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Built environment change: A framework to support health-enhancing behavior through environmental policy and health research

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Built Environment; Health Policy; Behavior Change; Health Promotion; Conceptual Model

INTRODUCTION

An increasing amount of research examining the potential relationship between environment and health is focusing on the specific influences of the built environment.. Research is also aiming at the policy dimensions of linkages between environment and health, in hopes of affecting changes in environment that will support healthier behaviors. Policy-related research seeks to identify promising interventions in the built environment that will have a significant impact on population health. The effectiveness of these lines of research is limited by a weak, often only implicit theoretical framework on the constituent parts of the

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Competing Interest

None to declare

Contributorship Statement

Ethan M. Berke and Anne Moudon equally contributed to the conceptual model, theory design, literature review, and data synthesis. They both equally contributed to the preparation of the manuscript.

Two tables supplement this framework and are available on the web:

Table 1. Supplementary BEC Framework Table: Operational variables/measures, actionable instruments, and change agents are summarized by the built environment levels.

Table 2. Supplementary BEC Framework Table: Selected health issues are related to built environment exposure and individual responses and behaviors.

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built environment and how it can be modified, making it difficult to compare studies, understand causal pathways and make recommendations.[1, 2] It is critical for health and planning researchers to conduct studies and make recommendations in the context of a robust framework. Our objective is to identify key components of a conceptual framework of the built environment that are useful to health and urban planning researchers studying the relationship between the built environment and health. We propose a conceptual framework for built environment change consisting of elements of the built environment and how people interact with them perceptually and functionally. Integrated into this framework are the legal and regulatory mechanisms and instruments that are commonly used to effect change in the built environment. The framework is anchored in the notion of built environment *change* (BEC) to take into account the structural characteristics of the built environment that could be modified in order to improve health. The conceptual framework highlights how specific levels and elements in the built environment are defined by different sets of regulatory mechanisms, which govern change in the built environment. We show how these levels and elements can be used to structure health research, how they can correspond to subjective and objective measures of the physical built environment, and how they fit into community planning strategies applicable to public health practice and health promotion.

Three Domains Guiding the BEC framework

The BEC is based on theories from three domains: (1) constructing the physical built environment; (2) identifying the dynamics of how people perceive and use the environment; and, (3) structuring the legal and regulatory mechanisms governing change in the built environment.

In domain 1, we identify constructs used in urban design, urban morphology, and urban geography to establish a framework defining levels in the built environment that range from rooms within buildings to cities and regions. In domain 2, we use theory from the field of person-environment behavior to construct how people interact with the built environment on a cognitive, perceptual, and functional basis. [3] In domain 3, we review urban planning and building construction regulations used to manage and change the built environment. These domains are then integrated into the BEC.

Domain 1: Constructing the built environment

Definitions: The built environment is the habitat constructed by humans. It is made of structures, buildings, and related ancillary or discrete open spaces such as gardens, parks, and includes roads and streets. Other terms have been used that capture the same phenomenon: urban or designed landscape,[4, 5] urban or city form,[6] and in the health literature, “place” encompasses the built environment and human interaction.[7, 8]

A socio-physical phenomenon: Anthropologist Claude LÈvi-Strauss called the human habitat one of the most complex phenomenon to decipher.[9] The foundations of the existence of the built environment are simple, coming from the need for settlement, and for protection from others and from the natural elements. Our habitats emanate from psycho-social, cultural, and perhaps even biological forces that eventually result in a physical

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structure or structures.[10–12] As such, the built environment is straightforwardly a socio-physical phenomenon.[13, 14] Yet because it reveals itself by material or matter (formed to provide shelter), the built environment endures as a physical phenomenon.

