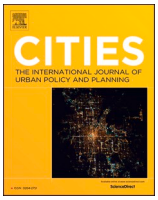
Cities 128 (2022) 103806

Contents lists available at ScienceDirect

Cities

journal homepage: www.elsevier.com/locate/cities



Four urban health paradigms: The search for coherence

Jinhee Kim [a,b,*], Evelyne de Leeuw [b,c], Ben Harris-Roxas [d], Peter Sainsbury [e]

[a] Centre for Health Equity Training, Research and Evaluation (CHETRE), Part of the UNSW Australia Research Centre for Primary Health Care & Equity, A Unit of Population Health, South Western Sydney Local Health District, NSW Health, A member of the Ingham Institute
[b] Centre for Primary Health Care and Equity (CPHCE), University of New South Wales
[c] Healthy Urban Environments (HUE) Collaboratory, Maridulu Budyari Gumal Sydney Partnership for Health, Education, Research and Enterprise SPHERE
[d] School of Population Health, University of New South Wales
[e] School of Medicine Sydney, University of Notre Dame

ARTICLE INFO

Keywords:
Paradigms
Urban health
Healthy cities
Healthy urban planning
Health social movements
Medical-industrial complex

ABSTRACT

Scholars, practitioners and policymakers view urban health based on their foundational ontologies, or paradigms, which provide a framework of norms that specifies the policy goals or research questions, the preferred policy instruments or research methodologies, and defines the nature of the urban health issue. This paper identifies four paradigms in current research and practice that address the links between the urban built environment and human health: the '*medical-industrial city*', '*urban health science*', '*healthy built environment*' and '*health social movement*' paradigms. We argue that scholars, practitioners and policymakers must recognise their diverse and sometimes contradictory views in order to create an opportunity for coherence in understanding knowledge generated from different paradigms.

1. Introduction

The urban physical environment that humans have built creates both opportunities and risks for the health and health equity of city dwellers. Urban health deals not only with the complex causal relationships between the urban form and its influence on health outcomes but also with underlying processes and politics that influence the decisions about the shape and qualities of cities. As such, the study and practice of urban health is ever-evolving and connects many disciplines, trades and traditions. Scholars, practitioners and policymakers address urban health issues based on their ontological foundations and work within a framework of standards that specifies the policy goals or research questions, the preferred policy instruments or research methodologies, and defines the nature of the urban health issue. This may lead to differences in interpreting the urban health field and to diverging practical, political and design solutions to urban health issues. A call for transdisciplinary collaboration has been made (Lawrence & Gatzweiler, 2017), but thus far, different approaches may seem irreconcilable to the casual observer.

We argue there is utility in making differences in thinking around the concept clearer and more distinctive. Not only would this help appreciate the proliferation of the field across different disciplines, schools of thought, and emphases, but it would also help facilitate particular efforts and patterns of knowledge generation and utilisation at the interface between community, public and private sectors, and the nexus between research, policy and practice (de Leeuw et al., 2008). This article will predominantly focus on the first step in this complex endeavour: identifying different constructions of urban health and constructing a typology. We argue for an epistemic ontological approach to the field that initially resonates with Kuhn's casting of scientific paradigms (Kuhn, 1962). We intend to provide a clearer understanding of theoretical and instrumental distinctions within the urban health domain. We argue that *recognition* and understanding of the multitude of views and realities creates an opportunity for coherence among the approaches, and consistency for next-generation joint policy, research and practice.

1.1. Diverse approaches to urban health

We begin by demonstrating the diversity of approaches in the field of urban health and explicitly presenting the scope of urban health we address in this paper.

Activities in the study and practice of urban health have grown in recent decades, and the range of topics transcends disciplines, research traditions, sectors and trades (Jia et al., 2014). Jia et al. (2014) retrieved

* Corresponding author at: Liverpool Hospital Locked Bag 7103, Liverpool BC, NSW 1871, Australia.
E-mail addresses: jinhee.kim@unsw.edu.au (J. Kim), e.deleeuw@unsw.edu.au (E. de Leeuw), b.harris-roxas@unsw.edu.au (B. Harris-Roxas), peter.sainsbury@nd.edu.au (P. Sainsbury).

https://doi.org/10.1016/j.cities.2022.103806
Received 31 March 2021; Received in revised form 1 March 2022; Accepted 2 June 2022
Available online 11 June 2022

a body of urban health scholarship from a search in Pubmed/MEDLINE of MeSH. They identified the four most frequent categories of research in urban health: physical environments (such as air pollution, noise, housing, indoor air quality); health outcomes (disease and risk factors); social environments (socioeconomic factors, social and cultural conditions, etc.); and interventions (health services and planning, health behaviour change, monitoring, urban planning).

In some traditions, urban health is regarded as a sub-discipline of international health or population health (Vlahov & Galea, 2002). The determinants of morbidity and mortality in urban areas are the focus of study, and they are commonly addressed in terms of burden of disease and health issues in inner city dimensions, related to, e.g., poverty, slums, drugs, and HIV/AIDS (Vlahov & Galea, 2002). In other traditions, the study of urban health focuses on the features of the urban environment and urban living that affect human health (Ferdinand et al., 2012; Hankey et al., 2012; Martin et al., 2014; Northridge et al., 2003; Rydin et al., 2012). Here, the physical and social environments of cities are considered critical determinants of health in the multilevel or socio-ecological model of health. A third tradition takes a governance or healthy public policy perspective. In this, the issue of urban health is addressed as a complex of institutional processes that creates healthy or unhealthy urban conditions (Burris et al., 2008; Collins & Hayes, 2010; Corburn, 2017; de Leeuw, 2017).

The Ottawa Charter for Health Promotion (World Health Organisation, 1986) sees supportive environments as encompassing social, cultural, ecological and built realms. We accept this layering of environments as integral to the current understanding of cities and urban health (UN-HABITAT & World Health Organization, 2020). Moreover, cities or urban spaces are not merely bounded spatial units, they are dynamically evolving *socio*-spatial configurations embedded in broader multitiered, organisational and geographical scales (Brenner, 2019).

In this paper, we focus on understanding the processes that shape the urban built environment and its associations with human health. Urban built environments refer to the human-constructed infrastructure of cities such as housing, buildings, transport systems, and parks that are created according to the relevant institutions and planning systems. Research and practice on urban health include activities related to investigating the causes and effects of urban health issues and understanding the process of implementing solutions to create urban built environments that are conducive to health (Lawrence, 2021). While the broader understanding of urban health encompasses contributions from disciplines such as urban geography, urban ecology, governance, urban management and other social and applied sciences, however, in this paper, we focus on the views that are at the interface of the urban built environment and human health.

Other attempts have been made to examine and identify typologies of healthy places. For example, Forsyth (2020) categorises three conceptually distinct but overlapping approaches to healthy places that are being proposed in urban planning, design and urban development at the city and neighbourhood scale. The three categories are basic healthy places, population-based lenses and technology-focused places. This classification is broadly based on the main element that distinguishes the healthy place approach, i.e., building the physical structure, focusing on specific population groups such as children and older people in healthy placemaking, and harnessing innovative technology. By emphasising how the interventions differ, Forsyth provides a comprehensive illustration of the range of existing healthy placemaking activities. However, this classification is insufficient in understanding the underlying conceptual and theoretical assumptions that constitutes the ideas behind the different types of interventions. Assumptions about what the ideal healthy place should be like, the preferred methods to investigating relevant issues or the nature of the causal mechanisms all construct the ideas behind why a specific intervention has been developed with that particular feature. Without acknowledging these underpinning assumptions, we still cannot fully distinguish nor understand the differences to healthy placemaking.

Therefore, our typology builds on Forsyth's categorisation and suggest an alternative way to differentiate approaches to urban health. On the one hand, we search for approaches beyond the urban planning focus, while on the other, we further explore the ontological differences as the basis for comparison to seek a broader transdisciplinary typology.

