

Synergies in Design and Health. The role of architects and urban health planners in tackling key contemporary public health challenges

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Summary. *Background and aim:* Important public health improvements have been achieved over the past decades, but new challenges are emerging and progress cannot be taken for granted. Urban settlements host most of the global population, but they are also sources of several threats. The aim of the paper is to investigate the role of architects and planners in contributing to overcome these critical health challenges and propose strategic actions for collaboration with the public health workforce. *Methods:* Taking global trends and public health challenges as starting point, a scoping literature review has been conducted to illustrate the possible synergies that architecture and public health workforce should exploit to support population health improvement and tackle key public health challenges. *Results:* The built environment affects climate change and public health through the use of resources, site location, and green spaces. In architecture curricula, limited space is devoted to health and vice versa. There is an urgent need for recognition of the benefits of collaboration and cross-fertilisation between public health and planning workforce from local to global levels. *Conclusion:* Public health is evolving from a bio-medical to a socio-anthropological approach and architects/planners have fundamental roles; further collaboration, research and training are needed.

Key words: public health, urban health, workforce collaboration, climate change, noncommunicable diseases, evidence based design, urbanization, multidisciplinary, architects role

Introduction

Public health transformations and challenges

In recent years, important public health improvements have been achieved thanks to technological, social and economic evolution, but this progress cannot be taken for granted. The risk that this success can be reversed is real. In the era of increasing urbanization, globalization, digitalization, ageing population, rise of non-communicable diseases and climate changes, the nature and scale of public health challenges is rapidly evolving, and significant transformations are both necessary and urgent (1-4).

Globally, the average life expectancy at birth increased by 5.5 years between 2000 and 2016 reporting

the fastest increase since the 1960s (5). Overall, it is expected to increase by 4.4 years between 2016 and 2040 and by 7.8 years for males and 7.2 years for females if more progresses are made. Nevertheless, if less progress is made, life expectancy could even decrease by 0.4 years for males and stagnate for females (6). Additionally, latest CDC data show that the U.S. life expectancy has declined over the past few years and this troubling trend is largely driven by deaths from drug overdose and suicide (7).

According to the latest Bloomberg Global Health Index, good health is still not achievable for all the countries and there are tremendous differences between the top 10 and the lowest ones (8). If a key component of achieving universal health coverage is ensuring that all populations have access to quality health care those data

appears as fairly critical. Indeed, despite substantial gains since 2000, many low and middle Socio-demographic Index (SDI, a summary measure of overall development) countries, face considerable challenges unless intense policy action and investments focus on advancing access to and quality of health care across key health services, especially Non-Communicable Diseases (NCD) (9). NCDs, such as diabetes, cancer and heart diseases, are responsible for over 70% of global deaths. The associated principal risk factors, that also exacerbate mental health issues are: tobacco use, physical inactivity, harmful use of alcohol, unhealthy diets and air pollution (5).

Emergent conceptual frameworks place a substantial focus on the built and urban environment not least because of the contribution that healthy urban design can make to the prevention and reduction of the burden of disease associated with these elements..

For example it is recognized that two sets of risk factors related to obesity such as food quality and physical activity are strictly linked to built environment characteristics in terms of physical access to local supermarkets, groceries, fast food restaurants, or convenience stores, area walkability, greenness, blue water, land use mix, and access to recreational facilities (10).

Another important topic to consider is the risks related to air pollution and the impact this has on stroke, heart disease, lung cancer prevalence, and both chronic and acute respiratory diseases, including asthma. Healthy design intervention along with sustainable policies at the urban and building level (such as supporting cleaner transport, energy-efficient homes, power generation, industry and better waste management) would reduce key sources of outdoor air pollution (11).

Finally, recent studies highlighted that good accessibility to public transport and densely built urban texture could contribute to reduce mental health risks such as depression, especially for fragile citizens (12); at the same time, poor environmental conditions and building features that include ventilation, lighting, temperature, indoor microbial, chemical and pest exposures are likely to have negative impacts (13).