While humans construct their habitat, it is well known that once a habitat effectively contains humans and their activities, it in turn affects humans in many different ways, functionally and perceptually. People and habitat adjoin in complex ways over time as layers of constructions stratify the physical environment, affecting its use, and as memories add to the meanings attributed to physical space.[15] The relationship between humans and the built environment is both interactive (two-way) and iterative, and people are both producers and consumers of their environment.[16] A similar construct has been used by health researchers who view of "relational" approach of place and health, where the relationship between people and place is reciprocal and mutually reinforcing.[7]

Domain 2: Measuring the dynamics between people and environment—The complexity of interactions between the built environment and human behavior and activities has led to measuring the phenomenon both subjectively, to better capture the personal dimension of the relationship, and objectively, to describe the environment dimension. Linking subjective and objective measurements to understand the nature of the interactions remains a difficult task at both conceptual and analytical levels.

Bridging the subjective-objective divide: the theory of Affordance: Almost three decades ago, J.J. Gibson sought to integrate objective and subjective measures and devised his theory of affordances.[3] Gibson illustrated the mutual and dynamic relationship between objects and subjects by providing novel ways of looking at objects as alternatively beneficial and dangerous, referring for example to a knife affording both cutting or being cut, or to a wall affording privacy or climbing, as well as collision. Gibson and his followers thought of affordance as the concept capturing "the agent-environment mutuality in ecological psychology." To them, the properties of the environment could only be properly described in **relation** to a person.

Behavior in space and time: Affordance needs to consider the dynamics of people moving through space. Generally, space and time structures a person's experience of the built environment. "Dwelling," meaning to remain in one location in space is opposed to moving through space.[12, 17, 18] The effects of the speed of movement through space on cognition, perception, and behavior have been studied in a multitude of fields, ranging from medical therapy to product marketing. [19] Scientists distinguished between dwelling and three aspects of movement: locomotion; navigation; and wayfinding. The mechanisms governing decisions associated with dwelling and wayfinding seem to be the ones that are most relevant to health research. Environments where people dwell are those that are associated with long duration of exposure. They host most habitual individual-level interactions. The longer the dwelling duration the longer the exposure, and therefore the stronger the likely influence of environment—for example, home or work, versus a grocery store or a museum. Wayfinding mechanisms on the other hand will be associated with the broader environment experienced by people. It will define what has been called the spatial

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realm of individuals.[20] Wayfinding is anchored by *places* where dwelling occurs and enabled by *routes* that can be travelled and distances between places for dwelling.[21]

Domain 3: Changing the physical environment—Change in the environment takes place at several levels. Whether created by individuals or by groups, change eventually affects both. Change is also monitored and regulated by institutional structures governing the creation of and modifications to the built environment.

The psycho-social divide which has dominated health-environment research is in turn reflected in the scalar aspects of the built environment: in their daily lives, individuals are directly exposed to and use, their own immediate proximal environment (where they are), yet their behaviors are also influenced by the distal environment (where they want or need to go), which is shared with others. Thus if the proximal environment can be considered at the personal and individual level, the distal environment is a group-level phenomenon. Urban morphologists construct the material dimension of the built environment in a nested hierarchical structure of rooms fitting into buildings, themselves fitting into street-blocks.[22] Planners use such socio-physical constructs as neighborhoods, districts, centers, etc., to subdivide areas within a city or a jurisdiction. Incorporated institutions such as cities, counties, parishes, townships, regions, states, and nations are also hierarchically nested. While in the US local jurisdictions manage and regulate *de jure* the built environment and land use, national and federal level policies can have and have had a significant influence in shaping its characteristics at the local level.

Land use and other regulations affecting behavior: Building and zoning codes regulate what is termed “use” for the purpose of supporting or limiting certain behaviors within a given physically determined environment. A building or a neighborhood can be assigned residential, commercial or mixed use. Some street uses can also be regulated without entailing physical change to the street: vehicular speeds can be reduced; high occupancy vehicle or transit lanes can be mandated. Clearly, use-focused regulations can shape general aspects of behavior within the physical built environment, yet they stop short of determining or controlling behavior: individuals can work out of their single-family-restricted areas, just as someone can use an office as a home.

