Title: The nature and extent of Healthy Architecture: the current state of progress.

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Abstract

The design of the built environment is a determinant of health. Accordingly, there is increasing need for greater harmonization of the architectural profession and public health. However there is a lack of knowledge on whether designers of the built environment are changing their practices to deliver healthier urban habitats. The research uses a multi-method approach to data analysis, including: systematic mapping study, structured review and thematic analysis. The research finds that there are almost no requirements for the compulsory inclusion of health across institutions and agencies that have the power to execute and mandate the scope of architectural profession, training, education, practice or knowledge. Despite the urgent need for action and the myriad entreatments for greater integration between architecture and health, there is very little evidence of progress. The research has implications for the architectural profession and architectural education. Health and wellbeing is not currently an integral part of the educational or professional training requirements for architects. University educational curriculum and Continuing Professional Development criteria need to better integrate health and wellbeing into their knowledge-base. The design of the built environment is currently undertaken by an architectural profession that lacks specialized knowledge of health and wellbeing. There is a risk to society of environments that fail to adequately protect and promote the health and wellbeing of its inhabitants. The research evidences, for the first time, the lack of integration of 'health and wellbeing' within the architecture profession training and education systems.

Keywords: health; architecture; pedagogy; wellbeing; design.

1 Introduction

One of the greatest contemporary challenges facing society is human ill-health; most of the world's population suffers health problems. There is growing evidence that architecture and the built environment is a significant determinant of health. Accordingly there are increasing calls, from global agencies such as the United Nations and the World Health Organisation to national governments and other actors and stakeholders, for greater harmonization of the architectural profession and public health. Despite the rhetoric, there is a lack of knowledge on whether designers of the built environment are changing their practices to deliver healthier urban habitats. This article presents research that describes, critically analyses and evaluates the extent and nature of healthy architecture. A definition is established whereby: '*Healthy Architecture should contribute to a state of complete physical, mental and*

social well-being and not merely the absence of disease or infirmity'. The research finds that there are almost no requirements for the compulsory inclusion of health and wellbeing across institutions and agencies that have the power to execute and mandate the scope of architectural profession: training, education, practice or knowledge. Despite the urgent need for action and the myriad entreatments for greater integration between architecture and health, there is very little evidence of *health-ification* in progress.

2 Health

2.1 The costs of health as a global issue

There is international recognition that society is faced with a global health problem (Bloom et al, 2011; Brown Cueto and Fee, 2006). Global ill-health is now at a critical point as 95% of the world's population suffer health problems (Lay, 2015; World Health Organisation (WHO), 2017a). There are significant economic costs of ill-health. For most nations, the financial costs are becoming unsustainable; *"healthcare costs are rising so fast in advanced economies that they will become unaffordable by mid-century"* (OECD, 2015). The economic impact of ill health is estimated to be over 30 trillion dollars over the next two decades, which is equivalent to half of the global GDP in 2010 (Bloom et al, 2011). In the UK alone, the cost of ill-health to society and the economy is estimated to be £150 billion (WHO, 2013). In order to sustainably manage the social, financial, environmental and emotional costs of health, there is a need to understand what the health issues are and how best to tackle them.

2.2 Health: contemporary health issues

Lifestyle diseases (also known as non-communicable diseases) are medical conditions that have not been caused by infections or transmission from another agent. For the first time in history they now cause more premature death and mortalities globally than communicable diseases (such as cholera or typhus) (WHO, 2017a). The major cause of global ill health and the majority of deaths and illnesses are due to lifestyle diseases and are comprised of health problems such as cardiovascular disease, cancer, diabetes and lung disease (Ackland, Choi, & Puska, 2003; WHO, 2017a; Wilkinson & Marmot, 2003). Over sixty percent of illnesses and diseases are attributed to lifestyle diseases through society's behavioural patterns, social circumstances and environmental contexts (Public Health England, 2016). The *"globalization of unhealthy lifestyles"* (Bloom et al, 2011, p. 5) means that this is now a worldwide problem. As Bukowski, the great American poet, summarizes unhealthy lifestyle choices: *"A whole goddamned nation of assholes driving automobiles, eating, having babies, doing everything in the worst way possible"* (1982, p. 212). The built environment plays an important part in the determination and facilitation of contemporary lifestyles. The term 'diseasogenic' environment has been coined to describe the correlation between the current configuration of the environment and the tendency towards negative health outcomes. Diseasogenic environments condemn the individual towards unhealthy lifestyle choices and towards less healthy outcomes. For example, in car-dependent suburbs, there is (in theory) a choice of transport modes for an individual to make; however in reality the use of a car is almost obligatory in these environments. Many of these lifestyle 'choices' are rarely overtly made, instead many behavioural decisions are (often covertly) designed into our environments (Barton & Grant, 2006). The built environment can 'nudge' individuals towards healthier or less

