



Five urban health research traditions: A meta-narrative review

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ABSTRACT

Urban health scholars explore the connection between the urban space and health through ontological perspectives that are shaped by their disciplinary traditions. Without explicit recognition of the different approaches, there are barriers to collaboration. This paper maps the terrain of the urban health scholarship to identify key urban health research traditions; and to articulate the main features distinguishing these different traditions. We apply a meta-narrative review guided by a bibliometric co-citation network analysis to the body of research on urban health retrieved from the Web of Science Core Collection. Five urban health research traditions were identified: (1) *sustainable urban development*, (2) *urban ecosystem services*, (3) *urban resilience*, (4) *healthy urban planning*, and (5) *urban green spaces*. Each research tradition has a different conceptual and thematic perspective to addressing urban health. These include perspectives on the scale of the urban health issue of interest, and on the conceptualisation of the urban context and health. Additionally, we developed a framework to allow for better differentiation between the differing research traditions based on (1) *perspectives of the urban system* as complicated or complex, (2) the preferred *locus of change* as a function of structure and agency and (3) the geographic *scale* of the urban health issue that is addressed. These dimensions have even deeper implications for transdisciplinary collaboration as they are underpinned by paradigmatic differences, rather than disciplinary differences. We conclude that it is essential for urban health researchers to reflect on the different urban health approaches and seek coherence by understanding their similarities and differences. Such endeavours are required to produce and interpret transdisciplinary knowledge for the goal of improving health by transforming urban systems.

1. Introduction

The modern city has evolved from a mere setting of health and disease analysis and intervention into a complex ecosystem of planning, development, and health service delivery and the realisation of individual and community wellbeing aspirations (Corburn, 2009; de Leeuw, 2017a; Freestone and Wheeler, 2015; Lopez, 2017). 'Urban health', broadly defined as the health of people in urban settings, has become a discipline for scholars, activism for residents, a challenge for planners, and a policy domain for politicians. However, what we observe as urban health outcomes are emergent properties of the complex adaptive urban system which is composed of socio-ecological agents, structures and mechanisms that form multiple interactions and feedback loops.

Therefore, it is ontologically flawed and methodologically impossible for any scholar, resident, planner, or politician to possess complete knowledge of or have complete control over the system's characteristics. Taking this perspective as the fundamental understanding of urban health calls for actors to seek a collaborative approach to address urban health.

The range of disciplines and sectors involved in urban health is vast, encompassing medicine and public health, planning and design, environmental studies, technology and engineering, governance and politics, among others. And despite the prevailing recognition that urban health research and practice requires collaboration across multiple sectors and levels (World Health Organization & UN-Habitat, 2016), actions seldom transcend disciplinary or sectoral boundaries. While

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intersectoral efforts are repeatedly proposed at global, national, and local levels, attaining effective collaboration for urban health remains an aspiration rather than a reality (de Leeuw, 2017b; Rantala et al., 2014; Siri and Geddes, 2022).

One fundamental reason why scholars and practitioners find it difficult to collaborate is because unique disciplinary and practice domain positions are based on deeper paradigmatic foundations (Kim et al., 2022; Lawrence, 2015, 2020). What is considered an important urban health issue from the view of one paradigm is different from what is regarded important in another. Also, preferred methodologies and the appreciation of particular types of data in investigating urban health issues are different depending on paradigmatic positions.

As a result, intersectoral collaborations in urban health research and actions remain in those intersections of shared paradigmatic positions (Lawrence and Gatzweiler, 2017; Ramadier, 2004). Rather than actively seeking to understand the differences of views that occur in the non-overlapping areas, intersectoral actions tend to focus more on the commonalities between different approaches. This *intersectoral* approach to urban health research and practice is not appropriate to fully address the comprehensive and complex nature of urban health issues. What is needed is a *transdisciplinary* approach through which scholars and practitioners need to find coherence in the production and interpretation of knowledge produced from multiple paradigms.

Transdisciplinary urban health scholars argue that one of the first steps to successful transdisciplinary research is through the explicit articulation of the multiple approaches (Ramadier, 2004). Articulation involves the unambiguous recognition of the different perspectives and understanding, specifically, how the perspectives are different. It is only then that researchers can start to make sense of the information that is generated by disciplines different from their own.

Previous studies have tried to identify and categorise different urban health approaches, definitions, methodologies, and solutions. Most of these typologies have remained within a subset of disciplinary sectors, mainly in public health and urban planning (Forsyth, 2020; Jia et al., 2014; Kim et al., 2022). These two disciplinary fields focus on the planning process and form of urban environments and their individual and community-level health impacts.

But the scope of urban health is broader than these two disciplines and involves other disciplines in natural and social sciences and professional techniques and practices such as engineering, geography, environmental studies, governance, and public administration. Moreover, urban health issues connect to broader ecological and planetary levels, and these have reciprocal impacts. While it may be impossible to comprehensively map all of the existing approaches to urban health, there is considerable need to scope the inquiry more broadly and explore a wide range of relevant disciplines. For example, in the broader planning literature, concepts such as sustainability, resilience and other ecological concepts are considered in relation to the urban health discourse.

This review attempts to include those views beyond the scope of traditional public health and urban planning realms and venture into other disciplines involved in urban health scholarship. The objectives of this review are to identify: a) which research traditions study urban health; and b) how the topic of urban health is conceptualised and researched similarly and differently across these urban health research traditions.

2. Methods

This study is a meta-narrative review of the urban health literature and applies bibliometric network analysis as a tool for mapping the key research clusters and selecting the publications for inclusion in the review. The meta-narrative review style was developed by Greenhalgh et al. (2005) as a method of systematic literature review to investigate how different scientific communities research a common field of study. It has been applied to multidisciplinary topics, mostly in the field of

public health (Chughtai and Blanchet, 2017; Collins and Hayes, 2010; Jackson, 2003; MacLure et al., 2014; Masuda et al., 2008).

Mapping the research traditions of the study topic is an integral process of the meta-narrative review and can be executed in various ways. Among those different methods, bibliometric network analysis is an efficient and effective way to process a large body of literature and map the relationship between publications on a given topic area, identify its key research traditions and retrieve publications that have significant influence for each tradition (Boyack and Klavans, 2010; Linnenluecke et al., 2020; Small, 2003). Although guidelines and protocols have been developed for meta-narrative review (Greenhalgh et al., 2011; Wong et al., 2013), adaptations to the process have been encouraged provided that they are appropriately justified and explained (Greenhalgh et al., 2005; Wong et al., 2013).