THE MODEL

BEC Framework

The BEC framework, shown in Figure 1, is composed of four parts: the three domains identified previously and their associated health issues. The left column, corresponding to domain 3, lists the regulatory instruments that shape and change the built environment. The second column, corresponding to domain 1, describes the elements of the physical built environment in 7 levels. The next column, corresponding to domain 2, focuses on how built environment elements afford certain exposures. The fourth column itemizes selected health issues that may result from the exposures described in the figure. The contents of the first and second columns are detailed in Table 1, describing the operational variables and measures of built environment elements, the actionable instruments and agents that enable change in or modifications to the elements. The contents of the fourth column is elaborated

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on in Table 2, where built environment exposure is linked to potential health behaviors, and finally to physical and mental health. The two tables are available online.

Arrows in Figure 1 indicate the direction of influence: regulatory instruments shape the built environment, which affords certain exposures and possible changes in behavior, which in turn lead to certain health issues. One might choose to read the framework from either right to left or left to right. By identifying a specific health issue, the researcher or planner may point to appropriate regulatory instruments or specific environments associated with exposure or behavior. The two supplementary tables assist BEC users in selecting the level of the built environment (Table 1) or the health issues of interest (Table 2).

Table 1, left side, lists operational variables and measures for each of the built environment levels. The right side describes the environmental elements' corresponding regulatory systems, and includes estimated rates of change and change agents of targeted interventions. By choosing the correct level of change agent and environment, policy recommendations become better focused and more likely to be implemented effectively. Defined physically, the built environment has 7 levels spanning from rooms within buildings to regions. Those levels represent spatial units, which are nested in space, with smaller units fitting spatially within the larger units: a building may have at least one but typically multiple rooms; similarly, a city will have at least one but typically multiple neighborhoods or districts. Spatial levels 5, 6, and 7 have long been accepted in urban geography and urban planning.[23] Levels 1 through 4 have been used implicitly in the field of architecture, and explicitly tested in the field of urban morphology for several decades.[13, 24] Variables and measures are suggested at each level to describe both the physical form of the environment and its general use.

Five basic types of policies and regulatory tools for the built environment operate at different levels of space, prompting change at different temporal intervals:

A. Building codes affect buildings, their construction, internal layout (e.g., bedrooms must have windows), and façade treatment (e.g., proportion of windows is governed by energy conservation standards). They affect levels 1 and 2.

B. Zoning and land use zoning codes are administered at the parcel or tax lot level. They address the position of buildings on lots, their bulk, the proportion of open space, and the amount of parking. They can also direct entries to buildings (for people and vehicles), materials to be used at the street level. Land use is typically defined for groups of adjacent parcels, which can cover entire blocks or neighborhoods. Zoning and land uses codes are applied one lot at a time, thus correspond to level 3.

C. Street standards and related transportation and traffic regulations operate at the neighborhood, city, or regional levels (levels 4–7).

D. Overlay zones apply to areas with multiple parcels to address a wide array of issues ranging from the protection of environmentally sensitive grounds, to design reviews (e.g., aiming to preserve historic elements or views of built or natural landmarks), to special development bonuses (e.g., to accommodate vulnerable

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populations or secure neighborhood amenities). Overlay zones can exist at the neighborhood or regional levels (levels 5–7).

E. Strategic planning shapes spatial structure including centers, nodes and networks at city/county and regional levels (levels 6 and 7)

Table 2 lists examples of health issues that are related to different environmental exposures with subsequent individual responses and behavior changes. Far from complete, the list illustrates a range of mental and physical health conditions commonly discussed in the literature when studying the role of built environment in health. Physical activity and obesity are a common theme,[25–28] along with depression,[29, 30] noise,[31] crowding,[32] and safety.[33, 34] In all cases an exposure is linked to a likely individual response or behavior that leads to a change in health, an assumption supported by the Institute of Medicine Field Model of Health.[35] Built environment exposures are associated with health in a one-to-many fashion, thereby highlighting the multi-dimensional aspects of the built environment, where different levels of habitat can yield similar health issues. Built environment changes affecting crowding or safety would likely pull the affordance trigger and result in selective behavior change, while other modifications such as light and ventilation, may lead to changes in toxic exposure with physiologic adjustments.

