

EMPATHY IN EMERGENCY

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in Texas, combines clinical precision
with softer, tender qualities

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Shanghai, 24-28 June 2015

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Contributors

Clare Cooper Marcus

A state-of-play overview exploring the myriad socio-economic health trends, and political responses, relating to the need to design 'salutogenic' cities



Ryan Gravel

Catalyst infrastructure projects, such as the Atlanta Beltline, hold the key to devising solutions to the health problems created by urban sprawl



Benjamin Koslowski

Insights from research carried out at the mental health unit of a new Scottish hospital, resulting in a design framework based on urban design principles



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Cheryl Atkinson

The architectural analysis of an in-progress post-occupancy evaluation of the recently opened Bridgepoint Active Healthcare in Toronto



Cover Image

The design of Legacy ER-Allen, in Texas, combines clinical precision with softer, tender qualities



Global health impacts

Scientists reported last month that China's carbon emissions per head have surpassed the European Union (EU) for the first time. Emitting 29% of the world's total carbon emissions, China is now producing 7.2 tonnes of carbon dioxide per person, compared with a per capita average for the world of 5 tonnes and 6.8 tonnes in the the EU. The US is still ahead on 16.5 tonnes per person. India is forecast to beat Europe's CO₂ output in 2019. At the same time, scientists have revised their forecasts for global population growth, estimating the number of people on the planet to rise to 11 billion by 2100 from 7 billion today. Previous forecasts suggested that the world's population would peak at 9 billion. As the new emerging economies of China and India continue their rapid development, and the world's population continues to grow at such pace, the resulting global impacts of climate change and air pollution on human health, wellbeing and quality of life will be catastrophic within our lifetime. It is with this in mind that the International Academy for Design & Health is now turning its attention to the world's most populous country, China. How can design help to address these challenges to human health? Participate in the debate by joining us in Beijing at the end of October for Design & Health China 2014 (p13-15) and submit an abstract for the Design & Health World Congress in Shanghai in June 2015 (p2,3,8,9).

Marc Sansom
Editorial director



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Editorial Director
Marc Sansom MBA
T: +44 (0) 1277 634 176
E: marc@designandhealth.com

Associate Editor
Andrew Sansom

Design Communications Associate
Helen Fisher

President
James Barlow PhD

Chief Executive and Founder
Alan Dilani PhD
T: +46 70 453 90 70
E: dilani@designandhealth.com

Editorial Advisory Board:
Dr John Zeisel PhD, USA
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Prof Ian Forbes, Australia
John Wells-Thorpe, UK
Mark Johnson, USA
Mike Nightingale, UK

Subscriptions
T: +44 (0) 1277 634 176
E: WHD@designandhealth.com

Published by:
The International Academy for Design and Health
PO Box 7196, 103 88 Stockholm, Sweden
T: +46 70 453 90 70
F: +46 8 745 00 02
E: academy@designandhealth.com
www.designandhealth.com

International Academy for Design and Health UK
West Suite, Westgate Court, 17 Western Road, Billericay
Essex CM12 9DY UK
T: +44 (0) 1277 634 176
F: +44 (0) 1277 634 041
E: WHD@designandhealth.com

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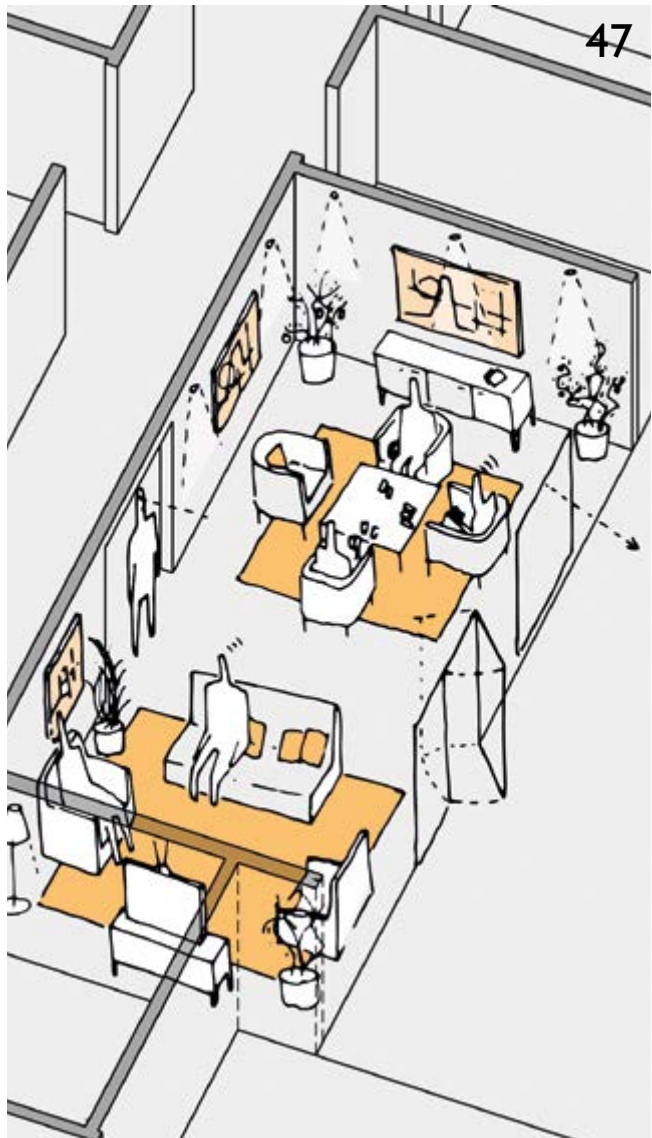
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Health-promoting design in China's changing society

The scientific programme for the 11th Design & Health World Congress & Exhibition in Shanghai will explore the global application of salutogenic perspectives on improving human health and wellbeing by design

The International Academy for Design and Health (IADH) will be organising the 11th Design & Health World Congress & Exhibition (WCDH 2015) – set to take place on 24-28 June, 2015 at the Shanghai International Convention Center – in partnership with Shanghai Municipal Health Bureau, and with the support of world-renowned academic institutions and global healthcare industries.

Host city Shanghai is a multi-cultural metropolis of more than 24m people. Holding a status equivalent to that of a province, the city reports directly to the central government. Serving as the largest base of Chinese industrial technology, it is one of the most important seaports and the country's main commercial hub.

Over the last century, China has been increasingly exposed to western medical practice based on the pathogenic model of disease treatment, but its historic medical roots reach back more than 2,000 years with the methods and concepts applied in Traditional Chinese Medicine (TCM) – a model that sits at ease with today's shift toward a salutogenic alternative. Now, rapid economic development is resulting in unprecedented migration from rural to urban environments, and the health status of the Chinese people is integrally linked to the quality of China's urban infrastructure and access to clean air, water and soil. By integrating salutogenic design methodologies that promote health and wellbeing with ecological design approaches that support natural ecosystems and prevent environmental destruction, architects, designers, planners and developers have a critical role to play in the creation of a healthy and more sustainable China.

Design goals for enhancing human health must facilitate an active lifestyle, enable the successful management of physical, psychological and emotional stress, and support mental and cognitive processing of information by stimuli in a variety of designed environments. Embracing the salutogenic perspective in how we shape our built environment to support more active lifestyles sits at the core of a preventative health strategy, which changes the focus from risk factors and the treatment of disease to a more holistic understanding of the factors that determine a healthier society.

In the 21st century, a new society is emerging in China; it is one in which the ability to create a strong scientific research and knowledge infrastructure, support innovation, and enhance productivity through the creation, growth and exploitation of new knowledge will be key to the future prosperity and economic competitiveness of the country.

By employing an interdisciplinary approach, architects, designers, engineers, public health scientists, psychologists and economists can improve the human condition by creating stimulating, enjoyable and sustainable environments that enhance quality of health and wellbeing for all.

Committed to bringing this understanding to the design and health professions, in an effort to reduce the prevalence of lifestyle diseases and improve quality of life, the IADH invites submissions of scientific abstracts and case studies for the 11th Design & Health World Congress & Exhibition in Shanghai, China.



DeHeng Clinic, Beijing, designed by Roberts Interiors and Architecture



Gualv New City General Hospital, Guangzhou, by RTKL Associates



Shanghai New Hongqiao International Medical Center, Shanghai, by Gresham, Smith & Partners

Call for papers

China and the world needs a new health paradigm, and the creation of a healthy global society is a vision we should all embrace. The WCDH 2015 provides an opportunity to engage with the world's foremost interdisciplinary network of architects, designers, health planners, engineers, public health scientists, physicians, health administrators, psychologists, economists, and other key decision-makers. The WCDH 2015 Congress Secretariat invites you to participate in the event by submitting abstracts on the following themes:

- **Innovation in health infrastructure: Integrating technology, services and the built environment**
- **Salutogenic design for healthy communities and urban planning**
- **The 'Salutogenic hospital': The role of hospitals in health promotion**
- **Case studies of successful healthy built environments**
- **Culture and health: Stimulating built environment**
- **Developing international benchmarks in design and health**
- **Promoting healthy and active lifestyles to prevent chronic disease**
- **Designing healthy workplaces in all settings**

Authors are invited to submit abstracts of 400 words in English. The abstract should clearly state the objectives, methods used, results and conclusions. The paper will be presented to an audience with diverse interests and disciplines. Consequently, we are seeking presentations that focus on the practical importance of environmental design qualities that promote health and wellbeing. Papers addressing more than one of the congress themes will be given preference.

All abstracts will be subject to a rigorous blind peer-review process by the WCDH 2015 Scientific Committee and a select number will be chosen for oral presentation with a wider number presented as posters. All abstracts and enquiries should be submitted by e-mail to the WCDH 2015 Secretariat no later than 15 November at the following address:

WCDH 2015 Secretariat
info@designandhealth.com
 Tel: + 46 70 453 90 70

Proposals must include a title, author(s), organisational affiliation, and three keywords. Papers chosen for presentation will be published in the Final Programme and Book of Abstracts, with selected papers published in full in *World Health Design* in 2015-16. The author(s) or co-author(s) should register and pay the registration fee in order to present the paper at the conference.

The official language of the WCDH 2015 is English. Further information on the conference venue, hotel accommodation and registration fee will be provided in the Preliminary Programme in February 2015.



Timetable

15 September 2014

First announcement and call for papers

15 November 2014

Deadline for abstracts of papers

15 December 2014

Authors notified of decision of paper acceptance

15 January 2015

Preliminary programme and registration opens

1 May 2015

Deadline for early bird, speaker registration and final manuscript

15 June 2015

Final programme and book of abstracts published

July 2015-2016

Selected papers will be published in *World Health Design*

Congress dates and schedule

The WCDH 2015 is a five-day event, which will be held from 24-28 June, 2015 at the Shanghai International Convention Center, Shanghai, China

Wednesday 24 June 2015

Registration from 14.00-18.00

Pre-congress symposium

Opening ceremony and Welcome reception from 19.00

Thursday 25 July 2015 Congress & Exhibition

Late registration from 08.00-09.00

Congress and exhibition from 09.00-18.00

Social programme to be advised

Friday 26 July 2015 Congress & Exhibition

Congress and exhibition from 09.00-18.00

Advisory board meeting of the International Academy for Design & Health from 19.30

Saturday 27 July 2015 Congress, Exhibition & Academy Awards Gala Dinner

Congress and exhibition from 09.00-18.00

Academy Awards Gala Dinner from 19.00

Sunday 28 July Architectural Study Tours

Site tours and visits to local landmarks and health facilities



UNDERSTANDING CHANGE



Lichen flourishes in clean air. Just like good health, good healthcare design starts with getting the basics right. AECOM sees health and healing in the round. Please contact John.Hicks@aecom.com

Collectively the four major industries that support healthcare – pharmaceuticals, biotechnology, medical technology, and IT – have global revenues approaching US\$2 trillion a year. This represents almost a third of total global healthcare expenditure. With pharmaceutical sales touching US\$1 trillion annually, and US\$233 billion spent on biotechnology-based drugs, the biopharma sector dominates. The medical devices sector is much smaller, at around US\$350 billion a year, while global spending on healthcare IT is estimated at US\$100 billion.

But what is usually neglected in discussions about the future of global healthcare is the contribution of a fifth sector – the built environment industries that provide the hospitals and other facilities to support healthcare services. These are thought to generate sales of US\$300-400 billion a year, making the sector as large as the medical devices industry.

Many countries are trying to redesign their healthcare system – adopting new payment and reimbursement models, moving from a 'sickness' to a 'wellness' paradigm, reforming their organisational architecture by placing primary care more centrally, and finding new ways of involving the private sector through public-private partnerships. There is much interest in 'disruptive innovation' – moving towards cheaper, simpler organisational and technological solutions that emphasise the importance of individuals taking more responsibility for their care, supported by lower-cost care professionals in community settings.

In helping facilitate this process, the built environment sector, just like biopharma and medtech, will need to adapt its structure and business models. However, the debate about how design and construction firms should adjust to the big trends in healthcare – the move to smaller and community-based facilities, the home, greater flexibility, new collaborative relationships, and novel payment models – has barely begun, and questions about what 'innovation' should look like and who will drive it in the built environment sector are not well understood.

Healthier living and modern infrastructure

As well as providing the buildings in which healthcare takes place, the built environment industries have a part to play in tackling the major burdens on health systems in two other related ways.

Firstly, the importance of 'salutogenic' environments – the notion that design factors can play a role in promoting health and wellbeing – is becoming increasingly prominent in debates about public health. There are huge opportunities to create healthy built environments in low- to middle-income countries, where urban development is growing at an unprecedented pace, but efforts to redesign established cities to support healthier living are also taking shape. In London eight boroughs are being transformed into Dutch-style cycle-friendly environments, with the world's longest dedicated cycle routes under construction. Harnessing better design and the power of big data

is also a prospect; for example, using people's smart public-transport payment cards to provide individualised information about the benefits of getting off the bus earlier and walking slightly further.

Secondly, road traffic accidents are a major hidden global health problem, projected to move from being the ninth to the third leading cause of disability between 2004 and 2030. The United Nations is now devoting much attention to the task of redesigning and modernising road infrastructure, along with the construction of alternative modes of transport. The emergence of 'cities' as a research domain – bringing together previously fragmented disciplines from engineering and construction, design and planning, and the social sciences – will create a more holistic understanding of the urban realm as a system of systems.

The emergence of 'cities' as a research domain will create a more holistic understanding of the urban realm as a system of systems

This should help tackle the innovation challenges in meeting global health needs, and the International Academy for Design and Health should be part of this debate.

James Barlow PhD is president of the International Academy for Design and Health and chair in technology and innovation management at Imperial College Business School, London, UK



The fifth element

The worldwide focus on urban development can provide a route for the built environment's influence on health to take on greater prominence, says *James Barlow*



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Beijing International Medical Centre, designed by HDR Architecture

Traditional meets the modern

Influenced by western notions of disease treatment but with its medical roots in health preservation, Design and Health China 2014 offers a fascinating opportunity to discuss and develop a new salutogenic vision for our changing world

New scientific data released by the Global Carbon Project showing that China's carbon emissions per head now exceed the European Union is a major concern for the Chinese people, its government and for global health. The great economic strides made over the last 20 years by the China government and its people have lifted millions out of poverty and resulted in an unprecedented level of modernisation and infrastructure development in terms of both speed and scale. Yet, left unchecked, such rapid development, and the swelling of the urban landscape to accommodate large population shifts from rural to city landscapes, could yet be undone.

With China now contributing 29% of the world's carbon emissions, equating to 7.2 tonnes per person, compared to the EU's 6.8 tonnes (the US remains ahead emitting 16.5 tonnes per person), the prospect of environmental destruction and catastrophic health impacts is a real and present danger as industrialisation and the proliferation of dirty energy compromises basic human requirements for clean, air, clean water and clean soil. By integrating salutogenic design methodologies that promote health and wellbeing with ecological design approaches, however, architects and developers can play a vital role in helping China become a more healthy society.

China's ability to develop a strong scientific research base, support innovation and enhance productivity through the exploitation of new knowledge will be key to its prosperity. Organised by the International Academy for Design & Health and hosted in Beijing, Design and Health China 2014 will bring together interdisciplinary world experts to share their knowledge in how to create a new salutogenic vision for China.

For the full programme, details of the speakers, and to register, please visit www.designandhealth.com

Design & Health China 2014

Global Perspectives. Local Identities.
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China Science and Technology Museum,
National Olympic Park, Beijing, China
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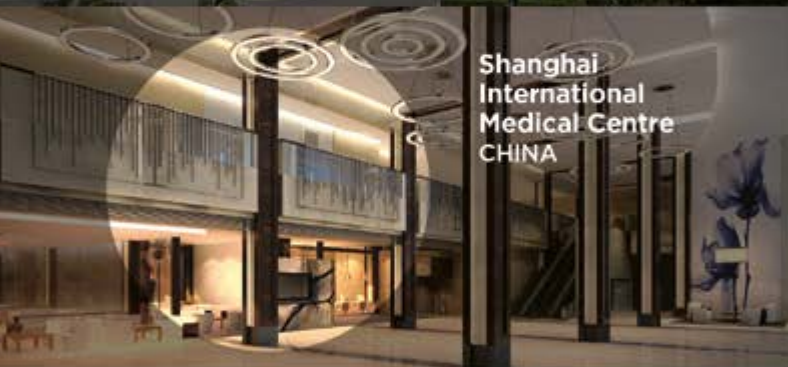
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TAIWAN



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In China, family members play a particularly important role in a patient's healing process, providing food, comfort and even supplementary nursing tasks. Yet, often, there is no space for them in the hospital, and they end up camped out in the corridors and wards of buildings that weren't designed to include social spaces.

These hospitals were designed as clinical spaces, so rigidly defined in their layouts, finishes and functionality that they overlook the power of the public realm. Can an ambulatory patient find a place to exercise in the mornings? Is there a place where their family can have a meal with them? These are the questions designers should be asking themselves.

Premier Li Keqiang's State Council released an urbanisation plan for China earlier this year, predicting that by 2020 60% of people will have migrated to cities, up from 53.7% today. It's a challenging prospect on many levels, not the least of which is that hospitals in major cities are already at capacity. While the 5,000 or so class I community health stations across China are about half full at any given time, as of 2010 the large urban hospitals were struggling to manage more patients than they could accommodate.¹

With new healthcare infrastructure planned to address this overflow, now is the time to rethink China's approach to designing these facilities.

The 'health village'

A good place to start is to think of a hospital as a 'health village', rather than just a clinical facility. Like a village, this reimagined hospital should encompass community spaces – areas that exist purely to enrich people's experience. In a village or city, such spaces exist as town squares and parks. In a hospital, it could be a room where families can share a meal together, or an outdoor space where longer-term patients can practise therapeutic activities such as Tai Chi or gardening.

Services around the local hospitals in Shanghai currently develop just outside of the facility gates. Restaurants, fruit shops (fruit is a popular gift for patients) and other amenities are inaccessible to anyone inside. These community elements should be brought inside the building, so that they are readily accessible to patients and their families.

Creating a healthier hospital environment can also encourage a healthier lifestyle outside of the hospital walls. China is facing rising obesity rates and increased instances of respiratory illnesses and diabetes consistent with a society that is shifting to a more urban lifestyle. A 2012 review in British medical journal *The Lancet* attributed the growing disease burden in Beijing, in part, to nutrition and lifestyle choices.² In that same year, a report issued by China's Ministry of Health confirmed that 83% of adults were engaging in no exercise whatsoever.

A hospital designed to encourage healthy physical and social behaviours – a walk, a few hours a day spent in the garden, a game of mahjong, etc – can help curb unhealthy behaviours in the long term, thereby reducing the burden on the healthcare sector in the future. This shift from function-focused to family- and patient-focused design is part of an evolving approach to healthcare facilities that places an emphasis not only on physical but also mental and spiritual healing. By designing facilities with people in mind, you will not only end up with better hospitals but a healthier population and country.

Bill Nankevell is chief executive officer of B+H Architects

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1. McKinsey & Company, 2010. *Health International*, 2010; issue 10.
2. Gong, P, Liang, S, Carlton, EJ, Jiang, Q, Wu, J, Wang, L, and Remais, JV. Urbanisation and health in China. *The Lancet*, vol. 379; issue 9818.



Vanguard of the village

Traditionally, local hospitals in China have been designed and built as clinical facilities. But, against a backdrop of rapid urbanisation, a new concept of incorporating family and community spaces into such settings is becoming fundamental, argues **Bill Nankevell**

Community elements should be brought inside the building, so that they are readily accessible to patients and their families

Forward legacy

Texas-based Legacy ER operates a hybrid programme offering urgent care and 24/7 state-licensed emergency healthcare services. The conceptual framework seeks to capture, aesthetically, the different traits required of the emergency medical professional: outwardly projecting the knowledge, skill, precision and decisiveness needed for the effective practice of emergency medicine, while inwardly reflecting the gentle, empathic and humane qualities associated with quality care.

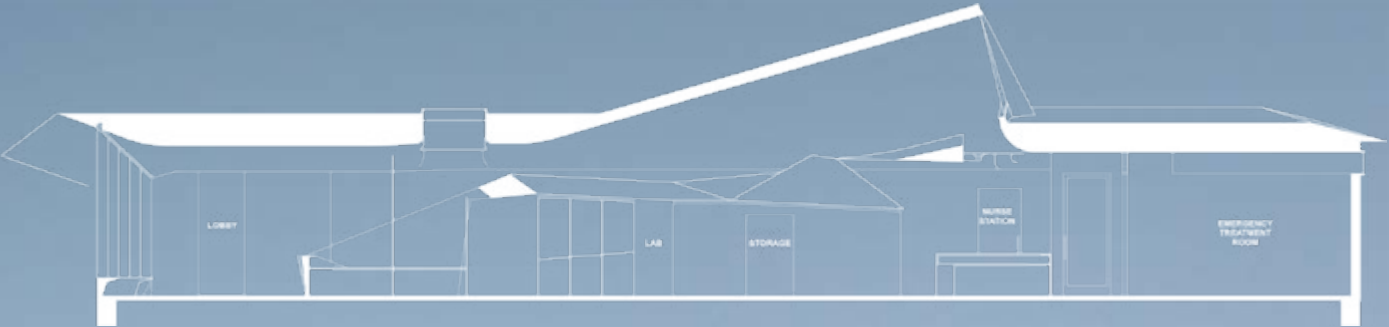
On the exterior, the building profile extrapolated the conventional residential roof planes. Perforated panels were mapped on to exterior surfaces to allow for diffusive building lighting and solar shading. Zinc was selected for its inherent greyish-blue warmth and resiliency during extreme weather.