1.2. Paradigms and transdisciplinarity

In our proposed typology, we differentiate urban health approaches by adopting the concept of paradigms. The concept of paradigms has many definitions and is applied in multiple settings with varying degrees of generalisation (Morgan, 2007). According to Kuhn (1962), a *paradigm* is a coherent body of work that shares a common set of concepts, theories, methods and instruments that scientists within the paradigm take for granted. In other words, researchers who follow different paradigms have different views on which aspect of urban health is most important, which underlying determinants best explain urban health and its internal workings, which data collection or analytical method best address the research question, and which solutions most effectively tackle any given problem.

In Kuhn's original work it was assumed that there is one dominant scientific paradigm, or normal science, in a discipline that can only be transcended by a new or different one. However, this epistemological notion has evolved, in particular to acknowledge developments in social science and transdisplinary contributions. A transdisciplinary field such as urban health includes contributions across multiple disciplines and is a typical example of a multiple paradigm science that lacks a single overarching paradigm (Lawrence, 2021; Ritzer, 1975; White, 2015). In such a multi-disciplinary and multi-paradigmatic field, there is rarely a dominant paradigm, nor should such a dominance setting be encouraged. More importantly, the diversity of urban health conceptualisations, theories and methodologies is easily confounded to be disciplinary traditions because disciplines generally have a dominant paradigm in addressing urban health issues. The diversity of approaches is the product of the underpinning paradigmatic perspectives which may be embraced by multiple disciplines and transcend disciplinary boundaries.

The myriad of disciplines we see today were created as a product of the traditional linear development of science and the compartmentalisation of scientific activities (Lawrence, 2015; Ramadier, 2004). However, the multidirectional causal pathways between the urban physical environment and human health, coupled with the diversity of disciplines, policy actors and epistemic communities participating in the production of knowledge and action, essentially calls for different disciplines to engage with each other. Moreover, the multi-scalar complexity and unpredictability of the urban health issues, constrained by the environmental and political context we face today, cannot be understood by conventional forms of disciplinary thinking. This is not merely because the current methodologies cannot embrace and predict all uncertainties (Lawrence & Gatzweiler, 2017), but also because attempts to synthesise knowledge struggle to integrate what disciplinary analysis has previously separated (Ramadier, 2004).

Therefore, urban health issues require collaboration that transcend disciplinary boundaries and contributions from both the overlapping and non-overlapping aspects between disciplines. A transdisciplinary approach addresses the non-overlapping, marginal areas of the disciplinary approaches and seeks coherence of knowledge in these conflicting areas, instead of looking for consensus between disciplinary approaches and knowledge. In contrast, a *multi*disciplinary approach occurs when researchers work in parallel but respect the different views of each discipline an *inter*disciplinary approach focuses on the intersections of disciplines and constructs a standard model based on the overlapping aspects that are compatible with each other. Both multidisciplinary and interdisciplinary approaches remain fragmented because they seek collaboration in those areas that may bring consensus and unity and avoid dealing with those areas that conflict (Lawrence,

2021; Ramadier, 2004).

To us, a transdisciplinary approach enables researchers and practitioners to examine and interpret urban health through different disciplinary and paradigmatic lenses and occasionally step outside of the comfort zones of their disciplines. Addressing urban health issues involves mutual communication and interaction across the larger societal knowledge domain that consists of diverse concepts, meanings, methods and values (Lawrence & Gatzweiler, 2017). Moreover, the ultimate goal of transdisciplinary approaches is to achieve shared understanding for and commitment to societal change by creating and applying knowledge about real-world problems and solutions (Bteich et al., 2019; de Leeuw, 2012; O'Campo et al., 2011).

Transdisciplinary research and practice can be first attempted through the *articulation* of the different approaches (Ramadier, 2004). Articulation is a process that looks at both the contradictions and the common aspects of the different approaches that address urban health. Through articulation, scientists and policy actors are able to put knowledge produced by one discipline or paradigm into the broader context and make sense of the apparent paradoxes between disciplinary and paradigmatic knowledge.

The importance of paradigms is not exclusive to the philosophy of science. Hall (1993) introduced the concept of policy paradigms as a framework of ideas and standards that specifies the goals of policy, policy instruments to attain them and the nature of the policy problems. Paradigms have a crucial role in the policy process, in which actors process complex information by making cognitive shortcuts based on their beliefs. Policy actors aggregate into coalitions to influence and change policy with others who share policy core beliefs (Jenkins-Smith et al., 2018) or reframe problems according to the specific belief systems of others to generate support for their policy proposals (Cox & Béland, 2013). Here, paradigms dictate policy actors' beliefs about how causal relationships occur and the ideas on what constitutes effective policy solutions (Hall, 1993; Stone, 1997). In the policies concerning urban planning, the conceptual understanding and positioning of health in urban planning differs among policy actors (Hensley et al., 2019; WHO Regional Office for Europe, 2019). For some, health in urban planning is building world-class hospital precincts for global competitiveness, while for others, health is a holistic concept that drives urban planning (Harris et al., 2020). Therefore, to understand and explain policy change for urban health, more attention should be given to understanding how the interplay between scholarly and political paradigms influences the policies proposed and adopted (Daigneault, 2014; Hensley et al., 2019). This could also serve as a starting point for bridging the gap between research and policy (Cairney et al., 2016).

2. The four paradigms of urban health

In identifying and distinguishing paradigms, we build on Kuhn's definition of a paradigm, which is essentially a set of shared beliefs among scientists about how problems are to be understood (Kuhn, 1962, p.186–7). Hall (1993) applies a similar approach to circumscribing policy paradigms. A paradigm displays characteristics different to other paradigms regarding what there is to know about and assumptions about the phenomenon (ontology), the nature of knowledge and how it relates to the phenomenon (epistemology), and the best method to acquire knowledge (methodology). Paradigms also vary regarding the causation of the way things happen (aetiology) and value systems (axiology). Following Kuhn's approach, we applied the following parameters to distinguish the different types of urban health paradigms:

- Conceptual dimension: How is urban health defined? What are the main assumptions? How are the key concepts (e.g., health, urban built environment) defined?
- Theoretical dimension: What are the underlying beliefs in the problem definitions (e.g., causal pathways between urban physical environments and human health) and their solutions?
- Methodological dimension: What are the appropriate methods to acquire knowledge?
- Instrumental dimension: What are the appropriate solutions to promote health?

The four urban health paradigms were identified through an iterative journey of discovery, in which analysis of scholarly and grey literature was alternated with critical reflexive practice among the authors and their peers. Over the years of experience in the field of urban health, the authors have encountered diverse approaches among colleagues and literature in the field. We initially recognised two broad disciplinary foundations – urban planning and public health. Within the public health discipline, there were two noticeable divergent approaches – one that focused on epidemiological studies and another that focused on the empowerment model. Based on this observation, we initially identified three dominant urban health approaches that stem from the disciplines of urban planning, epidemiology and the empowerment model in health promotion (Kim et al., 2020). As we progressed to compare the differences between the approaches against the conceptual, theoretical, methodological and instrumental dimensions the typology iteratively broadened in scope (Kim et al., 2022). The distinctions between paradigms became clearer than in earlier versions and with the addition of the approach that is influenced by the healthcare and medical industry sector, the typology resulted in the four categories we present in this paper. We also acknowledge that this typology is based on a western-oriented worldview as most of the (English language) published research and practice come from high income (OECD) societies where urbanisation and urbanicity patterns may differ from those in developing economies (Martínez, 2021).

A summary of the four paradigms is shown in Table 1. These paradigms are not mutually exclusive and are seldom if ever detectable in a 'pure' or 'ideal' form in specific urban health research or activities. The paradigmatic positions do not always represent specific disciplinary traditions and norms and are not meant to be used to designate individual studies, researchers or policies to a particular paradigm. Instead, they are intended to serve as a heuristic (or 'lens') to explain and distinguish the epistemological and methodological differences between the different approaches.