Nested environmental levels and health—Because elements of the built environment are nested, Figure 1 and Table 1 must be read upward from the level selected for research or intervention. By, for example, selecting level 5, the neighborhood, a planner or researcher must consider that the neighborhood consists of elements described at levels 4, 3, 2, and 1. Hence variables and measures at these lower levels may serve to describe the neighborhood. Accordingly, the instruments of change and change agents of these lower levels will also apply at the neighborhood level. And finally, while there are health issues specific to the neighborhood level (level 5), the impacts on health from the lower levels will accumulate to the neighborhood level. A connected network of streets (level 4) for example will shorten distances between activities at the neighborhood level (level 5). Similarly, overcrowding in many of the buildings or parcels of the neighborhood will affect the health of the entire neighborhood. Because the city/county and the region (level 6 and 7) are aggregations of elements of the built environment at lower levels, they will have indirect impacts on individual exposure and behaviors.

In terms of health, change occurring at different levels of the built environment does not necessarily correspond to a continuum from individual to population health. Indeed, lower framework levels corresponding to rooms, buildings, and lots can have a significant impact on population health. For example, stress and depression due to lack of privacy or overcrowding have implications not only for individuals, but also for larger groups through its effect on social capital. Similarly, higher built environment levels corresponding to neighborhood or regional planning can impact individual health (e.g. change in physical activity).

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MODEL APPLICATION

The BEC framework can serve as a platform for transdisciplinary research between health researchers and urban planners. It grounds observations made between built environment elements and actionable policies, using a theory captured by the domains outlined above. The framework levels also provide guidance for *a priori* selection of built environment components that are associated with health. For urban planners, knowledge of health issues and goals for wellness can be applied to the appropriate level of the framework, thereby increasing the likelihood of the desired health or behavior effect from the built environment or land use change. The framework offers a common understanding of the relationships between human behaviors and built environment, and allows for interventions to better target the appropriate level of environment to specific health issues.

Modifying the built environment and modifying behavior are not interchangeable concepts or strategies. For people, the built environment is a daily exposure, which relates to behavior, itself modifiable by perception and by other psychosocial mechanisms. Change in the built environment leads to change in exposure, which may in turn lead to change in behavior. The review of urban planning instruments available to change the built environment showed that modifications can principally be aimed at the physical dimension of the environment—the location, shape, construction, and only to a limited extent, at the use of its elements. Yet given the reality of the concept of affordance, individuals and groups can perceive, experience, and actually use the same physical environment in many ways. As a result, changes in the built environment can be measured objectively, while changes in behavior must also include subjective measures. Accordingly, research designs should carefully and strategically select objective and subjective measures. For each objective measurement, there will be multiple subjective interpretations (e.g., wide sidewalks may be perceived as too open and less inviting for walking and better for bikes, or as a highly accessible non-motorized route). This “one-to-many” relationship is key to acknowledge when translating observations in public health research to policy recommendations. Policy relevant research on the influence of the built environment on behavior should use objective measures of environment as a starting point from which subjective individual affordances can be compared. It is these objective measures that will ultimately be targeted for intervention and that will lead to modifications to the built environment.

The framework should help researchers structure their research design and select their environmental variables more strategically in order to hone in to the modifiable built environment elements that are most likely to lead to better health. It should also lead to an increased comparability of research results for studies using the framework. In practice, the effectiveness of the framework will depend on the acknowledgement that planning decisions affect public health, and health imperatives may drive modifications to the environment. Making an explicit link between health and habitat at multiple levels may at a minimum increase awareness of this important relationship, and provide direction on the development and redesign of policy priorities.

