with health in mind. The consensus studies highlight the importance of health promotion in design solutions, and do so in a systems-based approach to community-scale improvement, showing how design and recommended standards can make it easier to engage in health-promoting behavior. The workshop summaries illustrate the factors necessary to facilitate the design of healthier communities by way of shared, equitable and systems-based decisions-making processes from which policies should emanate. The existing and growing body of IOM and NCR work contributes to the increasingly shared vocabulary on health and design and to synergies between the two fields that can promote a culture of health in this nation.

References

- Brundtland GH, & World Commission on Environment and Development. (1987). *Our Common Future: Report of the World Commission on Environment and Development*. Oxford University.
- Corburn, J. (2004). Confronting the Challenges in Reconnecting Urban Planning and Public Health. *American Journal of Public Health* 94 (4):541-546.
- IOM (Institute of Medicine). 2000. *Clearing the air: Asthma and indoor air exposures*. Washington, DC: The National Academy Press.
- _____. 2002. *Health and the environment in the Southeastern United States: Rebuilding unity: Workshop summary*. Washington, DC: The National Academies Press.
- _____. 2003a. *The future of the public's health in the 21st century*. Washington, DC: The National Academies Press.
- _____. 2003b. *Ensuring environmental health in postindustrial cities: Workshop summary*. Washington, DC: The National Academies Press.
- _____. 2007. *Green healthcare institutions health, environment, and economics: Workshop summary*. Washington, DC: The National Academies Press.
- _____. 2009a. *Local government actions to prevent childhood obesity*. Washington, DC: The National Academies Press.
- _____. 2009b. *The public health effects of food deserts workshop summary*. Washington, DC: The National Academies Press.
- _____. 2010. *For the public's health: the role of measurement in action and accountability*. Washington, DC: The National Academies Press.
- _____. 2011a. *Climate change, the indoor environment, and health*. Washington, DC: The National Academies Press.
- _____. 2011b. *For the public's health: revitalizing law and policy to meet new challenges*. Washington, DC: The National Academies Press.
- _____. 2011c. *State and local policy initiatives to reduce health disparities: Workshop summary*. Washington, DC: The National Academies Press.
- _____. 2012a. *Accelerating progress in obesity prevention: solving the weight of the nation*. Washington, DC: The National Academies Press.
- _____. 2012b. *An integrated framework for assessing the value of community-based prevention*. Washington, DC: The National Academies Press.
- _____. 2013a. *Creating equal opportunities for a healthy weight: Workshop summary*. Washington, DC: The National Academies Press.
- _____. 2013b. *Educating the student body: Taking physical activity and physical education to school*. Washington, DC: The National Academies Press.
- _____. 2013c. *Public health linkages with sustainability: Workshop summary*. Washington, DC: The National Academies Press.
- _____. 2014. *Applying a health lens to decision making in non-health sectors: Workshop summary*. Washington: The National Academies Press.
- NRC (National Research Council). 2006. *Ethical considerations for research on housing-related health hazards involving children*. Washington, DC: The National Academies Press.
- _____. 2010. *Pathways to urban sustainability research and development on urban systems: Summary of a workshop*. Washington, DC: The National Academies Press.
- _____. 2011a. *Pathways to urban sustainability the Atlanta metropolitan region: Summary of a workshop*. Washington, DC: The National Academies Press.
- _____. 2011b. *Improving health in the United States: the role of health impact assessment*. Washington, DC: The National Academies Press.
- NRC and IOM (National Research Council and Institute of Medicine). 2005. *Does the built environment influence physical activity? Examining the evidence*. Washington, DC: The National Academies Press.
- United Nations. (1992). Rio Declaration on Environment and Development: Report of the Conference on Environment and Development "Earth Summit." Rio de Janeiro, Brazil



THE AMERICAN INSTITUTE
OF ARCHITECTS



AIA Foundation



ACSA
ASSOCIATION OF COLLEGIATE
SCHOOLS OF ARCHITECTURE

1735 New York Avenue, NW
Washington, DC 20006-5292
www.aia.org