healthy lifestyles; at present too many of those nudges are pushing society towards ill-health (Thaler, 1999). An example of a built environment nudge is the speed-bump, this can be conceptualised as a physical object that partly informs the decision process of a human actor (in a car) (Latour, 1992). The motorist could independently choose to drive over the speed bump at high speed (but risk damaging their car); however the physical world becomes active in predictable decision-making behaviour - the driver will slow down for the speed-bump. The speed of car-driving is related to many health factors, including: severity of accidents, mortality rates, air pollution, noise pollution and neighbourhood walkability. This example illustrates how behavioural decisions include environmental, design and spatial factors as well as choices made by human actors (Rice, 2017). The health crisis is caused not just by the choices that individuals make but decisions are pre-emptively and proactively nudged through the *design* of the built environment and other socio-technico-material factors. The design of the built environment is generally predisposed towards unhealthy lifestyles. According to the UN, architecture plays an important role in determining health and wellbeing, particularly as a contributory component of unhealthy lifestyles (UN Habitat, 2016). *'Just as there are behavioral and genetic determinants of health, there are design determinants of health'* (Muessig, 2017). The design of the built environment is linked to the increase in sedentary lifestyles, and with society spending more time indoors than ever before, internal architectural environments are increasingly important (Samet & Spengler, 2003; Tremblay et al, 2010; Matthews et al, 2008; Rice & Sara, 2018). Indoor environments can physically affect human health through factors such as: air quality, thermal comfort, acoustic levels (Bokalders & Block, 2010) The built environment be also may be helpful or harmful to mental health through, for example: varying perceptions of a space, aesthetic experience, differing levels of control, agency or ownership (Kalat, 1996; Dijkstra et al, 2006). Social health outcomes can be affected through varying levels of sociability can be improved or worsened as a result of the design of space (Bluyssen, 2014). Architecture plays a substantial part of a redesigned built environment. If we are to improve human health, we need to change the spaces that society inhabits. A healthy society needs healthy space.

Given the importance of health and its consequences for humanity, it is necessary to define: *health.* The most widely used and accepted comes from the Charter of the WHO (1946) which states: *"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".* WHO's definition is helpful in that it describes both what health is (*well-being*) and what it is not (*absence of disease or infirmity*). This statement does not reflect most contemporary health practice which tends to deal with illnesses once they occur rather than actively preventing illness. Only a small minority of health funding goes towards attaining '*complete physical, mental and social well-being*'. Almost all health funding currently still goes towards '*absence of disease or infirmity*' and almost exclusively in medical settings such as hospitals, surgeries or clinics. There is a mismatch between where health funding currently goes and the causes of ill-health, i.e. non-communicable diseases. However, the burgeoning financial burden on national health systems is forcing governments to look beyond medical professions to help resolve the health crisis.

The characteristics of disease are changing - common illnesses such as dementia and diabetes do not have a '*cure'* but sufferers do require '*care'*. Lifestyle diseases are not

treatable in medical settings alone or with a pill, but in homes and everyday settings for which a *unified front is needed*" (Bloom et al, 2011 p. 5). If we take one illness as an example of the current problem, obesity is an increased risk factor and major driver for many health issues; globally there are now more people who are overweight than underweight and obesity has doubled since 1980 and there are over two billion people who are now obese, i.e. a third of the world's population (Dobbs et al, 2014; WHO, 2017b). To put this into context, the economic cost of obesity is equal to the economic cost of armed conflict in the world (Dobbs et al, 2014). However, obesity is not going to be cured by a doctor or a pill, it needs a much more complex set of interventions and strategies to tackle the obesity epidemic than the medico-hospital model of health. Society and individuals can improve their health by changing the way they live; but even without changing the way they live, just the contexts in which they live, there can be significant health improvements (Kaplan, 1993; Matsuoka, 2010; Raanaas et al, 2011; Ohly et al, 2016; Bratman et al, 2012; Berman et al, 2008). There is a widespread recognition that more attention needs to be focused on supporting wellbeing and to prevent illnesses from occurring in the first place and that the redesign of the built environment is part of that strategy.