Transformations in cities and society and their impact on public health

Cities significantly contributed to increase health conditions and are also deeply linked to the aforemen-

tioned NCDs risk factors. In fact, at the beginning of 20th century only 10% of people inhabited urban settlements while in 2015 more than half (54%) of the world population lived in urban area and this figure is projected to 60% in 2030 and 66% in 2050. The United Nations estimates that more than 90% of future urban population growth will be in developing countries (14,15). Cities constitute centers of concentration of wealth, productive capability and creativity. They are best placed to satisfy population needs because basic services can be produced at a higher quality and at lower per-capita costs, and because in cities people can best organize for their rights (16). At the same time, cities are the platform of several issues that in the recent history contributed to challenging the living conditions of dweller and workers. For example, the industrial revolution radically transformed our cities and society. Whilst significantly supporting economic growth, it also gave rise to several environmental and health problems which were new at that epoch. As stated by Szreter, "*The world's first industrial revolution seemed to be having anything but obvious health benefits for the majority of the population*" (17). Today leap changes in civilizations spearheaded by technology breakthroughs and economic growth do not always automatically result in improved health, at least not for all persons from all backgrounds in society, and particularly if they harm the earth and the environment. Another example is that urban sprawl and the segregation of workplaces from housing, when incorporated with the increasing affordability of motor vehicles and the prioritization by policy makers and planners of mobility over accessibility, have led to an over reliance on the private motor vehicle increasing sedentary, pollution and other relevant NCDs risk factors (18,19). At the same time global challenges for 21st century cities emerged related to a fast-growing urban population. Foremost amongst these include, the need for expansion of affordable housing, upgrading of water and sanitation infrastructure, provision of critical services to increasing numbers of migrants to the city and meeting of the growing demand for a reliable energy supply while mitigate greenhouse gas emissions. Cities with clean air, energy-efficient infrastructure, and widely accessible green spaces can attract more investment and businesses, create more jobs, and offer more

opportunity to people from all walks of life. These issues cannot be tackled by Public Health professionals alone but there is a need for a multidisciplinary approach, stressing the social responsibility of practitioners that are directly involved into the urban planning process.

Starting from the Health in All policies and the humble recognition that health system alone can only make a limited contribution to health improvements, a more holistic intervention can support the creation of policies such as the Economy of Wellbeing, putting people and their wellbeing at the center of decision-making processes (20,21). This can improve productivity, foster gender equality and increase social protection toward a sustainable long-term economic growth (22).

In the climate change era, socially responsible urban planners need to recognize and assume a role in improving the living conditions of city dwellers, recognizing that urban development is deeply linked to politics, economics, management and health (16,23).

In March 2019 the European chapter of the International Academy for Design & Health organized the 1st European Symposium in “Salutogenic Hospital Design and Urban Health - Global Perspectives and Local Identities in Healthcare Architecture”, as a first attempt to set up this dialogue at the international level boosting what already achieved by national associations both in health and planning field (i.e. SIti, Italian society of Public Health and CNETO, Italian Center for Healthcare Architecture) patronaging different events and multidisciplinary working groups, in line with the innovation addressed by the European Public Health Association (EUPHA). The symposium value was to bring in the keynote session high level political representatives and decision makers (Minister of Health, Regional and Municipal healthcare authorities) along with international experts in the field of Public Health, Planning and Architecture (24).

Research Objective

Therefore, starting from this exemplary event and the challenges addressed, the aim of the paper is to investigate the relationship between public health and architecture and understand the benefits that such synergy can provide to populations and urban health.

Methods

The 2019 International Academy for Design & Health 1st European Symposium “Salutogenic Hospital Design & Urban Health – Global Perspectives and Local Identities in Healthcare Architecture” offered the platform for bringing together different expertise from the public health and the built environment field and to understand the common challenges that the two disciplines are facing. In the same year World Health Organization (WHO) started its new 5-year strategic plan focusing on universal health coverage, health emergencies and promoting better health and wellbeing. Reaching these goals would include targeting the 17 Sustainable Development Goals as well and therefore will require addressing the threats to health from a variety of angles (25). A multidisciplinary approach is therefore mandated. As stressed by WHO, issues including climate change and NCDs, are not exclusively the public health workforce responsibility, but several professional fields are involved. Specifically, in recent years there is a growing awareness on the role of architects and urban planners around those issues and researchers are starting to ask themselves “*What can urban planners do to promote the health and wellbeing of people in their cities and regions?*” (26).

Therefore, the paper is developed as a scoping review, with the aim of deepening the understanding of the relationship between public health and urban/architectural planning. In particular, specific research questions are explicitly addressed hereafter:

Are there example of existing relationships between public health and architecture? Is the scientific literature addressing this topic? Which are the challenges? Are there areas or challenges for future improvement?