2.1. The 'medical-industrial city' paradigm

The '*medical-industrial city*' paradigm is driven by the business and industry sectors (e.g., healthcare, construction, technology) and governments where healthcare infrastructure is considered as a major driver for urban economic growth and urban change. We apply the term 'medical-industrial' to represent the strong influence of the healthcare industry in shaping public policy (Relman, 1980). This paradigm is also a sub-category of the knowledge-based urban development (KBUD) agenda that involves clustering of knowledge-intensive industries and businesses in an urban-like setting with housing, business, education and leisure (Yigitcanlar et al., 2008). Investment in global competitive healthcare infrastructure is believed to stimulate a prosperous urban economy by creating employment, housing and transportation. As such, key characteristics of this paradigm align with neoliberal principles and those development theories that support the idea of urban infrastructure development and technological advancements as the desired method to achieve progress. This paradigm is explained well by the *urban growth machine* theory (Molotch, 1976), which suggests that "the objective of growth unites otherwise pluralistic interests in relation to a city" (Rodgers, 2009). A common discourse displayed by growth coalitions is the logic that growth creates jobs and that growth is conducive to wellbeing (Jonas & Wilson, 1999).

In this paradigm, the technologies and processes involved in the promotion of health and management of illness are treated as the producers of commodities to be invested in or exchanged for the promotion of urban development and growth. This view is in contrast to good

Table 1
Summary of the four paradigms.

	Medical-industrial city	Urban health science	Healthy built environments	Health social movements
Summary	Focuses on the development of healthcare facilities as a key urban planning project in the city or the application of technology to the urban infrastructure to monitor or change disease, risk factors and behaviour of individuals.	Applies epidemiological and complex systems analyses to urban health issues and emphasises the role of hard evidence on the causal relationships between the urban environment and human health outcomes to develop effective interventions and policies.	Originates from the urban planning discipline and advocates for the integration of health in the practice of spatial planning of cities. Spatial planning encompasses all aspects of human habitat and settlements that impinge on physical space.	Seeks to integrate health considerations into all aspects of urban governance (including decisions about the urban built environment), with an emphasis on operationalising values such as health equity and empowerment.
Conceptual dimension	The processes involved in the promotion of health and management of illnesses are viewed as commodities. Takes a biomedical and individualistic approach to health and illness.	Health is generally viewed in terms of risk factors for disease outcomes.	Health is often described as health-promoting lifestyles, wellbeing, quality of life, or flourishing.	Socio-ecological view on health and an explicit focus on health equity.
Theoretical dimension	Healthcare infrastructure and health-related technologies are regarded as drivers for a thriving economy.	The urban built environment is regarded as a determinant of health, exhibiting risk factors or facilitators for health outcomes.	Focus on urban planning elements (e.g., housing, transportation, etc.) and their impact on health-promoting lifestyles.	Focus on sociopolitical factors in urban governance and systems. Interventions are often viewed as outcomes of the sociopolitical factors.
Methodological dimension	Business logic and economic modelling (e.g., return on investment)	(Social) epidemiological analyses to explain causality and evaluate effectiveness.	Interdisciplinary interpretation of health in architectural and urban planning	Fourth generation evaluation and realist synthesis
Instrumental dimension	Investment in healthcare infrastructure as drivers of economic growth (e.g. jobs, income, education, etc.)	Expert-led empirical evidence-based interventions and technological solutions.	Influencing the planning system and urban planning regulations and processes.	Value-driven community empowerment approach to transform the urban environment.
Examples	Health and innovation precincts models for urban development	Urban health indicators Partnership for Healthy Cities (Bloomberg Foundation)	Healthy urban planning principles and guidelines	WHO Healthy Cities movement

health and good management of illness being regarded as desired outcomes, which is more characteristic of the other three paradigms. Because the healthcare industries considered in the paradigm include those biomedical and clinical services and research that work on disease treatment and cure, medical device manufacture, laboratories, hospitals and residential care and assisted living facilities, the concept of health is viewed in a biomedical, individualistic, pathogenic model. It is frequently coupled with the images of economic prosperity such as liveability and healthy lifestyles (Harris et al., 2020), which are promoted as individualistic values rather than societal goals. Actors in this paradigm include place entrepreneurs (e.g., developers, landowners and other actors that have interests in land development), businesses and industries that profit from such development, politicians, public and quasi-public agency leaders, and auxiliary players including universities, media, and corporate capitalists.

While the medical-industrial city paradigm appears prominently in current urban development practice and policy, this view is less active in research. This is the initial view on urban health that people who enter the field without a specific background tend to hold. Examples of this paradigm in practice include Biotech City in Canada (Biotech City, n.d.), health and education precincts in Australia (Greater Sydney Commission, 2018) and other knowledge-based urban development models. An extension of this paradigm could be applied to smart cities for health where the healthcare industry, coupled with information and communications technology (ICT) and digital infrastructure, drives the strategies for improving health (or treating disease) (de Leeuw et al., 2020).

2.2. The 'urban health science' paradigm

Epidemiological inquiry characterises the '*urban health science*' paradigm to understand the complex causal pathways of urban health and to develop effective interventions based on those causation models. We apply the term 'science' to its name to highlight the positivist approach that employs quantitative and analytical methodologies. The paradigm is based on the premise that dissecting the complex web of causal relationships produces a suite of 'scientific' evidence that can be translated into effective and actionable policy solutions (Giles-Corti et al., 2016; Pineo et al., 2018; Rydin et al., 2012). Prominent features of the urban health science paradigm include the measurement and quantification of the urban condition, or urban morphometrics, and analysing the impact of the urban physical environment on health (Martin et al., 2014; Sarkar et al., 2014).

This paradigm asserts that the urban environment is a critical layer somewhere midway between the higher distal and lower proximal layers of the multilevel framework of social determinants (Ettman et al., 2019; Northridge et al., 2003). Urban settings are also complex systems that include the interplay of both physical and social environments which can both be an asset and an impediment for urban health (Ompad & Tozan, 2019). The urban health system is a non-linear network of multidirectional causal relationships, feedback loops, tensions between objectives, and unintended consequences (Rydin et al., 2012). Various elements of the urban environment (physical, social and resource environments) are commonly studied as exposures, risks or enabling factors that influence health behaviour or physical, mental and social health outcomes for individuals or subpopulations (den Braver et al., 2018; Ferdinand et al., 2012; Smith et al., 2017; Wang et al., 2020). Similarly, linguistic terms from the medicine arena are deployed. For example, the urban social and physical environment is viewed as an 'obesogenic' environment leading to the obesity epidemic and increasing prevalence of noncommunicable diseases (NCDs) (Oliveira et al., 2020).

Research following this paradigm is concerned with obtaining precise information on when and where to intervene to guide policymaking and intersectoral collaboration. For example, research questions focus on measuring and highlighting which urban designs and land-use choices are most effective for improving the health of the public (Dannenberg et al., 2003). Consequently, rigorous data collection and analytical methods are used to produce valid and reliable evidence to inform policies (Pineo et al., 2018; Rothenberg et al., 2015). Reliable, validated and policy-relevant indicators are regarded as an effective tool to set shared objectives, monitor progress, communicate across sectors, and foster policy change (Badland et al., 2014; Lowe et al., 2015; Paine & Thompson, 2017; Pineo et al., 2019; Zeng et al., 2016). A consequence of the deployment of the urban health science paradigm is, for example,

the prescription of sets of 'best buy' interventions to prevent non-communicable diseases (NCDs) and injuries by the Partnership for Healthy Cities, a global initiative supported by Bloomberg Philanthropies (https://partnershipforhealthycities.bloomberg.org/) as shown in Box 1. These views are also found in the positivist approaches to global health in philanthrocapitalism that consider return on investment of philanthropic goals (Birn, 2014; Haydon et al., 2021) and the dominance of metrics in ranking and best buys (World Health Organization, 2017).