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The graphic rendition of the framework does not fully reveal important interactions between the different levels. The user should consider how modification at one level of environment, particularly levels 1–4, could impact either higher or lower order levels. Similarly, when public health practitioners identify an aspect of the built environment related to health that they believe should be altered (e.g., providing access to a trail, a level 5 neighborhood intervention), consideration should be given to reactionary effects on other levels that could potentially be detrimental for health (e.g., creating added traffic near the access point and adding stress to those living nearby, a level 2 and 3 effect).

CONCLUSION

Health research designed to associate the built environment and its elements with health and health behaviors needs to be guided by a framework that clearly describes criteria used and assumptions made regarding built environment change. Such a framework is a necessary companion to the behavior change theories which have been successfully used in health. It will strengthen and help further specify the social ecologic model, which has structured research and policy focusing on the built environment as an instrument for enhancing health behaviors. By focusing on change elements in the built environment, public health practitioners, urban planners, and policy makers can identify actionable items based on sound theory to improve the health of an environment's inhabitants.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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REFERENCES

1. Matthews SA, Moudon AV, Daniel M. Work group II: Using Geographic Information Systems for enhancing research relevant to policy on diet, physical activity, and weight. Am J Prev Med. 2009; 36(4 Suppl):S171–S176. Epub 2009/04/16. [PubMed: 19285210]
2. Daniel M, Moore S, Kestens Y. Framing the biosocial pathways underlying associations between place and cardiometabolic disease. Health Place. 2008; 14(2):117–132. Epub 2007/06/26. [PubMed: 17590377]
3. Gibson, JJ. A Preliminary Description and Classification of Affordances. In: Reed, ES.; Jones, R., editors. Reasons for Realism. Hillsdale, NJ: Lawrence Erlbaum & Associates; 1982. p. 403-406.
4. McHarg, IL. Design with Nature. Garden City, NY: Doubleday / Natural History Press; 1971.
5. Spirn, AW. The granite garden: urban nature and human design. New York: Basic Books; 1984.
6. Lynch, K. Good City Form. Cambridge: The MIT Press; 1980.