In order to address the research question, a literature review was conducted in the Scopus Elsevier scientific database. This database was preferentially selected because it involves most of the technical and social science disciplines that might include a substantial component of the contributions related to architecture, urban planning and engineering along with public health, health management and health policies researches. After some preliminary searches based on the keywords that emerged during the 2019 International Academy for Design & Health 1st European

Symposium “Salutogenic Hospital Design & Urban Health – Global Perspectives and Local Identities in Healthcare Architecture”, the search string selected was the following:

“*architect*” OR “*urban planner*” OR “*designer*” AND “*public health*” OR “*global health*” OR “*health-care*”.

This combination searched in *Titles, Abstracts* and *Keywords*, without any timespan or geographically limitations yielded 1853 results.

The results were screened and several contributions were excluded because they were out of the research scope. In particular the main exclusion criteria were:

- contributions not in English language. Some papers seemed to tackle the issue in a precise manner but they were available only in original language (i.e. Portuguese) and therefore they have been excluded because of their limited audience and local scope.
- contributions with strict focus on the building scale. Some papers had a specific focus on the role of architects and planner in the design or management of building assets, especially hospital facilities. This area is very specific therefore only contributions with explicit reference to health have been considered
- contributions that used the selected terms in figurative ways or with another meaning which is out of the research scope (i.e. architecture used as a metaphor for articulated public health governance characteristics).

After title and abstract screening, 40 full text papers were read and out of these 19 were selected, analysed and further discussed according to the following 5 thematic areas:

- The impact of urban phenomena on health
- Lack of training and need of curricular cross-fertilisation
- Need for collaboration in professional life
- Individual personalities bridging the gap
- Assessment tools based on evidence, such as: Strategic Environmental Assessment (SEA), Sustainability Assessment (SE) or Health Impact Assessment (HIA).

The full Prisma flow diagram is described in Figure 1 while the complete list of papers is highlighted in Annex 1.

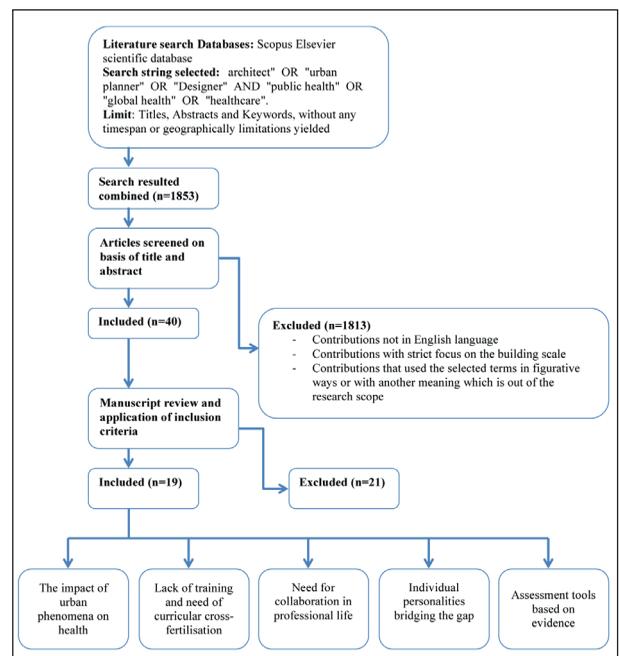


Figure 1. WHO regions of origin: distribution of subjects per year of study

Results

Descriptive analysis of the papers reviewed

Amongst the papers reviewed, the majority are primary studies (58%), 6 (32%) literature reviews and two commentaries/ editorials. Both in the primary studies as well as in the reviews, authors attempted to identify a problem or issue and propose possible frameworks to deepen the topic understanding or the systematization and conceptual elaboration. This itself denotes a high level of novelty of the research field. Research was mostly developed in USA (47%) and UK (32%) -if considering also a case of collaboration with South Africa institution). Canada, Chile and Australia Italy and France contributed one paper each. No studies from Asian countries were found.

The topic is very recent, indeed the oldest papers included have been published in year 2000 while the newest are from year 2020.

The author affiliations are related to three main fields typically; policy, design (built environment) and health. Only two group of authors (11%) can be related to the policy-making field, 5 (26%) to the architectural, built environment and urban design field and 6 (32%) to the public health and medical field. The

remaining 32% (6 out of 19) papers have been written by co-authors that are coming from a combination of these different fields, showing a good level of collaboration.

The authors published slightly more in public health-related journals (58%) versus a 42% of the articles that are from built environment related platform. An interesting fact is that in two cases design-related authors published in health-related journals and vice-versa.