2.3. The 'healthy built environments' paradigm

The '*healthy built environments*' paradigm proposes the (re-)integration of health into the objectives of spatial planning of cities (Barton et al., 2015; Barton & Tsourou, 2000; Corburn, 2004; Kent et al., 2018). We include the term 'built environments' in the designation to represent the paradigm's emphasis on the built environment and its planning process. The healthy built environments paradigm has an explicit focus on the urban and spatial planning system and strives to persuade planning institutions to adopt health as a primary goal for urban planning and design. Often, proponents of this paradigm produce sets of codes or guidelines to be used as guides or benchmarks in the review of development proposals (Callway et al., 2020; Koohsari et al., 2013).

The development of the healthy built environments paradigm originates from the planning discipline and gained critical attention by the planning community as problems associated with urban planning (e.g. urban sprawl) and public health (e.g. obesity) converged (Sloane, 2006). While traditional urban planning includes principles such as connectivity, mobility, accessibility and safety as key objectives for providing housing, transportation, employment, leisure, and services, the healthy built environments paradigm prioritises population health as the main goal (Barton & Tsourou, 2000). Here, health is frequently linked with concepts such as flourishing, thriving, wellbeing, liveability, walkability, sustainability, accessibility, connectivity, resilience and active lifestyle (Barton et al., 2015; Pineo, 2020; Townshend, 2020). Urban physical environments are conceptualised as human settlements that are considered in different scales ranging from buildings, streets, neighbourhoods to the whole city (Barton, 2005; Pineo, 2020). These urban infrastructures are planned, designed and built by actors with the assistance of and constraints imposed by planning systems, sets of procedures, institutions and policy tools.

While acknowledging that the rigorous quantitative evidence produced under the strict methodological characteristics of traditional health and epidemiological disciplines presents compelling proof of the impacts of the built environment on health, proponents of the healthy built environment paradigm advocate for more comprehensive methods to explore and understand the complexity of the issues (Thompson et al., 2019). Methods include case studies, in-depth observations and participatory planning processes to provide a more comprehensive view and ensure the consideration of health in planning decisions.

Solutions advocated in the healthy built environments paradigm focus on the urban planning sector with the goal of influencing the planning system and processes. Policy instruments to influence the planning process are developed in the form of codes, guidelines and checklists that can be used as a guide or benchmark in the review of development proposals. Examples of these include the Healthy Urban Development Checklist (NSW Ministry of Health, 2020), and the Active Design Guidelines (The City of New York, 2010). The dimensions indicated in the UN-HABITAT guideline for integrating health in urban and territorial planning (Box 2) are an example of the principles underpinning this paradigm (UN-HABITAT & World Health Organization, 2020).

2.4. The 'health social movements' paradigm

The *'health social movements'* paradigm takes a 'value-based' approach to promoting health through urban planning in cities (Brown & Fee, 2014; de Leeuw & Simos, 2017; Brown et al., 2004) and aligns with the definition and principles of health promotion set forth by the Ottawa Charter for Health Promotion (World Health Organisation, 1986). This view is also consistent with the ideas and work of Jane Jacobs and her perspective that the complexities, diversity and the identity of the community's residents should be the fundamental drivers of urban design and not the academic principles of homogeneity (Jacobs, 1961). Principles such as solidarity, equity, sustainability and empowerment guide the identification of health issues associated with the urban physical environment and the solutions are ideally driven by the empowered community, focusing both inward (in community action) and outward (in seeking policy and systems change) (Ashton et al., 1986; de Leeuw & Simos, 2017; WHO Regional Office for Europe, 2018).

While proponents of this paradigm agree that a high health status should be the goal of all cities, a healthy city is not defined by its epidemiologically determined health status. Instead, a healthy city is one that commits to the healthy cities values and engages in creating environments and resources for health. Therefore, in contrast to the common practices associated with the urban health science and healthy built environments paradigms, a set of indicators or prescriptions that define *the* healthy city is not presented. Instead, a set of parameters that illustrate the values of a healthy city (Box 3) is proposed, which, if such a city were to exist, would surely have high health status (Duhl & Hancock, 1988).

The WHO Healthy Cities movement is an example of city action and research in this paradigm, along with other examples of community-

Box 1
Fourteen proven interventions to prevent NCDs and injuries (Partnership for Healthy Cities, Bloomberg Philanthropies)

1. Create a smoke-free city
2. Ban tobacco advertising
3. Raise tobacco taxes or levies/fees
4. Tax sugary drinks
5. Set nutrition standards for foods served and sold in public institutions
6. Regulate food and drink marketing
7. Create healthier restaurant environments
8. Reduce speeding
9. Increasing motorcycle helmet use
10. Reduce drink driving
11. Increase seat belt use
12. Promote active mobility
13. Prevent opioid-associated overdose deaths
14. Enhance public health data and monitoring systems

Box 2
Guideline for integrating health in urban and territorial planning (UN-HABITAT & World Health Organization, 2020).

1. Basic planning and legislative standards to avoid risk to health
2. Planning codes to limit environments that detract from healthy lifestyles or exacerbate inequality
3. Spatial frameworks to enable healthier lifestyles
4. Urban and territorial processes to capture multiple co-benefits of "building in" health

Box 3
The eleven parameters of a healthy city (Duhl & Hancock, 1988).

1. A clean, safe, high-quality physical environment (including housing quality)
2. An ecosystem which is stable now and sustainable in the long-term
3. A strong, mutually supportive and non-exploitive community
4. A high degree of public participation in and control over the decisions affecting one's life, health, and well-being
5. The meeting of basic needs (food, water, shelter, income, safety, and work) for all the city's people
6. Access to a wide variety of experiences and resources with the possibility of multiple contacts, interaction, and communication
7. A diverse, vital, and innovative city economy
8. Encouragement of connectedness with the past, with the cultural and biological heritage, and with other groups and individuals
9. A city form that is compatible with and enhances the above parameters and behaviours
10. An optimum level of appropriate public-health and sick-care services accessible to all
11. High health status (both high positive health status and low disease status)

based participatory research and action methods for urban transformation. Cities, in their unique context, apply evidence and information for decision-making that comply with their value base. Therefore, research in this paradigm calls for a realist synthesis approach in which outcomes are seen as a function of the mechanism plus the context (Pawson & Tilley, 1997), acknowledging that each urban environment is unique, but that certain principles may apply to all. For example, the programme logic of the WHO European Healthy Cities and its evaluation arm distinguishes context and mechanisms to explain their impact on city health outcomes (de Leeuw et al., 2015). Because the data and information required for healthy cities research need to capture the values and the unique context of each city, a multi-methods approach is needed. To evaluate the effectiveness of the actions that follow the health social movement paradigm, the fourth-generation evaluation model (Guba & Lincoln, 1989) is recommended. In this model, the design and interpretation of the evaluation is determined by intensive stakeholder participation.

3. Discussion

The four urban health paradigms that are identified and articulated in this paper provide one way to categorise and understand the different approaches that co-exist in the current research and practice of urban health. Our categorisation is based on the differences in how the approaches view and conceptualise priority issues of the phenomenon and the beliefs on the best methodologies and instruments to research and address those issues. In summary, the medical-industrial city paradigm focuses on urban planning driven by the healthcare industry; urban health science emphasises the production of sound evidence to inform decisions; healthy built environments aims to influence the spatial planning system and institutions; and health social movement advocates for a value- and community-driven approach to urban planning. However, the benefit of articulating the paradigms is not in highlighting the differences, but in seeking opportunities to communicate and collaborate across different paradigms effectively.