In contrast to the zero-edged exterior, the interior blurs the edges of surfaces to receive natural and artificial light via skylights, which are detailed as frameless apertures puncturing through the exterior membrane. Skylights are situated at intersections to form a sensorial system of wayfinding.

Underlying the aesthetic is an efficient design synthesising various evidence-based design research findings without creating a facility that feels overly technical. Spaces for patient care are composed to reduce errors, and workspaces are designed for peer collaboration, patient accessibility, and data privacy.

Interior finishes were selected to comply with regulations to promote cleanliness, while waiting-room furnishings were selected to provide a hospitable variety of seating and activity for all ages.





Legacy ER-Allen

Architects / Interior designers: 5G Studio Collaborative
Commissioning authority: Texas Department of State
Health Services, Facility Licensing
Main contractor: UEB Builders
Size: 8,432 sq ft
Cost: US\$3,600,000



The salutogenic city

In this 'state-of-play' overview, *Clare Cooper Marcus* and *Naomi Sachs* consider the myriad socio-economic and demographic health patterns, and political and organisational responses, relating to the need to design urban environments based on the concept of salutogenesis

The sociologist Aaron Antonovski first coined the term 'salutogenesis' in 1979, combining the Latin words *salus* (health) and *genesis* (origin) to describe a model focused on promoting health rather than curing disease.¹ Today, radical changes in the environment, demographics, technology, and morbidity and mortality are forcing everyone from policy-makers to researchers to designers, on small and large scales, to shift their focus from the old 'pathogenic' paradigm to a salutogenic approach concerned with preventative care. This means addressing health on a much broader physical and temporal scale, and within a more interconnected framework. How does one's entire built environment – from the home, to the workplace, to public space, to the hospital – affect one's health? How can the design of those spaces, and elements within those spaces, contribute to and facilitate health?



Clare Cooper Marcus

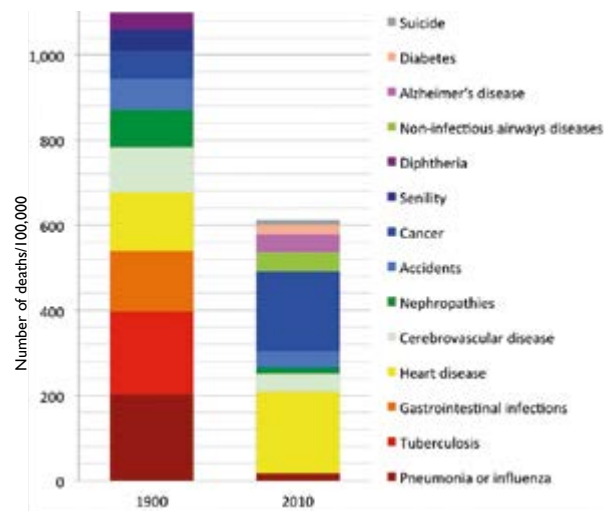
Nurses enjoying a break in a hospital garden, Randall Children's Hospital, Portland, Oregon

Nature, fitness and diet

Research on the positive health benefits of nature continues to amass, in the United States and abroad, and is becoming recognised not only by environmentalists and landscape architects but also by other designers, policy-makers, public-health officials, and governmental bodies from the local to the federal level.^{2,3,4}

Access to 'nearby nature' in the form of parks and green spaces within walking distance of people's neighbourhoods (as opposed to, for example, national forests and parks that usually require driving) has received particular attention. Indeed, the Centers for Disease Control's (CDC) National Center for Environmental Health has added a new standard to its measure of public health: whether people live within a half mile of a park.

'Park prescriptions' is an emerging movement that pairs healthcare and park systems to fight the obesity epidemic; doctors can order exercise in a park as they would medication. In Washington DC, volunteers rated 350 area parks and recorded them into a database for doctors to reference when advising their patients to exercise. In South Carolina, where two-thirds of the population are overweight or obese, a prescription enables people free entry to one of 30 state parks. A study by the RAND Corporation suggests that free equipment encourages people to visit parks more often and enables them to get more exercise when they do. The Trust for Public Land's Fitness Zone programme provides neighbourhood parks with outdoor workout equipment situated near playgrounds so that



In 1900, infectious diseases were the leading cause of death in the US, but chronic illnesses have now taken over. Original source: www.nejm.org/doi/full/10.1056/NEJMp1113569 (Data from the Centers for Disease Control and Prevention)

parents (and grandparents, etc) can work out while their children play.

City investments and public-private partnerships have led to the construction and refurbishment of parks, greenways and other open spaces across the United States. Owing to its tremendous success, the High Line, a 1.5-mile linear park built on an abandoned elevated rail line in New York City, has spurred similar projects elsewhere. The Trust for Public Land has helped acquire 44 segments of abandoned rail lines for conversion to trails and greenways. One example is the Minneapolis Midtown Greenway, which cuts through the city from east to west and generates 1.5 million trips a year; many by people walking or biking to work. "With urban areas, it's hard to find 20, 30 or 40 acres of wide-open space," says EB Boyd. "Finding a rail track is more feasible."⁵ Disused riverfronts provide another opportunity. Denver's South Platte River, for instance, has been reinvigorated with more than 100 miles of hiking and biking trails.



The High Line in Manhattan, New York City at West 20th Street, looking downtown (south)

Pedestrian friendly

In the US and abroad, communities are being made more walkable for people of all ages and abilities. An excellent example is the pioneering work by urban designer Jan Gehl and colleagues in Denmark, promoting the conversion of dozens of inner-city streets in, for example, Copenhagen, Melbourne, London and Moscow into pedestrian-friendly thoroughfares.⁶ A temporary project in 2009 to convert New York's Times Square into a pedestrian space proved so popular that it has now become permanent, and 50 other pedestrian plazas have been created by re-purposing streets throughout the five boroughs of New York City.

In the US, the number of people who commute to work by bicycle has increased by about 60% since 2004.⁷ This change is due, in part, to municipalities and workplaces creating environments more conducive to cyclists: for example, bike lanes, bike-sharing programmes, bike racks, and places to shower at work. New York City's bike-share programme generated 90,000 sign-ups within the first six months of its launch in 2013. Fifty other American cities have share programmes in place or in the planning stage. A 2010 study in Copenhagen – where as many as one third of all daily commutes are by bicycle – found that cycling resulted in fewer sick days and lowered healthcare costs at a saving of \$1.62 for every mile pedalled.⁵

The past two decades have seen tremendous growth in farmers' markets, community gardens, and urban agriculture (small, local urban farms). People are eager for fresh, local, healthy food (especially fruits, vegetables and meat) that has not been grown with hormones, pesticides, herbicides, or genetically modified seed, and that has not been transported thousands of miles. These venues have a social and community component as well: one study revealed that people have ten times as many conversations at farmers' markets than in a traditional supermarket.⁸ Designers and city planners are among the experts working with municipalities to reduce the number of 'food deserts' – urban, often low-income neighbourhoods that lack access to fresh, healthy food. ►

**In the US
and abroad,
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Top: Three-storey homes at St Francis Square co-op in San Francisco, California face inwards to landscaped courtyards

Bottom: A 'woonerf' (residential precinct) in Tel Aviv, Israel

► Policies and political influence

Recent large federal and state initiatives in the US are also signs of positive change and a new focus on salutogenic policy and design.⁹ The Centers for Disease Control (CDC) Healthy Community Design Initiative works to improve public health by, for example, improving community-design decisions through tools such as the health impact assessment and educating decision-makers on the health impact of community design.

The US Patient Protection and Affordable Care Act (aka 'Obamacare') has spurred major changes in healthcare delivery and design. As early as 2010, when the ACA was first inaugurated, \$500 million was distributed to states and communities for preventative care, such as smoking cessation, obesity prevention, and fitness. The president's Childhood Obesity Task Force and First Lady Michelle Obama's Let's Move! initiative are two federal programmes aimed at combating childhood obesity.¹⁰

In November 2013, the American Public Health Association adopted 17 new policy statements, including 'Nature, health and wellness'. The organisation's aim is to promote healthy and active lifestyles and to encourage "land-use decisions that prioritise access to natural areas and green spaces for residents of all ages, abilities and income levels". Furthermore, the policy "calls on public health, medical and other health professionals to raise awareness among patients and the public at large about the health benefits of spending time in nature and of nature-based play and recreation".¹¹

The Health Districts Initiative of the Congress for New Urbanism (CNU) uses the CDC's Healthy Community Design Checklist Tool and the CNU Charter for New Urbanism as springboards to facilitate the provision of what they call health districts: livable, walkable neighbourhoods that contain at least one health facility, and where one aim is "to assist hospitals in their efforts to 'do no harm' to their surrounding neighbours".¹²

In 2010, the New York Department of Design and Construction published the Active Design Guidelines, a clearly written and beautifully illustrated manual for architects and urban designers that offers strategies for "creating healthier buildings, streets, and urban spaces, based on the latest academic research and best practices in the field".¹³ The Guidelines have become a model that other cities are beginning to follow.

Sense of community

The design of residential neighbourhoods is a critical element in creating a salutogenic city. It is clear that the low-density, car-oriented suburb is not the best solution. Lack of sidewalks, and long distances to shopping centres, workplaces and schools create a culture almost totally dependent on the car, resulting in limited daily exercise, increased air pollution, and a disconnect from the natural world.

An example of a more healthy solution is medium-density housing with private plus shared outdoor space, the latter providing for children's play within sight and calling distance of home, and a setting where neighbours casually meet, creating opportunities to forge a sense of community.¹⁴ An excellent example is St Francis Square, a 300-unit co-op in San Francisco, California where three-story apartments face inwards on to three landscaped courtyards, each a human-scaled space owing to its dimensions (c.150 × 150 feet) and height-width ratio (1:6). The courtyards are heavily used by children playing (80% of total users), adults walking to shared laundries and parking lots, and teens gathering in the evenings. Such a setting is especially beneficial to children's health. In households where both parents work, there is little time or energy on a weekday for them to walk their

children to a park. Only half the days of the year are school days, making settings for exercise and play close to home especially important.^{15,16}

In a comparable community in Petaluma, California, with 29 townhouses clustered around a similar inward-focused site plan, interviews with residents revealed that 71% rated the sense of community as 'strong' or 'very strong', and 50% responded that their children watched less television since they had moved there, as they could see other children playing outside in the shared community spaces.¹⁷ One can assume that the health of children in these and similar communities is likely to be better than those who have to be driven everywhere, and where a small back yard may not be a tempting place to play.

Shared space

North America has seen a growing acceptance of co-housing since the publication of the books *Co-housing: A contemporary approach to housing ourselves*¹⁸ and *Creating co-housing: Building sustainable communities*.¹⁹ This is a form of clustered housing pioneered in Denmark where a community of anything from ten to 100 households – each with its own kitchen and normal living spaces – not only share some outdoor space but also a commercial-sized kitchen and dining room in a common house where neighbours can cook and eat together as often as they choose. Through a participatory process, the group works closely with the design team. In 120 co-housing communities so far built in North America, all have chosen some form of inward-facing pedestrian site plan to enhance exercise, casual meetings, and child supervision. Parents are far more likely to allow their children (after a certain age) to play outside unattended in these shared spaces than in adjacent streets or nearby parks since two of their prominent fears – traffic and strangers – have been eliminated.

In creating shared space close to home that is healthful to children and adults, the option of that space being green is not always present. Other possibilities include the 'woonerf' (residential precinct in Dutch), the shared back alley, and the cul-de-sac. The move to create safe inner-city streets shared by pedestrians and slow-moving traffic dates from the early 1970s in the Dutch city of Delft. An entry sign to a woonerf warns cars to drive at less than 5 mph; raised planting beds, play spaces, sitting areas, and lack of a distinction between sidewalk and roadway ensure that cars move slowly and carefully. Before-and-after studies of woonerfs record a large increase in the numbers of children playing, and adults socialising, close to home.²⁰ Guidelines for the construction of woonerfs were adopted in Germany (1976); the UK, Denmark, and Sweden (1977); and France and Japan (1979). No fully developed example exists in the US, principally because the Institute of Traffic Engineers has never endorsed the concept and police and fire departments have opposed it.²¹ In 2007, the City of Baltimore, Maryland passed an ordinance that permits residents to vote to have an alley in the middle of their block closed and gated. Many neighbourhoods have chosen to do this, creating an option for those in inner-city settings to reclaim an area for safe play and socialising that was formerly the domain of garbage cans, vermin, and parked cars.²²

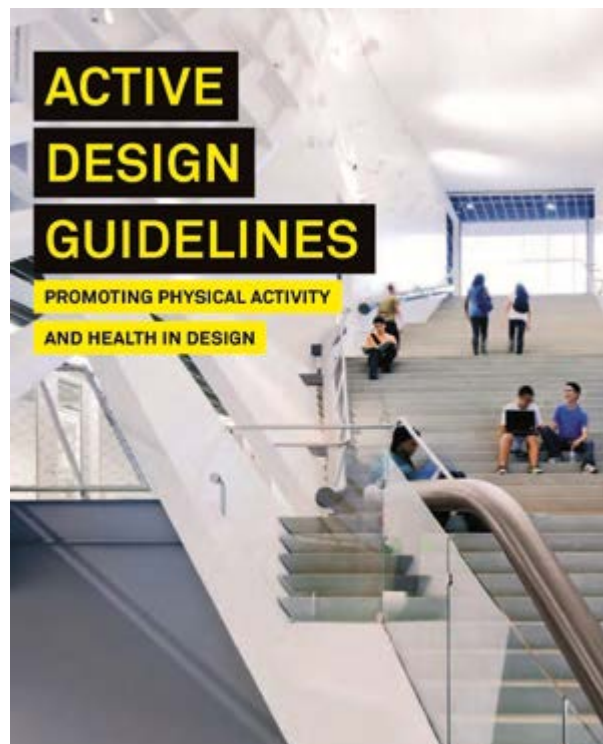
For the past 100 years, many suburban street layouts have included the cul-de-sac. In Village Homes, a 240-unit development in Davis, California, completed in 1981, all dwellings are approached via long cul-de-sacs, ▶



Chris Garcia

A retention pond at a skilled nursing facility provides a wildlife habitat and a cool, nearby social space for residents and visitors. The Pavilion, Jupiter Medical Center, Jupiter, Florida

North America has seen a growing acceptance of co-housing



The New York Department of Design and Construction's Active Design Guidelines provide a model for creating healthier urban spaces



A residence for cancer patients. Before-and-after images of a roof garden designed and built by undergraduate students at the University of Washington under the direction of Professor Daniel Winterbottom

▶ between which are green pedestrian ways leading to a large common green, community garden, and community-owned vineyard.²³ Children roam and play safely throughout the neighbourhood, and residents report having three times as many social contacts and twice as many friends as those living in a nearby conventional subdivision.²⁴ Foot and bicycle paths link Village Homes with the extensive bicycle network for which the university city of Davis is famous. Although no studies have looked specifically at the health of children living at Village Homes, one could assume that it is better than that of children living in conventional subdivisions, which often lack sidewalks for safe nearby play, and where low densities require that children be driven to school, play-dates, etc. A study of four Northern California towns confirms what we might intuitively expect: children who live on cul-de-sacs play outside more often and more energetically, and their parents are less concerned about traffic than those living on nearby through streets.²⁵

A study of 12 UK housing projects found that children's favourite places were those with 'greenery and trees' and that their favourite activity was 'being on the move' – running, cycling, roller-skating, chasing, etc.²⁶ The study recommends a traffic-calmed cul-de-sac and footpath layout, with children's access to as large an outdoor environment as possible. The conclusion of this and other studies prompts one to ask if we can designate extensive movement corridors for large mammals such as mountain lions – as is happening in the US – can we not regard our children as a precious species and provide for their safe and healthy movement through increasingly hazardous urban environments?

The cul-de-sac has always been popular with home-buyers and, apparently, provides a safer environment for children. Nevertheless, traffic engineers, planners, and some municipalities in the US are lobbying for their elimination in new developments.²⁷ This move is largely the result of a popular and influential movement in architecture and planning known as 'New Urbanism', which emphasises that all streets are through-streets, most dwellings face directly on to streets, and all green spaces are wholly public rather than shared by a group. While many other tenets of New

Urbanism – for example, walkable neighbourhoods, mixed land use, and mixed housing types – are laudable, rejection of the cul-de-sac and shared landscape space, such as that described above at St Francis Square, suggest that there is little understanding of the health-promoting aspects of such spaces, especially for children.

In 1971, 80% of children aged seven or eight in the UK were permitted to walk or cycle to school alone; by 1990 that figure had dropped to less than 9%. The numbers are similar in the US. Two positive initiatives in the US encouraging children to walk to school, and thus increasing daily exercise, are Safe Routes to School and the Walking Schoolbus. Safe Routes to School encourages parents, where possible, to walk with their children to school and provides information on pedestrian and bicycle safety.²⁸ The Walking Schoolbus encourages parents to share responsibility for accompanying groups of children to school, and to choose a route where sidewalks are wide enough and where it's easy to cross streets.²⁹

Rejection of the cul-de-sac and shared landscape space suggest there is little understanding of the health-promoting aspects of such spaces

The role of schools

Although the idea of school gardens in the US goes back 100 years or more, a resurgence of the green schoolyards movement occurred in the first decade of the 21st century with the realisation that many children had no idea from where their food came, and that unhealthy diets and lack of exercise were resulting in rising rates of childhood obesity and type 2 diabetes. In his book *Last child in the woods* Richard Louv coined the term 'nature deficit disorder' to describe the inordinate amount of time children spend looking at 'screens', and the diminishing time they spend exposed to nature.³⁰

An increasing number of US children are being diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) and are treated with daily doses of a psychotropic drug. Studies, however, are beginning to show a statistically significant association between access to nature – even a view to greenery through the window – and improved attention functioning. University of Illinois research indicates that children's ADHD symptoms improve after spending even as little as 20 minutes in natural settings.³¹ This provides growing support for a movement to 'green the schoolyard', converting asphalt school grounds into gardens, and designing curricula around these green spaces.³² Perhaps most famous of the green schoolyards is the Edible Schoolyard at King Middle School in Berkeley, California, where children at all grades spend time in the extensive garden, learn to cook healthy dishes in an adjacent kitchen, and serve them in the school cafeteria.³³ The resultant environment may well be helpful to children with ADHD, as well as to those with other disorders – for example, children diagnosed with autism spectrum disorder (ASD). The number of US children diagnosed with ASD has risen alarmingly from 1 in 150 in 2000, to 1 in 68 in 2014. Many autistic children are hyper-sensitive to sensory input (light, noise, glare, etc), all commonly experienced on a typical asphalt schoolyard. Some research indicates that naturalistic settings are more calming for people on the spectrum;³⁴ hence, there is a pressing need for green, quiet spaces where a child can retreat to be alone and feel less 'invaded'.



Scott Shigley

At the Gary Comer Youth Center in Chicago, children grow, harvest and cook herbs and vegetables from the rooftop garden. Designer: Hoerr Schaudt Landscape Architects

The so-called 'grey tsunami' is prompting an urgent need to embrace universal design

Environments for the elderly

In 2010, almost 40 million US adults were 65 and older; it is predicted that by 2050 that figure will have reached almost 90 million. This is the so-called 'grey tsunami', which is prompting an urgent need for cities, neighbourhoods and homes to embrace universal design: one that is accessible to all people, regardless of age or ability, and on all scales. While there is growing emphasis on the appropriate design of senior residential facilities and their open space, most people want to stay in their own homes as they age. A study by the American Association of Retired Persons (AARP) found that 90% of those over 45 wanted to remain living in their own home.³⁵ In other parts of the world, it has been traditional for younger family members to move in with ageing relatives (or vice versa) to take care of them, but with the spread of Western values and changing demographics, residential facilities for seniors are beginning to appear in China, Japan and the Middle East.

The CDC defines ageing in place as "the ability to live in one's own home and community safely, independently and comfortably, regardless of age, income or ability level".³⁶ A number of initiatives has emerged to support ageing in place. The Village model started with Beacon Hill Village, established in Boston in 2001. For an annual fee, members can call on vetted vendors to provide home healthcare and house modifications to promote safety. Volunteers provide help with transportation, shopping and household chores. Programmed social activities create a sense of community. As of 2010, there were 50 fully operational villages with paid administrative staff, and more than 150 in the developmental stage.

Naturally Occurring Retirement Communities (NORCS) are neighbourhoods not specifically designed for older adults but where at least 50% of the residents are age 60 or older. Neighbours are connected with preventative health and social services, leisure activities, and so forth. ▶



Site plan of Village Homes in Davis, California



Susan Rodiek

Whether ageing in place or in a senior-care facility, people want to stay involved in outdoor activities, including gardening

There is a burgeoning interest in community gardens, both in senior facilities and in the community at large

- ▶ Almost 100 NORC programmes have sprung up across the US, generally financed by a mix of local, state and federal dollars, and funds from foundations.³⁷

Co-housing for seniors is a growing movement as older people seek a setting with people of their own age and interests – something more intimate than a commercial retirement community. Groups of elders who want to stay in a particular town or neighbourhood band together to buy land and work with an architect to create their own elder-friendly community. In Davis, California, for example, 12 individuals who knew each other from their Unitarian Universalist Church created their own community, Glacier Circle, by buying land and building eight homes, a common house for shared meals together, and an apartment for a skilled nurse to live in and provide care for the residents.³⁸

Many cities have assisted ageing residents by making their infrastructure more elder-friendly by, for example: providing safe sidewalks and kerb cuts at all intersections for the use of those using wheelchairs or walkers; providing seating at bus stops; and increasing the time allowed for street crossing at traffic lights. Mixed land uses, where shops and other services are within walking distance or easily served by public transport, encourage older people to stay living in their own homes. As people age, muscles lose their strength, joints may become arthritic, and balance may be compromised. Daily exercise is essential and is made more attractive and feasible in such walkable neighbourhoods. It should be noted that – as is often the case with universal design – all of these design enhancements benefit all members of the population, not just the frail elderly.