In general terms, it is noted that in the last 20 years the topic of relationship between design and health emerged, first from a policymaker point of view and then in the architectural and public health field, with a growing interest in cross-fertilisation and multidisciplinary.

The impact of urban phenomena on health

Worldwide, the urban population has grown rapidly from 751 million in 1950 to 4.2 billion in 2018 and projections show that global trends could add another 2.5 billion by 2050 resulting in almost 70% of the total population (15). Therefore, seeking to improve public health globally requires an improved awareness of how urban life affects health and well-being (27).

Sanitary engineering interventions importantly changed the profile of many diseases such as the case of Cholera outbreaks, where the water deputation and the improvement of sewer systems in urban areas are fundamental actions to prevent and reduce the diffusion of the bacteria (28). Indeed today several forms of engineering expertise are applied to basic public health problems, such as improving water, sanitation, and hygiene (WASH) conditions in low and middle income countries (29).

Since the mid-1990s, the European Sustainable Cities and Towns Campaign with the participation of the WHO-Healthy Cities has explored the relationship between health and planning. SDG 11 in particular aims to make cities and human settlements inclusive, safe, resilient and sustainable. Other SDGs and many of the 169 SDG targets relate closely to urban design and health planning dimension with specific regard to housing, transportation, water management, air quality, etc. (30,31). As stated by several researchers, built environment can contribute to climate change, influence transportation and affect health through the

use of resources, materials, site location, availability of green space (32-35). Urban planning and public health share also common missions and perspectives. Both aim to improve human well-being, emphasize needs assessment and service delivery, manage complex social systems, focus at the population level, and rely on community-based participatory methods (36).

Urban environment, indeed, affects all aspect of life and health and therefore architects and planner play an important role in determining health and well-being (27,35).

Lack of training, need for curricular cross-fertilisation and collaboration in professional life

Nevertheless, despite health being considered in several relevant documents, (i.e. EU policies, UN and WHO reports) it does not appear to be part of the architectural profession or education at European and international level (35). Marsh et al recently showed that the Royal Society of Public Health reported that professionals related to environment (including architects and planners) are considered between the largest employment group of professionals that have impact in the wider public health realm (13%), the ones that should be most interested but the least involved into the public health agenda (1%) (4). Scholars highlighted that the profession charged with planning the urban environment currently lacks a conceptual framework for integrating health into spatial planning decision-making (32). As already mentioned, since 1992 Rio "Earth summit" and the introduction of SDGs, the official view of urban planning has shifted from a simply physical or aesthetic constructs, or manifestations of economic forces, toward providers of sustainable and healthy human habitat and ecosystems (30,32). Nevertheless, as recently pointed out by Rice, there are no requirements that stipulate that health expertise should be mandatory in the institution and agencies that have the power to mandate the scope of architectural profession, training education practice or knowledge. The current situation is that the design of built environment is undertaken by professional figures that lack sufficient exposure on health throughout their education (35,4). Despite exceptional situations in top European universities, among which is important to mention Politecnico di Milano "Design &

Health Lab” and Chalmers University of Technology “Center for Healthcare Architecture”, health is rarely considered and never systematically incorporated into the architecture and planning curricula. By becoming knowledgeable about the growing body of research on health and the built environment, architects can become a positive force in the development of healthy urban centers (37,38).

Individual personalities bridging the gap and assessment tools based on evidence

Since 1854 Jon Snow’s study of public water pump in London to fight cholera, toward 1960s Jane Jacobs’s call for safe, walkable and non-segregating American cities, relevant personalities have overcome the disciplinary threshold between public health and urban studies (36,39). But it is now time for a call to systematic action for all the professionals and researchers, professional bodies and institutions to closely work together to face the biggest challenges for public health at global level.

Some methodologies and assessment tools, such as Strategic Environmental Assessment (SEA) and Sustainability Assessment (SA) encourage holistic, systematic projects and plans appraisal, but deeper frameworks are necessary (32,40,41). Examples of Health Impact Assessment (HIA) tools are also encouraged by the WHO and some examples are emerging (30, 42). Tools and methodologies are important in order to support the decision makers. Difficulties in basing decisions on evidence can be related to language, exploitability of data, relevancy, not willingness of listen the academic results or, not direct link of health benefits with return on investments (30). Therefore, public health evidence must be translated into actionable healthy planning principles ensuring an Evidence-Based Design process of planning at different scales, providing empirical data on design elements. While architecture itself does not necessarily provide a cure, good design can also act as a preventive tool and enhance the overall quality of life (43–45). As per the introduction of *green* and sustainable requirements into European laws, regulation and recommendation, there is the urgent need of identify also *healthy* requirements to be translated into rigorous and concrete policy interventions (46–48).