In reality, overlaps and hybrids between paradigms are common and necessary, and we often observe the influence of multiple paradigms. For example, in the planning and implementation of the Greater Sydney Regional Plan (Greater Sydney Commission, 2018), a long-term strategic plan that integrates land use, transport and infrastructure in the Greater Sydney area, we identify a dominance of the medical-industrial city paradigm, but also see influences of the other paradigms. The medical-industrial city paradigm supports the health and education precincts model for urban development and economic growth, but the plan's key objectives of liveability and sustainability, use of epidemiological evidence to inform decisions, and the participatory processes share characteristics of the urban health science and healthy built environments paradigms. While the overarching values and principles of the WHO Healthy Cities movement represent characteristics of the health social movement paradigm, individual programmes and projects include initiatives that follow the urban health science and healthy built environments paradigms (WHO Regional Office for Europe, 2019). This illustrates the complexity and diversity of urban health and the value of multiple views in dealing with the different areas of the phenomenon and strengthening cross-sectoral action. We contend that there cannot be one dominant, overarching paradigm on urban health. It is by harnessing the strengths of each paradigm that we can seek intersectoral collaboration.

With the diversity of the co-existing paradigms, research and practice activities sometimes misinterpret or appropriate the concepts and methodologies of other paradigms (Tudge et al., 2016). Some studies claim to adopt the socio-ecological systems framework to understanding urban health, which requires a multi-dimensional, multi-directional, non-linear dynamic methodological approach, but apply methodologies that do not support this theoretical approach. They continue to apply traditional analytical methodologies that take reductionist, linear approaches that study the determinants of the phenomenon in a multilevel framework, but not necessarily in a socio-ecological framework (Richard et al., 2011; Schölmerich & Kawachi, 2016). Similarly, some activities position their approach as a systems model, but the adopted solutions target behaviour at the individual level and singular elements of the urban built environment (Krefis et al., 2018). In other cases, methodologies developed for community empowerment and social transformation, such as the photovoice methodology, are borrowed by researchers and practitioners to be used as a qualitative method for data collection and analysis (Liebenberg, 2018). Another example involves

health impact assessments (HIA), a policy tool to prospectively assess the potential health impacts of a proposal that involves intervening in the decision-making process to eliminate or minimise predicted harmful effects. In urban health, health impact assessments are at times misinterpreted as an evaluation tool to analyse the actual health impacts of environmental exposures for scientific research (Mueller et al., 2018).

3.1. Urban health paradigms and the policy process

Contrary to the beliefs of the urban health science paradigm, strong statistical associations that confirm causal relationships between the urban environment and human health do not always guarantee policy change. Ironically, the more factors that are scientifically proven to be involved in the causal network, the less power the evidence has in bringing policy change (Stone, 1997). A complex relationship with many confirmed contributing elements diffuses responsibilities – every sector becomes responsible. In such a case, it is easier to place the responsibility for health on the individual, as is the view of the medical-industrial city paradigm. Even if a robust, valid and reliable association is confirmed, there are often multiple potential entry points for intervention within the web of relationships even if there is a single responsible sector. In this sense, the healthy built environments paradigm may have merit, as it places responsibility on a specific subsystem, the urban planning sector. The health social movement paradigm, on the other hand, acknowledges the potential of causal evidence to mobilise people to form alliances for policy change.

There are different levels of policy change ranging from, for instance, a minor, incremental change to a policy that maintains the overarching goals, to a major change involving a radical shift in policy goals, priorities and policy instruments. If one paradigm remains in control of the policy subsystem, a major policy shift is unlikely to occur without a significant policy failure (Hall, 1993; Jenkins-Smith et al., 2018). Therefore, in many cases, targeting incremental change may be an effective strategy for bringing urban policy change for better health. This can be achieved by appealing to the belief systems of the policy actors involved in the policy subsystem. To do so, policy actors need to be aware of not only their own foundational beliefs and worldviews on urban health but also those of others.

The four urban health paradigms described in this paper offer a framework to identify and understand the foundational positions of policy actors. Each of these urban health paradigms supports a set of policy ideas. However, the specific ideas on their own do not have the power to influence change; rather, they need to be framed within the conceptual understandings of others to gain support (Stone, 1997). Our description of the urban health paradigms can be used to identify policy actors who share the same deep core beliefs and search for opportunities for transdisciplinary collaboration across the different methodological and instrumental beliefs.

3.2. Transdisciplinary research

One element all paradigms seem to agree on is that urban health requires cross-disciplinary collaborations. The issues and solutions concerning urban health go beyond the scope of a singular field or sector, but intersectoral collaboration is seen more as a vision than in actual practice. Many have referred to the lack of common understanding as a barrier to establishing collaboration along with the disciplinary silos and boundaries, institutional and organisational arrangements, and lack of common goals, vision and political will (Lipp et al., 2013). Sharing a common understanding or language cannot be achieved without first respecting the differences of other paradigms and traditions. Articulating paradigms would help bridge some of this gap. By understanding the underlying conceptual differences researchers and practitioners can see more clearly the similarities and differences in the definition, scope and vision of an issue of common interest. This understanding leads to being able to speak others' language or at least being able to relate other languages to one's own. Moreover, when researchers and practitioners understand the underlying paradigmatic assumptions, they can interpret knowledge and information produced under different paradigmatic frameworks. This further enables researchers and practitioners to link knowledge and information across paradigms. Without this, urban health will continue to resort to multidisciplinary or interdisciplinary approaches where collaboration is based only on commonalities.

4. Strengths, limitations and future research directions

Although this work builds on the previous work by Forsyth (2020) and her classification of healthy places, to our knowledge, this is the first attempt to articulate contrasting paradigms that appear in the research and practice of the interface between urban environments and human health. More importantly, this paradigmatic framework is a direct response to a critical challenge of cross-disciplinary collaboration that researchers and practitioners face. Working with actors from diverse traditions and sectors inevitably involves encountering a diverse range of ideas on what a healthy city would look like and the way to get there. This framework is an attempt to articulate these multiple views.

This paradigmatic framework assists scholars and experts who are already in the field to position their work within the framework, reconsider their paradigmatic orientation and critically reflect on views from other paradigms to strengthen their practice. It can also serve as a compass to students, researchers and practitioners who are new to this topic area.

As previously argued in this paper, research and practice concerning urban health should strive to be a transdisciplinary field of research and practice. Articulating different paradigms allows participants to learn the languages, norms and cultures of other disciplines and traditions rather than be an opportunity to attain consensus in a universal understanding or a common language.

Nonetheless, this typology runs the risk of over-simplifying the complexity of urban health and its research and practice. Because our search for the paradigms started from the urban planning and public health disciplines, we are aware that we may have overlooked paradigms in other disciplines including urban governance and politics, development studies, community studies, sociology, policy studies and geography.

In our typology, the processes and mechanisms through which the four paradigms inform and translate to policy ideas and beliefs in policymaking remain unclear. A political lens to examine the beliefs regarding the locus of power, mechanisms for policy change, equity, the broader external and global forces such as neoliberalism, climate crisis and pandemics would contribute to further understanding the paradigmatic positions concerning the policy process.

As this paper introduces an initial conceptual framework to identify different paradigms applied to urban health, subsequent studies to validate or challenge our typology are critical. We invite scholars and practitioners in the field to verify, correct errors, contest, strengthen, identify missing gaps and correct the inaccuracies in our typology. Furthermore, empirical and systematic studies that investigate how each of the core concepts is defined and applied in each paradigm would provide detailed information on the commonalities and conflicts between the paradigms. For example, a comprehensive meta-narrative review is one such study methodology that can be applied to articulate the marginal differences of the paradigms and may help to resolve any conflicts (Kim et al., 2021).