3.0 Health+Architecture = Healthy Architecture

The previous sections determined that much architecture today is associated with ill-health; what is needed therefore is a different approach to architecture, towards a 'healthy architecture'. Healthy Architecture should contribute to a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity. Contemporary architectural practice obviously does take into consideration some health issues; but it does not cover all or most aspects of health. What are the differences or similarities between *contemporary* architecture and *healthy* architecture in relation to health? Contemporary architectural design often attempts to deal with the absence of disease or infirmity, for example buildings are designed so that they do not fall down and harm the inhabitants; architects have carefully located and designed toiletry facilities to reduce the spread of disease. Thus both contemporary architecture and healthy architecture share a common ancestry in prevention of communicable diseases and infirmities. However, conditions such as obesity or depression are not addressed by contemporary architectural design systems thinking. Healthy architecture must go further in tackling absence of disease. The second WHO criterion is the *promotion of positive health and wellbeing* and this is perhaps the key factor that differentiates between contemporary architecture and healthy architecture.

The aspect of promoting positive health outcomes such as high levels of wellbeing is sometimes describes as health+ or health-*plus* (Hall & Lamont, 2009). Health+ can be described as the: '*process of enabling people to increase control over, and to improve, their health.*'(WHO, 2017c). Health+ is commonly characterized by users having control over their environment or agency to control one's lifestyles in a positive way (Ashton, 1992). Health+ also focuses on the promotion of health improvements to a human's life in a positive way; it pertains to state of complete mental, physical and social wellbeing. Very little attention is currently focused on contemporary buildings that facilitate or support complete wellbeing outside of medical contexts. There is however some research into wellbeing and health+ as part of architectural design (Desmet & Pohlmeyer, 2013; Manzini, 2007; Keinonen et al, 2013; Lawson, 2010). *Health-ification* is the process of making a system, product or process healthier. There

is a need to *healthify* the architectural profession, that is, to make changes to the education, training and practice of architectural designers so that built environments might promote, enable and sustain healthier lifestyles . Healthy architecture would place much greater emphasis on health+, in a process described as 'Health-ification'.

4.0 Governance of the Architecture Profession

It is necessary to overview contemporary architectural practice and the governance of the profession in order to understand how health might be integrated therein. Architecture is now a global profession. The practice of architecture is broadly similar across the world (Know & Taylor, 2005; McNeill, 2009). New buildings, urban environments and cities are increasingly similar across world, regardless of climate, culture or context (Auge, 2008). The knowledge that architects require and acquire is also increasingly homogeneous. The majority of countries have some form of regulation and accreditation of architects, with legal control regarding the title of an architect (usually mandated at a national level). Regulation of the title architect invariably requires compulsory training and education (typically at a University) whereby the national accrediting body mandates the scope and extent of an appropriate body of knowledge. Most of these national regulatory boards around the world have now harmonized agreements about the governance and regulation of the requisite architectural knowledge. As a result of these globalizing and governmental processes, architectural education has been homogenized with a relatively similar set of mandated subject areas required (Lawson, 2002; Nicol & Pilling, 2005; Jones, 2009; Schön, 1987; Roaf, &Bairstow, 2008). If the profession of architecture is to become '*healthified'* it will require changes to the governance of its regulatory and legislative agencies and institutions.

5.0 Methodology

The research examines the research question: *What is the nature and extent of Healthy Architecture in the architectural profession*?. A definition of healthy architecture is established as a benchmark against which to assess and evaluate the nature and extent thereof. A comprehensive range of agencies, stakeholders, policy-makers, legislative bodies and/or institutions that shape, influence or impact the architectural profession are systematically investigated in relation to the research question. These range from international bodies such as the United Nations and World Health Organisation, to national governments' policies and international trade agreements such as the European Union or the Commonwealth, to regulatory organisations (often legally controlled) at a national level through to patrons, design systems and evaluative tools. This are conceptualized as actors in a network that form the architectural profession. The research adopts a multi-method approach to data analysis. Firstly, using an initial systematic mapping study and subsequent structured review, a review of global/international agreements that relate to the integration of health and the built environment was undertaken; this mostly concerns the United Nations and WHO organisations (Arksey & O'Malley, 2005; Bonell et al, 2013; Grant & Booth, 2009). A thematic review of documentary evidence for inclusion of health and/or wellbeing into the architectural profession or practice was carried out. Secondly, a further review of EU policy, H&S legislation, Health Impact Assessments and Health Evaluation tools and international trade concords was conducted. Thirdly, a systematic review of all undergraduate modules for architecture degrees was conducted. This included gathering the descriptors and written content for each of the