Discussion

The need for collaboration between the two fields

There is a renewed and growing recognition of the link between public health and built environment because many of the most important advancements in public health have come thanks to improvement and innovation in the built environment. Moreover, recent rising public health issues such as obesity and non-communicable diseases stressed the attention on the lifestyle and on how built environment can impact that. Unfortunately, the specialists in public health have not worked alongside built environment colleagues and the same happened with other way around. Therefore, the need for a workforce development initiative through shared learning and reflection between the two professional sectors and agendas emerges (37).

On one hand, by focusing on the health-promoting aspects of design, architects have the opportunity to contribute to find solutions to major societal challenges, to lead change, to improve the quality of life for everyone, and to grow the demand for their services (49). In the ideal world, architects and their clients will begin to consider the health-promoting aspects of design as routine and desirable as they now consider sustainable elements of design understanding that many features of sustainable design offer co-benefits of promoting health (50). To reach that stage, architecture students and health science students need to be taught consistently about the health impacts of design elements in an Evidence Based Design perspective (4,35,51).

On the other hand, among the different non-traditional careers and leadership opportunities that medical doctors have, an emerging field is the relationship between health and built environment. As highlighted by Ganske, clearly emerge the need of cross-fertilisation between the two field both in education and in practice. This shared learning approach could open up valuable and multidisciplinary career possibilities strengthening the characteristics of public health as interdisciplinary and multi-professional field (52,53).

Joint collaboration between the two field and a higher degree of contamination should be promoted and improved. Working across sectors to incorporate a health promotion approach in the design and evaluation of built environment components may mitigate

climate change, promote adaptation, and eventually improve public health (34,54). Furthermore, the engagement of professional bodies, institutions and government for significantly incorporating and better integrating health in the built environment and urban agenda is fundamental. Leadership capabilities emerged to be very important in this negotiation, in order to building bridges, enforcing the decision-making role and empowering the next generations (55). Appropriate governance is also important in terms of policies, structures, funding and services that are able to leverage and address resources in a proper way. Finally, it is important to exploit the power of contemporary communication and dissemination toward politicians, clinicians and technicians but, as well, to the general public with a wise use of new media and a narrative aligned to people's real concerns.

Both evidence and experience should support large scale decisions to solve complex problems and communicate the solutions to the wider public in order to truly implement the SDGs.

Conclusion

Recent trends in contemporary society engender new challenges for public health, including climate change, ageing population and non-communicable diseases. To face those complex issues a novel and multidisciplinary approach is required and public health workforce should be enriched and contaminated by other disciplines.

The appraisal of the literature in the area highlighted also important gaps and relevant future research agenda in terms of analysis, advocacy and actions. New strategies must be taken in the different fields of research, teaching and practice in order to improve the synergies and achieve global objectives.

The literature review conducted highlights in several ways that the built environment in which we live is a significant determinant of health. Therefore, architecture and planning should be finally considered as an instrument for creating healthy communities and contribute to tackling the emerging public health challenges at local and global level. Public health is the result of various socio-economic, cultural and environ-

mental factors and therefore should move from a biomedical to a socio-anthropological model. Contamination between planning and health in the spheres of education, research, dissemination and governance is highly recommended for future developments.

Limitations

The search has been conducted only in Scopus Elsevier database and only scientific articles have been reviewed therefore some relevant journals from the architectural field who are not traditionally indexed in those databases might have been excluded.

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ANNEX 1. Table of Literature included