There is a burgeoning interest in community gardens, both in senior facilities and in the community at large. Many senior facilities have waiting lists for planting beds, which not only provide food but also offer exercise, as well as opportunities to socialise and connect with others, and a general sense of engagement with the world. A study in Alameda, California found that volunteer retirees who did environmental work were half as likely to show depressive symptoms after 20 years, while people who did other forms of volunteering only had their risk lowered by 10%.³⁹

Healthcare facilities

As evidence-based design (EBD) gains traction, so do concepts such as wellness programmes and patient-, family- and even community-centred care. Many facilities are beginning to adopt this salutogenic approach, such as permitting access to their grounds and gardens to the wider community. The McLaren Health Care Village's

four-acre Garden of Healing and Renewal in Clarkston, Michigan was designed as both a healing garden and a public park to serve patients, visitors, staff and the community at large. Funding came primarily from McLaren Health Care Corporation, which also maintains the park. The designers, Professional Engineering Associates, took advantage of the existing wetlands, woodlands, stream and pond, connecting them with a series of pathways and creating small, intimate spaces and larger public gathering spaces. The park appeals to a wide range of groups who use it for exercise, socialising, meeting and relaxing.⁴⁰

An increasing number of healthcare facilities are adopting programmes similar to that implemented by Kaiser Permanente more than two decades ago: community-centred wellness programmes that focus on prevention and healthy living through education, exercise and nutrition. In 2003, Kaiser began holding farmers' markets at their Oakland, California hospital. By 2009, they had more than 30 farmers' markets at medical facilities in four states, and locally grown fruits and vegetables were being used in 23 Kaiser kitchens.⁴¹ Healthcare Without Harm, an international coalition of healthcare organisations, reports that more than 100 US hospitals hold farmers' markets, or even have their own farms, on their grounds; for example, Goodyear Cancer Hospital in Goodyear, Arizona makes use of a 25-acre plot adjacent to the hospital to grow organic fruit and vegetables for the hospital. Patients are invited to harvest the produce, which they can then take back to the hospital to prepare and eat.

'Medical homes' are a relatively new concept in the US, wherein an integrated team provides comprehensive, continuous and coordinated medical and social care for patients of all ages. The Martin Luther King Jr Medical Center Campus in Los Angeles, California is a medical home that incorporates walking and bicycle paths, and community parks and gardens. Gensler principal (Chicago) Sarah Bader says: "It's a holistic approach to healthcare... Instead of focusing on one disease, medical homes focus on the whole body: live healthy, eat healthy, educate healthy... You have to look at a hospital not as an island in the city but how it touches the entire space around it."⁴²

Conclusion

Changes in morbidity and mortality, along with a growing awareness of looming environmental crises, such as global warming, are forcing changes in how health is addressed.

Individuals, non-profit organisations, communities, and government entities are adopting policies and design strategies that follow the salutogenic approach – preventative care on a small and large scale, from the private home to the public park; from the school to the hospital; and from pedestrian pathways to bicycle trails. All of these, when thoughtfully interconnected, comprise the salutogenic city.

Authors

Clare Cooper Marcus Hon. ASLA, MA, MCP is Professor Emerita, at the Departments of Architecture and Landscape Architecture, at the University of California, Berkeley. Naomi A Sachs MLA, ASLA, EDAC, is founding director of Therapeutic Landscapes Network, and a PhD student in Architecture, at Texas A&M University, Center for Health Systems and Design.

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The references to this article can be found in the online version: www.worldhealthdesign.com/Urban-health-The-salutogenic-city



Vegetables for sale at Ballard Sunday Farmers' Market, Ballard, Seattle

Joe Mabai

Catalysts for change

Inventing new solutions to the health problems created by sprawl requires a new thinking and a new kind of city. Catalyst infrastructure projects, such as the Atlanta Beltline, hold the key as they promote experimentation with new ideas that lead to comprehensive changes in the physical form of cities and in people's lifestyle attitudes. *Ryan Gravel* has the full story

A powerful transformation is currently under way in the United States. It's one that will have potentially radical implications for the infrastructure we build and the lifestyles we adopt. Health is likely to become both a leading agent and beneficiary of this change, but this will require the public to see health practitioners as providing more than the mere treatment of disease. As participants in this transformation, we must protect a holistic view of health as "a state of complete physical, mental and social wellbeing".¹ We must also encourage a "salutogenic" design approach that forms healthy places and promotes health through good physical design of the communities in which we live. The merits of this ambition are easy enough to see conceptually and among public-health advocates. However, to achieve a sufficiently broad political momentum capable of carrying out the long-term, sustained, expensive and impactful physical transformation needed in most American cities, health must also be considered an integrated part of a much larger movement that includes



A Parisian boulevard

complementary economic, social and cultural levers for change. Although the likelihood of achieving this momentum may seem improbable, such movements are illustrated many times throughout history and can provide some guidance for us today.

Boulevards of progress

One example is the dramatic renovation of Paris in the mid-1800s. Napoleon III ploughed the city's now-iconic "grand boulevards" through the heart of the medieval city in support of his transformative vision. Their construction destroyed homes and businesses and replaced them with broad avenues on axes with new and existing landmarks. The goal was twofold: they would provide military access into the city's tangled streets to stave off social uprisings, and they would improve health conditions by draining low-lying land and bringing sunlight into formerly narrow streets and other dark spaces. The grand boulevards, of course, accomplished much more than that. They strengthened commerce by providing pavement to improve the movement of wheeled carts and wagons. They conveyed water and sewer for people and a growing economy. They created new public spaces with monuments, fountains and trees. Eventually they brought street lighting, electricity and other utilities; and, starting at the turn of the century, they accommodated an expanding network of underground subways.

The grand boulevards transformed the city, but Paris was only one example. Its renovation was part of a larger movement that reflected a new global standard of progress. Around the world, historic cities were modernised with infrastructure while new cities were designed with an even more rationalised outlook on civic organisation. Pierre L'Enfant's plan of radiating boulevards for Washington DC, for example, predates Napoleon III's renovation of Paris by more than half a century. It offered an idealised vision for how to build new cities from scratch. In contrast, Paris revealed the more common necessity to work within existing conditions. ▶

► The Paris example perhaps best illustrates the role of health in the establishment of a fundamentally new infrastructure for an existing population. Over several decades the city's dramatic renovation would allow Paris to transform into one of the most important and powerful cities in the world. The grand boulevards laid the foundation for the life of the modern city, reorganising land to suit new health and living standards and providing conduits for mobility, utilities and other needs of a burgeoning economy. In the process, along with the unifying architecture of Napoleon III's Second Empire, they bestowed on Paris a distinct and profound physical identity that remains recognisable around the world and continues to support a remarkable cultural life that is fully entangled in the engine of its economy. In short, the physical transformation of Paris catalysed a whole new way of life for its residents, which, alongside other economic, social and cultural improvements, had profound effects on health.

The growth of car culture

The renovation of Paris reflected an evolving cultural perspective of progress that is not dissimilar to other transformations that have taken place under less-authoritarian regimes. In the United States, for example, in the early days before car-dependent "sprawl" took on that name, it was simply called the future. By the second half of the 20th century, Americans had grown dissatisfied with the dirty, violent and overcrowded city centres that were confounded by racial tensions, unregulated industrial pollution, and other problems. They became enamoured instead with a modern lifestyle proposed by cars, highways and other innovations that would allow them to escape the city and enjoy a lifestyle of private green lawns, fresh air, and the open road. This emerging car culture was not an ideology that was forced on them; it is what they wanted. Its momentum emerged incrementally from many sources and over several decades as a logical response to a vexing set of physical and social conditions. New technology and infrastructure simply helped define a compelling vision for a healthier, more satisfying way of life, enabling millions of people to act on a broad cultural desire to get away from the city.

Alongside the concurrent advancement of automobiles, Americans invested in new infrastructure, such as limited-access freeways and parking garages, to support this new technology. They also approved sweeping regulations on the built environment that would protect public health through the physical separation of ►

**Before
car-dependent
"sprawl" took on
that name, it was
simply called the
future**



American sprawl

► land uses. In the process, they created an entirely new way of life that would define urban development in the United States for the remainder of the century. While this lifestyle may be easy to criticise today, it is important to remember that it emerged in a context of broad and visionary cultural transformation. At the very same time, for example, science was curing disease, exploring new energy, and transporting us to the moon. The sexual revolution was breaking down barriers and the Civil Rights movement began its march toward the fulfilment of America's promise. The country's changing cultural perspectives led to landmark changes in public policy of all kinds – from health to human rights to environmental protection.

These new policies also led to dramatic changes in the kind of infrastructure that would be constructed to support American cities. Like the Parisian boulevards, the resulting physical transformation helped reinforce further cultural change. As sprawl lifted millions of families into economic prosperity and successfully eliminated many unhealthy conditions, generations of Americans were born into these new cultural expectations. There is nothing unusual or magical about this cycle. Most of us find ourselves living in conditions that are simply the physical expression of our politics, economy and culture.

What the story of sprawl helps demonstrate is the clear relationship between the infrastructure that we build and the way we live our lives. Infrastructure helps shape our cultural perspectives, but our changing perspectives also shape the decisions we make about the infrastructure that we build. Ideally, this relationship results in the development of places where we want to live, and every investment, from the restoration of the Brooklyn Bridge to the installation of roadside bio-swales, should be considered in this light. Where new or repurposed infrastructure supports a progressive vision for people, it can become a powerful tool in this physical, cultural and political cycle for improving our health and wellbeing.

Infrastructure and its many dimensions

If we want to move forward with a more salutogenic approach to healthy urban development, it is essential that we understand not only the physical nature of infrastructure as a tool for change but also its economic, social and cultural dimensions. These relationships used to be quite natural, but in the United States, they have become blurred by the car-dependent development patterns that are so ubiquitous today. Decades of discontinuity and isolation created by strip malls, outparcels and cul-de-sacs have altered our perspective of the city itself, dissolving the clarity of relationships that once gave coherence and identity to the places where we live. This new perspective has affected our business practices, our social circles, and our politics. Not only that but it has also fundamentally changed the way Americans live their lives. Physically, this new infrastructure has created a lot of new problems. The distances between places and the low-density separation of people by income, age, activity or any other means has resulted in lifestyles for millions of Americans that are completely dependent on cars to do almost anything at all.

The American public is beginning to wake up to the costs of sprawl and car-dependency. The highways that divided urban communities and invaded the countryside a half-century ago represent an enormous capital cost, which has been compounded by the resulting depopulation of magnificent downtowns and the devastation



Many Americans are happily trading big yards and bonus rooms for walkability, bike-share and reliable public transport

of urban economies. Inefficient growth patterns, generated by highways and the free-form mobility of cars, continue to devalue even the older suburbs of sprawl, and the cost to maintain such an unwieldy and inefficient system is becoming increasingly untenable for taxpayers. Additional costs to repair the resulting environmental degradation are matched only by the cost to public health. Chronic diseases, escalating healthcare costs, depression, isolation, injuries and death related to traffic, degraded air and water quality, and eroded social capital are among the health impacts that are amplified by the policies and investments we continue to make in sprawl. The infrastructure of sprawl made America prosper for a generation, but it has now left us socially impoverished, physically disconnected, politically polarised, and highly dependent on an unhealthy, expensive and energy-intensive built environment.

New dangers to health

In the United States, the policies and regulations that created these conditions are based on a 1920s legal interpretation of how best to protect the “health, safety and welfare” of the American public.² This health-focused reading is at the origin of sprawl. It permitted government to limit and separate the use of private land. Slaughterhouses and chemical plants, for example, were moved away from homes and other businesses. This improved public health and was a part of the larger story of 20th century progress and prosperity. Over time, however, the same laws effectively separated everything from everything else. People became dependent on automobiles to travel the great distances between spread-out places, and capital budgets became significantly devoted to constructing and maintaining the only infrastructure that could accommodate that need.

Today, we can recognise a new set of dangers to public health created by those conditions. We can also see that cities are no longer hotbeds for infectious disease or burdened with industrial pollution. In fact, their relative compactness, their options for mobility, and their diversity of social and economic opportunity have created a valuable counterpoint to mounting concerns about sprawl. This reversal suggests that the United States is due for a new legal interpretation of what policies and regulations can best protect the public interest. While the prospect for such a legal challenge may seem unlikely today, it will happen eventually. When it does, it will have enormous implications for the creation of a more salutogenic built environment.

A burgeoning movement

In the meantime, it's a relief for advocates of health and these other issues, to see that the broad cultural movement required to achieve that political goal is already under way. It is driven by a sufficient number of individuals and families changing their minds about sprawl. Unsatisfied, they are redefining their preferences for the future. Entrepreneurial businesses are responding to their new preferences with innovative technology, new housing configurations, and integrated workplaces. Progressive governments are making changes, such as smarter zoning, more transportation options, and integrated land-use solutions, to attract these people and the economic advantage that they represent. In this new cycle of change, the physical attributes of cities are being revitalised and Americans are rediscovering the inherent health, social and economic values that historic communities and other compact places have to offer. Many are happily trading big yards and bonus rooms for walkability, bike-share and reliable public transport. As this cycle continues to build on itself, cities and towns are flourishing, and the opportunity for thoughtful leaders to shape a new generation of policy with a renewed perspective about public health is profound.

Like the early days of sprawl, these changes are not based on any particular ideology. They are simply early indicators of an ongoing physical, cultural and ultimately political transformation that will have meaningful impacts for our future, including human health and wellbeing. For those of us who welcome these changes, we don't need to argue about their semantics. We simply need to identify the levers of this powerful and positive cultural paradigm, harness its energy, and leverage its momentum to fuel a new cycle of transformation in support of our common goal for healthier, more prosperous, and environmentally sustainable places to live.

Some communities are actively doing this already by investing in innovative, strategic non-partisan public works projects that help cultivate a more progressive momentum toward the future before having to fully address the political challenges of change. These new infrastructure projects are not only beginning the physical transformation required ▶



Smarter zoning, more transportation options, and integrated land-use solutions are all part of a new and developing definition of what constitutes public health

The US is due for a new legal interpretation of what policies and regulations can best protect the public interest



Until recently, the Los Angeles River had disappeared from public consciousness

People are refashioning the forgotten corners of their communities into healthy, sustainable places

the sprawling metropolis, but they do demonstrate strategies that can be applied to other areas and, over time, make comprehensive changes more politically palatable. Whether they are complex regional proposals, such as those for the Los Angeles River, city-scale investments such as the Calle 30 in Madrid, or district-scale projects such as the High Line in New York City, these repurposed infrastructures are not only transforming the physical form of their cities but they're also changing our expectations for how we want to live and how our physical environment should be built. Even in the early stages of implementation, they are demonstrating how the creative re-use of abandoned railroads, industrialised riverfronts, gridlocked freeways, and channelised waterways can become renewed conduits of a healthier urban life.

The Atlanta Beltline

In this light, it seems appropriate that one of the most innovative and comprehensive experiments of this type can be found in one of the least-salutogenic metropolitan growth machines in North America. The Atlanta Beltline is a \$3 billion public-private initiative in the early stages of implementation. It transforms a 35km loop of old railroads circling downtown into a linear park with light rail transit and bicycle and pedestrian trails that connect more than 40 diverse neighbourhoods, as well as city schools, historic and cultural sites, shopping districts, and public parks. In the process, it organises more than 1,600 hectares (4,000 acres) of adjacent underused industrial land for transit-oriented development, expands transit service within the urban core, and connects various parts of an emerging regional trail system.

The thesis³ that began the Atlanta Beltline was just an idea, but it gave city residents a vision for their future that was brighter than what they saw through their car windshields. Beginning in the summer of 2001, it was brought to life by a broad ▶

▶ to attract future residents and jobs but they are also catalysing a cultural shift in thinking about the kinds of policies and infrastructure in which we should be investing. Interestingly, they can be discovered in nearly every corner of the world, and their concurrent emergence, outside any common ideology, suggests they are part of a larger movement under way.

The Los Angeles River

Take the case of the Los Angeles River, which gave the city its original reason for being and nourished its early cultural life and economy. By the time local industry began shifting from rail to trucks for the shipping of goods and supplies, the once-wild river had already been hemmed in by railroads and industrial zones, and had already been channelised to control flooding over the course of its full 51 miles, from the San Fernando Valley to the port at Long Beach. The public had largely

forgotten about their river, and their gaze was on a future elsewhere driven by automobiles. Their indifference allowed the ugly concrete "river" to disappear from consciousness and become further degraded by highways, high-power transmission lines, and other transgressions.

Fast forward to today, and a new generation has rediscovered the river and is fighting to reposition it, once again, as a central part of a more sustainable vision for Los Angeles. In a collaborative and grassroots kind of way, the people of Los Angeles are not only proposing significant changes to the physical infrastructure of the river but they are also reinserting the river back into the public consciousness, and challenging the public to rethink their decisions about the places where they live, work and play.

There are examples of similar catalyst infrastructure projects all around us. Absent a larger vision, people are taking matters into their own hands, refashioning the forgotten corners of their communities into healthy, sustainable places where they actually want to live. By themselves, these projects cannot resolve the dramatic deficiencies of

► grassroots movement, which, over the next three years, was built around an unlikely coalition of community activists, private developers, and environmental groups. They were surprised to find themselves at the same table demanding the same outcome. Their collective efforts got the attention of elected officials, civic leaders, and regional planners, and they brought in other partners to help implement their vision. Together this broad, organic coalition has retained ownership of the project's vision and continues to hold the implementing agencies accountable for the project's integrity.

It cannot be overstated that the most powerful players in this coalition's success were the average citizens, neighbourhood groups, and local non-profits who believed in the Atlanta Beltline before anyone else. They made it their own, offering energy to the movement and demanding that local officials and agencies take notice. By 2004, they authored the expansion of the original concept far beyond what was thought possible. In addition to its core vision of transit and trails, economic development and neighbourhood revitalisation, the expanding physical scope now includes 1,400 acres of new parks, the largest affordable housing initiative in the city's history, and the longest arboretum in the country. The project's vision continues to expand today with new initiatives in art, food, sport and business.

Deliberate attention to public health coalesced through a health impact assessment in 2007. Recommendations from this report encompassed a wide range of issues, such as the timing of implementation, the integration of the project with other city systems, its design for all users, and the inclusion of those users throughout the decision-making and implementation process.

An equitable vision

In addition to the more obvious health impacts such as physical activity, safety, and social capital, of particular importance for Atlanta are the issues of access and social equity. To this end the report "evaluates the degree to which access to parks, trails, transit and redevelopment meet the needs of the existing and future population, and whether improved access and the resulting health benefits are equitably distributed geographically and demographically".⁴

Strategic new investments continue to fulfil this obligation to equitable implementation because it is embedded soundly in the public's original vision. The project is still in the early stages of implementation, but extensions of the Eastside and Westside Trails into underserved communities will break ground later this year. Looking ahead over the next 15 years, the list of projects to come promises even more substantive changes. Old railroads that historically acted as barriers between neighbourhoods are being reinvented as new public meeting grounds and are supporting the revitalisation of existing communities, more than half of which have suffered decades of disinvestment. The city's park system will be expanded by as much as 40% along a connected network of greenways that link recreational facilities, such as ball fields and swimming pools, to neighbourhoods that have none. Similarly, the transit corridor will expand the region's rail network by more than 40%, and together, this new infrastructure will improve public health by reducing dependency on cars, improving traffic-free access to schools and fresh food, and dramatically increasing options for daily physical activity.

While much of this physical transformation is in the future, its impacts are already visible. Today, the Atlanta Beltline offers three new parks with several more in development. There are 8km of permanent multi-use trails, and nearly another 8km of interim-use hiking trails. Atlanta's first modern streetcar will begin operation this fall and its first expansion will enter the Atlanta Beltline corridor in just a few years. With more than \$350 million of public and private money spent since 2005 on land acquisition, parks, and trail construction, more than \$1 billion in private-sector redevelopment has come to the corridor during the same timeframe. This includes new housing, retail and office uses that provide jobs and amenities where there weren't any – building the case for additional investment in project implementation.

The relatively modest completion of the first section of mainline trail is proving the project's ►



Ralph Daniel Dobbs

Top: The Eastside Trail before rail removal and construction. Photo credits: Ralph Daniel Dobbs
Bottom: The Eastside Trail today

The Atlanta Beltline was brought to life by a broad grassroots movement



The Atlanta Beltline before, 2009

► early promise by changing the way that people live in the half-dozen neighbourhoods along its route. The 3.2km Eastside Trail has become a magnet for recreation, offering walkers, runners, cyclists and skaters an enjoyable social connector for daily exercise. It is also filled with people going places. It's a commuting route to work, the grocery store, restaurants and shopping. People are organising their lives around the corridor, and this demand is attracting major private investments. In 2015, Ponce City Market will open on an adjacent site, transforming a 195,000 square metre (2 million square foot) historic architectural behemoth into a mixed-use redevelopment that includes a huge market hall modelled on Chelsea Market in New York City. With office and residential leases already filling up, the symbiotic relationship between the infrastructures we build and the construction of our way of life has never been so clear. Every new physical investment reinforces changing cultural preferences, which further empowers leaders to improve public policy, which ultimately will impact a much larger area than the physical project itself.

Buoyed by this evidence of success, the Atlanta Beltline is changing the region's cultural expectations for itself and providing the opportunity for a new way of life. Success is reinforcing a new cultural momentum. Like the grand boulevards did for Paris, the Atlanta Beltline is defining a new civic identity, which is built around diverse, revitalised communities, vibrant local economies, and renewed attention to the role of the built environment in our personal health and wellbeing.

Building momentum

Of course Atlanta's story is only one example of our changing cultural momentum that, over the coming decades, will have fairly radical implications for the infrastructure we build and the lifestyles it supports. Looking more broadly at what this seismic shift might mean for the places where we live, we can see that existing urban areas with compact, walkable and transit-oriented districts are inherently better positioned to benefit. They already offer much of what this new American perspective is seeking. Catalyst infrastructure projects such as the Atlanta Beltline or the Los Angeles River revitalisation offer urban areas a strategic opportunity to take advantage of this new paradigm and build momentum toward an even brighter future. In addition to economic, social, and cultural improvements, most cities are sure to see positive outcomes for public health.