5. Conclusion

Urban health is a complex phenomenon that is studied and practised by multiple disciplines that come from varying epistemological and methodological belief systems. In this paper, we identify four paradigms – medical-industrial city, urban health science, healthy built

environments and health social movement – that are observed in the current research and practice in the field of urban health. Because these four paradigms have different assumptions about urban health and subsequently ask different questions, an attempt to find the 'best' approach or to seek consensus among the paradigms would be invalid. In a transdisciplinary field such as urban health, instead of searching for unity and consensus with a focus on the overlapping commonalities among the paradigms, researchers and practitioners should seek to understand the paradoxes that occur in the non-overlapping aspects of the paradigms. Articulating the conflicts would assist researchers and practitioners to seek coherence in the interpretation and application of the knowledge, methodologies, and solutions produced by different paradigms to improve urban health.

Author statement

We confirm that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors has been approved by all of the listed authors.

CRediT authorship contribution statement

Jinhee Kim: Conceptualization, Investigation, Writing – original draft, Writing – review & editing. **Evelyne de Leeuw:** Writing – review & editing, Supervision. **Peter Sainsbury:** Writing – review & editing, Supervision.

Declaration of competing interest

This work was supported by the UNSW Scientia Scheme. The funder had no involvement in the conduct of the research nor in the preparation of the manuscript.

Acknowledgement

We thank Roderick Lawrence for his comments that improved the manuscript.

References

Ashton, J., Grey, P., & Barnard, K. (1986). Healthy cities—WHO's new public health initiative. *Health Promotion International, 1*(3), 319–324. https://doi.org/10.1093/heapro/1.3.319

Badland, H., Whitzman, C., Lowe, M., Davern, M., Aye, L., Butterworth, I., Hes, D., & Giles-Corti, B. (2014). Urban liveability: Emerging lessons from Australia for exploring the potential for indicators to measure the social determinants of health. *Social Science & Medicine, 111*, 64–73. https://doi.org/10.1016/j.socscimed.2014.04.003

Barton, H. (2005). A health map for urban planners: Towards a conceptual model for healthy, sustainable settlements. *Built Environment (1978-), 31*(4), 339–355.

Barton, H., Thompson, S., Burgess, S., & Grant, M. (2015). *The Routledge handbook of planning for health and well-being: Shaping a sustainable and healthy future*. Taylor & Francis Group.

Barton, H., & Tsourou, C. (2000). *Healthy urban planning*. World Health Organisation (WHO). https://ebookcentral.proquest.com/lib/unsw/detail.action?docID=1272853.

Biotech City. Biotech City, from discovery to commercialization. Retrieved from. https://www.citebiotech.com/home.html.

Birn, A.-E. (2014). Philanthrocapitalism, past and present: The Rockefeller Foundation, the gates foundation, and the setting(s) of the international/global health agenda. *Hypothesis, 12*(1). https://doi.org/10.5779/hypothesis.v12i1.229

Brenner, N. (2019). *New urban spaces: Urban theory and the scale question*. Oxford University Press.

Brown, P., Zavestoski, S., McCormick, S., Mayer, B., Morello-Frosch, R., & Altman, R. G. (2004). Embodied health movements: New approaches to social movements in health. *Sociology of Health & Illness, 26*(1), 50–80. https://doi.org/10.1111/j.1467-9566.2004.00378.x

Brown, T. M., & Fee, E. (2014). Social movements in health. *Annual Review of Public Health, 35*(1), 385–398. https://doi.org/10.1146/annurev-publhealth-031912-114356

Bteich, M., Miranda, E.d. S., Khoury, C. E., Gautier, L., Lacouture, A., & Yankoty, L. I. (2019). A proposed core model of the new public health for a healthier collectivity: How to sustain transdisciplinary and intersectoral partnerships. *Critical Public Health, 29*(2), 241–256. https://doi.org/10.1080/09581596.2017.1419167

Burris, S., Hancock, T., Lin, V., & Herzog, A. (2008). Emerging Principles of Healthy Urban Governance. In *Thematic Paper 5 of the Knowledge Network on Urban Settings*. WHO Centre for Health Development. https://ssrn.com/abstract=1148346.

Cairney, P., Oliver, K., & Wellstead, A. (2016). To bridge the divide between evidence and policy: Reduce ambiguity as much as uncertainty. *Public Administration Review, 76*(3), 399–402. https://doi.org/10.1111/puar.12555

Callway, R., Pineo, H., & Moore, G. (2020). Understanding the role of standards in the negotiation of a healthy built environment. *Sustainability, 12*(23), 9884. https://doi.org/10.3390/su12239884

Collins, P., & Hayes, M. (2010). The role of urban municipal governments in reducing health inequities: A meta-narrative mapping analysis. *International Journal for Equity in Health, 9*(1), 1–20. https://doi.org/10.1186/1475-9276-9-13

Corburn, J. (2004). Confronting the challenges in reconnecting urban planning and public health. *American Journal of Public Health, 94*(4), 541–546.

Corburn, J. (2017). Equitable and healthy city planning: Towards health urban governance. In E. de Leeuw, & J. Simos (Eds.), *Healthy cities: The theory, policy and practice of value-based urban planning*. Springer.

Cox, R. H., & Béland, D. (2013). Valence, policy ideas, and the rise of sustainability. *Governance, 26*(2), 307–328. https://doi.org/10.1111/gove.12003

Daigneault, P.-M. (2014). Reassessing the concept of policy paradigm: Aligning ontology and methodology in policy studies. *Journal of European Public Policy, 21*(3), 453–469. https://doi.org/10.1080/13501763.2013.834071

Dannenberg, A., Jackson, R., Frumkin, H., Schieber, R., Pratt, M., Kochtitzky, C., & Tilson, H. (2003). The impact of community design and land-use choices on public health: A scientific research agenda. *American Journal of Public Health, 93*(9), 1500–1508. https://doi.org/10.2105/AJPH.93.9.1500

de Leeuw, E. (2012). Healthy cities deserve better. *The Lancet, 380*(9850), 1306–1307. https://doi.org/10.1016/S0140-6736(12)61756-5

de Leeuw, E. (2017). Engagement of sectors other than health in integrated health governance, policy, and action. *Annual Review of Public Health, 38*(1), 329–349. https://doi.org/10.1146/annurev-publhealth-031816-044309

de Leeuw, E., Green, G., Dyakova, M., Spanswick, L., & Palmer, N. (2015). European healthy cities evaluation: Conceptual framework and methodology. *Health Promotion International, 30*(suppl_1), i8–i17. https://doi.org/10.1093/heapro/dav036

de Leeuw, E., McNess, A., Crisp, B., & Stagnitti, K. (2008). Theoretical reflections on the nexus between research, policy and practice. *Critical Public Health, 18*(1), 5–20. https://doi.org/10.1080/09581590801949924

de Leeuw, E., & Simos, J. (2017). *Healthy cities: The theory, policy, and practice of value-based urban planning*. Springer.

de Leeuw, E., Simos, J., & Forbat, J. (2020). Urban health and healthy cities today. In E. de In, J. S. Leeuw, & J. Forbat (Eds.), *Oxford research encyclopedia of global public health*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190632366.013.253.

den Braver, N. R., Lakerveld, J., Rutters, F., Schoonmade, L. J., Brug, J., & Beulens, J. W. J. (2018). Built environmental characteristics and diabetes: A systematic review and meta-analysis. *BMC Medicine, 16*(1), 12. https://doi.org/10.1186/s12916-017-0997-z. SciTech Premium Collection.

Duhl, L., & Hancock, T. (1988). *Promoting health in the urban context*. WHO Healthy Cities Project Office.

Ettman, C., Vlahov, D., & Galea, S. (2019). Why cities and health?: Cities as determinants of health. In S. Galea, C. Ettman, & D. Vlahov (Eds.), *Urban Health* (pp. 15–24). Oxford University Press. https://doi.org/10.1093/oso/9780190915858.003.0002.