For this review, we used *document co-citation analysis*, a type of bibliometric analysis, to map the landscape of urban health research. A co-citation relationship occurs when two papers are cited in the same publication. In other words, all papers that have been cited in a single publication have co-citation relationships with all the other citations. Of the co-cited pairs, some pairs are co-cited in other publications more frequently than other pairs. In this case, we can assume these papers belong to a similar ‘research front,’ or research tradition, a concept that reflects the core developments in a particular area of study (Boyack and Klavans, 2010). Co-citation behaviour indicates that these references are recognised by peers within the same research front as important pieces of work (Small, 2003). Therefore, document co-citation network patterns allow us to not only identify clusters of publications that form a common research tradition, but also retrieve those publications that are recognised as significant pieces of work within those clusters.

A rigorous meta-narrative review is predicated on solid justifications and boundaries in the protocol that drives the research. Protocol registration and open access assure transparency and accountability. The protocol of this review was developed in accordance with the standard 6-phase (planning-searching-mapping-appraisal-synthesis-recommendation) sequence that was introduced by Greenhalgh et al. (2005). The original protocol for this study is registered within the Open Science Framework (OSF) (registration number - masked) and is published in a peer-reviewed journal (Kim et al., 2021).

2.1. Changes in the review process

As the review progressed, we became increasingly convinced of the potential of the bibliometric analysis as a powerful tool to map research traditions. However, we also became aware of the need to modify the overall design of the processes for searching, mapping and selecting publications:

- The relevant publications were selected based on the results from the document co-citation network analysis instead of screening for inclusion in a stepwise manner;
- The search for source material was conducted in a single database (Web of Science Core Collection) instead of multiple databases (the rationale for this is further explained in the Searching the Literature section).

2.2. Evidence of adherence to guiding principles of meta-narrative review

With these modifications, this review retains or, in most cases, strengthens the six principles of meta-narrative review. We have discussed compliance with the six principles previously in the protocol (Author, 2021), and here we add some of the key features of each principle:

The 6 principles

- *Pragmatism*: The decisions on how to search, map and analyse the publications were made based on “what will be most useful to the

intended audience.” The focus of this review was to provide the audience with an overview of the ontological perspectives of the different urban health approaches. This purpose guided the decisions made throughout all stages of the review.

- **Pluralism:** To capture publications that come from broader urban health perspectives, we developed and applied search terms that reflect multiple views on urban health. Moreover, to reflect the diversity of the studies in their conceptualisation of urban health and their methodologies, we did not impose an a priori coding framework in analysing the publications and applied an iterative analytical method that was guided by the emerging data.
- **Historicity:** By using the document co-citation analysis method, we were able to examine the network of cited references which reflect the citing behaviour of later researchers.
- **Contestation:** In the analysis, our main goal was to determine how different research traditions framed urban health issues differently and made different assumptions about the concepts and methods of urban health.
- **Reflexivity:** The authors accept the influence of their own perspectives in making decisions on the review process and in the interpretation of the findings. Additionally, as the authors come from a public health background, we acknowledge that our disciplinary background may introduce bias in the interpretation of the results. We made efforts to counter this bias by referring to the source material in data extraction and analysis and confirming our preliminary findings with peers within and beyond public health.
- **Peer review:** At various stages of the review, findings were presented and shared with peers, including international conferences such as the 5th World Planning Schools Congress, the 18th International Conference on Urban Health 2022 and the 24th IUHPE World Conference on Health Promotion.

2.3. Searching the literature

The search was conducted in a single multi-disciplinary database, Web of Science Core Collection (WoSCC). The maximum utility of the software of our choice, VOSviewer, is achieved when the records are collected from a single database, and in particular, the WoSCC (van Eck and Waltman, 2017). From our understanding, limiting the search to the WoSCC will not have a significant influence on the overall research findings, as the Web of Science is one of the largest and most comprehensive multi-disciplinary academic databases that produces a comprehensive body of literature on urban health (Gusenbauer and Haddaway, 2020). Additionally, limiting the search to a single database is justifiable as this search strategy is sufficient to fulfil the purpose of applying bibliometric analysis to categorise and identify key research traditions (Linnenluecke et al., 2020).

For systematic literature reviews that generate theory-building knowledge such as meta-narrative reviews, a *precise* search strategy can be adopted. A precise search strategy identifies a sufficient and appropriate range of studies that includes fewer relevant publications in the retrieved corpus (Gough et al., 2012; Lefebvre et al., 2022). This is in contrast with the exhaustive (or comprehensive) search strategy preferred in meta-analytic style systematic reviews that attempts to retrieve all relevant studies to minimise selection bias.

One strategy to conduct a precise search strategy is to limit the search parameters and apply as many exclusions to the search terms as possible to exclude irrelevant publications. The three concepts that were pertinent for our review were urban, built environment, and health. We restricted the search fields to title and author keywords and used Boolean operators AND, OR, NEAR/3 to link synonyms and NOT to exclude non-relevant topics. We limited the publication type (journal articles), year (1900–2021), and language (English).

To develop and refine the search terms, we conducted a series of author keyword co-occurrence analyses. Once a round of search was completed, we performed a keyword co-occurrence analysis on the

retrieved publications to generate a map of the publications’ keywords. These maps presented an overview of the key concepts that were addressed in the retrieved publications. We were able to identify additional relevant terms which were subsequently added to the search strategy. For example, in the earlier iterations, sustainability and resilience appeared as relevant terms for health and were subsequently added to the search strategy. The combination of the search terms we applied inevitably captured large collections of other publications that apply similar terms, such as family planning and local health services planning. We used the Boolean operator NOT/to exclude these publications from the search strategy. By iteratively building the search strategy, we were able to collect a body of urban health literature with minimal irrelevant publications. The final search term set is included in [Supplement 1](#).

2.4. Mapping the field

The collected body of literature on urban health using the search strategy presented above was then analysed to map the co-citation relationship of its cited references. The metadata and the list of references of the retrieved publications were imported into VOSviewer software. A document co-citation analysis was conducted. Considering the number of publications that were referenced in the searched urban health literature ($n = 217,740$), we set the limit of at least 20 citations as the threshold to be considered as a highly cited publication. This generated an appropriate number of publications ($n = 369$) to provide a balance between theoretical saturation and practical analysis. For comparison, setting a higher threshold of at least 30 citations generated a smaller number of 137 publications but the same five clusters, while a lower threshold of at least 10 citations produced 1426 publications with an additional cluster. While setting a lower threshold may seem to offer more detail on the clusters, our cut-off point generated the same five clusters as the higher threshold while providing a manageable and sufficient number of publications to include in the review.