In contrast, many car-dependent areas of those same regions will not be so lucky. As America begins to deal with the true costs of sprawl, the challenges here will be suffocating. Characteristics such as geographic isolation, demographic homogeneity, and visual uniformity – previously considered to be advantages – will begin to threaten the economic value of real estate stuck in sprawl. As people with

The Atlanta Beltline is defining a new civic identity





The Atlanta Beltline now, 2013



The Atlanta Beltline future

resources and choice gravitate toward city centres, the ultimate burden of sprawl will fall disproportionately on the poor, who will have little choice but to move there. With insufficient buying power from this new population, retail and other services will decay, making the distance between things even greater. With rising costs of car ownership, and with no real hope of effective transit service, a very bleak scenario for their future is not hard to imagine. The negative consequences for these communities will be economic, social and cultural, and will include severe effects on health.

To get ahead of this decline and ensure that these communities remain a thriving part of our future, we need a catalyst to jolt us from our obsession with automobiles. We need to transform communities from places that are built for cars into places that are made for people. This will require a sustained political momentum to generate a long-term, expensive and impactful physical transformation. Advocates for health will be leading partners in this effort, integrating health as an essential part of a much larger movement that includes complementary economic, social and cultural levers for change.

Inventing new solutions to the problems created by sprawl will require a new thinking and ultimately a new kind of city. If we build an inclusive movement, develop a compelling vision, and act on innovative ideas, we can achieve a healthier, more prosperous and more satisfying way of life. This is the real power of catalyst infrastructure projects; they allow us to experiment with new ideas that lead to more comprehensive changes. In the process, they are not only changing the physical form of cities but they are also changing the way we think about the places where we live and the decisions that we make about living. Our cultural momentum is already working toward this goal. All we need to do is grab hold of it and engage more fully in the politics of change.

Ryan Gravel AICP is senior urban designer at Perkins+Will

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Bedroom blessings

There is growing recognition of the role that design can play in alleviating many of the psychological problems from which people suffer. A place of sanctuary, privacy and rest, the patient bedroom is a natural starting point

A quarter of the British adult population experiences at least one diagnosable mental health problem in any one year, according to widely reported figures. Beset with an ageing population, who are particularly at risk of mental illness, the country is beginning to focus attention not only on organisational efficiencies, safety and security but also on how the built environment can help people with mental health problems recover in a dignified setting and find ways to cope with their challenges.

In line with this shift in thinking, the better bedroom initiative (BBI) was launched two years ago. Led by the Design in Mental Health Network (DIMHN), the project's focal point is a concept bedroom, the first design of which resides at the Warrington offices of Britplas, a UK doors and windows manufacturer with expertise in the healthcare market. The mock-up room offers a showcase for innovation in product technology and design to encourage architects, designers, manufacturers and NHS commissioning staff to think more creatively about how the bedroom environment in adult mental health units can assist recovery.

In the beginning

The birth of the project can be explained by a combination of timing and serendipity. Britplas had never been involved in any mental health projects before the Rathbone Hospital new-build – a flagship facility in Liverpool (completed in August 2006). The hospital's project manager was a childhood friend of Britplas' chair Kevin Gorman and, struggling to find a suitable window option, he asked Gorman if he could devise a solution. The result was Britplas' Safevent window.

Seconded to work on the project to represent the views of service-users, Joe Forster also happened to be a member of the Design in Mental Health Network (DIMHN), an organisation that champions good practice in mental health design. Shortly after working with Forster on the Rathbone project, Gorman himself joined the DIMHN, eventually becoming a director, with Forster appointed chair.

Gorman explains: "Whenever a new hospital is built, the doors open and everybody rushes to see the new innovations and ideas to inform their own projects. However, everything in a new hospital has invariably been specified years previously – usually from seeing another 'new' hospital. This is actually a hindrance to innovation."

He continues: "On moving to our [Britplas'] new premises in 2011 I came up with the idea of the better bedroom initiative as a way to use our huge showroom in a positive way and provide a platform for the DIMHN to showcase progressive designs and innovations."

"These products should be the very best of their kind. Should another more innovative and effective product come along that is a genuinely new idea, not just a copy, then that will replace the existing item and spur companies on to create better products and drive excellence."

Having bought into the idea, the DIMHN set about building an experienced team to give it credibility. Jenny Gill, who advises on planning for mental health hospitals, was brought in to lead the initiative, and Laing O'Rourke's Gerald Smith, one of the UK's most experienced healthcare design managers, was asked to manage the project. Andrew Arnold of Gilling Dod Architects was tasked with the room design, and the team devised a room that was compliant with the HBN 03-01 standard on adult acute mental health units. "When we were speaking to the network at the time we had just been on site with a project called Discovery House in Lincoln," says Arnold. "We said we'd use that bedroom design, which is where we were as of then, but the intention was only ever going to be for it to be a starting point."



The better bedroom mock-up unit can be viewed at Britplas' offices in Warrington

Gilling Dod Architects



Aerial shot of the better bedroom concept

Gilling Dod Architects

To ensure the room was truly innovative and to maintain independence, manufacturers were invited to pitch products in the style of the UK TV show *Dragon's Den*, with the aim of having them selected.

Healing properties

During his career, Smith has seen for himself how the patient environment can support the healing process if designed effectively. He explains that while working on Rathbone Hospital, patients who had been moved off site during construction would intermittently visit the site and get involved in choosing colour schemes and materials.

"Those patients were seen to have less issues, the amount of drugs they were taking was greatly reduced and they were quicker moving back into society," he says. "The better the environment for any patient, whether they've got a mental or medical problem, the more it's going to help that person recuperate faster."

Gorman agrees: "Some of the decisions that have been made in the past have



The Safevent window offers safety and natural ventilation

resulted in what has been described as warehousing people and feeding them drugs, instead of thinking about the building as medicine. That's the difference here with the DIMHN."

The BBI is not just a product of its time but has also acted as a catalyst to encourage discussion about the salutogenic potential of the healthcare environment. "In mental health, the design aesthetic had always been secondary and people would accept what was out there," says Alan Towns, managing director of Knightsbridge Furniture, one of the product suppliers for the bedroom. "But now the interior aspect of mental health schemes has improved enormously."

As an example Joe Forster cites carpets, which have traditionally not been used in mental health owing to preconceptions around infection control. "End-users like carpet because it's more friendly, it's a nicer environment, and it feels more like home. Carpet manufacturers are now realising that if they emphasise the cleanability of their products and educate on cleaning methods, they can get their products accepted where they couldn't before. It's keeping the industry on its toes, and nudging people to get things improved."

Offering another example, Smith remarks: "Part of the healing process for this bedroom, and it's probably a one-off because of the window used, surrounds patients' need for natural ventilation. That window gives natural ventilation and complies with the Building Regulations' requirements for natural ventilation (depending on the size of the window and size of the room). It also saves energy."

Challenging the status quo

Central to the initiative is that it's the *better* bedroom, not the *best* bedroom. Its aims are to challenge conventional thinking about the mental health environment, to promote innovation and excellence, and to move the discussion away from one dominated by restraint and risk to one that is focused on recuperation and healing.

Gorman explains: "We're not dictating to anybody; we're not telling them this is how to build it. It's a tool that they haven't got at present."

"If you put carpet down it's not saying that from now on every bedroom in mental health will have a carpet, but it's a challenge. If you don't put it in, nobody will question it. So put in things that challenge and say where they can be used and where they can't be used."

We're not dictating to anybody; we're not telling them this is how to build it



Altro's Whiterock can incorporate colourful, artistic elements to help enhance the aesthetic of the en-suite bathroom

"The bedroom in a mental health facility is where the patient is probably most vulnerable," says Towns. "If they're out in other areas of the building, there tends to be staff around to supervise, but in the bedroom, someone is alone, they could self-harm and they could find their whole behaviour changing. That's where the bedroom environment can support the healing process, and, at the same time, provide a safe environment for staff and patients."

The project sits well in a culture increasingly looking at how traditional aspects of safety and security can be delivered in ways that don't detract from patients' wellbeing. "If there's a risk-averse culture there are always going to be compromises in design because you end up more custodial," says Arnold. "Bed position in the better bedroom is very much line of sight, control and restraint, and being able to see from the door, so a secure service would say 'that's great', whereas if we're going on pure design and borrowing from the hotel sector you'd be able to open your eyes and see the trees and birds outside when you wake up. Our bed is by the door so it reaffirms that you're behind a door. Little things like that are what these sorts of forums are about because the bedroom is the ultimate personal space."

Smith points out that one trust's perception of safe often differs from another's viewpoint. Again, using Rathbone Hospital as an example, he explains how the hospital's design features a main corridor called 'Easy Street', which acts as a meeting point for patients, staff and visitors and includes snooker tables, televisions, music equipment, etc. Whereas one trust might shy away from the idea of 'arming' a patient with potential weapons like snooker balls and cues, the philosophy of Rathbone is to manage the patients and provide them with an enjoyable environment, cutting down their level of medication, and allowing them to integrate with each other.

Says Smith: "You can build a better bedroom but you can have people from a trust who say 'we don't use that product', and because it's new, they don't want to trial it, possibly in case something goes wrong, someone gets hurt, and they [take the blame]."

So, while some might balk at the idea of allowing freestanding entertainment equipment, with wires that might present a ligature risk, the alternative of boxing everything up might trigger undesired behaviours. Smith explains: "By protecting it, you're challenging patients. If there's something they can't break, they're going to say 'I'm going to prove you wrong and I'll do my best at having a go at breaking it.'" Adrian Maddock, a specification consultant with Altro, which has provided anti-slip flooring and wall coverings for the BBI, says: "What's interesting is that when they're designing mental health facilities now, they actually have patient representatives as part of the design team – it's now standard practice. They say 'we want an environment in which we feel happy and safe, we'll respect, and which makes us feel better:'"

Unleashing innovation

While various British and European standards exist to test products against criteria (for example, in anti-slip flooring), there remains a gap, according to Gorman, in mental health. Many of the safety tests carried out in mental

If there's a risk-averse culture there are always going to be compromises

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Products meet the needs of a wide group of male mental health patients

health are somewhat 'bespoke', with people replicating what they've seen patients do to equipment. But comparing products for the mental health environment is difficult owing to the lack of a uniform testing regime.

To address this problem, moves are under way between the DIMHN and the Building Research Establishment (BRE) to introduce a standard that will bring some clarity to testing. It is also hoped that this will assist in procurement decisions and stimulate innovation.

Gorman comments: "If there's a recognised, independent test that makes the decision an easy one, so someone can say 'yes, we can have that', then what you get is better products. Everyone else will have to get that standard approval if they want to make the specification, and their product might fail, so then they have to make their product better."

Consistency should bring commercial benefits for manufacturers as well as taxpayers, freeing up more resource for product development. "We have done tests where there are 30 people in a room all on wages paid for by the UK taxpayer," Gorman says. "That costs millions of pounds a year, yet every project is doing the same thing and aren't really finding anything that's scientific."

Another factor that can suppress innovation is today's culture of demanding greater cost efficiencies. While this may have advantages, if obsessed about it can encourage over-standardisation, or there is a risk that minimum standards become the accepted norm. The non-standard components included in the BBI room can help counter this culture. Moreover, with many different types of mental illness and various levels, behavioural triggers and risk groups to consider, the non-standard approach helps clients think about the risks and potential of the environment to support healing rather than accept what they're told.

"What is in there is a vanilla package if you like," Towns points out. "It meets the criteria for a wide group of male patients in a mental health unit. But when you need specifics and you need specialities, whether it is for really challenging autistic behaviour or acute dementia, no, it's not appropriate. Elements of it will be, but there would need to be changes."

Unwanted surprises

The tangible nature of the room helps bring those who see it back to first principles, adds Forster: "If you see it on a plan you see it as a component and start analysing it, but if you walk into the room, people get that feel and first impression, and that's their starting point."

Smith agrees, adding that it limits the potential for design mistakes through incorrect product selection. Lamenting such errors, which result in changes to design specification late on in a project or after handover, he says: "Patients are being brought into A&E and the contractor might be altering the back of the building, which has only just been handed over. If more people can see what you've got on offer up front, before you make a decision, all the better."

"It's a great way to think about it," adds Towns. "How much cash has the better bedroom saved people in terms of design-process thought and ongoing revenue costs, reduced medication costs, shortcutting the whole process, and getting it right first time? I'd also argue that it makes the product lifecycle shorter as well. You're giving away a bit of intellectual property (IP) quicker than you generally would. Your competitors might pick things up from exhibitions or sites that you've worked on but because it's on display here, you're more or less giving away a bit of IP."

Future ambitions

So far, 600 people have visited the concept and many have fed back their comments to help inform the design's development. The design has already undergone three updates and has even helped inform the work of ProCure21+ – the NHS procurement framework agreement – in exploring how to reduce construction costs and operational efficiency through standardisation.

The DIMHN recently launched the better bedroom 2 initiative, which will be led by Matthew Balaam of Oxford Architects (see x-xi), while the original project has also gained international attention, with moves under way to set up similar mock-up units in other countries. The ambition, says Gorman, is to have better bedrooms all over the world, which can all be visited virtually and explored on the internet, to stimulate more innovation.

"With change, sometimes people feel there are compromises to be made," says Gorman. "That's not necessarily true. Usually it sets off another set of dominoes. If you're working in the right direction you tend to get spin-offs in further innovation."

"Innovation has to come from direct involvement: 'here's my issue,'" concludes Towns. "Someone has to give you the problem, otherwise it just doesn't happen!"

Design in Mental Health Network Better Bedroom 1 Team

Network chair: Joe Forster
Project lead: Jenny Gill
Project manager: Gerald Smith, Laing O'Rourke
Architect: Andrew Arnold,
Gilling Dod Architects

Key product suppliers
Doors and windows: Britplas
Door ironmongery/security: Primera Life
Bed/furniture: Knightsbridge Furniture
Safety flooring/wall coverings: Altro

Innovations that challenge

With its focus on innovation, the better bedroom strives to challenge conventional thinking about mental health environments and issues of safety, security, dignity and privacy

Chair of the DIMHN Joe Forster believes the better bedroom is opening up a debate about how management and design considerations interact, so that safety and healing are not in conflict but in support of each other. He explains. "It's an interesting argument that the role of the staff in managing the environment is more important than the environment itself, but there's a different viewpoint, which is how can the environment support staff as well as patients. If you rely too much on one or the other – a completely safe environment so the staff take their eye off the ball, or an unsafe environment so the staff have to spend all their time managing safety – then you lose something."

Healing-supporting components that pay close attention to issues of safety and dignity are a strong feature of the products contained within the bedroom, a snapshot of which are detailed below.



Safevent windows were installed at Discovery House in Lincoln

Britplas

Addressing concerns over the provision of safe, anti-ligature environments for mental health patients, the Safevent window from Britplas was first conceived for the new Rathbone Hospital, a psychiatric facility in Liverpool.

Comprising a double-fronted window and a free-sliding sash, the window has one glazed area while the other is fitted with a stainless steel mesh that is hardly noticeable and so delivers security in a sensitive fashion.

The product is anti-ligature but allows full natural ventilation. It is said to be the first window to overcome the 100mm restriction laid down in UK Building Regulations, a fact that has led to it winning multiple awards. It also prevents the passing of contraband to residents from outside.

"Every component can withstand heavy attack," says Britplas' chair Kevin Gorman. "This is the number-one window in mental health and has been tested and passed for use in the UK and around the world."

Therapeutically, as well as providing natural light, Safevent windows are said to achieve fresh air supplies ten times that of existing restricted windows (WSP report), while halving CO2 levels. The windows can also eliminate the need for large air-conditioning units, minimising environmental impact.

Says Gerry Smith, project manager of the BBI: "The window gives patients the natural ventilation they require and complies with the Building Regulations' requirements for natural ventilation (depending on the size of the window and size of the room). It also saves energy."

Altro

The link between safety and healing is highlighted by Adrian Maddock, a specification consultant with Altro, when commenting on the Whiterock wall cladding in the mock-up room: "We promote safety, hygiene and sustainability – that's our strapline. What you've got in the better bedroom, although it's decorative and healing, it ticks all those three boxes as well."

Altro says Whiterock requires no grout, so dirt and bacteria can't accumulate, while water can't seep through to the substrate behind and cause structural damage.

"We work very closely with Stirling University's Dementia Services Development Centre to develop products and colour schemes that are dementia-friendly," says Maddock. "In terms of colour and contrast, Whiterock has been developed to have different finishes. We have a gloss finish, which you can't use in dementia units as it's a reflective surface, and there is a satin finish, which can be used for dementia."

Digital prints can also be incorporated, which de-institutionalise the environment and can act as artistic healing elements or help trigger memories. Indeed, at a dementia unit at Sunderland's Monkwearmouth Hospital, Altro helped design a digitally enhanced wall with a map of the local area – providing a conversation point, enhancing the interior and aiding the healing process.

Safety flooring is polyurethane reinforced for cleanability, and there are no aggregates that make the floor sparkly – a factor that can cause agitation among residents or look like something that can be picked up, risking them injury.



Altro Whiterock Digiclad at Salisbury Hospital's dementia unit



Britplas and Primera Life

Featuring the Primera PassPort, a robust, anti-ligature access-control door lock from Primera Life, the SafeSee door from Britplas resolves several problems in mental health settings.

One is the restricted view provided by, and noise generated from, sliding-glass observation panels. The SafeSee door provides staff an unrestricted view, without disturbing the patient's sleep, by deploying their access-control card, which signals the viewing panel's electronic glass to change from opaque to transparent, allowing observation. The procedure can also flood the bedroom with red light to give staff a better view of the patient without disturbing them. Details of the time and staff member carrying out the check are electronically logged, providing an auditable record should an investigation be required.

In mental health units doors generally open outwards to prevent barricade situations, but, because an outwardly opening door can be used to strike passers-by, an inwardly opening door is preferred. While giving the service-user full control over their bedroom door by allowing it to open inwards, the PassPort system is also housed on the outside of the door, reducing the potential for tampering without staff noticing. The SafeSee door requires no tools to open the door outwards and gives staff safe, instant entry using their access-control card. Eliminating the need to break down the door to gain entry also allows the use of stronger materials to be used in its construction, enhancing its lifespan.

The door also deals with ligature risk. "People have tried to come up with an anti-ligature door but, so far, they haven't been able to," says Britplas' Kevin Gorman. "The next best thing is to know when a ligature incident is taking place. We've made the whole door a set of scales, so whatever weight you put on the door it is registered."

For an adult male population, for example, you might want to know when there is, say, a 40kg weight on the door but you don't want false alarms, so you might set it to activate after eight seconds. Similarly, some patients might jam a towel under the door and start 'crocodilling' – a process where they roll over and over as the towel tightens round their neck. In this situation, the door can be programmed to raise an alarm if, say, 2kg is taken off the door for, maybe, six seconds.

The door won a Design & Health Academy Award for product innovation in 2013.

Knightsbridge Furniture

Based on a 250,000 sq ft site in Bradford, Yorkshire, Knightsbridge Furniture provided the wardrobes, drawers, seating and bed for the better bedroom demonstration room.

Explaining how he got involved in the initiative, managing director Alan Towns says: "We'd just completed one of the UK's largest mental health facilities, the State Hospital in Carstairs, Scotland, with 156 bedrooms. We were selected through a design and tender process above 10 different companies and the DIMHN asked us to submit some products."

Made using anti-microbial vinyl, the seating has no gaps where items could be concealed. There are two types in the showroom: a Hula armchair with back support weighing about 70kg; and a light, cylindrical foam-based design. Says Towns: "Clients tell us that items should be heavy enough so that they can't be lifted and thrown, or light enough so no one will be harmed if they are thrown."

The wardrobe incorporates vertical dividers to stop patients hiding, while the shelving is slanted up for anti-ligature. Light back panels contrast with darker wooden shelves and dividers, helping those with visual difficulties.

Although it is locked, storage space above the wardrobe can hold a patient's possessions. "They might not be able to have their iPad without supervision but they can see that it's in their bedroom and no one is tampering with it," explains Towns. A safe is also available to hold drugs for supervised self-medication, while drawers have anti-ligature inset handles and are fixed so they can't be pulled out.

The bed itself rests on a frame that slants backwards, which not only prevents a patient from concealing things underneath it but also assists those with mobility problems to get in and out of bed.

Commenting on what the company has gained out of its involvement with the BBI, Towns said: "It's aligned us with specialist mental health units at the beginning rather than at the end. We have far more discussion now with architects and designers."

Towns also credits involvement with a strategic change in encouraging him to introduce BIM files for all products, so that architects can drag them from the company's website and drop them on to their plans with ease.



Roomset featuring Knightsbridge's Hardy bed and fitted furniture

Here comes the sequel

The follow-up to the better bedroom initiative is now under way with a second concept room to be built in the south of England within a 'live' hospital



The current layout at Sussex Partnership NHSFT



Room configuration: Option appraisal A

Taking things to the next level, Sussex Partnership NHS Foundation Trust has agreed for two mock-up bedrooms to be created within a 10-bed ward refurbishment in Worthing: one bedroom will be a ProCure21+ (P21+) repeatable room focused on standardisation, which has in fact been informed by the first better bedroom; the other will be the DIMHN's better bedroom 2 (BB2), which will be managed by Matthew Balaam of Oxford Architects.

Building on the principles of the better bedroom 1, Balaam underlines the importance of designing something therapeutic, though he admits that the delicate balance of design and management factors that converge in mental healthcare can lead to opposition from some quarters. He says: "The frustrating thing is you talk to other ward managers and they say 'no, we want it to feel institutional because we want patients to know they're in hospital and know they're here to be made better.'"

Jenny Gill, who led on better bedroom 1 and will also help project-manage the second bedroom, echoes Balaam's sentiment, adding: "In healthcare planning we've gone from homely and comfortable to a more clinical environment, which isn't conducive to recovery. The clinical aspect has largely been driven by infection control and is still doing so."

Today's innovation, tomorrow's standardisation

Setting a 'standardised' room alongside an 'innovation' room is an intriguing development, as "the innovation of today is the standardisation of tomorrow," according to Gill. "We're all after the same ends, which is to deliver something in the best interest of the service-users."