Ferdinand, A., Sen, B., Rahurkar, S., Engler, S., & Menachemi, N. (2012). The relationship between built environments and physical activity: A systematic review. *American Journal of Public Health, 102*(10), e7–e13. https://doi.org/10.2105/AJPH.2012.300740

Forsyth, A. (2020). What is a healthy place? Models for cities and neighbourhoods. *Journal of Urban Design, 25*(2), 186–202. https://doi.org/10.1080/13574809.2019.1662718

Giles-Corti, B., Vernez-Moudon, A., Reis, R., Turrell, G., Dannenberg, A. L., Badland, H., Foster, S., Lowe, M., Sallis, J. F., Stevenson, M., & Owen, N. (2016). City planning and population health: A global challenge. *The Lancet, 388*(10062), 2912–2924. https://doi.org/10.1016/S0140-6736(16)30066-6

Greater Sydney Commission. (2018). *A metropolis of three cities: The Greater Sydney Region plan*. Department of Planning and Environment (NSW).

Guba, E. G., & Lincoln, Y. S. (1989). *Fourth generation evaluation*. SAGE.

Hall, P. A. (1993). Policy paradigms, social learning, and the state: The case of economic policymaking in Britain. *Comparative Politics, 25*(3), 275–296. https://doi.org/10.2307/422246. JSTOR.

Hankey, S., Marshall, J. D., & Brauer, M. (2012). Health impacts of the built environment: Within-urban variability in physical inactivity, air pollution, and ischemic heart disease mortality. *Environmental Health Perspectives, 120*(2), 247–253. https://doi.org/10.1289/ehp.1103806

Harris, P., Kent, J., Sainsbury, P., Riley, E., Sharma, N., & Harris, E. (2020). Healthy urban planning: An institutional policy analysis of strategic planning in Sydney, Australia. *Health Promotion International, 35*(4), 649–660. https://doi.org/10.1093/heapro/daz056

Haydon, S., Jung, T., & Russell, S. (2021). 'You've been Framed': A critical review of academic discourse on philanthrocapitalism. *International Journal of Management Reviews, 23*(3), 353–375. https://doi.org/10.1111/ijmr.12255

Hensley, M., Mateo-Babiano, D., Minnery, J., & Pojani, D. (2019). How diverging interests in public health and urban planning can lead to less healthy cities. *Journal of Planning History*. https://doi.org/10.1177/1538513219873591

Jacobs, J. (1961). *The death and life of Great American Cities*. Random House.

Jenkins-Smith, H., Nohrstedt, D., Weible, C., & Ingold, K. (2018). The advocacy coalition framework: An overview of the research program. In C. Weible, & P. Sabatier (Eds.), *Theories of the policy process* (pp. 135–171). Routledge. https://doi.org/10.4324/9780429494284-5.

Jia, X., Dai, T., & Guo, X. (2014). Comprehensive exploration of urban health by bibliometric analysis: 35 years and 11,299 articles. *Scientometrics, 99*(3), 881–894. https://doi.org/10.1007/s11192-013-1220-4

Jonas, A., & Wilson, D. (1999). The city as a growth machine: Critical reflections two decades later. In A. Jonas, & D. Wilson (Eds.), *The urban growth machine: Critical perspectives, two decades later*. SUNY Press.

Kent, J., Harris, P., Sainsbury, P., Baum, F., McCue, P., & Thompson, S. (2018). Influencing urban planning policy: An exploration from the perspective of public health. *Urban Policy and Research, 36*(1), 20–34. https://doi.org/10.1080/08111146.2017.1299704

Kim, J., de Leeuw, E., Harris-Roxas, B., & Sainsbury, P. (2020). The three paradigms on urban health. *European Journal of Public Health, 30*(Supplement_5), v586–v587. https://doi.org/10.1093/eurpub/ckaa166.155

Kim, J., de Leeuw, E., Harris-Roxas, B., & Sainsbury, P. (2022). Urban health paradigms. In R. Brears (Ed.), *The Palgrave Encyclopedia of Urban and Regional Futures*. Cham: Palgrave Macmillan. https://doi.org/10.1007/978-3-030-51812-7_283-1.

Kim, J., Harris-Roxas, B., de Leeuw, E., Lilley, D., Crimeen, A., & Sainsbury, P. (2021). Protocol for a meta-narrative review on research paradigms addressing the urban built environment and human health. *Systematic Reviews, 10*, 311. https://doi.org/10.1186/s13643-021-01848-6

Koohsari, M., Badland, H., & Giles-Corti, B. (2013). (Re)Designing the built environment to support physical activity: Bringing public health back into urban design and planning. *Cities, 35*, 294–298. https://doi.org/10.1016/j.cities.2020.102616

Krefis, A. C., Augustin, M., Schlünzen, K. H., Oßenbrügge, J., & Augustin, J. (2018). How does the urban environment affect health and well-being? A systematic review. *Urban Science, 2*(1), 21. https://doi.org/10.3390/urbansci2010021

Kuhn, T. (1962). *The structure of scientific revolutions*. University of Chicago Press.

Lawrence, R. (2015). Advances in transdisciplinarity: Epistemologies, methodologies and processes. *Futures, 65*, 1–9.

Lawrence, R. (2021). *Creating built environments: Bridging knowledge and practice divides*. Routledge.

Lawrence, R., & Gatzweiler, F. (2017). Wanted: A transdisciplinary knowledge domain for urban health. *Journal of Urban Health, 94*, 592–596. https://doi.org/10.1007/s11524-017-0182-x

Liebenberg, L. (2018). Thinking critically about photovoice: Achieving empowerment and social change. *International Journal of Qualitative Methods, 17*(1). https://doi.org/10.1177/1609406918757631, 1609406918757631.

Lipp, A., Winters, T., & de Leeuw, E. (2013). Evaluation of partnership working in cities in phase IV of the WHO healthy cities network. *Journal of Urban Health : Bulletin of the New York Academy of Medicine, 90*(Suppl. 1), 37–51. https://doi.org/10.1007/s11524-011-9647-5

Lowe, M., Whitzman, C., Badland, H., Davern, M., Aye, L., Hes, D., Butterworth, I., & Giles-Corti, B. (2015). Planning healthy, liveable and sustainable cities: How can indicators inform policy? *Urban Policy and Research, 33*(2), 131–144. https://doi.org/10.1080/08111146.2014.1002606

Martin, A., Ogilvie, D., & Suhrcke, M. (2014). Evaluating causal relationships between urban built environment characteristics and obesity: A methodological review of observational studies. *The International Journal of Behavioral Nutrition and Physical Activity, 11*. https://doi.org/10.1186/s12966-014-0142-8

Martínez, L. (2021). Health differences in an unequal city. *Cities, 108*, Article 102976. https://doi.org/10.1016/j.cities.2020.102976

Molotch, H. (1976). The city as a growth machine: Toward a political economy of place. *American Journal of Sociology, 82*(2), 309–332. SciTech Premium Collection.

Morgan, D. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research, 1*(1), 48–76.

Mueller, N., Rojas-Rueda, D., Khreis, H., Cirach, M., Milà, C., Espinosa, A., Foraster, M., McEachan, R. R. C., Kelly, B., Wright, J., & Nieuwenhuijsen, M. (2018). Socioeconomic inequalities in urban and transport planning related exposures and mortality: A health impact assessment study for Bradford, UK. *Environment International, 121*, 931–941. https://doi.org/10.1016/j.envint.2018.10.017

Northridge, M., Sclar, E., & Biswas, P. (2003). Sorting out the connections between the built environment and health: A conceptual framework for navigating pathways and planning healthy cities. *Journal of Urban Health, 80*(4), 556–568. https://doi.org/10.1093/jurban/jtg064

NSW Ministry of Health. (2020). Healthy built environment checklist. https://nla.gov.au/nla.obj-2880221691.

O'Campo, P., Kirst, M., Schaefer-McDaniel, N., & Hwang, S. (2011). Introducing a transdisciplinary approach to applied urban health research. In M. Kirst, N. Schaefer-McDaniel, S. Hwang, & P. O'Campo (Eds.), *Converging disciplines: A transdisciplinary research approach to urban health problems* (pp. 3–11). Springer.