2.5. Selection and appraisal of documents

The next step of the review involved selecting the publications that were included in the document co-citation clusters to analyse how each cluster studied urban health. Because document co-citation analysis uses all the cited references, some highly cited publications included methodology or conceptual papers that are not urban health specific. We subsequently excluded these from the review by applying the same selection criteria that were used to guide the literature search. To maintain consistency of data extraction for analysis, we only included articles in peer-reviewed journals such as original empirical studies, reviews and case studies.

The selected publications covered a very wide range of methodologies, populations, phenomena, scale and analytical ambition. This vast spectrum naturally posed a great challenge in developing a standard data extraction framework for analysis. We proceeded by reviewing each full text, extracting data on the purpose of the study, the urban health sub-topic(s) addressed, the interpretation of key urban health concepts, the main findings and the author’s key arguments. The data extraction process was iteratively conducted as new patterns and themes were discovered from the emerging data.

2.6. Analysis and synthesis processes

The data extraction, analysis, and synthesis occurred in an iterative manner. As a main principle, the extracted data were examined for between-cluster comparison and also for identifying cross-cutting patterns and themes. While reviewing the initially extracted data from the publications, we identified newly emerging patterns and themes. To further explore and confirm these themes, we would revisit the publications to add new items to the data extraction table. Throughout

different stages of the review, preliminary findings were continuously validated not only by the review team but also by other colleagues. This process included joint presentations and discussions at international conferences.

3. Results

3.1. Document flow diagram and characteristics

The process of document selection for the meta-narrative review is illustrated in Fig. 1. The initial search for urban health publications in the Web of Science yielded 5926 publications that cited a total of 217,740 references. Among these cited references, we selected those publications that were cited by at least 20 publications (N = 369) for document co-citation analysis. We then screened the 369 highly cited references against the eligibility criteria. This resulted in 167 publications to be included in the final review.

The documents were published between 1991 and 2019 in 85 journals. The geographical distribution based on the first author’s affiliation included USA (N = 62), UK (N = 28), Canada (N = 15), Australia (N = 12), The Netherlands (N = 12), and Sweden (N = 12). Because the scope and definition of the three concepts in the cited references were varied, an open approach to data extraction and analysis was required to capture the varying definitions and dimensions on urban health. Supplement 2 contains a table with the list of the 167 publications included in the review and a summary of key information such as the source, field of study, type of study and the main topic of the paper.

3.2. Five urban health research traditions

The document co-citation network analysis generated five distinct clusters of closely co-cited references, each representing a different research tradition. Fig. 2 presents the document co-citation pattern of the highly cited 369 references and thus contains books, book chapters, reports and publications that are not on the topic of urban health. Details of the citation data, such as the number of citations and strength of co-

citation links can be found in the table provided in Supplement 3.

After examining the 167 publications in the five clusters that directly addressed the topic of urban health, we have named the five clusters: *sustainable urban development*, *urban ecosystem services*, *urban resilience*, *healthy urban planning*, and *urban green spaces*. The nomenclature was derived by extracting the key terminologies used by the publications that embody the core concept of urban health for each respective cluster. Careful consideration was given to selecting names that are concise and impactful, effectively encapsulating the essential characteristics that not only signify their research tradition, but also serve to differentiate them from each other. Nonetheless, it is crucial to acknowledge the potential risk of oversimplification associated with these designated names.

Moreover, it is important to emphasise that these categories and their descriptions represent ideal types of urban health research traditions that have been discovered through an empirical examination of urban health scholarship. The characterisation of these research traditions is predicated on the analysis and synthesis of publications that have been clustered together based on co-citation patterns among urban health researchers. In other words, by employing iterative processes of analysis and synthesis, the descriptions reported below have been consolidated into the idealised representation of each research tradition, rather than a comprehensive breakdown of individual publications that were included in the meta-narrative review.

Each cluster has a different viewpoint on how the studies conceptualise the urban environment and its health implications. The network visualisation also shows varying network densities among the clusters and varying strength of connections between different pairs. In the following sections, we first present a comprehensive comparison based on their conceptual, theoretical, methodological and instrumental viewpoints, then discuss how each cluster addresses urban health in detail.

A summary of the five research traditions is presented in Table 1. The overview is based on how each research tradition conceptualises urban health issues and the urban system, prioritises research questions and methods to produce knowledge and proposes solutions to improve urban health. Because the descriptions of the five research traditions are based

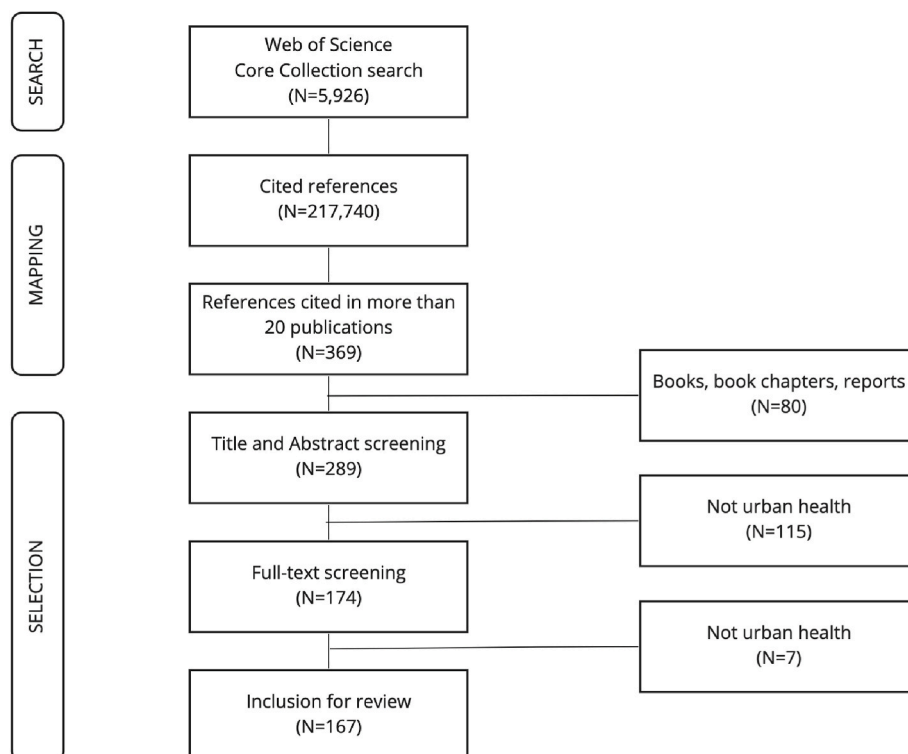


Fig. 1. Document selection flow diagram.