The same objectives as the first scheme will still apply: to create a familiar homely environment; to stimulate and encourage development of better products; to move forward the debate on anti-ligature fixtures and fittings; and to use the latest technology.

Highlighting the difficulties with the Sussex trust's current ward configuration, Balaam explains: "The existing ward layout is typical of most residential accommodation from the 1990s, presenting similar challenges such as restricted sightlines, poor lighting and an institutional feel."

The better bedroom 2 layout will be the same for the P21+ repeatable rooms initiative, as Balaam wanted to avoid having two different factions that could confuse future delivery. "Joined-up thinking is the best approach to take, where I'm fuelling the P21+ repeatable rooms initiative in the future but also striving for innovation," he explains. In keeping with this strategy, and to challenge the P21+ and DIMHN teams, it was agreed, following appraisal of a number of options (see plans), that they would both adopt a smaller functional bedroom configuration (option D). This approach also allows the components used in the better bedroom 2 to be easily dropped into the P21+ room at a later date, if necessary, without them having to be redesigned.

Defensible space

Balaam himself is keen to explore new ways to empower service-users and give them an added sense of control over their environment, concentrating on defensible space for the service-user:

"I would really like to challenge where personal space within the room starts, introducing the door threshold within the corridor; thus delineating the space between public and private outside of the room," he says. "Artwork, door personalisation and



Room configuration: Option appraisal B

quicker than they would if it was a traditional-style room. The more homely and the more caring the room design is, the more it makes people relax and open out."

Other component issues under consideration include: the adaptation of the bed base to assist in getting out of bed; the tapered en-suite and wardrobe configuration to improve sight lines; and the vanity unit within the bathroom to create a more hotel-style approach.

Two bed options are also being considered, one being the swing bed. This gives the service-user the opportunity to have their bed configured in two different orientations, which not only empowers the service-user; giving them a feeling they can make a difference to their own room, but it also improves access if the service-user has any disabilities. Balaam adds: "If someone could develop flush, lockable floor sockets, which could be installed within the bedroom floor; this may allow us to develop a robust lightweight bed, which can be moved by staff members, configured to the requirements of the service-user, and then firmly secured to the floor."

The other option is the peninsula bed; generally used in high-secure hospitals, this allows staff members to access both sides of the bed.

Collaboration and competition

Balaam hopes that the same collaborative spirit from better bedroom 1 can be transferred to the new project. He stresses that the focus is not to be different to the original project but to use the best and latest products available, as this is the only way to encourage innovation and spur manufacturers to better their competitors' products. It may be the case, he concedes, that the same products are used in the new scheme as the original, "if it is the best product and the one that is most cost-effective", but, equally, he wants to give "everyone a true shot at this because it should be a real privilege to showcase their products in the bedroom".

"The better bedroom 2 is looking to promote innovation," he concludes. "Innovation within residential care facilities can be broken into three key areas – configuration, components and management – and it's important that we promote and challenge all three to ensure we are doing our job correctly."

In setting up these demonstration rooms, the team is again holding 'Dragon's Den-style' competition days, with products due to be selected in November; and final installations complete by May 2015. The deadline for product applications is 31 October – see www.dimhn.org/better-bedroom

corridor light will all have to be considered together to ensure that service-users can call the bedroom their own."

The hope is that this will have an impact on staff management in a way that will be beneficial to the service-user. Balaam explains: "When the staff member goes to the front door, they will knock. By having a change in the floor covering they will [be prompted to] ask to come into the room, and the service-user can say 'yes' or even 'no' if they wish. Also, by encroaching [the resident's space] into the corridor, the service-user can then use the outside of the door to personalise their area."

He goes on to explain the importance of designing in areas to sit, in order to encourage residents to open out and communicate their problems and challenges to staff or family members.

"If you have a window seat and a sofa, it gives you options of where to sit," he remarks. "If you can provide an impromptu place to sit, sometimes you can get people to open out far



Room configuration: Option appraisal C



Room configuration: Option appraisal D (Final)



The BB2 will explore the idea of service-users' defensible space

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Communal emphasis

Clitheroe Community Hospital in Lancashire has started to move patients into its £7.8 million new primary-care facility, designed by IBI Group.

The modern, therapeutic building is said to be clinically efficient in supporting staff to deliver a high service to patients in need of 24-hour nursing care.

“The new hospital provides a two-storey purpose-built environment that is dementia-friendly,” says Nick Prole, senior architect at IBI Group. “Patients benefit from views out on to the surrounding landscape, optimised natural light, intuitive wayfinding, and significant communal space, including an external exercise therapy area that doubles up as an al fresco dining room.”

The inpatient department features 16 individual en-suite bedrooms and four four-bed bays, which can be converted into single bedrooms if required. These bays are said to provide greater privacy and personal space for patients, reducing cross infection and improving observation by nursing staff.

Delivered with the help of East Lancashire Building Partnership, and built by Eric Wright Construction, the new hospital is designed to achieve a BREEAM ‘Excellent’ sustainability rating and includes the following facilities: outpatient department and consultation rooms; specialist dentistry unit; physiotherapy and occupational-therapy facilities; a restaurant; and Clitheroe’s new ambulance station.



and collaboration across the campus. A new parkland setting surrounding the building will feature open green spaces organised around a pond, connecting patients, family and staff to nature and supporting the healing process.

The hospital’s layout will support Papworth Hospital NHS Foundation Trust’s model of care by creating discrete zones for ambulatory care, emergency services, and diagnostic and treatment functions. The separation of these areas creates an environment that will be easy to navigate, while streamlining admissions and enabling efficient patient transfers.

Each inpatient floor incorporates two nursing units. The innovative double-corridor design results in a compact, accessible layout with reduced travel distances and direct sightlines to all patients from nurses’ stations. This approach facilitates patient privacy and dignity while enhancing patient safety and maximising daylight.

HOK will work with Skanska to deliver the project, which is set to open in 2017.

Outside the Boex

Boex Healthcare recently teamed up with manufacturing company Renatus to enhance a dementia ward at Franklyn Hospital in Exeter:

This project comprised a blend of nature, design, technology and observation to improve the use of space, patients’ wellbeing, and orientation. The ward was originally designed around ‘sensory trails’ that connected the indoor and outdoor spaces, based on the themes of coast, country and moorland. But because the ward was designed in a loop, there were certain areas that patients would gravitate towards, leaving others underused and hard to navigate.

Analysing how the lounge was used, Boex identified a need for different areas in the room for different uses. The space was divided into a kitchen activity space and a lounge area. The design created a domestic feel to the space that included visual cues as to how to use the room.

To encourage patients to use the whole ward, Boex worked with occupational therapist Carrie Clarke, who understood the potential in adding engaging interactives to enable patients to explore audio and visual stimuli.

Finally, patients experienced navigational difficulties in finding their own rooms. Consequently, Boex created door signs that identified the positioning of the door handle and provided a personalised sign and image for patients.



Parkland project

HOK has been named lead architect for the new Papworth Hospital, a state-of-the-art cardiothoracic facility on the Cambridge Biomedical Campus.

The new 310-bed hospital will welcome patients with a striking architectural form, providing a comforting, easy-to-navigate environment that will help reduce stress and anxiety. Meeting places in the main atrium, gardens and restaurant will enhance communication

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Bedside boost for parents

The next phase of Great Ormond Street Hospital's (GOSH) development programme has commenced on site. The Premier Inn Clinical Building is set to complete the Mittal Children's Medical Centre, following on from the opening of the Morgan Stanley Clinical Building in 2012.

Both phases have been planned and designed by Llewelyn Davies, who, as design team leaders, will work with Skanska to deliver the project for 2017.

The new building is part of an ongoing programme to redevelop some of the oldest parts of the hospital, replacing outdated wards with world-class facilities and providing more space for parents to stay by their child's bedside. It will include new inpatient wards with more spacious bedrooms, integrated operating theatres, and a post-anesthetic care unit.

The Premier Inn Clinical Building will be constructed by deconstructing the top four floors of the Cardiac Wing and building back up to level nine, allowing the higher levels to align with the wider GOSH island site campus, creating new links to both the Variety Club Building and Octav Botnar Wing.

The completed Mittal Children's Medical Centre will increase GOSH's capacity for treating children by up to 20%.



Seasonal influence

The refurbished Wolfson Ward at London's Royal Hospital for Neuro-disability has reopened to patients living with Huntington's disease. Designed by architects IBI Group, the enriching environment is influenced by healthcare research and the changing seasons.

The ward has been opened up to create a spacious, colourful, light and sensory therapy space to cater for its 14 inpatients, who are dependent on carers for 24-hour assistance.

Creating a homely and calming atmosphere, IBI has applied colours, textures and vary-tone lighting based on the 'changing seasons' to help users make connections with the past and present, and feel a greater sense of belonging.

This theme is reflected in an indoor 'garden room', which looks out on to a courtyard garden where patients can pot plants and carry out holistic therapies. This is something that has proven to enhance the quality of life for people living with Huntington's disease, according to research by the Royal Hospital for Neuro-disability.

People living with Huntington's are prone to changes in mood. The design therefore features two different therapy spaces: a contemplative and relaxing lounge area, which includes a fish tank and sensory room; and a bright, stimulating multi-use area, which encourages therapeutic engagement and social interaction.

Family-centred care

Dayton Children's Hospital has broken ground on an eight-storey, 260,000 sq ft patient-care tower, as part of a \$141m campus renewal that promises to meet the needs of patients, families and care providers well into the future.

The new design allows for more efficient operation with proximity to the emergency and trauma centre, surgery, and the outpatient care centre. The tower will include a cancer and blood disorders centre, which will deliver both inpatient and outpatient care in one integrated space, and a level-III regional newborn intensive-care unit, which enhances the hospital's commitment to family-centred and developmentally sensitive care through single-family room design. The new tower will also contain the infrastructure and technology to care for critically ill and injured children in the Wallace Critical Care Complex, and technology-dependent patients in the Intermediate Care Unit.

Danis Building Construction Company has been selected to manage the construction of the project. Paediatric-hospital architectural firm FKP Architects will lead the development of the long-range plan, while Ruetschle Architects & Champlin Architects have teamed up to act as the local architectural groups for the project.





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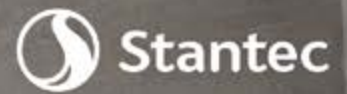


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Yin-yang or yang-yin?



Dr John Zeisel is chair of the international advisory board of the International Academy for Design & Health and president of Hearthstone Alzheimer Care

We all interact with, respond to, and influence the physical environments we inhabit, but some of us are more sensitive than others to the environment-behaviour interactions we encounter. The elderly, for example, might consider how the physical environment supports physical safety; for young children, how the environment supports learning or play may be more important. Many also live with cognitive challenges that require greater environmental support to meet their needs, from finding their way to basic functions like dressing themselves or eating a meal.

The greater significance environmental interactions have on our daily lives, the more the following questions arise:

1. Do environments influence behaviours or the other way around?
2. What actually constitutes 'environment'? Does the term refer merely to a person's physical surroundings or do all environments always include physical and behavioural characteristics, as well as the informal norms or formal rules that apply to particular settings?
3. In studying environment-behaviour interactions, how important is it to precisely measure each component?

These questions have long been debated, but one issue on which there seems broad consensus is that 'environmental determinism' – the belief that the way in which the physical environment is designed leads directly to certain behaviours, perceptions and feelings among users in that setting – is now a discredited concept. Or is it?

The articles in this issue, all of which deal with designing environments for people facing cognitive challenges, flirt with environmental determinism. Looped walking paths, places to escape, and wayfinding cues all seem to be linked to 'outcomes', whether specific or general. The choices offered in these settings might reduce the impact of environmental determinism, but they still remain in the conceptual frameworks reflected in these articles. [Author's note: I don't exempt my own research and evidence-based design translations from this dilemma.]

What is physical and what is behavioural environment? Can they be defined and observed separate from each other? There are enough examples in the following articles to suggest not. To take just one, interviews with a group of users indicate their desire for greater privacy, the ability to meet socially in small groups, and greater control over their activity schedule. Environments here are clearly seen by these users as both physical *and* behavioural.

The third question is linked to the two previous ones: if one can't separate the two types of environments, how can one measure them as distinct elements? The articles in this issue each try to identify environmental characteristics, behavioural correlates, and outcomes of different types.

In the end, however, measurement and analysis miss the point. While one can read these articles with an eye on specifics – the yang environment and its effect on yin behaviours – one can also just absorb the 'gist' of the holistic behaviour/environment or environment/behaviour picture being painted. In the end, yin and yang are one – which comes first really doesn't matter.



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Workspaces for mental health: A creative approach to healthcare environments

Benjamin Koslowski and Jonathan West



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Designing for adults with intellectual development diversities: An integrated design approach

Anglea Bourne MSc, MEd, PhD



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Design analysis: Architectural metrics – developing design analysis tools for post-occupancy evaluations

Cheryl Atkinson BArch, MRAIC

Mental health:

Workspaces for mental health: A creative approach to healthcare environments

This paper aims to offer insights and share the experience of a multi-disciplinary research project carried out at the mental health unit of a new Scottish hospital, which has resulted in a design framework based on key principles of urban design to help improve issues experienced in the environment on a daily basis

Benjamin Koslowski and Jonathan West

The NHS Forth Valley Royal Hospital (NHSFV) is a large, modern hospital facility located in Larbert, providing 860 beds / day-care spaces, 25 wards, and high-technology systems to operate the pharmacy and support delivery functions. The fully robotic pharmacy, food-delivery and waste-removal systems are pioneering projects, which have helped reduce error, as well as infection and contamination risks. The hospital opened in 2010, having been built as a PFI (Private Finance Initiative) at a cost of about £300m.

The hospital's mental health unit (MHU) involved the consolidation of two separate mental health facilities in the region. It can accommodate up to 94 patients across five wards, including a dementia ward and a secure ward, the latter of which did not form part of this research and design project.

Initially, there had been some negative responses to the MHU, the design of which was driven by infection-control standards implemented in the clinical wards of the hospital and anti-ligature protocols. Three main shortcomings were cited:

- public spaces – for example, corridors, sitting and dining rooms – had been criticised as bland and uniform in appearance;
- navigation had been found to be difficult, perhaps as a result of the uniform appearance, and it was felt that visual signposting had been poorly designed and implemented to mitigate the problem; and
- noise levels had been found to be excessive, with seemingly harsh reverberation giving rise to a stressful environment for patients and staff.

Architecturally, the one-storey MHU is characterised by long, winding corridors, wrapping around central courtyards within each ward. The therapeutic courtyards

tended to be underused and remained largely locked; however, the reasons for this were unclear. Patients have single en-suite rooms. Anti-ligature strategies resulted in the omission of door handles from the entire MHU; this proved problematic, in particular, within the dementia ward, where ageing patients with cognitive impairment and varying physical ability are at risk of falling and remaining unobserved in their rooms. Furthermore, any devices with cables, such as low-level lighting and bedside lamps or standard lamps, are not permitted, making it difficult for staff or patients to control lighting levels locally.

Aims and objectives

While it is understood that environments have an impact on the health of their occupants, in particular with regard to spatial qualities and views to nature,^{1,2} the qualities of this particular space and its impact on the wellbeing of users can only be comprehensively understood through a range of research methods that engage the users themselves. The aim of the research

project was to identify key users of the space and their needs, and to apply a previously developed design framework to guide future interventions. Furthermore, the engagement of all stakeholders was to be facilitated in order to successfully improve space use and ambient qualities of the MHU.

A new arts strategy was to be developed, which would enable the working group to drive an arts programme, as well as delivering a participatory arts programme with patients across the whole of the MHU. An arts working group was established with MHU staff from across the unit, led by the NHSFV arts coordinator (funded by Creative Scotland), and the director of Artlink Central, an independent Scottish arts organisation contracted by NHSFV.

The working group was keen to take a coherent and well-considered approach across the whole unit and tasked itself with the coordination of the development of a plan aiming to address the problems of the physical environment on the psychiatric wards of the MHU; the key aim of this plan was to create a more human environment



Long undifferentiated corridors characterise the architecture of the MHU

that takes into account the needs of patients, as well as all staff working in the facility.

It was recognised that the scale of the overall problem was too great to be dealt with piecemeal, and was beyond the remit of the maintenance contracts in place with the facilities managers; these are only intended to address minor corrections that arise following the commissioning of the building and its ongoing maintenance, and they do not offer scope for dealing with the design issues that have been highlighted within the MHU.

Furthermore, a holistic approach was viewed as essential, as summarised by a consultant psychiatrist at the MHU: "The physical changes must take into account existing evidence for the effectiveness and benefit of such changes, and they must reflect the patients' journey."

Rather than attempting to effect the necessary changes by merely putting things on walls, the working group expressed an interest in:

- using existing evidence as one of the parameters for devising the designs;
- involving patients and staff (from all five wards) in the design process;
- providing practical creative activities for some elements of the production process;
- giving corridors and social spaces a sense of flow and continuity in subtle and imaginative ways; and
- using new materials or innovative ways of using existing materials and processes.

An inter-disciplinary, cross-lab research team from the Royal College of Art's Helen Hamlyn Centre for Design was invited to carry out research in the MHU during a week-long exercise in January 2013. The findings of this research were intended to help inform the approach to a design strategy that encompasses strategic art interventions, aimed at addressing the issues within the mental health facility through a series of design recommendations and guidance for the commissioning of artworks. The design strategy would later form the core of a funding application to raise the financial means to implement the suggested interventions and create a more stimulating environment for all its occupants.

The design strategy offers a series of interventions that fall into the key categories of commissioned art, original design features,



Therapeutic courtyards are currently underused and access is limited

and design modifications to the building itself. These interventions are designed to be implemented over time, while cohering as a whole. The strategy is informed by a thorough understanding of the MHU's core dynamics and issues, which are contextualised using a framework that borrows from core principles of urban design.

Methods

The research team carried out and tested a range of research methods. These were aimed at gaining insights into the daily patterns at the MHU, understanding user needs, as well as gathering data on the building, in particular, with regard to noise and light levels. A dozen in-depth individual conversations with nursing staff, consultants and patients were conducted to investigate the user perspective and understand individual perceptions of the MHU. While anecdotal evidence regarding core problems within the MHU was available at the outset of the research process, these further insights were crucial in better understanding the causes of any issues and tensions within the mental health environment, and to develop a more nuanced picture. Interviews consisted of structured conversations, focusing on diagrams of the MHU, to allow the researchers to map daily activities and patterns with patients, staff and consultants; this strategy prevents conversations from following a rigid structure and instead enables them to flow more naturally.

Observations were carried out within the MHU through shadowing key activities,

notably group therapy sessions. These provided the basis for interviews, with targeted questions to staff and patients regarding particular activities, to help understand key activities, timings and processes within the MHU. The process mapping is crucial in helping to contextualise the mappings carried out with individual users through the in-depth conversations using diagrams; this provided insights to the external research team into 'a day in the life' of the MHU, charting key processes and different activities across the unit from the perspective of some of the patients and health professionals who use the space.³

As part of a space audit, measurements were taken of actual physical properties of spaces focusing, in particular, on noise and light levels, as well as texture and materiality. In addition to providing detailed insights into actual spatial properties, to put into perspective insights gathered from users, conducting the space audit allowed the researchers to spend more time in the MHU and engage users of the environment in casual conversation, which also helped them gain first-hand insights.

The research team interviewed the facilities managers, which enabled the team to gain a more strategic overview of the relationship between the MHU and the rest of the hospital; this also helped in understanding the historic development of the MHU and in better understanding the relationship between stakeholders.

Once these initial research activities had been carried out and collated, workshops



The complex architecture of the MHU and key access points to wards

were planned and conducted with staff to test some initial findings resulting from the interviews, observations and process mapping, and the space audit. Workshops with patients in the different wards were held to discuss notions of comfort within a care environment, focusing on the look and feel of key spaces; this allowed the team to discuss expectations with this core user group and provided a platform to casually discuss initial findings of the research. In addition, this range of workshops allowed users to become involved in the research process and gain a sense of involvement.

Following the field research, a design framework previously developed by researchers at the Helen Hamlyn Centre for Design, in conjunction with a consortium of industry partners, including HermanMiller,

Element	Examples	Description
CIRCULATION + ORIENTATION 	<p>arterial</p> <p>meandering</p> <p>colour coding</p> <p>signage and supergraphics</p>	<p>Different routes through the building and ways of navigating the environment. Differentiation of distinct parts of a building, in particular through colour and signage. This supports a greater sense of place and aids wayfinding.</p> <p>The other design tools generally aim to reflect and emphasise the different identities.</p>
POINTS 	<p>plants</p> <p>posters and pictures</p> <p>book case</p> <p>TV screen</p>	<p>Smaller-scale points of interest, which are often mutually agreed by occupants of the space, and may be components of larger elements. These act as catalysts for social interaction.</p> <p>Scattered points of interest might aim to reflect and emphasise the different identities through their colour and themes.</p>
OBJECTS 	<p>image walls / supergraphics</p> <p>recognisable landmarks</p> <p>art installations</p> <p>small structures</p>	<p>Larger objects are landmarks that provide a focus for group congregation within the work environment. They function as nodes for circulation and aid orientation.</p> <p>Objects to reflect and emphasise the different identities through their colour, materiality and themes.</p>
SURFACES 	<p>patient bedroom</p> <p>courtyard spaces</p> <p>dining room</p> <p>sitting room</p>	<p>Different programmable areas which lend themselves to certain activities but are open to further interpretation by users.</p> <p>The furniture, texture and materiality of the different programmable surfaces should aim to reflect the overall identity of different spaces.</p>

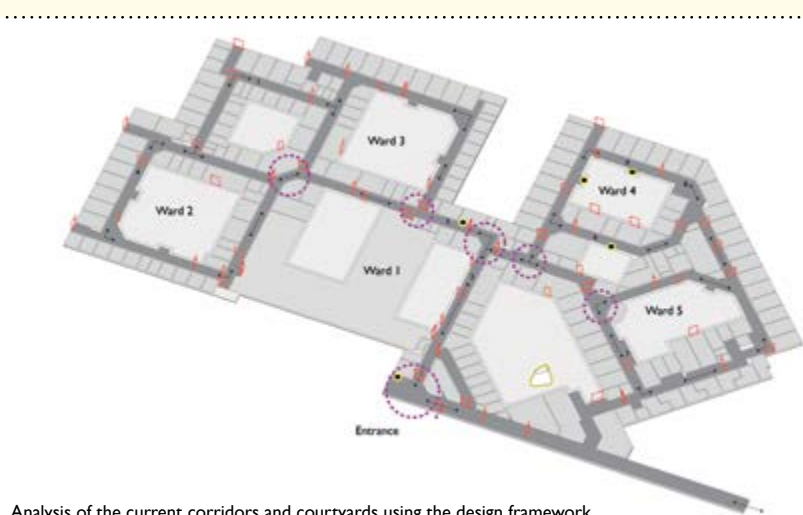
A design framework with four elements informs and guides the art strategy

GlaxoSmithKline, Plantronics and the Bossons Group, was applied to process and analyse the findings of the on-site research. The Workscapes project explored a user-centred research methodology to help designers understand how work environments are used through in-depth qualitative research.⁴

A design framework based on a language of urban design was developed to analyse and act on the findings of the user research. This consists of four key design elements, rooted in Kevin Lynch's work on the *Image of the city*,⁵ as well as the work of Bernard Tschumi and The Office for Metropolitan Architecture for their respective competition designs for the Parc de La Villette in Paris.⁶ These key design elements are programmable surfaces, large landmark objects, scattered points of interest, and circulation and orientation. They denote and specify use of space, ease of orientation, offer opportunities for interaction, and help foster a 'sense of place'. Crucially, in addition to these elements being used to map the existing composition of design elements, they help contextualise the qualitative findings and, thus, improve an understanding of the relationship between the findings of the user-centred research and the physical environment. The design framework is viewed as a key tool in responding to the identified needs and issues that patients, nursing staff, consultants and visitors encounter on a daily basis.