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7. Cummins S, Curtis S, Diez-Roux AV, Macintyre S. Understanding and representing 'place' in health research: a relational approach. Soc Sci Med. 2007; 65(9):1825–1838. Epub 2007/08/21. [PubMed: 17706331]
8. Berke EM. Geographic Information Systems (GIS): recognizing the importance of place in primary care research and practice. J Am Board Fam Med. 2010; 23(1):9–12. Epub 2010/01/07. [PubMed: 20051537]
9. Levi-Strauss, C. A world on the wane. London: Hutchinson; 1961.
10. Wilson, EO. Biophilia. Cambridge: Harvard University Press; 1984.
11. Ehrlich, PR. Human Natures: Genes, Cultures, and the Human Prospect. Washington: Island Press; 2000.
12. Rapoport, A. Human aspects of urban form: towards a man-environment approach to urban form and design. New York: Pergamon Press; 1977.
13. Whitehand JWR. The Urban Landscape: Historical Development and Management, Papers by M.R.G. Conzen. Institute of British Geographers. 1981 Special Publication 13.
14. Conzen, MP. Analytical approaches to the urban landscape. In: Butzer, KW., editor. Dimensions of human geography. Chicago: University of Chicago; 1978. p. 128-165.
15. Lynch, K. What Time is this Place?. Boston: MIT Press; 1972.
16. Galster GC. On the nature of neighbourhood. Urban Studies. 2001; 38:2111–2124.
17. Thiel, P. People, Paths, And Purposes : Notations For A Participatory Envirotecture. Seattle: University of Washington Press; 1997.
18. Kwan MP. From place-based to people-based exposure measures. Soc Sci Med. 2009; 69(9):1311–1313. Epub 2009/08/12. [PubMed: 19665828]
19. Montello, DR. The Cambridge Handbook of Visuospatial Thinking. Shah, P.; Miyake, A., editors. New York: Cambridge University Press; 2005.
20. Fan YL, Khattak AJ. Urban Form, Individual Spatial Footprints, and Travel Examination of Space-Use Behavior. Transportation Res Record. 2008:98–106.
21. Moudon AV, Lee C. Walking and bicycling: an evaluation of environmental audit instruments. Am J Health Promot. 2003; 18(1):21–37. [PubMed: 13677960]
22. Scheer, B. The Evolution of Urban Form: Typology for Planners and Architects. Chicago: New Planners Press; 2010.
23. Hartshorn, T. Interpreting the City: An Urban Geography. New York: Wiley; 1992.
24. Moudon AV. Urban morphology as an emerging interdisciplinary field. Urban Morphology. 1997; 1:3–10.
25. Berke EM, Koepsell T, Moudon AV, Hoskins RE, Larson EB. Association of the built environment with physical activity and obesity in older persons. Am J Public Health. 2007; 97(3): 486–492. [PubMed: 17267713]
26. Frank LD, Andresen MA, Schmid TL. Obesity relationships with community design, physical activity, and time spent in cars. Am J Prev Med. 2004; 27(2):87–96. [PubMed: 15261894]
27. Sallis JF. Measuring physical activity environments: a brief history. Am J Prev Med. 2009; 36(4 Suppl):S86–S92. Epub 2009/04/16. [PubMed: 19285214]
28. King AC, Sallis JF, Frank LD, Saelens BE, Cain K, Conway TL, et al. Aging in neighborhoods differing in walkability and income: associations with physical activity and obesity in older adults. Soc Sci Med. 2011; 73(10):1525–1533. Epub 2011/10/07. [PubMed: 21975025]
29. Berke EM, Gottlieb LM, Moudon AV, Larson EB. Protective Association Between Neighborhood Walkability and Depression in Older Men. J Am Geriatr Soc. 2007; 55(4):526–533. [PubMed: 17397430]
30. Kubzansky LD, Subramanian SV, Kawachi I, Fay ME, Soobader MJ, Berkman LF. Neighborhood contextual influences on depressive symptoms in the elderly. Am J Epidemiol. 2005; 162(3):253–260. [PubMed: 15987730]
31. Babisch W. Road traffic noise and cardiovascular risk. Noise & health. 2008; 10(38):27–33. Epub 2008/02/14. [PubMed: 18270405]
32. Guite HF, Clark C, Ackrill G. The impact of the physical and urban environment on mental well-being. Public health. 2006; 120(12):1117–1126. Epub 2006/11/14. [PubMed: 17097120]

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33. Chen L, Chen C, Srinivasan R, McKnight CE, Ewing R, Roe M. Evaluating the Safety Effects of Bicycle Lanes in New York City. American Journal of Public Health. 2011 Epub 2011/11/19.

34. Koepsell T, McCloskey L, Wolf M, Moudon AV, Buchner D, Kraus J, et al. Crosswalk markings and the risk of pedestrian-motor vehicle collisions in older pedestrians. JAMA. 2002; 288(17): 2136–2143. [PubMed: 12413373]

35. Evans RG, Stoddart GL. Producing health, consuming health care. Soc Sci Med. 1990; 31(12): 1347–1363. Epub 1990/01/01. [PubMed: 2126895]

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What is already known on this subject?

There is an increasing amount of research pertaining to built environment and health. Current work uses theoretical models of behavior change, but not ones that explicitly consider the built environment and related public policy.

What does this study add?

This transdisciplinary work describes the creation of a theoretical model to be used by health and planning researchers in understanding the relationship between the built environment, health, and actionable policy change. Such a model is critical for those in these fields in order to perform robust studies and make policy recommendations to improve the population's health.