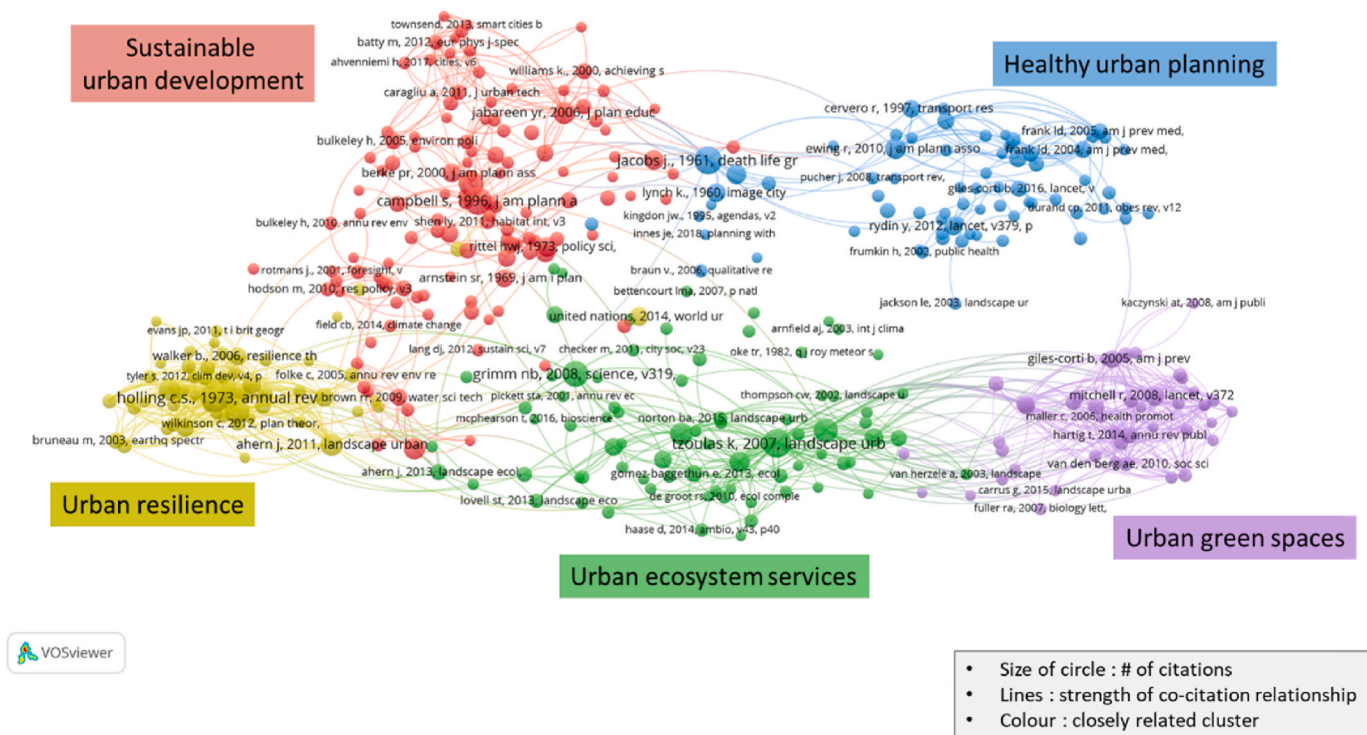


Fig. 2. Document co-citation network analysis showing five distinct clusters.

Table 1
Summary of the five urban health research traditions.

Five urban health research traditions	Sustainable urban development	Urban ecosystem services	Urban resilience	Healthy urban planning	Urban green spaces
Key urban health concept	Urban development policies that balance environmental, social and economic goals.	Health benefits generated by ecosystem services provided by urban green and blue landscape patterns.	Ability of the urban system to adapt and transform to absorb disruptions, reorganise and maintain desired functions.	Attributes of the urban environment as a determinant of health.	Attributes of urban green spaces and their impact on health.
View on the urban system and its health implications	The urban governance structures and processes develop policies that have environmental, ecological and social consequences.	The urban landscape pattern is a key component of the urban socio-ecological system. Human actions determine land-use decisions that shape landscape patterns and ecosystem services.	The city is a complex adaptive system that is chaotic, complex, uncertain and unpredictable. A city that is resilient has the capacity to achieve desired goals such as sustainability.	The multiple pathways and networks between planning practice, the resulting urban environmental features, and their influence on the determinants of health and health outcomes.	Amount of, access to, quality and features of urban green spaces impact various human health measures and outcomes.
Knowledge production and research questions	Comparisons between cities and against indicators and benchmarks. Factors influencing development of sustainable urban policies.	Applying hierarchical patch dynamics framework to landscape planning, monitoring and modelling of land-use change.	The knowledge production processes that are co-produced by scholars and practitioners is more important than a particular research method or approach.	Epidemiological models that place urban planning and the urban environment as independent variables and measures causation and pathways on population health outcomes.	Understanding the mechanisms through which greenspace affects health using epidemiological models and statistical analysis.
Solutions to improve urban health	Indicators, benchmarks and assessment tools to evaluate cities' sustainability policies.	Model the identification and valuation of ecosystem services to influence land-use planning decisions.	Create "safe-to-fail" adaptive urban systems through better understanding the urban socio-ecological system and human-dominated systems.	Evidence of the causes of the urban environment's attributes and health inform policies and interventions.	Statistical associations between the attributes of urban green spaces and health inform policies and interventions.

on the review of the highly co-cited references, they may not comprehensively represent all the approaches that exist within each tradition. Additionally, the five research traditions are examples of Weberian 'ideal types' (Hekman, 1983) and serve as a heuristic device to learn about the different urban health research traditions but do not correspond to all the characteristics of any one particular individual researcher or study. Instead, the descriptions below are our attempt to synthesise and summarise the core elements of each urban health research tradition in a rational way.

Additionally, the scale at which urban health is addressed differs across the five research traditions, ranging across global, regional, urban, neighbourhood and individual levels. Generally, the sustainable urban development, urban ecosystem services, and urban resilience clusters consider urban health issues from a city, regional or global level. These clusters conceive the whole city as the unit of analysis and address its impact on the health of the overall urban system. This view contrasts with the other two clusters, which study the sub-components of cities and their impacts on population health.

3.2.1. Sustainable urban development

This approach to urban health is based on a concept of sustainability that holistically harmonises three priorities for planning – economic growth, environmental protection and social equity (the “3 Es”). Although books were excluded from the selection of this review, it is worth noting that the landmark publication by Campbell (1996) on sustainable urban development appeared at the core of this cluster. Conceptually, the ‘city’ is generally considered as a politically bounded administrative unit that has decision-making functions to develop and implement policies. This research tradition is strongly represented in environmental studies and urban planning disciplines.