Results

A series of key tensions was identified, such as having a clinical or a homely/welcoming environment, or conflicts between local and central control over spaces. Issues such as overstimulation and understimulation of patients point towards the need for a greater range of settings to cater for varying patient needs. Closely linked to this, the desire for privacy stands in stark contrast to the necessity for staff to be able to observe activity throughout the unit and monitor individual behaviour on a regular basis. Tensions between group and solitary activity highlight the need for clear communication of activities throughout the MHU, to enable patients to participate to degrees that suit them. Furthermore, issues around levels of individual control over the environment arose; the inability to control light levels at a local level, for example, is seen as problematic – in particular in the dementia ward, where the moderation of lighting levels is seen by staff



Analysis of the current corridors and courtyards using the design framework

as crucial to creating a calm atmosphere and counteracting agitation. While not all of these tensions can be directly attributed to the physical environment, the research team identified ways in which the spatial settings of the MHU would be able to contribute positively to alleviate tensions.

Anecdotal evidence showed there were distinct problems with acoustics throughout all wards of the MHU. Although the space audit indicated that noise levels were within recommended levels, the architecture was nevertheless found to exacerbate perceived noise – in particular when disruptive noise is heard clearly throughout the corridors of the unit, yet the source remains out of sight owing to the labyrinthine qualities of the spaces. This is a common phenomenon in environments like the MHU, with hard surfaces and a complex spatial arrangement, which limit sightlines but exacerbate noise.^{7,8,9}

The MHU was required to accommodate a broad range of patient needs within individual wards; while a depressed patient might easily be overstimulated and retreat from interaction with others, a manic patient will easily be understimulated and bored. The fact that these patients are accommodated within the same ward leads to tensions between individual needs. A range of spaces is required that allows different degrees of sociality and opportunities for retreat; options in the MHU seem limited to spending time in quiet private bedrooms or in the often noisy communal areas of each ward, such as the sitting rooms where TV sets tend to dominate the room. Differences in patient sensitivity to levels of stimulation also affect group activity and

therapy sessions; partially due to their mental health conditions, some patients prefer being peripheral to structured activities. Therapy spaces and the ways in which activities are communicated seem to offer limited scope to cater for such differences.

Observations and process mapping further highlighted gaps in activity in a patient's day and raised questions around how spaces and access can help support meaningful activity for patients – in particular during idle time, and how they can help reduce isolation and boredom. Offering a greater range of opportunities for patients to spend time outside of their individual bedrooms, within a range of settings that enable them to moderate their levels of engagement with others, further helps nursing staff observe activity throughout the unit.

One of the most significant key tensions, however, is the relationship between the MHU as a clinical environment and the need for comfort for patients with acute mental health issues; in particular, within the dementia ward where the unfamiliarity of the clinical and somewhat labyrinthine environment has been observed by staff to cause distress.¹⁰ The winding nature of the anonymous and undifferentiated circulation spaces was further found to hinder wayfinding and create an environment that feels inherently institutional. Indeed, the institutional nature of some of the spaces, such as the dining rooms in some of the wards, was remarked on by patients.

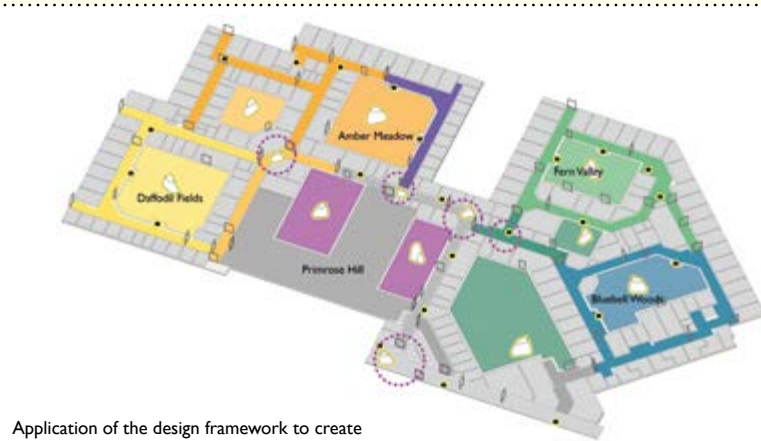
Key to comfort for patients is control and choice;¹¹ while patients may bring their own bed linen and decorate a whiteboard in their bedroom with personal items, a greater

architecture that promotes health



range of spaces for different activities is to be provided, allowing patients to be peripheral to interaction with others, and being able to choose different settings, depending on sensitivity to stimulation. These spaces include a quiet room, a room for group interaction, such as playing games, and sitting rooms that are furnished in a way that suggests a range of activities, instead of being dominated by a television set. The smoking rooms throughout the MHU are key spaces for patients, owing to the privacy and sense of escape they offer, as well as the way in which patients take ownership of the space; this, however, currently consists mainly of graffiti on walls. Therapy rooms also seem very popular with patients; this is partly on account of their personalised furnishings, and the sense of escape they provide. Furthermore, group therapy sessions give patients a means of interacting and engaging with each other around an activity, rather than having to engage in self-initiated conversation.

The careful recording of the spatial conditions throughout the MHU allowed the research team to make more varied



Application of the design framework to create greater legibility, establish ward identities and identify key locations for art interventions

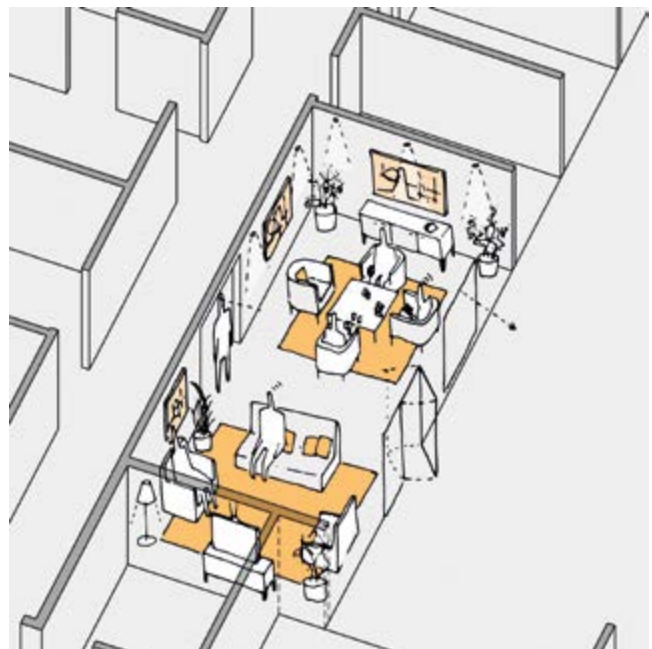
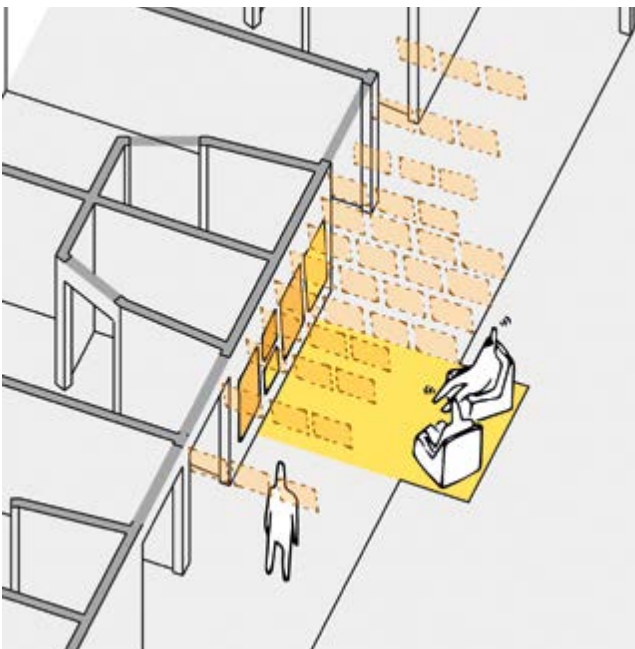
suggestions regarding material quality. While infection-control guidelines deeply impacted on decisions made throughout the planning and construction process of this non-clinical part of the Forth Valley Royal Hospital, materials such as fabric carpeting were found in communal spaces used by patients – helping make a case for the use of a greater range of tactile materials within this non-clinical part of the hospital – contrary to the guidelines regarding infection control that had generally been implemented even within the MHU.

help create a richer environment for patients, staff and visitors. The design strategy offers a series of interventions that fall into three key categories of commissioned art, original design features, and design modifications to the existing building.

Commissioned artworks will be a key element to enhance the overall ward environments and to offer conversation points for the users of the space. These artworks also serve a key role in easing wayfinding by creating recognisable landmarks. Artworks may also help modify the atmosphere of spaces, to offer a greater sense of variety across the different wards, and can help modify lighting and acoustics. Strategically placed artworks intended to aid wayfinding might be of a more permanent nature, and become recognisable not only

Conclusions

The conclusions of the research project are encapsulated in the design framework, which, overall, is intended to ensure that the various interventions implemented by different stakeholders over time cohere and



Top left: The reception's bold art installation, colour and signage mark the point of arrival. Bottom left: Creating a dwelling point with comfortable seating where artwork is displayed along a corridor. Acoustic panels offer privacy. Bottom right: Key social spaces, such as the sitting room, reflect ward identities and suggest a range of activities.



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to patients and staff but also to visitors and family members, who tend to remain less familiar with the environment. In contrast, local artworks within the different wards may change more frequently; these also offer the opportunity to be created in therapy sessions, helping again to create a stronger sense of ownership over the environment.

Original design features and, in particular, the establishment of distinct ward identities are key to help differentiate discrete areas in this large unit, aid wayfinding, and offer a greater sense of place to patients, staff and visitors. The research team suggested different ward identities for each of the wards: Primrose Hill, Daffodil Fields, Amber Meadow, Fern Valley, and Bluebell Woods. The suggested identities were merely suggestions, yet they are intended to lend themselves to distinct themes that can be interpreted in the furnishing and decoration of wards, and help reinforce the different ward identities; artworks may also use themes to enforce a greater sense of identity and place.

Suggested modifications to the existing architecture of the MHU are limited to those necessary to accommodate an extended arts programme for patients at a later date. Modifications consist mainly of the removal of existing walls to create larger spaces for offices and studios. However, the design framework makes suggestions to relocate some of the key spaces for nursing staff, such as the ward office, to a more central position within the ward, closer to the communal spaces, where a larger number of patients spend a majority of their time and from where staff have a better vantage point over wards. It also makes suggestions for alternate uses of some spaces throughout the unit that appear to be underused and could provide a greater range of settings from which patients can choose. Some recommendations are also made regarding the furnishing of spaces to help communicate their use in a non-prescriptive way, as well as increasing comfort for users – in particular within the dementia ward.¹²

While the long corridors allow patients to roam, they easily lead to exhaustion and falls. One key intervention across all wards, including the dementia ward, is to use the existing architecture of the MHU, with its winding corridors and nooks with views on to therapeutic courtyards, to provide spaces to dwell. These spaces offer the opportunity for art interventions but also need to

moderate acoustics to enable private conversation. Crucially, such interventions are key in providing means of orientation and offering a sense of progress for roaming patients, as well as a greater sense of place for all users of the MHU; notably interventions along corridors are to be designed as part of a coherent approach to wayfinding.

The design strategy specifies locations, suggests types of interventions, and indicates how interventions need to perform, for example, in moderating light and acoustics. It does not, however, make aesthetic judgements, and aims to be open to interpretation by various artists and designers, who are expected to make interventions over time. In addition to the use of artworks in key areas along corridors, a clear graphic identity, including supergraphics, is intended to support the new ward identities. Courtyards are a crucial component in creating a greater sense of place, while offering therapeutic spaces for patients as well as amenity for staff.^{13,14}

The application of the Workscapes design framework based on key principles of urban design has not only provided a framework within which to make interventions but has also, crucially, acted as a communication tool between the various stakeholders and the research team. While some tensions between various stakeholders have arisen out of the procurement process, the design framework, as a way of visualising and contextualising research findings, has helped focus conversations to start addressing issues, such as access to courtyards and their maintenance.

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In addition to outlining the overall approach for the MHU, the design strategy will be used to brief designers and artists who will make interventions in the space, to help their understanding of the complex dynamics within the unit. It also allows the various stakeholders to negotiate responsibility for the range of interventions – from painting walls to reflect ward identities to commissioning artists to create large-scale artworks. The design strategy further takes into consideration how the interventions can be implemented over time; while, for example, basic cosmetic changes can be made on day one, the commissioning of artworks will be part of an ongoing evolutionary process.

Limitations and future research

The design strategy encompassing an approach to art interventions in the MHU was developed during 2013. Owing to the shifting nature of funding opportunities in Scotland, funding applications to support interventions as outlined through the strategy have only recently been made; the testing of the design strategy therefore is an ongoing process. The methods outlined above do, however, lend themselves to testing the impact of interventions made at a future date.

Authors

Benjamin Koslowski is a research associate and Jonathan West a research fellow at the Royal College of Art's Helen Hamlyn Centre.

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Mental health:

Designing for adults with intellectual development diversities: An integrated design approach

The goal of this study was to establish best practices for design of spaces that accommodate and ameliorate the neuro-diversity of adults with intellectual and developmental disabilities, in order to better address and improve their quality of life

Angela Bourne MSc, MEd, PhD, ENVD

The quality of life (QOL) and wellbeing of adults with intellectual and developmental disabilities (I/DD) is an ongoing concern. For people with I/DD, their QOL is often challenged due to their inability to fit into their environments in the same way as neuro-typical (NT) people. The way people with I/DD make sense of their environment is influenced by their sensory sensitivities and the neuro-diverse (ND) manner in which they process information. Frequently, they are agitated when trying to cope with a variety of physical attributes in their environment and, as a result, their stress manifests in adverse behaviours they use as coping mechanisms.

Architects, designers, environmental psychologists and researchers recognise the

effect the behavioural setting can have on the perceptions, behaviours and cognitive processing of people, and have confirmed the impact that the environment (built and natural settings) has on QOL.¹⁻⁸ Collectively, their research provides a stimulus for the development of spaces that provide an optimum environmental fit for the neurologically fragile group in this research.

The subject group

People with I/DD are known to have limitations in intellectual functioning and in: adaptive behaviour; conceptual skills – literacy, numeracy and self-direction; social skills – interpersonal skills, social responsibility, self-esteem and practical skills – activities of daily living and occupational skills.⁹ Two sectors of this group were the focus of this study: those diagnosed with Down syndrome (DS), and with autism spectrum disorders (ASD). Both groups have challenges with processing information. The group with DS has difficulty in this regard due to their differentiated intelligence, while people with ASD have difficulties because of the diverse manner in which they connect information and express their interpretations.

For people with ASD, many of their challenges stem from sensory integration (SI) – a neurobiological process that refers to the detection, assimilation, organisation and use of sensory information to allow an individual to interact effectively with the environment in their daily activities.¹⁰ People whose sensory input is not organised or integrated in the brain have sensory integrative dysfunction. As a result, the spaces they encounter often cause them to become confused, and subsequently frustrated, creating a negative environmental fit or 'environmental press'.¹¹

Cognition processing is a condition of arrested cognitive growth commencing in

childhood. These deficits/differences are easily identified in children with DS but less so in children with ASD.¹² In fact, children with ASD often appear to have arrested cognitive growth, but in a lot of cases they don't. Their arrested appearance is often due to the manners in which they process information and, in turn, communicate their understanding. Many people with ASD excel in areas of intelligence; they are known to have 'islands of intelligence', and some have 'multiple islands of intelligence'.¹³ Cognitive processing in people with ASD has recently been referred to as a 'differently knowing' neuro-diverse (ND). A person who is ND is not disordered but possesses a different sort of ordering system.

Population prevalence / demographics

Recently, QOL concerns have become a major concern owing to rapid growth in the population, which is also living longer. The National Center on Birth Defects and Developmental Disabilities,¹⁴ estimates that approximately 6.5 million people in the United States have an intellectual disability. Of this population, there is a rising incidence of individuals with ASD who are getting older. In the US, a projected 500,000 children with ASD are expected to reach adulthood within the next 15 years,¹⁵ and by 2020 there will be 4 million Americans with autism, many of whom will be adults. In particular, it has been noted that adults with Down syndrome have an elevated risk of dementia; normally the incidence occurs 15-20 years earlier than in NT populations. It has also been projected that of the 35 million adults in the US who have I/DD and are 65 years of age or older, there will be at least 140,000 older adults with an intellectual disability, and a minimum 9,000 of these adults will be affected by dementia.¹⁶ Furthermore, in excess of 700,000 people across the US



Figure 1: Spaces that have higher-than-standard ceilings and views to the outdoors are uplifting and can allow people with I/DD to manage their proprioceptive and vestibular differences

with DS and/or ASD live with carers, who are themselves ageing. These parents are concerned with where their offspring will live and how they will sustain their QOL (a supportive residence, education, training, work and social connections) when they themselves are deceased.

Services

With the growth in the number of children being diagnosed with I/DD and the ageing of their primary carers, the demand for service providers and supports will increase. According to Thomas and Brull, "the total number of individuals with I/DD in need of residential, in-home and day supports is expected to rise from an estimated 1,015,000 in 2003 to 1,400,000 in 2020 – an increase of about 38%".¹⁷ The demand for service providers will likely accelerate after 2020, as the baby-boom generation approaches an age when their carers are themselves elderly, and as beneficiaries of medical advances of the past generation move into and through adulthood, when demand for long-term support services (LTSS) steadily grows. This increase in demand for service providers is likely to be exacerbated by substantial growth in demand for service providers to meet the LTSS needs of the baby-boom generation itself, the leading edge of which will reach 80 years in about 2025.

Cost to society

To date, the majority of research had focused on children with I/DD, but with the rapid increase in population, and especially the prevalence of autism, there is a need to address the ageing sectors. Cost of care and support for these individuals are felt by society at large well into adulthood. According to Moldin and Rubenstein, it costs upwards of \$35bn in medical and non-medical costs to care for all individuals diagnosed with I/DD over their lifetimes.¹⁸ Alemayehu and Warner reported that, on average, a typical American spends \$317,000 over their lifetime in direct medical costs, in which 60% of those costs incur after the age of 65.¹⁹ In contrast, people with autism incur approximately \$306,000 in incremental direct medical costs, implying that people with autism spend twice as much as the typical American over their lifetimes and spend 60% of those incremental direct medical costs after the age of 21.

These results have important implications



Figure 2: Opportunities to retreat to personalised escape spaces permit individuals with I/DD to temper their emotions

for the baby-boom generation because, as those individuals retire, many of their adult children with autism will be transitioning into adult-care settings. Hence, there is a need for housing that is both appropriate and affordable. One of the most suitable types of supported housing available today is communal housing, which includes safe residence and facilities for meaningful work and opportunities for social connections.

Service-care philosophies

For many years, advocates in the US have been demanding equal access and equal rights for people with disabilities. Support at a federal level has included legislation for better access and opportunities for people with I/DD to live fully integrated community lives. With these changes, there has been a notable shift in the way support services and care are provided for people with I/DD. This paradigm shift includes a move from a product-driven philosophy (whereby people with I/DD are seen as patients in need of physician or nursing care,

which is driven by product or outcome measures) to a process-driven approach (whereby people with I/DD are provided with support to help them express their own opinions, known as 'normalisation'). This approach enables people with special needs to find acceptance and recognition as the equals of NT people.

Knowledge of the ways in which people with I/DD perceive their environments is important to architects since, otherwise, the building and spaces they design will include elements and attributes appropriate for the NT population and ignore the needs of people with ND.

Housing

Where people live is arguably the most important factor in determining lifestyles of people with I/DD.¹² Traditionally, people with mid-to-high functioning levels of I/DD live with their parents well into adulthood. But, with more children living longer; this may not be an option as their parents are ageing, too. Hence, lifelong



Figure 3: Careful configuration and application of built forms, surfaces and colours provide meaning for a space

housing options need to be developed, and Ahrentzen and Steele suggest the optimal approach “is to work with individuals to find which best suits them [and use] the example of housing for seniors; 30 years ago there were few alternatives for elderly residents beyond nursing homes and residence in the homes of their adult children – much like the situation today for many adults with ASD”.¹⁵

Developments in housing options for ageing NT populations have much to offer this research inquiry. Services for the I/DD population may not need to focus on medical aspects of wellbeing as much as with the ageing NT population, given that the former group is not necessarily sick or in ill physical health. In fact, many people with I/DD are very capable of learning and performing tasks to support their wellbeing and contributing to society.