Oliveira, D., Marques, M., dos Santos, D., Spexoto, M., Togashi, G., Massini, D., & Filho, D. (2020). Spatial index relating urban environment to health lifestyle and obesity risk in men and women from different age groups. *PLOS ONE, 15*(3), Article e0229961. https://doi.org/10.1371/journal.pone.0229961

Ompad, D. C., & Tozan, Y. (2019). A systems science approach to urban health. In *Urban health* (pp. 179–187). Oxford University Press.

Paine, G., & Thompson, S. (2017). What is a healthy sustainable built environment? Developing evidence-based healthy built environment indicators for policy-makers and practitioners. *Planning Practice & Research, 32*(5), 537–555. https://doi.org/10.1080/02697459.2017.1378972

Pawson, R., & Tilley, N. (1997). An introduction to scientific realist evaluation. In *Evaluation for the 21st century: A handbook* (pp. 405–418). Sage Publications, Inc. https://doi.org/10.4135/9781483348896.n29.

Pineo, H. (2020). Towards healthy urbanism: Inclusive, equitable and sustainable (THRIVES) – An urban design and planning framework from theory to praxis. *Cities & Health*. https://doi.org/10.1080/23748834.2020.1769527

Pineo, H., Glonti, K., Rutter, H., Zimmermann, N., Wilkinson, P., & Davies, M. (2019). Use of urban health indicator tools by built environment policy- and decision-makers: A systematic review and narrative synthesis. *Journal of Urban Health : Bulletin of the New York Academy of Medicine. SciTech Premium Collection.*. https://doi.org/10.1007/s11524-019-00378-w

Pineo, H., Zimmermann, N., Cosgrave, E., Aldridge, R. W., Acuto, M., & Rutter, H. (2018). Promoting a healthy cities agenda through indicators: Development of a global urban environment and health index. *Cities & Health, 2*(1), 27–45. https://doi.org/10.1080/23748834.2018.1429180

Ramadier, T. (2004). Transdisciplinarity and its challenges: The case of urban studies. *Futures, 36*(4), 423–439. https://doi.org/10.1016/j.futures.2003.10.009

Relman, A. S. (1980). The new medical-industrial complex. *New England Journal of Medicine, 303*(17), 963–970. https://doi.org/10.1056/NEJM198010233031703

Richard, L., Gauvin, L., & Raine, K. (2011). Ecological models revisited: Their uses and evolution in health promotion over two decades. *Annual Review of Public Health, 32*(1), 307–326. https://doi.org/10.1146/annurev-publhealth-031210-101141

Ritzer, G. (1975). Sociology: A multiple paradigm science. *The American Sociologist, 10*(3), 156–167. JSTOR.

Rodgers, S. (2009). Urban growth machine. In R. Kitchin, & N. Thrift (Eds.), *The international encylopedia of human geography* (Vol. 12, pp. 40–45). Elsevier.

Rothenberg, R., Stauber, C., Weaver, S., Dai, D., Prasad, A., & Kano, M. (2015). Urban health indicators and indices—Current status. *BMC Public Health, 15*(1), 1–14. https://doi.org/10.1186/s12889-015-1827-x

Rydin, Y., Bleahu, A., Davies, M., Dávila, J. D., Friel, S., De Grandis, G., Groce, N., Hallal, P. C., Hamilton, I., Howden-Chapman, P., Lai, K.-M., Lim, C. J., Martins, J., Osrin, D., Ridley, I., Scott, I., Taylor, M., Wilkinson, P., & Wilson, J. (2012). Shaping cities for health: Complexity and the planning of urban environments in the 21st century. *The Lancet, 379*(9831), 2079–2108. https://doi.org/10.1016/S0140-6736(12)60435-8

Sarkar, C., Webster, C., & Gallacher, J. (2014). *Healthy cities: Public health through urban planning*. Edward Elgar Publishing.

Schölmerich, V., & Kawachi, I. (2016). Translating the socio-ecological perspective into multilevel interventions: Gaps between theory and practice. *Health Education & Behavior, 43*(1), 17–20. https://doi.org/10.1177/1090198115605309

Sloane, D. (2006). From congestion to sprawl: Planning and health in historical context. *Journal of the American Planning Association, 72*(1), 10–18. https://doi.org/10.1080/01944360608976720

Smith, M., Hosking, J., Woodward, A., Witten, K., MacMillan, A., Field, A., Baas, P., & Mackie, H. (2017). Systematic literature review of built environment effects on physical activity and active transport – an update and new findings on health equity. *International Journal of Behavioral Nutrition and Physical Activity, 14*(1), 158. https://doi.org/10.1186/s12966-017-0613-9

Stone, D. (1997). *Policy paradox: The art of political decision making*. W.W. Norton.

The City of New York. (2010). In *The active design guidelines: Promoting physical activity through design* (p. 144).

Thompson, S., Paine, G., Judd, B., & Randolph, B. (2019). Towards a nuanced understanding of health-supportive place using composite research methods. *Geographical Research, 57*(1), 24–39. https://doi.org/10.1111/1745-5871.12329. ProQuest Central; SciTech Premium Collection.

Townshend, T. (2020). Urban design and human flourishing. *Journal of Urban Design, 25*(2), 181–185. https://doi.org/10.1080/13574809.2020.1727732

Tudge, J. R. H., Payir, A., Merçon-Vargas, E., Cao, H., Liang, Y., Li, J., & O'Brien, L. (2016). Still misused after all these years? A reevaluation of the uses of Bronfenbrenner's bioecological theory of human development. *Journal of Family Theory & Review, 8*(4), 427–445. https://doi.org/10.1111/jftr.12165

UN-HABITAT, & World Health Organization. (2020). In *Integrating health in urban and territorial planning: A sourcebook* (p. 108). UN-HABITAT and World Health Organization. Licence: CC BY-NC-SA 3.0 IGO.

Vlahov, D., & Galea, S. (2002). Urbanization, urbanicity, and health. *Journal of Urban Health: Bulletin of the New York Academy of Medicine, 79*(90001), 1S–12S. https://doi.org/10.1093/jurban/79.suppl_1.S1

Wang, R., Feng, Z., Liu, Y., & Qiu, Y. (2020). Is lifestyle a bridge between urbanization and overweight in China? *Cities, 99*, Article 102616.

White, K. (2015). Ludwik Fleck: Thought Collectives and the Sociology of Medical Knowledge. In F. Collyer (Ed.), *The Palgrave Handbook of Social Theory in Health, Illness and Medicine*. London: Palgrave Macmillan.

WHO Regional Office for Europe. (2018). Copenhagen Consensus of Mayors: Healthier and happier cities for all. https://www.euro.who.int/_data/assets/pdf_file/0003/361434/consensus-eng.pdf.

WHO Regional Office for Europe. (2019). *Implementation framework for Phase VII (2019–2024) of the WHO European Healthy Cities Network: Goals, requirements and strategic approaches*. WHO Regional Office for Europe.

World Health Organisation. (1986). *The Ottawa charter for health promotion*. World Health Organisation (WHO). http://www.who.int/healthpromotion/conferences/previous/ottawa/en/.

World Health Organization. (2017). *Tackling NCDs: "best buys" and other recommended interventions for the prevention and control of noncommunicable diseases (WHO/NMH/NVI/17.9)*. World Health Organization. https://apps.who.int/iris/handle/10665/259232.

Yigitcanlar, T., Velibeyoglu, K., & Martinez-Fernandez, C. (2008). Rising knowledge cities: The role of urban knowledge precincts. *Journal of Knowledge Management; Kempston, 12*(5), 8–20. http://wwwproxy1.library.unsw.edu.au/10.1108/13673270810902900.

Zeng, C., Deng, X., Xu, S., Wang, Y., & Cui, J. (2016). An integrated approach for assessing the urban ecosystem health of megacities in China. *Cities, 53*, 110–119.