The sustainable urban development discourse is based on the assumption that urban governance traditionally prioritises economic gains and growth-focused development to the detriment of environmental and social principles (While et al., 2004). In reality, the mainstream debate in sustainable urban development has often been focused more heavily on the ecological and environmental aspects than the social sustainability aspects of social equity and community (Saha and Paterson, 2008). However, social sustainability is increasingly being considered (Ahvenniemi et al., 2017; Dempsey et al., 2011).

Sustainable development is a global agenda that calls for action in all levels and sectors of policymaking, including local governments. The concept of sustainable urban development was first recognised as a global agenda at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 and is the underlying principle of the Sustainable Development Goals (SDGs) (United Nations, 2015). Consequently, many types of urban sustainability indicator frameworks have been developed to measure how ‘sustainable’ cities are (Ahvenniemi et al., 2017; Hiremath et al., 2013; Li et al., 2009; Mori and Christodoulou, 2012; Satterthwaite, 2016; Shen et al., 2011; Tanguay et al., 2010). These indicators are used as goals or benchmarks to monitor and evaluate cities’ progress and provide input for prospective decision-making endeavours.

Urban policies are key instruments to operationalise the goal of sustainable urban development but, unfortunately, sustainability is not well represented in many local plans and/or has been included in an ad hoc manner (Saha and Paterson, 2008) or as a ‘sustainability fix,’ a selective incorporation of sustainability goals (While et al., 2004). Researchers not only evaluate local plans and policies against sustainability indicators and principles (Berke, 2002; M. M. Conroy and Berke, 2004; Lubell et al., 2009; Reckien et al., 2014; Saha and Paterson, 2008), but also emphasise the governance setting and politics as important areas of inquiry in sustainable urban development. Studies on why cities adopt sustainable policies or the politics of sustainable policies implementation highlight the policy-focused nature of sustainable urban development research (Broto and Bulkeley, 2013; Bulkeley and Betsill, 2005; Lubell et al., 2009; M. M. Conroy and Berke, 2004).

Additionally, research in this cluster is concerned with the technical challenges planners face in developing and implementing policies. To address these challenges, researchers suggest instrumental knowledge to planners, such as principles or frameworks, to resolve the conflicts between the different sustainability policy goals (Berke, 2002; Godschalk, 2004) or procedural knowledge on how to bring about urban transformation and change (Neuens et al., 2013; Newman, 1999).

3.2.2. Urban ecosystem services

The second cluster of urban health research discusses spatial and land coverage patterns through the lens of the urban *landscape*, a spatially heterogeneous system that humans manipulate and manage (Bolund & Hunhammar, 1999; Wu, 2013). The built infrastructure, urban green, and blue spaces create a variety of urban ecosystems, including street trees, parks, urban forests, wetlands, lakes, and streams. The ‘multifunctionality’ of these urban ecosystems includes the generation of ecosystem services, climate change mitigation effects, and increased biodiversity that ultimately contribute to human well-being (Bowler et al., 2010; Chiesura, 2004; Niemelä et al., 2010; Tzoulas

et al., 2007).

The influence of the urban ecosystem on human health is centred around the ecosystem services that are generated from the green and blue infrastructure. Ecosystem services are “the benefits human populations derive, directly or indirectly, from ecosystem functions” (Bolund & Hunhammar, 1999; Costanza et al., 1997). The types of ecosystem services that are generated from urban green infrastructure are grouped into four categories: (1) supporting services (e.g., soil formation, primary productions and nutrient cycling); (2) regulating services (e.g., microclimate regulation at the street and city level, carbon sequestration and storage, noise reduction, air purification, rainwater absorption); (3) cultural services (e.g., recreation, physical and mental health benefits, social benefits); and (4) provisioning services (e.g., food supply, freshwater, timber products) (Ernstson, 2013; Niemelä et al., 2010).

The urban ecosystem is viewed in a *hierarchical patch dynamics perspective* that considers the multi-scalar nature of the different types of patches of land cover (e.g., parks, buildings, roads, etc.) and their interactions influence the structure and function of the urban ecosystem (Wu, 2014). In addition to this spatially defined perspective, the urban ecosystem is also considered a *socio-ecological system*, which reflects the core involvement of the human and social aspects with the biogeochemical and techno-mechanical components of the urban ecosystem. The view of the socio-ecological system in this research cluster emphasises human actions as a key factor in shaping the urban environment (Wu, 2014). Human actions, such as land use decisions, shape the urban ecosystem and influence changes in the environment, such as climate change, which, in turn, affect human societies. Moreover, these decisions are politically influenced and the distribution of the benefits and costs resulting from these decisions are influenced by social practices (Ernstson, 2013; Heynen et al., 2006; Wolch et al., 2014). Therefore, according to the socio-ecological systems view of urban ecosystem services scholars, the human, social, and political processes in ecosystem services and planning should be considered, and the integration of social sciences with ecological approaches is essential (Grimm et al., 2000).

The types of knowledge and methodologies that are valued in this research cluster involve the measurement and quantification of the benefits and costs of urban green spaces and modelling techniques to predict optimal land-use or urban planning decisions. Many studies identify the types of ecosystem services provided by the different forms and patterns of urban green and blue spaces at different scales and study their benefits on the urban ecosystem and human health. For example, studies investigate the effects of individual components of green infrastructure such as green walls and roofs (Alexandri and Jones, 2008; Oberndorfer et al., 2007; Santamouris, 2014), trees (Roy et al., 2012), parks (Chiesura, 2004; Peters et al., 2010), and forests (Escobedo et al., 2011), or the effects of the combination of the different types of urban green infrastructure and interventions (Bowler et al., 2010; Demuzere et al., 2014; Norton et al., 2015; Tzoulas et al., 2007). These impacts are often measured and quantified in monetary values to be used in decision-making on infrastructure and conservation plans (Bolund & Hunhammar, 1999; Conroy et al., 2018; Gómez-Baggethun and Barton, 2013; Haaland & van den Bosch, 2015; Hansen and Pauleit, 2014).

Solutions to improve urban health focus heavily on decision support tools with models that generate information on what to do and procedures on how to use the information in the planning process. Geographic Information System (GIS)- based methods and modelling techniques are frequently applied to obtain information on the spatial distribution of urban green areas (Fuller and Gaston, 2009; Kabisch and Haase, 2014; Van Herzele and Wiedemann, 2003). Evidence generated through these types of methods ideally informs spatial planning (Meerow and Newell, 2017).

3.2.3. Urban resilience

The publications forming this cluster see urban health through the lens of resilience theory. Once again, a book, Holling’s landmark

publication on the concept of resilience in ecological systems (Holling, 1973), appeared at the core of this cluster. In this research tradition, the resilience of the urban system is necessary to achieve the city's health-related goals and outcomes. Disciplines that are involved in the urban resilience research cluster include environmental studies, public administration, housing and urban planning and geography.