modules, across all three years, at all UK Universities. A thematic review of content was then carried out to find evidence of 'health and wellbeing' (or related search terms) within the current UK curriculum. Finally an overview of grey literature and practice journals related to clients and patrons of healthy architecture was appraised. The article organizes the substantive findings of the review according to the networks of actors that influence or impact on the architecture profession in relation to health+ and these are summarised in table 1 near the end of this section.

6.0 Findings

6.1 United Nations Health Goals

At the highest level of political unity, the United Nations, supported by all 191 member nations, agreed that improving human health is one of its main priorities (United Nations, 2000). Furthermore the United Nation's Sustainable Development Goals (2015), which replaced their Millennium Development Goals (2000), place greater emphasis on health. "*Health has a central place as a major contributor to and beneficiary of sustainable development policies*" (WHO, 2015). The UN incorporates a relatively broad interpretation of health and wellbeing within the remit of their SDGs. Pressure for urban development is driven by the increase in the global population combined with a simultaneous rise in urbanisation (UN, 2014). The UN understand that development will require new houses, factories, workplaces, offices, schools, hospitals and commercial spaces; placing greater responsibility at an *architectural* level to ensure that those billions of new inhabitants have appropriately healthy living environments.

6.2 World Health Organization Policy on Healthy Cities

At an operational level, the United Nations delegates responsibility for health to the World Health Organization. The UN states that the "*WHO is the directing and coordinating authority for health within the United Nations system*" (UN, 2013). Whilst the WHO, whose "*goal is to build a better, healthier future for people*" (WHO, 2018a), have many approaches to improving health, one strategy concerns delivering improved health through the built environment. The most visible and overtly architectural aspect of this strategy is the WHO Healthy Cities (HC) programme (WHO, 2018b). WHO Healthy Cities is a expression of the importance of place-based health initiatives and the role that the built environment plays in determining health outcomes. WHO '*Healthy Cities'* (HC) is based operationally in Europe and most of the HC policies and actions developed in Europe are then established globally. One of the stated priorities of the WHO HC is *"how the built environment… affects the health of our citizens and the importance of integrating health and sustainable development considerations in how we plan, design, maintain, improve and manage our cities and neighbourhoods"* (WHO, 2008; 3). This key priority is a broad and bold ambition and requires intersectoral support to achieve. Accordingly WHO Healthy Cities make a plea: (ibid; 6) *"to encourage increased involvement of other professions and disciplines in the Healthy Cities agenda, recognizing their critical contribution to health and well-being."* Given the specific focus on cities as the delivery mechanism through which healthier outcomes be improved, architects are one of the key '*professions'* that are called to participate.

The organisational tiers of the UN and WHO are truly global and include almost all nations on the planet. The UN and WHO direct global agreements on urban development that includes health and wellbeing. The next organizational tier down includes international and national legislative institutions. The following section examines this next level of legislative influence on the architectural profession.

6.3 Pan-European Legislation on Healthy Architecture

The European Union, which is responsible for a population of approximately half a billion people provides legislation that supports the promotion of health improvements through the built environment, including the architectural profession. Overarching all EU policy related is the Lisbon Treaty (EU, 2007), the first line of article 168 states "*A high level of human health protection shall be ensured in the definition and implementation of all Union policies and activities*". This umbrella statement explicitly locates health as a fundamental aspect of all subsidiary policies. The Treaty continues, EU action: "*shall be directed towards improving public health, preventing physical and mental illness and diseases, and obviating sources of danger to physical and mental health*". This clear statement of intent from the EU is not merely an aspiration nor a general ambition; it is legally enforceable. Health, therefore, should be embedded in all subsidiary policies and directives of the EU. However the wording of the Treaty is more focused on '*the absence of disease or infirmity'* but arguably does not encompass the fuller definition of health as a '*state of complete physical, mental and social well-being".*