Aim of the study

The purpose of this study was to determine how the design of the built and surrounding environment in which people with I/DD live, learn, work and socialise could best be designed to facilitate an optimum QOL for them. The corresponding goal of the study was to establish best practices for design that accommodate and ameliorate the neuro-diversity of the I/DD population. Given the neuro-sensitivities this population experiences in processing their environments, a more informed and systemic approach to the design of these spaces is required.

Although the Americans with Disabilities Act²⁰ has done much to make buildings accessible for people with physical impairments, it has had virtually no impact

on environmental accessibility issues for people with intellectual disabilities.²¹ Most of the design information available to designers who service this population focuses on the physical needs of people with disabilities and the needs of a typical ageing population. Although research on learning environments for this population and housing for ageing and dementia-related diseases has advanced, there are few studies that examine living environments for adults who are neuro-diverse (ND). Additionally, although housing for the aged who are cognitively challenged can help provide direction for the design of environments for those with I/DD, neither do they take into account the ‘ableness’ of this population nor do they celebrate the many talents and abilities of people with I/DD and their potential to contribute to their economic stability throughout their adult lives. Therefore, this study addressed these issues in order to better inform designers of environments on optimum QOL for people with I/DD.

Research methodology

The research questions addressed in this study were:

1. What physical design features positively support the cognitive processing of individuals with I/DD in intentional communities?
2. What physical design features support the sensory sensitivities of individuals with I/DD in intentional communities?
3. What design features in the physical environment of intentional communities for people with I/DD support independent lifestyles throughout their life?

Comprehensive conceptual frameworks for the design of the specific conditions of housing and enrichment environments that address the intellectual needs of people with I/DD are limited. Therefore, this research takes a broad approach to the development of knowledge to designing spaces for this sector of the population. A qualitative grounded theory and social-constructivist approach guided this research.²² Within this framework, an ecological perspective,^{23,24} (person-in-context) was addressed from a holistic perspective that included an examination of the setting and the occupants’ interactions in a setting. Within this context, model of place, environmental preference, and biophilia design theories were examined to determine whether a non-pharmaceutical design approach (salutogenic approach)²⁵ was beneficial for the enhancement of an I/DD person’s cognitive processing, their abilities, and the accommodation of their sensory sensitivities to support an independent lifestyle.

Context of the study

A literature review was carried out of the characteristics of the populations, including their behaviours, health, demographics, lifestyles and housing. The results showed an increase in the populations of the various sectors, especially those that are ageing, and a distinct need for appropriate housing. Given there were few housing studies specifically aimed at this group, models for vulnerable populations were examined and compared (table 1, first eight columns only).

Six common themes from eight literature studies were identified and reviewed in this research. They were: orientation/wayfinding; social; privacy; meaningful/familiar; individual/escape spaces; and access to nature.

Although these models have proven to be successful in the development of ageing vulnerable populations, they didn’t address many of the sensory sensitivities, differentiated neurological processing, and ableness of people with I/DD. Hence, a search for existing housing was undertaken, which identified several intentional communities that provided opportunities for this group to live, work and socialise in a supportive environment. Five communities that housed between 30 and 150 residents were chosen, as they provided diversity in population-sampling and service philosophies. The research for each community consisted of:

1. Observation and interviews with residents as they performed activities of daily living (ADL), and staff

a) Sixty resident participants (RPs) were selected from the five communities studied; 58 agreed to participate. Given that autism is more prevalent in the male population and two of the communities in the study were established for people with autism, there were more eligible males than females in the target population. RPs ranged in age from 21 to 71 years. Frailer RPs were only observed, as they needed care to help them with their ADL. The sample had been diagnosed with one or more forms of I/DD. More than one-third of the RPs had been diagnosed with ASD, one-fifth had DS, and all of the residents had difficulty with cognitive processing.

b) Thirty-nine staff members participated in this study: 13 administrative, and 26 who were either managers of areas or direct service providers. Teachers, counsellors, therapists and house parents were asked how the spaces in which they worked enabled them to do their jobs.

c) Interviews were conducted with ten administrative staff who provided leadership for the five intentional communities. Interviewees were asked about the communities' operational philosophies; their guiding physical property laws; and, if they had an opportunity to redesign the spaces, what recommendations they would make.

2. Environmental analysis

This considered the physical properties and operational philosophies of multiple case

studies, in respect of the five intentional communities for people with I/DD.

3. Survey of service providers (SPs)

This involved service providers who were not interviewed in the communities and other service providers who did not provide services in intentional community settings. Fifty surveys were sent out. The survey asked SPs to rank the importance of sensory sensitivities for a person with I/DD in relation to the development of their cognition.

This 'transactional' approach (taking an event as its unit of analysis; with time and change studied as an integral part of that event)²⁶ provided information about how the RPs use their senses to comprehend their environment and perform tasks of daily living.

Comparison chart – models of influence: Designing therapeutic spaces for vulnerable populations

Physical and Architectural Features ³	Evaluative Criteria ²⁷	Therapeutic Goals ²⁸	Domains ²⁹	Environment-Behaviours Principles ³⁰	Environmental Characteristics ³¹	Trends in Group Environments ³²	Adults with Autism Resident – Design Goals ¹⁵	Neuro-Considerate Design for I/DD CEEAEE ³³
Orientation aids	Enhance memory and orientation	Awareness and orientation	Presence of cues	Wayfinding and orientation	Noise comprehension	Small cluster/ service provision	Ensure safety and security	1. COMMUNICATE Legibility/Clarity Predictable Consistency Meaningful 2. EMPOWER Purposeful Work opportunities Meaningful Self-worth/Esteem 3. ENGAGE Encourage Respect Inspire Acknowledge Strengths 4. ACCOMMODATE Celebrate differences Flexible Choice Enable Ageing 5. ENRICH Cultural Spiritual Progressive Futuristic Technology 6. ENCOURAGE Motivate Empower Match/Attainable
Social recreational aids and activities	Increased social interaction	Opportunities for socialisation	Seating staff resident interaction	Social interaction	Common space structure	Non-institutional appearance	Maximise familiarity, stability and clarity	
Expectations for functional activities of daily living	Increase autonomy in activities of daily living	Support functional abilities through meaningful activities	Home-like furniture	Accessibility and functioning	Wandering path	Visual and physical access to outdoors	Minimise sensory overload	
Physical amenities	Enhanced sense of self	Ties to the healthy and familiar	Privacy in bedrooms	Personalisation and familiarity	Residential charter	Life skills approach	Allow opportunities for controlling social interaction and privacy	
Provision for privacy	Increased meaningful use of time	Privacy	Safety	Privacy	Individual away places	Involve friends/ family	Provide adequate choice and independence	
Prosthetic aids and safety features		Safety and security	Views to outside, access to courtyard	Safety and security	Exit control	Movement and use of patterns	Foster health and wellbeing	
Residential control		Autonomy	Resident involvement in activities	Control	Autonomy support	Aesthetic design	Enhance one's dignity	
Architectural choice		Flexibility		Choice	Outdoor freedom	Apartment for life	Ensure durability	
Access to community						Home care	Achieve affordability	
Staff facilities						Stimulate sense, create happiness	Ensure accessibility and support in the surrounding neighbourhood	
Tolerance for deviance								

Table 1: Therapeutic goals of residents in vulnerable populations

Findings

Observation / interviews

These revealed that people with I/DD use their senses to comprehend their environment and fulfil activities of daily living. Observations of how RPs manoeuvred through their environments showed that the individuals looked, felt, listened, and aligned their body and corrected their postures as they moved from space to space and task to task. Sensory responses were recorded using the chart in table 2.

Sensory / cognitive responses

The observations revealed varying uses of the sensory systems during ADL undertaken by the RP. Figure 4 illustrates the frequency of use of the seven senses engaged during the cognitive processes used to perform ADL.

The proprioception and vestibular senses showed high levels of engagement, followed by visual and tactile, and then gustation and olfactory.

Proprioception and vestibular: Engagement was evident in how often the RP touched

and held on to surfaces and looked at the floor/ground to prevent themselves from falling. Several RPs also looked over their shoulders to listen to sounds, which suggests they were relying on information in their surroundings to orientate themselves.

Vision: Most RPs relied on their sight to perform tasks of daily living. Although RPs with ASD rarely made eye contact with people, they relied heavily on visual aids to perform daily tasks and to adhere to the daily schedules they relied on for emotional stability. Pictures of steps to perform activities and labels of rooms and objects helped them participate and contribute to their own wellbeing.

Auditory: Participants in this study were both hyper- and hypo-sensitive to sound. Some wore headsets to block out sounds; others made noises to calm themselves. Sign language was frequently used as a form of communication by RPs and SPs, especially as several RPs did not speak. Difficulty with hearing was also evident, as the volume on televisions and radios was frequently set at a high level.

Tactile: Sense of touch was recognised in the precise hand skills and creative works enjoyed by RPs. Many individuals liked to collect soft, stuffed animal toys and have clothing and bedding that was also soft. The concept of personal space is associated with the sense of touch, and people with I/DD displayed varying tolerances for distances in their immediate surroundings. The group diagnosed with DS enjoyed being close to people and, at times, did not recognise their infringement on another person's personal space, whereas the people diagnosed with ASD in this study did not like to be close to other people, or other people being close to them.

Olfactory: RPs gave limited response to questions regarding their sense of smell. Some individuals' expressed opinions of unpleasant smells that came from the barn yard and the pleasant smells that came from the bakery. No mention was made of the various scents that were emitted from the vegetable/herb/flower gardens in which many participants worked. This suggested that given the experience was part of many

Participant and the built / natural environment					
Competency and sensory / cognitive processing observation and assessment					
Assessment area: Home – private-space bathroom					
Site	Participant	Observation: Brushing teeth			
		Verbal communication	Sensory	Sensory sensitivity	Cognitive processing
#3	P.1	Minimum visual engagement. No eye contact with researcher and limited verbal response to questions/prompts by support worker.	Visual	Used TEACCH codes* to identify teeth-brushing procedures and find his case among other residents' cases. Held toothbrush close to face, examined it, and didn't look at himself in the mirror. Relied on other senses, such as touch, taste and smell, to complete the task.	Opened the case slowly and methodologically. Took out the toothbrush and put the case on the counter abruptly as if to reassure himself that this step had been completed and he was ready to move on to applying the toothpaste.
			Auditory	Looked around, and was distracted by people passing by the door. Looked out of the corner of his eye.	Disturbed, lacked focus. Limited time spent on the task.
			Tactile	Rubbed fingers along edge of toothbrush case. Used wash cloth, and wiped corners of mouth several times to ensure toothpaste was removed. Grasped the toothpaste tube tightly – another indicator that physical contact was a positive reinforcement. Opened tube slowly and carefully applied toothpaste to the brush. Carefully washed toothbrush and realigned it in case.	Feeling the edge of the case seemed to confirm to him that he had it in the correct direction to open it, so toothbrush was right side up once he had removed it from the case. Connection with the cap and watching the toothpaste spread on the brush appeared to keep him engaged.
			Olfactory	Smelled the toothpaste on brush.	Smelling appeared to help him remember what he was doing.
			Gustation	Licked, tasted and ate toothpaste.	Sensory response from licking action appeared to help remind him what he was doing.
			Proprioception	Reached for door frame and held it as he passed over threshold. Spat water all over the sink/counter. Messy.	Having the door frame to lean on and brace himself against appeared to provide security and allowed him to stabilise his own body.
			Vestibular	Held on to door frame on entering the bathroom, and touched edges of counter with hands and torso to maintain balance. Approached space rigidly, joints appeared stiff. Rocked on his feet and paced as he was completing the task.	The security of the building structure and fittings appeared to enable him to think better. Rocking and swaying appeared to help him work through his thoughts and complete the task.

Table 2: Competency and sensory / cognitive processing observation and assessment for task of brushing teeth

*Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH) is a service, training and research programme for individuals of all ages and skill levels with autism spectrum disorders.

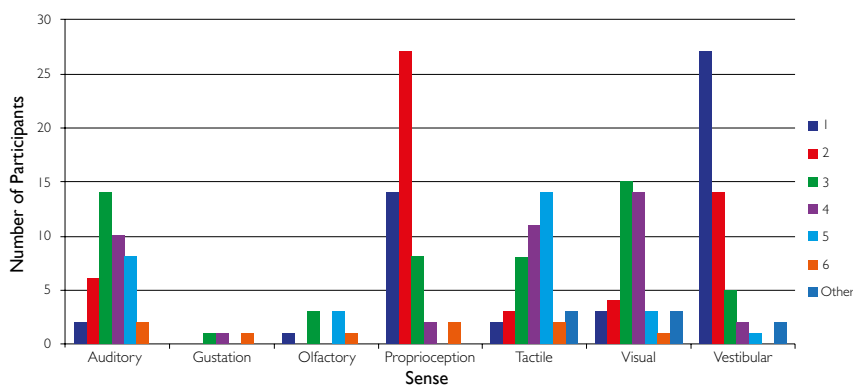


Figure 4: Sensory and cognitive processing observation results

of their everyday lives, they could take the sensory experiences in which they engage daily for granted.

Gustation: Observations of RPs using their gustation sense when performing tasks of ADL were less prevalent in these interviews and observations than any of the other senses. Some participants expressed preferences for certain foods and expressed memories about having particular foods, but there were no prominent findings.

Summary of resident interviews

RPs were asked about how the physical environment met their needs. They expressed a desire for more privacy, to meet socially with one or two friends, to have control over their schedules and their physical environment in terms of heat, lighting and sound, and to have the opportunity for family to visit and stay overnight. They also expressed a desire to have pets and unlimited interaction with technology.

Interviews with administration staff

Collectively, the administrators expressed an interest in having more space, especially spaces that matched the needs of their clients. They recommended that a masterplan be developed and followed. They all indicated that the next generation of designs should accommodate fewer residents in each home, include high-tech and IT accoutrements, have a refined management of transportation system, and have more pleasant outdoor spaces.

Service providers (SPs)

The staff expressed a need for spaces (living and learning) to be flexible, organised, predictable, and more generous in size than those typically required for NT people. They also stressed the need for controlled

acoustics and visual cues in the spaces in which they worked. Access to the outdoors and the opportunity to get outside in open spaces were also noted. Additionally, given RPs were often negatively affected by their differentiated cognitive processing and sensory sensitivities issues, the SPs stressed the need for having spaces that helped them remember where they were and what behaviours were appropriate for particular settings. Furthermore, they emphasised the importance of ensuring each RP was able to personalise their space and have control over their environment.

Survey results

The visual sense ranked highest, followed by auditory, then olfactory, and, finally, proprioception and vestibular. Participants were also asked to rank the challenges of the built environment. Spatial configuration and ergonomics were ranked as the most challenging; materials and finishes were ranked least challenging; and natural daylight was preferred over artificial lighting.

Implications of findings

This exploratory study produced results that contribute to the body of knowledge on designing for people with I/DD and have implications for both theory and practice.

A synthesis and analysis of the data gathered in this grounded-theory study build on the findings in the literature review and prompted the development of a new model that is sensitive to both the ableness and the cognitive and sensory sensitivities of the I/DD population. The new design model is called neuro-considerate design (NCD)³³ for people with I/DD, and it consists of six new themes: 1) communicate; 2) empower; 3) engage; 4) accommodate; 5) encourage; and 6) enrich (see table 1, final column).

An annotated sample of two themes (see table 3 and 4), which acknowledges earlier studies on ageing NT populations, provides an effective and responsible tool for designers and architects to embrace a salutogenic approach to design.

Tables 3 and 4, and figure 5 provide practical ways to implement two of the themes outlined in the model. In the example of 'theme 1: Communicate' (table 3), the concept of previewing a space before entering or using it is explained. Evidence-based design interventions are recommended to enhance an I/DD person's comprehension of a space, ie what the space is used for and expected behaviours of occupants. Clear sight lines, definable architectural forms and surfaces, and purposeful, meaningful spaces serve as modelling devices that help the occupant learn independently. Careful configuration and application of built forms, surfaces and colours provide meaning for a space and serve as a learning tool. Suggestions such as providing transparency through spaces, and opportunities to overlook, sit on the side, and view a space from a distance, allow a person with I/DD to adjust to an environment and make a decision about how and when they would like to be engaged with a space. This opportunity to preview also permits a person with I/DD to observe, ponder, digest and learn the appropriate behaviour for a space, and develop an understanding of what activities and uses take place in a room.

Sensory sensitivities

In the example of 'theme 3: Engage' (table 4), several design interventions are recommended to help a person with I/DD fit into the environments they use. One of the key suggestions in this model is the implementation of elements and principles of design that support concepts inherent in the habitat theory (prospect and refuge).³⁴ Providing areas for 'prospect', such as looking out on to settings from a sheltered 'refuge', such as a porch aligned with seating that backs on to a wall, allows occupants to have complete peripheral views of areas around them. Incorporating both open and closed spaces into the building configuration, and floor-to-ceiling windows, such as those found in a sunroom, also enable people with I/DD to have control over their environment and, hence, feel more engaged. These types of spaces allow this group to



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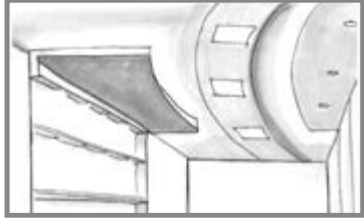
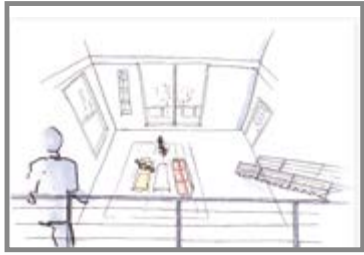
Neuro-considerate design model for I/DD ³³ Accommodations for cognitive challenges and sensory sensitivities				
Theme	Findings	ENVD theory	Design interventions	Key design interventions
I. Communicate	<p>Provide spaces that:</p> <ul style="list-style-type: none"> • Enhance cognitive clarity <ul style="list-style-type: none"> – Legible – Predictable – Consistent – Coherent, – Engage senses – Allow for territorial preference – Therapeutic to regulate circadian rhythms. • Support cognitive cueing <ul style="list-style-type: none"> – Previewing – Architectural differentiation – Define purpose of space – Flexible – Convey purpose of space – Inform weather, conditions. 	<ul style="list-style-type: none"> • Memory • Wayfinding, EBT purposeful spaces, focal points, signature spaces • Vernacular influence • Environmental preference theory • Biophilia influence • Viso-spatial processing • Affordance theory • ENVD preference theory 	<ul style="list-style-type: none"> • Memory cues, clarity <ul style="list-style-type: none"> – distinguishable sight lines to see what's ahead – previewing, transparency through spaces: <ul style="list-style-type: none"> – look in through glass – look from above. • Definable forms <ul style="list-style-type: none"> – positive / negative space: clear definition between physical structure and built spaces, symmetrical forms and spaces; predictability. • Variation in ceiling finishes, heights, textures <ul style="list-style-type: none"> – draw the eye up. • Communicate behaviours <ul style="list-style-type: none"> – quiet versus loud activities, spaces that identify activities: eg kitchen, food, bathroom, personal privacy, depth for acclimatisation. • Lighting that defines space <ul style="list-style-type: none"> – perimeter provides clarity of use and wayfinding, eg perimeter lighting. • Landmark objects <ul style="list-style-type: none"> – cognitive maps to help wayfinding – therapeutic, home-like environments – connections to, and proportion and scale that fit with, nature settings. 	<div style="border: 1px solid gray; padding: 5px;">  <ul style="list-style-type: none"> • PREVIEWING sight lines, adjacencies • DEFINABLE architectural forms and surfaces </div> <div style="border: 1px solid gray; padding: 5px; margin-top: 10px;">  <ul style="list-style-type: none"> • PURPOSEFUL, MEANINGFUL spaces </div>

Table 3: Recommendations and implications for practice. Sample theme: 'Communicate'

'visually test the waters' and observe their surroundings without being noticed. This is important for these individuals' wellbeing, as often they are intimidated by large group settings and/or they are unsure of what is expected of them in certain social settings.

Previewing also allows a person with I/DD to understand a space so they can temper their emotions and build their self-esteem before they engage in an activity in a given space. Additionally, spatial configurations that have architectural depth, ie a variety of rooms and spaces that open out to one another (figure 5), permit the 'pacers' in this population to loop from one area to another and deal with any anxiety they may encounter from over- or under-stimulation. The 'layering of spaces' intervention associated with architectural depth allows individuals with I/DD to glance into a setting and pass by discreetly, rather than be forced into, and become potentially trapped within, social settings that they often find disturbing.

In line with the habitat theory is the idea of providing 'escape space' – a quiet room

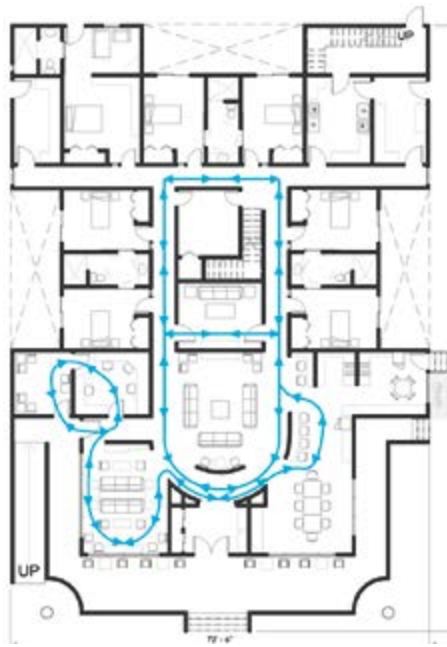
where people can be alone and interact with materials, textures, patterns, music, technology and special lighting to foster engagement. Escape spaces permit the individual to adjust their level of privacy and sensory balance, in order to maintain their psychological wellbeing. Predictable outdoor spaces equipped with interconnecting pathways and clearly defined sight lines, with transition points that give cues to individuals, promote independence and, hence, more engaging experiences. Larger-than-normal corridors that act as social settings, rather than just points of transition, also encourage engagement, as do spaces that have higher-than-standard ceilings and views to the outdoors, as they allow people with I/DD, who have different proprioception and vestibular needs, to express their need to flap or twirl their arms and hands, etc.