Inherent to the concept of urban resilience is the explicit recognition of the city as a social-ecological system that is composed of overlapping physical, social and technological systems and their components, interactions, networks and feedback loops (Desouza and Flanery, 2013). This view is similar to the view on social-ecological systems discussed in the urban ecosystem services cluster in recognising the interactions between the social and natural systems. The urban ecosystems services cluster views the urban system as a hierarchical patch dynamics framework and a human-environment system that can be reduced to its components, and the interactions between them can be measured and identified. However, urban resilience scholars view the urban system as a complex adaptive system that is non-linear, self-organising and unpredictable. Moreover, because the system is perpetually dynamic and continues to adapt, no actor can have full knowledge or full control of the urban system (Ernstson et al., 2010; Evans, 2011). Therefore, the co-production of transdisciplinary knowledge to better navigate the behaviour of the system is preferred over applying a particular method or approach.

The concept of health in this research tradition is understood within the broader concept of resilience, which refers to the capacity of the urban system to maintain or quickly return to its desired function and to adapt and transform in the face of disruptions (Meerow and Newell, 2019). Attaining urban resilience is not the end goal for improving urban health. Rather, a city that is resilient has the capacity to achieve sustainability and other desired health impacts. Disruptions to the urban systems caused by, for example, disasters, terrorism, economic crisis, or climate change not only have direct impacts on the safety and wellbeing of urban residents, but also create failures within the system designed to manage or adapt to these stressors. Both the direct effects and the system failures have significant health impacts. In concrete terms, the external and internal disruptions the city wants to be resilient to can be categorised as natural, technological, economic, and human stressors (Desouza and Flanery, 2013).

Within the urban resilience scholarship, there are two disparate views on urban systems and urban resilience. One takes a mechanical view of urban systems that emphasises static “engineering” resilience, referring to a system's ability to bounce back to its previous state or maintain equilibrium. The other view conceives urban systems as unplannable and supports dynamic “ecological” resilience, which focuses on the system's ability to deal with the uncertainties and maintain key functions when perturbed (Evans, 2011; Meerow and Newell, 2019; Pickett et al., 2004). The mechanical view to urban resilience aligns with reductionist and technocratic approaches to addressing urban systems where actors strive to identify the components, links and loops that compose the system. Meanwhile, from the contemporary socio-ecological systems perspective, managing, planning, and regulating urban systems is regarded as not realistic (Evans, 2011). Therefore, instead of proposing a specific urban form or development that is resilient, scholars suggest principles or characteristics of systems – such as redundancy, diversity, efficiency, autonomy, strength, interdependence, adaptability and collaboration – that promote resilience (Godschalk, 2003). Scholars suggest that embedding such characteristics within urban governance structures creates ‘safe-to-fail’ cities that absorb the impacts of external stressors. This, it is proposed, is preferable to building city structures or systems that are ‘fail-safe’ (Ahern, 2011; Evans, 2011; Jabareen, 2013).

3.2.4. Healthy urban planning

The study of urban health in this cluster focuses on “the determinants of health and diseases in urban areas and with the urban context itself as

the exposure of interest” (Galea and Vlahov, 2005). This approach to urban health addresses the multiple pathways and networks between planning practice, the resulting urban environmental features, and the influence of the two on the determinants of health and health outcomes (Badland et al., 2014; Ewing et al., 2003; Frank et al., 2006; Heath et al., 2006; McCormack and Shiell, 2011; Northridge et al., 2003; Saelens and Handy, 2008; Sallis et al., 2012). This cluster appears in the fields of medical sciences and public health, urban planning and transportation studies.

While the first three clusters focus on the health of the city as the unit of study, this research cluster focuses on the physical, mental and social health of the population (Durand et al., 2011; Ewing et al., 2003; Frank et al., 2006, 2006, 2006; Frumkin, 2002; Galea and Vlahov, 2005; Giles-Corti et al., 2016; McCormack and Shiell, 2011; Saelens and Handy, 2008; Stevenson et al., 2016). An epidemiological causal pathway model that places the multiple dimensions of urban planning and the urban environment as independent variables is adopted and the strengths of associations and causations are measured. For example, research seeks to generate evidence about which features of the built environment have beneficial or negative population health impacts, the pathways through which urban environments impact health, and the distribution of the urban environmental determinants and their impacts. The strength of this approach is that it provides empirical evidence on the direct impact of the urban environment on population health outcomes.

These ‘scientific’ findings then provide evidence for policymakers to make urban planning decisions that are conducive to improving the health of urban residents at individual and population levels. Research findings provide precise information on when and where the intervention should occur and a strong rationale for which policies are most effective. There is an implicit assumption that the more ‘compelling’ the scientific evidence is, the better the chance that policy change will occur. Researchers in this cluster call for research to use rigorous methods to “delve further into the exact causal mechanism by which one affects the other” (Ewing et al., 2003).

3.2.5. Urban green spaces

Applying similar methodologies as the previous cluster, this research cluster addresses the population and individual-level health benefits of urban green spaces. The main research topic of this cluster focuses on how urban green spaces provide urban residents with restorative effects on psychological and mental health through, for instance contact with nature and biodiversity, in addition to physical health impacts such as increased physical activity. Disciplines such as medical sciences, public health, psychology, urban planning, and environmental studies are involved in this research cluster.

This research cluster shares a thematic focus with the urban ecosystem services cluster in addressing the urban green infrastructure. However, the two clusters are ontologically and methodologically different in their conceptual frameworks for understanding the nature of the relationship between green infrastructure and health. The urban ecosystem services cluster conceptualises the green infrastructure and its health impacts at the urban landscape and socio-ecological systems scale, while this research cluster addresses urban green spaces and health at community and individual scales. This research cluster focuses on various types of urban green spaces, their accessibility and design features, and the impact they have on individual and community health. For example, the health benefits of urban green spaces on physical activity and obesity (Coombes et al., 2010; de Vries et al., 2013; Hillsdon et al., 2006), stress management (Grahn and Stigsdotter, 2010; Ulrich et al., 1991), psychological health (Fuller et al., 2007), mental health (Gascon et al., 2015), and longevity (Takano et al., 2002) are often discussed.

4. Discussion

This review identifies five prominent research traditions in urban health scholarship. These five research traditions can be distinguished by their topic areas: sustainable urban development, urban ecology and ecosystem services, urban resilience, healthy urban planning, and health benefits of green spaces. The scale and conceptualisation of the urban system varies amongst the traditions, as well as their understandings of the concept of health. These differences are reflected in how each research tradition explains the relationship between the urban environment and its health impact, the types of research questions and the methods for producing knowledge, and solutions that are perceived effective to improve urban health.