Article 46 of EU "*Directive 2013/55/EU of the European Parliament and of the Council*" (European Parliament, 2013) prescribes guidelines for the '*Training of Architects'* for the whole of the EU area. The intention of this directive is to establish a common set of interests, values and key knowledge for all EU architects (to ensure parity of competencies and knowledge of architects across national borders). It is worthwhile noting that architectural education and training includes both the initial University-based training as well as 'continuing professional development' (a mandatory requirement) throughout an architect's career. The scope and range of the knowledge expected of an architect delineates the remit of competencies. The directive declares that all architects must attain "*the acquisition of the following knowledge, skills and competences*" and lists eleven mandatory areas. This list states a mandatory knowledge of, for example: *"knowledge of the fine arts as an influence on the quality of architectural design"* and "*understanding of the structural design, and constructional and engineering problems associated with building design*" (ibid). The list does not include the term: *health* (or *well-being* or *wellness* or *disease* or *illness* or any variation on this theme). Despite the evidence of the links between health and the built environment, health+ is excluded from being considered a necessary or requisite area of knowledge for the architecture profession.

6.4 European Regulation of the Architecture Profession

Within the EU, there are a number of bodies that regulate and officiate the architectural profession. The largest of these is the Architects' Council of Europe (ACE) who *"represent the interests of over 560, 000 architects"* (Architects' Council of Europe, 2014). ACE's interests mirror that of the EU Directive and do not focus on human health in relation to architecture. Similarly the European Network of Architect's Competent Authorities (ENACA) is concerned with implementing EU

policy and directives into the architectural profession. ENACA is formed by the professional regulators for each of the individual nation states. ENACA are particularly concerned with the EU directive 2005/36/EC that focuses on the mutual recognition of professional qualifications, including the architectural profession, education and training requirements. "*Article 46 of the Professional Qualifications Directive sets minimum requirements for the training of architects"* (ENACA, 2018) in order to ensure that all architects across Europe have commensurable skills and sets of knowledge. Establishment of the scope of knowledge for an architect makes evident that health is not considered relevant to the architecture profession at a European level. Despite the prominence of health as an overarching aspect of all EU policies as stated in the Lisbon Treaty aligned with those of the UN and WHO; health+ does not form part of the mandated European architectural profession.

6.5 International Regulation of the Architecture Profession

Internationally there are many agreements that seek to ensure parity across the training, skills and education of architects. Whilst the EU is one of the largest and most coherent unifications for control of the architectural profession, there are a number of other organisations that act in a similar fashion. The Canberra Accord sets out equivalencies between countries for the training of architecture professionals. Members of the Canberra Accord includes representation from countries such as China, Canada, South Korea, Mexico, the Commonwealth Association of Architects (CAA) and the USA. Most of the countries of the world already have high levels of agreements concerning the training and education of the architectural profession. Similarly the Commonwealth Association of Architects (CAA) is constituted by the regulatory bodies of nation states. CAA has national members from all around the world, including: Australia, Hong Kong, New Zealand, Sri Lanka, Pakistan and Zambia and have members who follow the regulations broadly similar to the UK. In the Canberra Accord and CAA health, wellbeing and/or health+ are not explicitly mentioned as part of their mandated regulatory criteria.

6.6 Architectural Profession and Practice Policy Integration at a National Level

Despite the importance of international agreements on parity across architectural knowledge, there is potential scope for individual nations to incorporate variations appropriate to the different cultures, climates and contexts of each nation state. Given the pressing health issues at a domestic level nationally, it might therefore be expected that at the level of national policy there might be more of a focus on health within the architecture profession. There is insufficient space to examine every country individually. Therefore one nation has been studied as a representative proxy sample for many other countries; the UK has been chosen because it has many shared regulatory agreements globally, particularly its position in the EU and Commonwealth concords. The UK is one of the world's wealthiest but unhealthiest nations and has some of the highest levels of: obesity, mental ill-health, diabetes, dementia and other non-communicable diseases; therefore it ought be a pressing matter for the national government to legislate on (Public Health England, 2017; Institute for Health Metrics and Evaluation, 2016). In the UK, the profession of architects has two bodies that oversee the regulation. The Architects Registration Board (ARB) and the Royal Institute of British Architects (RIBA) and the two work closely together on most regulatory issues. If individuals wish to become members of the architecture profession, they must attend a University Architecture course that is