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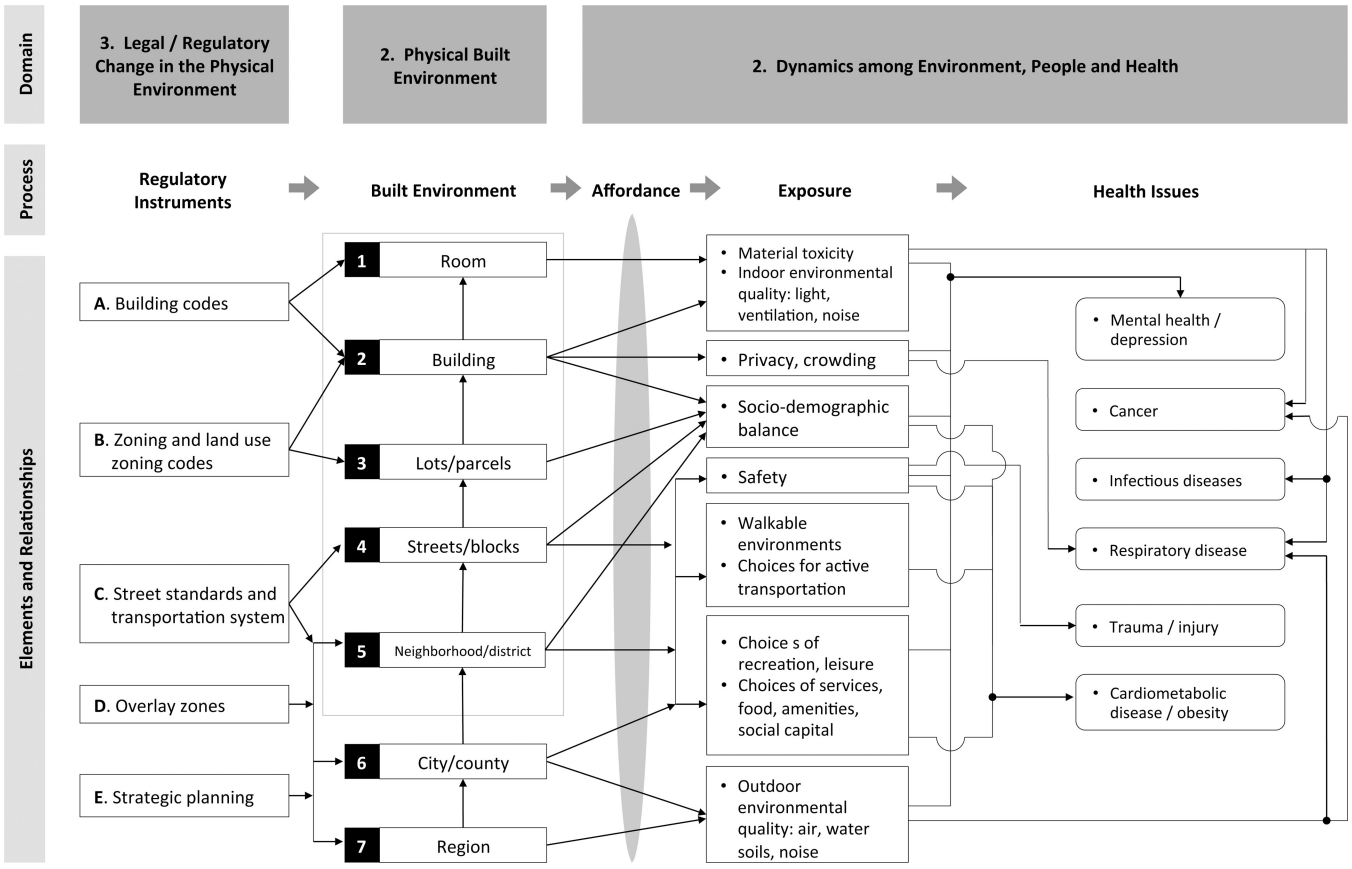

Figure 1.

BEC Framework: Theoretical structure of the regulatory mechanism, the built environment, and impact on health. Public health practitioners may choose to read table right to left, while urban planners may read left to right.