The research traditions we have identified in this review are examples of Weberian ideal types that serve as a heuristic device to learn about the different urban health research traditions (Hekman, 1983). The strengths and limitations of these categories and descriptions representing ideal types will be discussed further in detail in the corresponding sections.

4.1. Developing a tool to enable transdisciplinary urban health collaborations

The significance of this meta-narrative review is that the findings inspire the development of a framework that can be used to identify the ontological differences between research traditions. This framework facilitates mutual understanding between research traditions, which is a precursor to developing transdisciplinary collaborations, by placing where and how the research traditions differ in their approaches to urban health. As mentioned earlier, transdisciplinary collaborations involve developing shared interests in the knowledge and evidence that exists in the non-overlapping areas between the different research traditions.

While the five research traditions differed in the conceptual, theoretical, methodological and instrumental approaches to urban health, we observed some common dimensions across these approaches. These dimensions include the discipline’s perspective on the system (complicated or complex), the locus of change (structure or agency) and the scale at which the urban health issues are discussed. The three dimensions are also areas where transdisciplinary collaborations can be sought.

4.1.1. Perspective on the urban system – complicated or complex

The first potential area of transdisciplinary collaboration concerns each discipline’s perspective on the urban system (Table 2). There is strong consensus among the five traditions that the urban system is multi-scalar and multi-dimensional with multi-directional interactions and feedback loops between the social and natural systems. However, across the five research traditions, we observe two fundamentally different approaches to understanding the urban system – one that views the urban system as a *complicated* system and another that takes a *complex* systems perspective. The main difference lies in the assumption

Table 2
Perspective on the urban systems - complicated versus complex.

Perspective on the urban system	Complicated systems	Complex systems
Description	Understands the urban system by identifying its individual components and their interconnected relationships.	Understands the urban system as a complex adaptive system and believes that no actor can have full knowledge or full control over the system.
Examples in urban health research	Hierarchical patch analysis, urban metabolism, causal pathways, engineering and mechanical solutions	Evolutionary urban resilience, human-dominated urban socio-ecological systems, urban political ecology

of whether the system can be fully understood and predicted. A *complicated* system perspective identifies the components of the urban system and their relationships in order to recommend precise intervention points. For example, a complicated view of the concept of urban metabolism might involve the precise definition, measurement, documentation, management and control of energy flows and engineering systems (water supplies, waste management, transport, power grids, etc.).

On the other hand, the *complex* perspective to systems embraces the characteristics of emergence, non-linearity, feedback loops, hierarchy and adaptability of systems which leads to the notion that one cannot fully understand, control the systems or predict outcomes. While the components of a complex system must be simplified for analytical purposes, a systems-thinking perspective applies the multiple theories and tools derived from different disciplines to better understand the characteristics and behaviours of the urban system as a whole rather than develop a comprehensive synthesis of its individual components.

In summary, proponents of the complicated approach to urban systems believe that mapping the system components and their connections is necessary and methodologically possible and provides answers. Proponents of the complex systems approach, however, recognise that trying to construct a comprehensive map of the system is ontologically flawed. Systems thinking sometimes uses mapping to gain a better understanding of parts of a system, but such maps always have boundaries, and the insights they generate are always contingent. Across the five urban health research traditions discovered in this review, we observed differing assumptions regarding the complicatedness-complexity of urban systems, with research traditions exhibiting a stronger tendency towards either one.

4.1.1.2. Locus of change – structure and agency

A second area of transdisciplinary collaboration can be found in the locus of change (Table 3). Across the urban health research traditions, we observed differing views on the strategies to bring about change for urban health. These views range from identifying the features of the urban form and structure that contribute most to health outcomes to influencing the decision-making processes and/or transforming the urban governance system. Here, we can apply the structure-agency relationship to better understand the different views on the locus of change. In urban health, the structure-agency relationship presents in two ways: a) the urban spatial structures influence the daily actions of the city’s inhabitants and their health; and b) the social structures and agents in urban planning influence decisions that shape the spatial structures (Næss, 2015). The perspective that focuses on urban structure targets the urban form or the planning system as the locus for change. Whereas the focus on agency emphasises the critical role of the actors in influencing and transforming the urban structure.

Similar to how the perspective on the urban systems manifests, there are elements of both constructs across the five research traditions, with some research traditions having a stronger tendency towards one construct than the other.

Table 3
Locus of change - structure and agency.

Locus of change	Structure	↔	Agency
Description	Focus on the urban spatial structures that influence the behaviour and decisions of urban residents or policy actors.		Focus on the behaviour and actions of residents and policy actors to influence changes to the urban spatial structures.
Examples in urban health research	Identifying the best urban form and land-use patterns for health		Understanding the underlying political processes in urban planning and identifying transformative actions.

4.1.3. Scale of urban health - individual to planetary

A third area of transdisciplinary collaboration can be found in the scale at which the urban health phenomenon is addressed (Table 4). The scope of urban health research encompasses all scales, ranging from individual health behaviour through street, city and regional environments to the impact of international and global factors. Although the hierarchical nature of the impacts and inter-relationships are acknowledged by most urban health research traditions, each research tradition tends to focus on particular levels of the geographic scale.

4.2. Applying the three dimensions to the five urban health research traditions

Using these three dimensions, we have developed a framework to better understand the five urban health research traditions and help to identify potential areas of transdisciplinary work (Table 5).

4.3. Strengths and implications for public health practitioners

This review presents a framework to understand the different approaches to understanding urban health research and practice, which, to our knowledge, has not been presented before. We not only describe the prominent research traditions that we identified from a bibliometric analysis, but also critically analyse and synthesise how these traditions address urban health research through a paradigmatic lens. Generally, within a particular research tradition, assumptions about key urban health concepts are not explicitly expressed because these ideas are agreed upon by its participants and are taken for granted. Therefore, by critically analysing the conceptual, theoretical, methodological and instrumental approaches of each research tradition, this review uncovers some of these assumptions.

Moreover, this review demonstrated that bibliometric analysis is an effective method in mapping research traditions and identifying publications for a meta-narrative review. With the growing interest and technology development in bibliometric analysis, we urge more researchers to use these methods in conducting literature reviews, especially when the aim is to capture a snapshot of the scholarship on their topic of study. Other researchers may also wish to consider incorporating the changes we made to the meta-narrative protocol.

For researchers and practitioners who come from a public health standpoint, the findings from this review reveal that the public health approach to urban health research is but one of the many different approaches that address urban health. The traditional public health

Table 4
Differing scales in urban health research.