accreditation by ARB/RIBA. As part of the accreditation process, ARB/RIBA stipulate to a detailed level, the content that each course must include. Examples of ARB/ RIBA's 'General Criteria' include: "*the impact of buildings on the environment, and the precepts of sustainable design*", "*the way in which buildings fit into their local context*" and "*understanding of the structural design, constructional and engineering problems associated with building design*". There is no reference to 'health' in the criteria (other than to a mandatory piece of UK Legislation '*Health and Safety at Work etc Act 1974'* (UK. Parliament, 1974) (*see subsection below on H&S*)); the term 'well-being' or 'wellness' is not listed at all within the General Criteria.

ARB/RIBA establish the general areas of knowledge for study at all UK University courses. Universities break down their degrees into separate units of subject or content, (typically, but not universally, referred to as modules). This research examined all undergraduate architecture modules at UK Universities (of which there are over forty). University undergraduate architecture courses share a fairly similar set of taught modules, with only a small degree of variation. All University programmes have modules that focus on the areas stated in ARB/RIBA's 'General Criteria' and explicitly taught modules on the following five subjects: history, theory, construction, environmental principles and professional practice. These five subjects were common to all programmes; some universities *only* offered these as their 'taught' content. The naming conventions vary between institutions but the content can be categorized into these five thematic groupings. There is some evidence of small variations and heterogeneity in modules; however the vast majority restricted knowledge very closely to the prescribed topics. Of the UK Universities that currently run an accredited undergraduate degree in Architecture, none runs a module with an explicit focus on 'health' or 'well-being' (or variations thereof). Whilst it is possible that health is taught as a peripheral aspect of a module, it is not the focus; neither is 'health' nor 'well-being' mentioned in the title of any module, nor are they explicitly mentioned in the written descriptions (of those that are publicly available on individual University websites). The closest domain of relevant knowledge was an infrequent reference to 'Health and Safety Legislation' (see next subsection for discussion thereof). Healthy architecture is not included in the locus of requisite knowledge for architectural profession, education or training in the UK.

7.0 Architectural Practice and Healthification

The preceding subsections examined mostly agencies or institutions which relate to the architecture profession through *legislative* mechanisms. The next subsections explore the operational *practice* of the architecture profession in relation to health+. These are the stakeholders, agencies and actors that influence the profession to varying degrees. This section only examines where there is evidence of the integration of health+ into architectural practice.

7.1 Health & Safety

The most widely used instance of 'health' within the architectural profession is related to Health and Safety (H&S). H&S is variously known as: occupational safety and health or workplace health and is concerned with safety and health in the workplace. H&S emerged meaningfully in 1970's to improve safety, mostly in workplaces from hazardous or dangerous environments (Holt & Allen, 2015). H&S shares some public health aspirations, however there are significant differences

between the two, with limitations with respect to H&S's remit. H&S is primarily concerned with: "*protecting… against risks to health or safety in connection with the activities of persons at work*" (Parliament, UK. 1974 s. 37). In practice, H&S tends to focus on factors related to reducing the risk of "*infirmity"* or communicable diseases which is only part of the WHO's definition of health; there is scant capacity in H&S for achieving "*a state of complete physical, mental and social well-being*" (WHO, 1946). Thus H&S only covers half of the issues required for a state of health. This is also a criticism of most national Building Regulations, that reduce short-term accidents or injuries, but don't address the longer-term drivers of NCDs. H&S is overly goal-focused rather than systematic, for example: a design for safety might mandate that a worker be required to wear a helmet to protect the head from accidental impacts; but there is no wider consideration of the role of that worker's health in terms of e.g. diet, sedentary lifestyle, happiness levels or wellbeing (Wokutch & VanSandt, 2000). Lastly H&S is usually restricted to 'workplaces', which means that this legislation is not relevant to external spaces such as streets, parks, or piazzas nor does it pertain to other building types, particularly our homes where we spend the majority of our time. Nonetheless, H&S does provide a minor level of harmonization of some health issues into the architectural design process.