Authors, year	Authors	Year	Title	Journal	type	place	author field	journal field	Urban phenomena impacts on health	Lack of training and need of curricula on health contamination	Need for collaboration in professional life	Individual Assessment tools based on evidence from the gap (SEA / SE / HIA / EBD)
Dubé, 2000	Dubé, P.	2000	Urban health: An urban planning perspective	Reviews on Environmental Health	study	Canada	policy	health	x			
De La Barra, 2000	De La Barra, X.	2000	Fear of epidemics: The engine of urban planning	Planning Practice and Research	study	Chle	policy	design	x			
Barton, 2005	Barton, H.	2005	A health map for urban planners: Towards a conceptual model for healthy, sustainable settlements	Built Environ- ment	review	UK	design	design	x	x		x
Kochritzky et al, 2006	Kochritzky C.S., Frumkin, H., Rodriguez, R., Dannenberg, A.L., Rayman, J., Rose, K., Gillig, R., Kanter, T.	2006	Urban planning and public health at CDC	MMWR. Morbidity and mortality weekly report	review	USA	health+ policy	health	x			x
Galea et al, 2006	Galea, S., Freudenberg, N., Vlahov, D.	2006	Cities and the Health of the Public	A framework for the study of urban health	study	USA	health	health	x			
Gorman et al, 2007	Gorman, N., Lackey, J.A., Rollings, K., Huang, T.T.-K.	2007	Designer schools: The role of school space and architecture in obesity prevention	Obesity	review	USA	health+ design	health	x			x
Younger et al, 2008	Younger, M., Morrow-Almeida, H.R., Vindigni, S.M., Dannenberg, A.L.	2008	The Built Environment, Climate Change, and Health. Opportunities for Co-Benefits	American Journal of Preventive Medicine	review	USA	health	health	x	x		x

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Authors, year	Authors	Year	Title	Journal	type	place	author field	journal field	Urban phenomena impacts on health	Lack of training and need of curricula on contamination	Need for collaboration in professional life	Individual Assessment tools based on evidence ing the gap (SEA / SE /HIA/ EBD)
Pilkington et al, 2008	Pilkington, P., Grant, M, Orme, J.	2008	Promoting integration of the health and built environment agendas through a workforce development initiative	Journal of the Royal Institute of Public Health	study	USA	design	design	x	x	x	x
Verderber, 2012	Verderber, S.	2012	Sprawling cities and our endangered public health	Sprawling Cities and Our Endangered Public Health	study	USA	design	design	x			
Seidel et al, 2012	Seidel, A.D., Kim, J.T., Tanaka, I.B.R.	2012	Architects, urban design, health, and the built environment	Journal of Architectural and Planning Research	review	USA	design	design	x	x	x	x
Ganske, 2012	Ganske, I.	2012	A different angle: Physician and architect	Physicians' Pathways to Non-Traditional Careers and Leadership Opportunities	study	USA	health	health	x	x	x	x
Burton et al, 2015	Burton, A., Bambrick, H., Friel, S.	2015	If you don't know how can you plan? Considering the health impacts of climate change in urban planning in Australia	Urban Climate	study	Australia	health	design	x		x	
Exner, 2015	Exner, M.	2015	Edwin Chadwick and the public health act 1848: Principal architect of sanitary reform	Routledge Handbook of Water and Health	review	UK	health	health	x			x

ANNEX 1. Table of Literature included

Authors, year	Authors	Year	Title	Journal	type	place	author field	journal field	Urban phenomena impacts on health	Lack of training and need of curricula contamina- tion	Need for col- laboration in professional life	Individual Assessment tools based on evidence bridging the gap (SEA / SE /HIA/ EBD)
Capolongo et al, 2016	Capolongo, S., Lemaire, N., Oppio, A., Buffoli, M., Le Gall, A.R.	2016	Action planning for healthy cities: The role of multi-criteria analysis, developed in Italy and France, for assessing health performances in land-use plans and urban development projects	Epidemiologia e Prevenzione	study	Italy+ France	design health	health	x	x	x	x
Dannenberg & Burpee, 2018	Dannenberg, A.L., Burpee, H.	2018	Architecture for Health Is Not Just for Healthcare Architects	Health Environments Research and Design Journal	com- ment	USA	health+ design	design	x	x	x	
Anderson, 2019	Anderson, D.C.	2019	Bricks and Mortals—Hospital Buildings, Do No Harm	Journal of General Internal Medicine	com- ment	USA	health+ design	design	x	x	x	x
Carmichael et al, 2019	Carmichael, L., Townshend, T.G., Fischer, T.B., Lock, K., Petrokofsky, C., Sheppard, A., Sweeting, D., Ogil- vie, F.	2019	Urban planning as an enabler of urban health: Challenges and good practice in England following the 2012 planning and public health reforms	Land Use Policy	study	UK+ South Africa	health+ design+ design	design policy	x	x	x	x
Marshall, 2020	Marshall, R., Pilkington, P., Rice, L.	2020	A guide to architecture for the public health workforce(Article)	Public Health	study	UK	health+ design	health design	x	x	x	
Rice, 2020	Rice, L.	2020	The nature and extent of healthy architecture: the current state of progress	Archnet-IJAR	review	UK	design design	design design	x	x	x	