Scale	Individual/ community	– City/regional	– Global/ planetary
Description	The scope of urban health focuses on neighbourhood characteristics and their impact on health of individuals.	The scope of urban health is concerned with the urban landscape, urban and regional planning and its implications on urban ecological and social health.	The scope of urban health encompasses global issues such as increasing urbanisation and its impact on planetary health.
Examples in urban health research	The association between street design and individual active transport behaviour. The effect of urban green spaces on mental health.	Landscape patterns and ecosystem services. Sustainable principles in local comprehensive planning.	Urbanisation impacts on planetary health. Climate change and urban mitigation and adaptation efforts.

approach to urban health takes a complicated systems perspective that emphasises the structure of the urban form and the planning system with less focus on agency for transformation. The scope of urban health remains at the city or sub-city scale, with attention to how different urban environmental elements function as social determinants of health.

Generally, public health researchers and practitioners take a determinant-based model in developing intersectoral collaboration for urban health. The central argument for intersectoral participation suggests that the disciplines and sectors that have responsibility for those social determinants should consider health in their research and policies. However, researchers and practitioners can benefit by applying a transdisciplinary lens using the findings from this review. For example, in current initiatives such as the WHO’s Healthy Cities program and Health in All Policies, practice focuses on identifying the determinants of health and their relevant sectors to develop intersectoral planning mechanisms and actions. This approach has many pitfalls as the actors and actions of the various sectors operate at different scales with different sets of ideas and conceptualisations. We believe that our identification of five urban health research traditions and the framework presented in Table 5 can add value to these collaborative endeavours by articulating how the actors and actions in the different sectors address the perspectives on systems, locus of change and scale of urban health.

In addition, by understanding how the approaches to urban health differ, researchers can learn from each other and bridge methodological or conceptual gaps. One research tradition may have the conceptual framework and tools to address an issue that another research tradition does not. And in applying methodologies, the research traditions can share a coherent understanding of the ontological and epistemological views on collaborative urban health research projects.

4.4. Limitations and insights for future studies

A few limitations of this review arise from the methodological scope of our meta-narrative review. While the methodological decisions were thoughtfully designed and implemented to fulfill the primary objective of the review, they unavoidably constrained the inclusion of certain vital issues that could have enriched the comprehensiveness of this study.

Firstly, this review presents a macroscopic analysis of the principal research traditions within the expansive and intricate landscape of urban health research. Consequently, it is plausible that less prevalent urban health research traditions or sub-domains within one or more of the five urban health research traditions might have been missed. Furthermore, since a document co-citation network relies on publications that have been cited in subsequent works, the review may not fully capture more recent perspectives that have not yet had sufficient time to be extensively cited. Notably, significant developments have been made in the areas of social justice, democracy, urban governance and politics across all urban health research traditions within the past decade. These methodological limitations have also constrained the exploration of the broader geographic representation of urban health research. Most of the past and highly co-cited publications captured in this study originate from the North American, European and Australian contexts. Consequently, the more recent and contextually diverse global perspectives on urban health research have not featured strongly. The exclusion of books and reports by key international organisations (e.g., United Nations and World Health Organization) in the review limits the inclusion of government and policy-oriented approaches to be considered in the review. While these limitations should be considered in interpreting the findings of this review, they also open up opportunities for future studies to explore the more detailed nature of urban health research traditions and incorporate more recent developments from a broader range of geographic locations.

Another important aspect that this review is the absence of an in-depth exploration of health inequities and the dynamics of knowledge creation across the five clusters. These multifaceted concepts, central to critical urban health studies, were not given a thorough examination

Table 5
Applying the dimensions to the five urban health research clusters.

	Sustainable urban development	Urban ecosystem services	Urban resilience	Healthy urban planning	Urban green spaces
<p>System</p> <p>Complicated Complex</p>	Urban development policies influence how cities are built.	The urban landscape pattern is a key component of the urban socio-ecological system.	The city is a complex adaptive system that is chaotic, complex, uncertain and unpredictable.	The attributes of the urban environment influences population health through multilevel and complex causal chains.	The amount, access to, quality and features of urban green spaces impact various human health benefits.
<p>Change</p> <p>Structure Agency</p>	Local governments develop policies that shape the urban environment.	Focus on the constructing landscape patterns that are beneficial to health.	Values the processes of human agents over technological interventions.	Identifies causation and policy interventions to improve the urban environment.	Identifies the type of urban green spaces, accessibility, design features that contribute to health.
<p>Scale</p> <p>Individual/Community City/Regional Global/Planetary</p>	Sustainable local policies contributing to the sustainability of the planet	Landscape patterns at the regional urban planning scale	Urban system, socio-ecological systems at the city, regional and global levels	Urban forms at the city or community level and its individual health outcomes	Access to green spaces in communities and its individual health outcomes

within the scope of our review. Health equity, being a fundamental value of urban health, encompasses various dimensions, ranging from the measurement of disparities across diverse socioeconomic and geographical contexts to addressing systemic and structural inequities. Similarly, the dynamics of knowledge creation entail not only considering the epistemic value associated with different types of knowledge but also the factors that shape knowledge production and the power dynamics among various groups in this process.

We encourage future research to investigate the transdisciplinary domain further. We do not regard the five traditions we have identified in this review as the final word on this topic. Rather, we offer them as a preliminary framework to better understand the different ontological approaches to urban health. The next stages of transdisciplinary urban health scholarship require a stronger focus on actions and strategies that inform how researchers can seek coherence in the conceptualisations and approaches to urban health research. We need to develop the kinds of transdisciplinary research questions that will help us tackle some of the critical urban health issues we are faced with today. We also need to develop methodological strategies to find coherence between the different urban health approaches.

5. Conclusion

This paper presents an analysis of the different urban health research traditions through a meta-narrative review guided by a bibliometric analysis. The findings show that the urban health approaches range in topic, scale, the focus of intervention and conceptualisation of the urban system. The review highlights how urban health researchers take for granted the disciplinary assumptions that have been established as the ‘normal science’ of their own research paradigm. However, it is becoming increasingly crucial that researchers become more aware of their own and others’ ontological viewpoints to participate in transdisciplinary research endeavours.

We do not suggest that developing a single, comprehensive knowledge map for urban health is necessary. In fact, the existence of multiple views on urban health highlighted by this review mirrors the complex nature of urban systems. What is needed is for researchers to be more flexible in applying different views that facilitate a systems approach to addressing urban health research and practice. More importantly, the findings from this review provide a framework that researchers and policymakers can use to interpret evidence according to diverse ontological viewpoints and subsequently frame them into appropriate policy

ideas to influence transformative policy change.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

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