7.2 Heath Impact Assessments

The abundance of medical evidence to substantiate the role of the built environment as a health determinant has lead to some attempts to harmonize the health and architecture fields. One approach to harmonizing design and public health is the use of Heath Impact Assessments (HIA). HIAs are procedures relating to the judgement and evaluation of (e.g. urban) development policies and projects on a particular population (Glasson, Therivel & Chadwick, 2013). Many countries worldwide use HIAs to varying degrees to limit the effect of development policies on human health (Harris-Roxas & Harris 2011). The aim of HIA is to enable decision-makers take more informed choices to promote health or limit the spread of disease (Kemm, 2001; Ross, Orenstein & Botchwey, 2014). HIAs have the potential for harmonizing health and the design of the built environment if implemented well. At present, one of HIA's limitations is that designers are not integrated with the decision makers. Furthermore, HIAs are often not implemented, or not fully implemented, due to lack of: resources, time, skills or political support (WHO, 2010). The use of HIAs is relatively more widespread for large-scale construction projects and mega-scale urban planning developments, but are rarely used in the architectural profession. Nonetheless, there is merit in principle for incorporating HIA use within the building design process.

7.3 Patrons of Healthy Architecture

The patron is an organisation or client who procures a building. They are typically responsible for choosing an architect, paying for the construction and establishing the purpose, function and role of the building (Ostime, 2017; Chappell & Dunn, 2015). Clients play a vital part in determining the aspirations of the building. Whilst the vast majority of all new buildings pay very little focus on healthy architecture, there are some clients who are more interested in attempting to produce healthier buildings. Perhaps unsurprisingly, the bulk of these clients are from the medical world, particularly hospital environments, and some built projects now provide rigorous evidence of improvements to health and wellbeing through spatial design (Mason, & McGinnis, 1990; Whitelaw, Martin, Kerr & Wimbush, 2006). Furthermore, The

National Institute for Clinical Excellence (part of the UK Government's Department of Health (2006)) provide examples of healthy architectural design approaches: "*ensuring buildings and spaces are designed to encourage people to be more physically active (for example, through positioning and signing of stairs, entrances and walkways)… by providing showers and secure cycle parking and by using signposting and improved décor to encourage stair use…*". New hospital designs mandate that recovery wards be designed so that patients can see greenery from their windows. Views of nature from buildings have myriad proven medical benefits: they aid patient recovery times, reduce perceived levels of pain and reduce staff absenteeism (Ulrich, 1981; 1984; 1992; Hartig et al, 1991; Kaplan, 2001. Shepley et al, 2012). Healthy architecture can also encompass the choice of materials, the layout of the building, user controls, and provision for social and physical activities. These few pioneering exemplars from the medical domain illustrate the possibility for designing an architectural environment to support public health. However, such patrons are few and far between, the vast majority of clients do not stipulate healthy architecture when procuring a building.

7.4 Healthy architecture assessment tools

Patrons of Healthy Architecture sometimes also demand a degree of verification of the '*healthiness'* of their building. Whilst this industry is in its infancy, there are some methods for evaluating the health of a building - and in effect issuing health certificates for architecture. Globally, there are a number of competing systems: in America are the Green Building Council's Leadership in Energy and Environmental Design (LEED) and The American International Well Building Institute (IWBI), in Europe (mostly) is the Building Research Establishment Environmental Assessment Method (BREEAM), Japan's Comprehensive Assessment System for Built Environment Efficiency (CASBEE) and Australia's Greenstar. Each system has differing criteria for measuring health and what the different factors might be. The International Well Building Institute (IWBI) offers certification for new buildings that meet their health criteria. This certification requires adherence to a checklist of issues such as 'pot-plants', 'olfactory comfort' or 'sleeping policies' (IWBI, 2017). Certification is mostly a retrospective process, evaluating and managing activities during the design process. Likewise BREEAM have added a '*Health and Wellbeing'* subsection to their environmental assessment model to try to address some health issues. All of these accreditation systems provide helpful contributions to the analysis, evaluation and measurement of health in architectural deign. However none are mandatory parts of the architectural design process nor are they sufficiently widespread throughout the construction industry for evaluating health.

Actors/Agencies	**Description**	**Evaluation Summary**
United Nations / Sustainable Development Goals	International legislation and agreement including policies related to urban development and public health.	*Health+* and *healthy architecture* are included within the remit of UN policies.
World Health	International agency for improving and promoting health globally: including	*Health+* and *healthy architecture* are

Organization	architectural development principally within the WHO 'Health City' programme.	included within the remit of WHO strategies.
International concords: e.g. Canberra Accord / CAA	Agreement between nations to harmonize the professional requirements of the architecture professions.	*Health+* and *healthy architecture* is not included in these concords.
EU policy - *Lisbon Treaty*	European Union broad treaty governing trade practices, including the architecture profession.	Health is mentioned but: *health+* and *healthy architecture* are not included in these concords.
Article 46 *of EU*	Specific EU Treaty on the 'Training of Architects' including continuing professional development.	*Health+* and *healthy architecture* are not included in this Treaty.
Professional Regulatory Criteria *(at a national scale, e.g. UK)*	Regulation of the architecture profession in relation to compulsory training, education and mandated areas of knowledge (as stipulated criteria).	*Health+* and *healthy architecture* are not included in professional criteria.
University education & training *(UK)*	Prescribed areas of curriculum knowledge for architectural education at University (accredited by professional regulatory bodies)	*Health+* and *healthy architecture* are not included in UK University curricula.
Health and Safety legislation	Legislation aimed at reducing workplace-based accidents and injuries.	*Health+* and *healthy architecture* are not fully accounted for as part of H&S legislation
Health Impact Assessments	Method for analyzing and evaluation of urban development on the health of a population.	*Health+* and *healthy architecture* are not accounted for in theory, but rarely in practice
Patrons of Architecture	Clients who procure buildings using an architect.	*Health+* and *healthy architecture* are rarely encountered in practice
Health Assessment Systems/Tools	Procedures for measuring and assessing the healthiness of a building or development.	*Health+* and *healthy architecture* are included within these approaches

Table 1: Summary of the nature and extent of healthification in the architecture profession.

8.0 Discussion

Table 1 summarises the nature and extent of health in the architecture profession. The research highlights where there are gaps which need to be addressed; but also reveals where there has already been progress in the integration of health+ into the profession. This empirical evidence can be used by policy-makers, decision-takers and other actors to be more targeted in applying pressure to enact change within this network. There are three significant implications highlighted by this research. Firstly, the research demonstrates the absence of health and/or wellbeing in architectural education resulting in a shortage of knowledge, skills and capacity in this discipline. The corollary of this educational lacuna leads onto the much broader second implication; there is a significant absence of health+ in professional architecture practice at national and international levels. It is at these levels that most benefit might be gained from exerting influence and enacting change. That change might come from public health professionals, residents or building occupants, architecture profession organisations, the medical insurance industry, struggling health services or architects themselves. The issue is relevant to all of these actors as well as many others who have an input into either health promotion or the delivery of the built environment. This leads onto the third implication of the research findings, which is the effect on wider society. Architectural design practice that lacks specialized knowledge of health and wellbeing is at risk of delivering a built environment that may inadvertently be harmful to public health. Therefore, in order for buildings and the population to be healthier, it is necessary to align all appropriate policies and practice in harmony. The research provides important empirical contributions to knowledge, particularly in the realms of architectural education and training curricula. The findings should be instrumental in facilitating and developing new policies and practices that support healthier buildings. The research establishes the scale and extent of healthification in the architecture profession. This research is an innovative contribution to knowledge through which to further investigate, examine and ultimately promote healthier built environments.

9.0 Conclusions

There are high levels of human ill-health globally and this is forecast to grow over the next few decades. There is compelling evidence that architecture and the built environment are important determinants of health. Accordingly, there are increasing calls for greater harmonization of the architectural profession and public health. Despite the urgent need for action and the legion calls for greater integration between architecture and health, there is very little evidence of progress. Almost all existing regulatory organisations that have the power and remit to determine the range, scope and focus of relevant architectural knowledge fail to include a mandatory focus on health+ and wellbeing. University architecture schools and national regulatory agencies do not require architects to have a mandatory knowledge of health+. The high level of uniformity of the global architecture profession compounds this issue. The homogenisation of the profession comes at the same time as health issues are homogenizing; nations of the world are facing the same challenge of rising levels of non-communicable diseases related to contemporary lifestyles. There is some evidence that healthy architecture might emerge; from global agencies such as the UN

and WHO or demand-led pressures from pioneering clients. Due to the escalating financial costs of ill-health, it is perhaps inevitable that health+ will become a mainstay of architectural training, practice and knowledge. For the health of future generations, health+ must be integrated with architecture through the development of 'healthy architecture'. *Healthy Architecture should contribute to a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.*

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