Future research

This research embraces an evidence-based design perspective grounded in cumulative, confirmatory data. It serves

as a responsible and effective study to contribute to the knowledge base in this limited area of study. The humanistic approach adopted by the research creates hypotheses – relating to the influence of cognitive processing and the amelioration of sensory sensitivities in adults with I/DD – that require testing. These studies need to be tested and built on using a broader population sample in similar settings and correlated to establish best-practice design. Studies in cultures outside the western hemisphere would also add to the development of a global awareness and create impetus for change.

Additionally, broader studies in different, less familiar settings, such as public spaces, malls, restaurants and offices, would also add to the body of knowledge and examine what this group needs from a less-sheltered perspective – especially given there are lots of people who would prefer not to live in group-living situations or cannot afford to live in them. Specific studies that focus on evidence-based theories such as place



attachment, ageing in place, and active lifestyles would be beneficial, as would studies that focus on the non-verbal aspects of the sector with ASD, given that, in this small sample alone, about a quarter of this group were non-verbal.

Furthermore, research studies based on similar parameters, as outlined in this study, with a sample of family-parents and siblings / guardians, would also add new perspectives and contribute to the body of knowledge in environmental design for vulnerable populations.

Acknowledgements

This paper includes highlights from the author's dissertation research. The author is appreciative of the support received from: her dissertation committee of Dr Kristi Gaines, Dr Debajyoti Pati, Dr Lee Duemer, and Dr Robin Lock; her research associate Lupe Nevarez and editor Kathy Bouma; the American Society of Interior Design Foundation; the Organization for Autism Research; case-study communities: High Point Village in Lubbock, TX; Brookwood Community in Houston, TX; Marbridge Foundation in Manchaca, TX; Bittersweet Farms in Whitehouse, OH; Camphill Copake in NY; and Teri Inc in Oceanside, CA; and her employer Fanshawe College, in Canada.

Author

Angela Bourne MSc, MEd, PhD, ENVD is a professor in interior design at Fanshawe College.

Figure 5: Looping (top left). A spatial configuration that permits one to travel from one space to another without being confronted with any dead end spaces.

Top right: Prospect – spatial layouts that provide opportunities for occupants to have clear sight lines serve as neurological nourishment for understanding the use of a space and behavioural expectations appropriate for particular settings.

Refuge – spatial layouts that provide opportunities to view from a distance in a sheltered area permit the occupant to examine the actions and behaviours occurring in a setting and digest these in a manner that suits their learning style.

Practical applications for design professionals are noted in the diagram.

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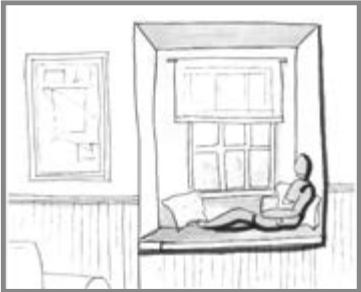


Neuro-considerate design model for I/DD ³³ Accommodations for cognitive challenges and sensory sensitivities				
Theme	Findings	ENVD theory	Design interventions	Key design interventions
3. Engage	<p>Provide spaces that:</p> <ul style="list-style-type: none"> • Respond to rather than dictate persons' needs / ways. • Are meaningful and purposeful to hold their attention and interest. • Provide opportunities to express talents and learn at own pace, and in individual ways that are meaningful experiences, eg process and product, change growth. • Allow personal expression, eg creative outlets, such as visual art, music, etc. • Engage senses, eg views to nature, physical participation in activities in natural settings. • Allow one to release physical energy – eg looping, pacing, swinging arms. 	<ul style="list-style-type: none"> • Spatial syntax: <ul style="list-style-type: none"> – in buildings with greater architectural depth (the number of spaces one must pass through in order to get from one room in the house to another) residents are less likely to withdraw socially or be psychologically distressed than residents in crowded homes.³⁵ • Incorporate biophilic design characteristics, ie forms and shapes that reflect nature resonate with a person's natural predispositions.² 	<ul style="list-style-type: none"> • Spatial choice: <ul style="list-style-type: none"> – limit crowding, provide opportunities for previewing, see activities / situations from a distance, eg front porch, seating in corridors, and escape spaces such as a window seat, which allows viewing from a position on the side. – provide natural lighting that draws a person into a space / activity. – provide large, open spaces with high ceilings and uniform, simple architectural elements to accommodate physical / energetic expression. • Personal choice: <ul style="list-style-type: none"> – provide closed spaces for solitude, wandering and pacing. – include spaces with interesting objects and scenes, eg outside bird feeders, fish ponds, interactive musical instruments; inside: memorabilia areas, celebratory walls, and personalised individual bedrooms. – looping through, layered spaces. – architecture and interior forms and materials that are symmetrical, repetitive and interesting, and flow freely, eg curved corridors that include a variety of surface textures, low-contrast patterns and soothing colours, which solicit cognitive participation but reflect an organised complexity; symmetrical, predictable and legible. 	<div style="border: 2px solid red; padding: 5px;">  <ul style="list-style-type: none"> • ESCAPE SPACES  <ul style="list-style-type: none"> • Accommodate SPATIAL NEEDS – vestibular and proprioception expression  <ul style="list-style-type: none"> • PREDICTABLE OPEN OUTDOOR SPACES – encourage independence and provide relief from over-stimulation </div>

Table 4: Recommendations and implications for practice. Sample theme: 'Engage'

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Post-occupancy evaluation: Architectural metrics – developing design analysis tools for post-occupancy evaluations

This research is the architectural analysis component of an in-progress, multi-year, multi-method post-occupancy evaluation of the recently opened Bridgepoint Active Healthcare (BAH) in Toronto, Canada

Cheryl Atkinson BArch, MRAIC

The new 455-bed Bridgepoint Active Healthcare (BAH), in Toronto, Canada has the largest cohort of complex continuing-care and complex rehabilitation patients in an urban area.

The facility is currently undergoing an in-depth post-occupancy evaluation (POE) – the biggest systematic POE of its kind in Canada¹ – led by a team of social scientists examining the potential causal link between architectural design and health-related outcomes. The identified domains of these

outcomes are: psychosocial wellbeing, ie psychological wellbeing as a function of interactions with the social environment (depression, connectedness, mood, stress reduction); functional health (pain, mobility); and organisational efficiency. Using various methods (eg quantitative surveys, naturalistic observation, and go-along interviews with patients and staff), the same population of Bridgepoint, pre- and post-move, are being documented and compared with those of a third control facility, West Park Health Care Centre, which is analogous in use, scale and regional locale.

This paper, which presents the architectural documentation and analysis of the design elements intended to impact on these identified outcomes, forms a sub-component of the larger programme of research. By documenting, quantifying and making visually comparable the actual differences and similarities across facilities under comparison, this analysis enables the social scientists to better attribute potential causal relationships between design and patient experience. Using examples from the findings and analysis, the methods and strategies for graphically organising and presenting the comparative

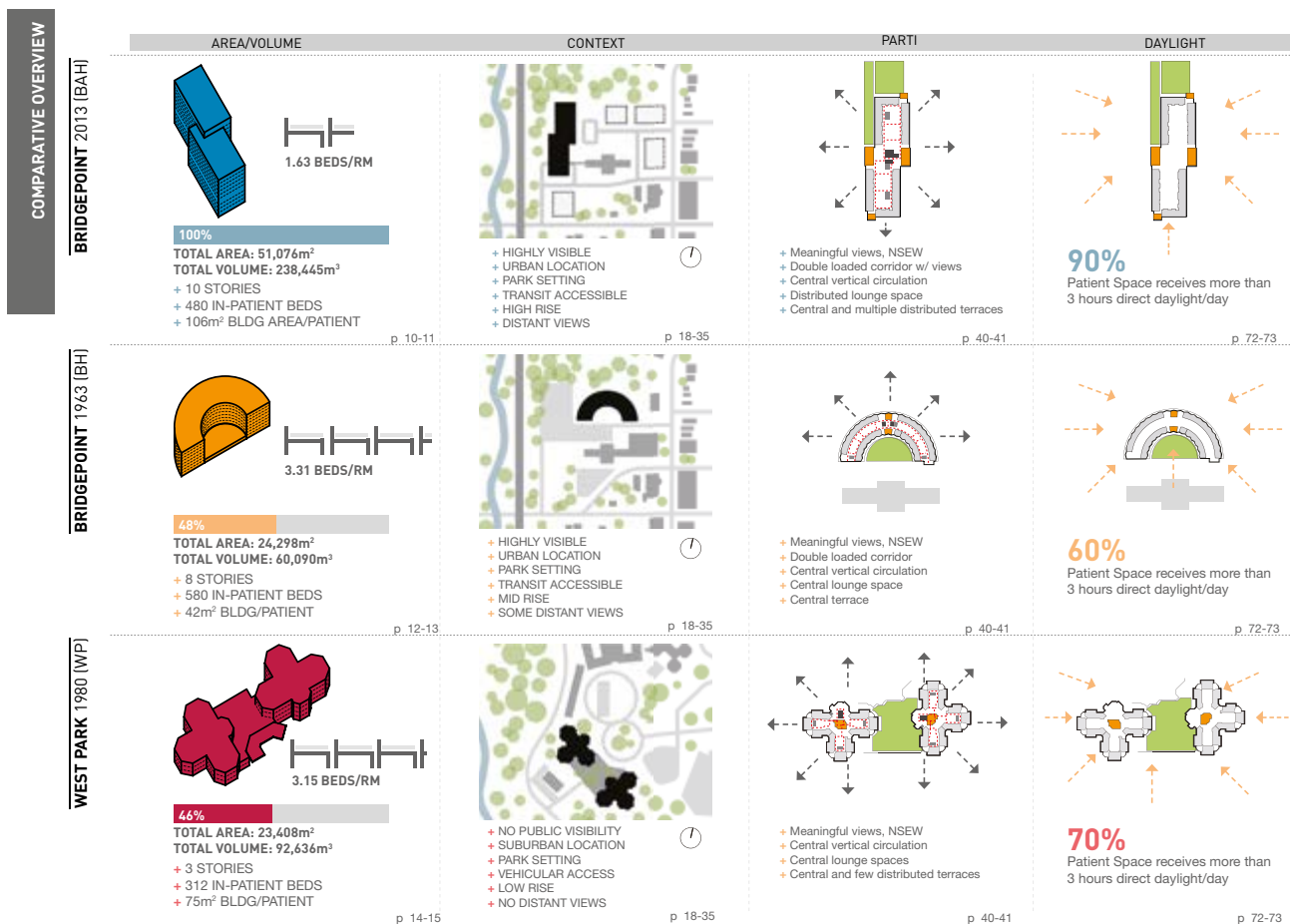


Figure 1: Comparative overview: area / volume, context, parti, daylight, fenestration, bedroom type, programme, social space, outdoor space and density of patients

design data will be illustrated and discussed.

Differing to most POEs, which usually address clinical impacts of design, this one focuses predominantly on the environmental conditions anticipated by the designers and administrators to significantly impact sociological and mental health. The architects stated, from the outset, that this project would be a new model "village of care... that is as much about city building and engagement with the community as it is about creating an architecture of wellness".²

This study has specifically focused on the key design elements that the architects themselves included with the explicit intention of improving patient enjoyment of the internal environment, social engagement, and interaction with the local urban community and park setting. Components selected for documentation, analysis and comparison between the three facilities include:

- framing of exterior views (increased quantity and variety of positive distractions);
- programme augmentation (increased variety, quantity and quality of social amenities for patients);

- daylighting (increased quality and quantity of natural light);
- programme organisation (building planning, patient-room occupancy, and its impact on mobility, proximity and wayfinding); and
- relationship to site (visual and actual access to out-of-doors, nature and community).

These graphic templates are designed not only to facilitate this particular research project but also to operate as universal healthcare-facility planning and programming tools. The Ontario Ministry of Health and Long Term Care, also a research collaborator, hopes to establish design templates and objectives from this work, to use for the development of programming, design guidelines, and policy for complex continuing-care and rehabilitation facilities.³

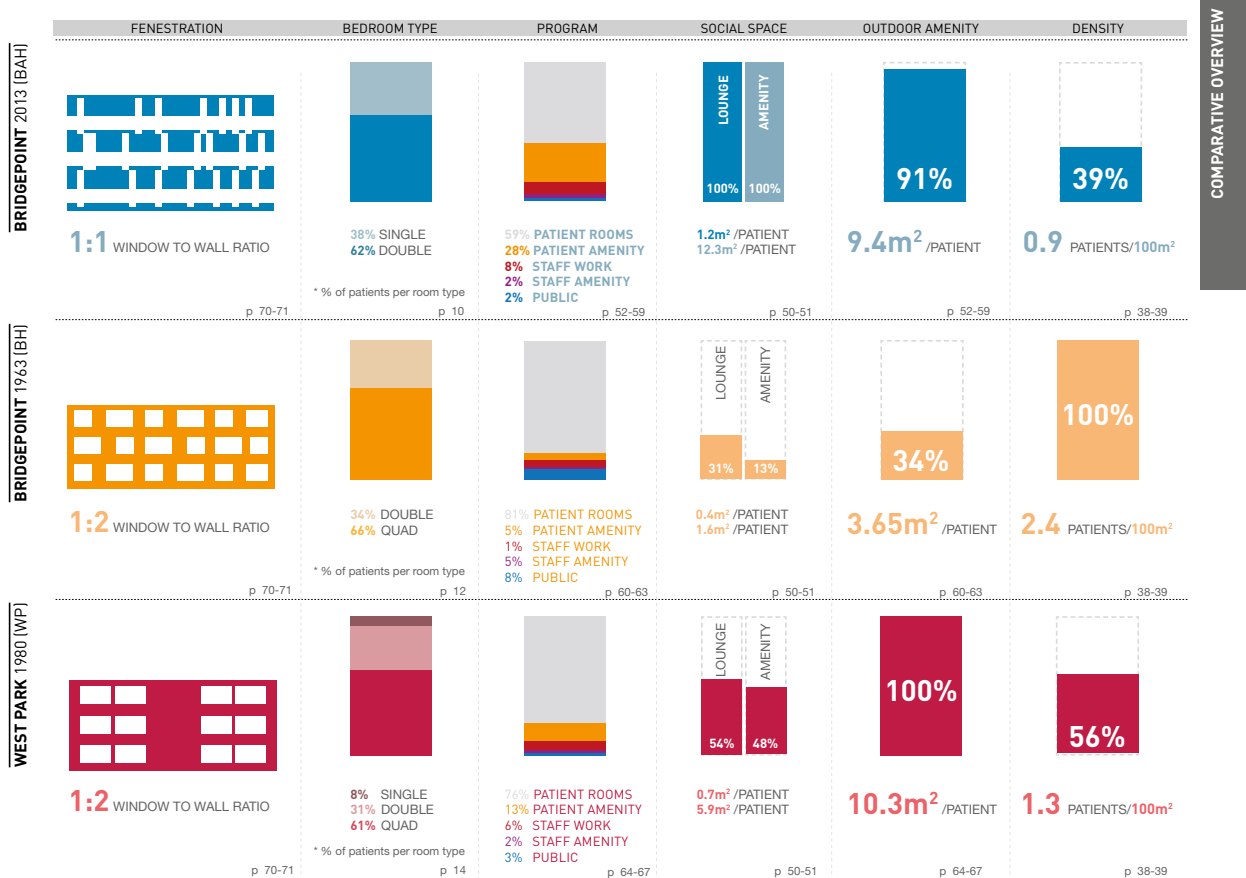
Research rationale and objectives

It is well-documented that the ambient qualities of the architecture for treatment and respite have a positive impact on psychological, social and physical health. Aesthetics, material qualities, views and direct exposure to

nature, and spatial organisation⁴ can distract patients from pain⁵ and improve mental state. It is also recognised that enhanced building programming and ambient environmental conditions are particularly important for complex chronic-disease (CCD) patients, who experience long-term residency and are a fully conscious patient population prone to pain, anxiety and depression.⁶

Standard measures and methods

The larger programme of research represents an unusual opportunity to compare the same user group in two distinct and different buildings, using design intentions as a gauge; with its arm's-length, multidisciplinary research team,¹ it is positioned to establish a rigorous and systematic methodology for POE design research in complex chronic care.¹ The architectural component of the Bridgepoint study is similarly designed to augment this emerging knowledge, by creating an equally rigorous and systematic methodology for deconstructing and measuring the myriad specific design factors anticipated to have significant valuable impact on complex chronic-disease patients and staff. As interior



COMPARATIVE OVERVIEW

environments are a complex interplay of multiple design decisions, it is critical to isolate individual design interventions to disentangle their potential effects. Using samples of the in-progress analysis, this research presents a variety of the graphic presentation techniques used to document, measure and analyse architectural design elements between buildings. This visualised documentation and comparative analysis are intended to create substantive clarity in relation to observed differences in outcomes in the larger programme of research, and in differences in design.

Graphic framework

This study (building on the general lexicon of design analysis diagrams codified by the publications of Clarke and Pause,⁷ and Unwin⁸) developed a variety of graphic templates to objectively compare design conditions across the three buildings. These templates are designed to have efficacy not just for this particular study but also for general use, as standards for visual data collection on facilities. Following the principles adopted by the Centre for Health Design's evidence-based design (EBD) glossary,⁹ it is critical to create a universal and consistent

visual language and terminology for design research and planning.

Graphic templates are both critical inductive and deductive tools in design, as they provide a direct, compressed shorthand message for designers, users and administrators, eliminating the ambiguity of written and numerical descriptors. Much of design is ineffable and experiential, and is best communicated graphically. Bundled environmental and design factors within a single space (materials, acoustics, dimension, colour, etc) make it difficult to attribute specific conditions to outcomes. Diagrams and drawings break down architecture into a series of categories where specific design components are isolated (structure, circulation, parti, site conditions, geometrical proportions, programme, etc) for ease of analysis and comparison. Line weights, symbols, arrows, and colour are used to abstract form, space, forces and time, to create insight and clarity.

There is a rich history of the use of reductive analytical diagrams in modern architecture. Le Corbusier, in both his speaking and writing,¹⁰ used diagrams prolifically to proselytise his revolutionary ideas. Rem Koolhaas, of OMA¹¹ and, more

recently, Danish architect Bjarke Ingels, of BIG,¹² have significantly elevated the value of the diagram as the primary tool to theorise, generate, problem-solve, communicate and justify designs to their function and context. This same kind of analysis can also be used deductively from form to concept, to aid understanding of the complex interplay between cause and effect in design.

Graphic methodology

The graphic analytical methods used in this research include a variety of separate architectural 'parti' drawings,⁷ exploded axonometric drawings, plans, sections, diagrams, and bar charts.

Selected components of the three facilities were photographed, measured, diagrammed, mapped, analysed and compared through a variety of graphic templates, to present a report format.¹³

This analysis is supplemented with photographs of designated spaces and the use of software to model daylight penetration. Documented components include:

- areas and proportional differences in selected rooms and spaces;
- organisational patterns of movement and circulation for in-patients and staff;

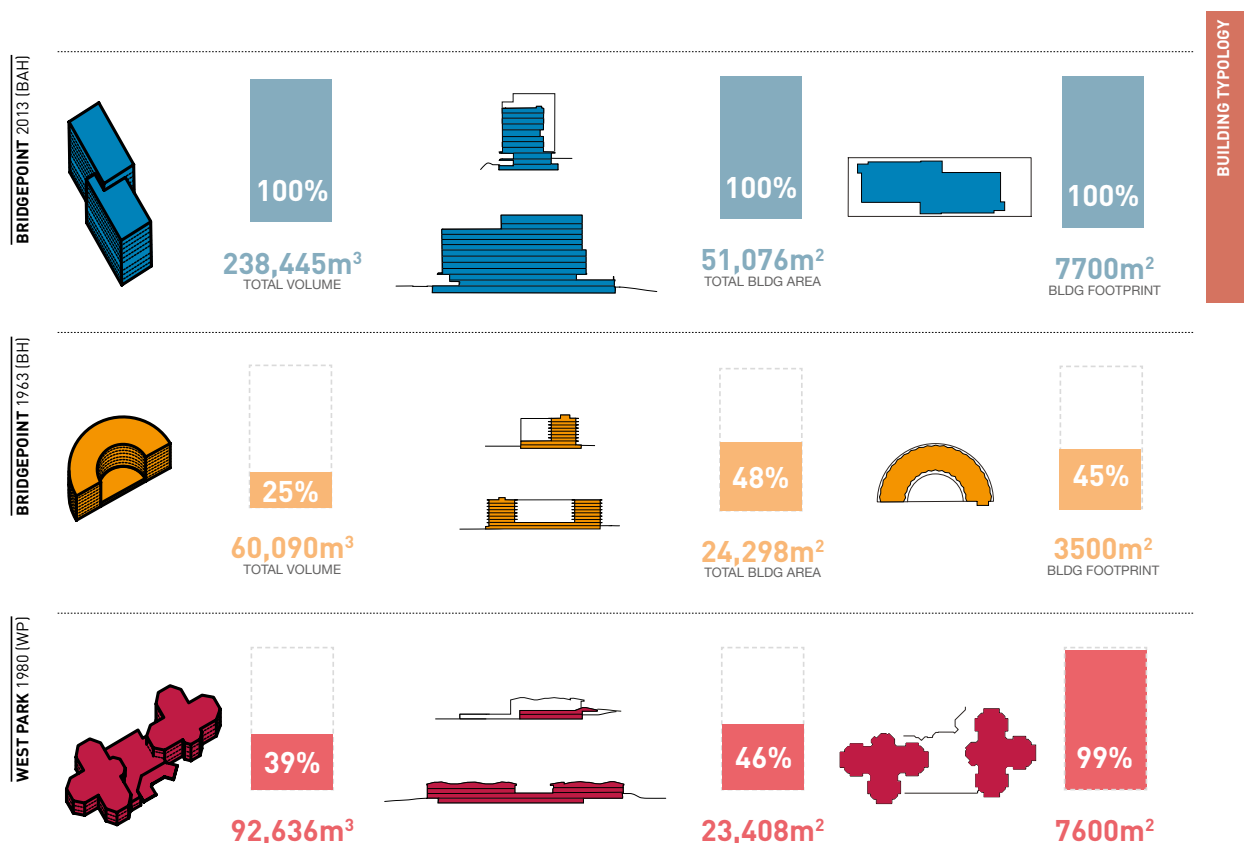


Figure 2: Site context

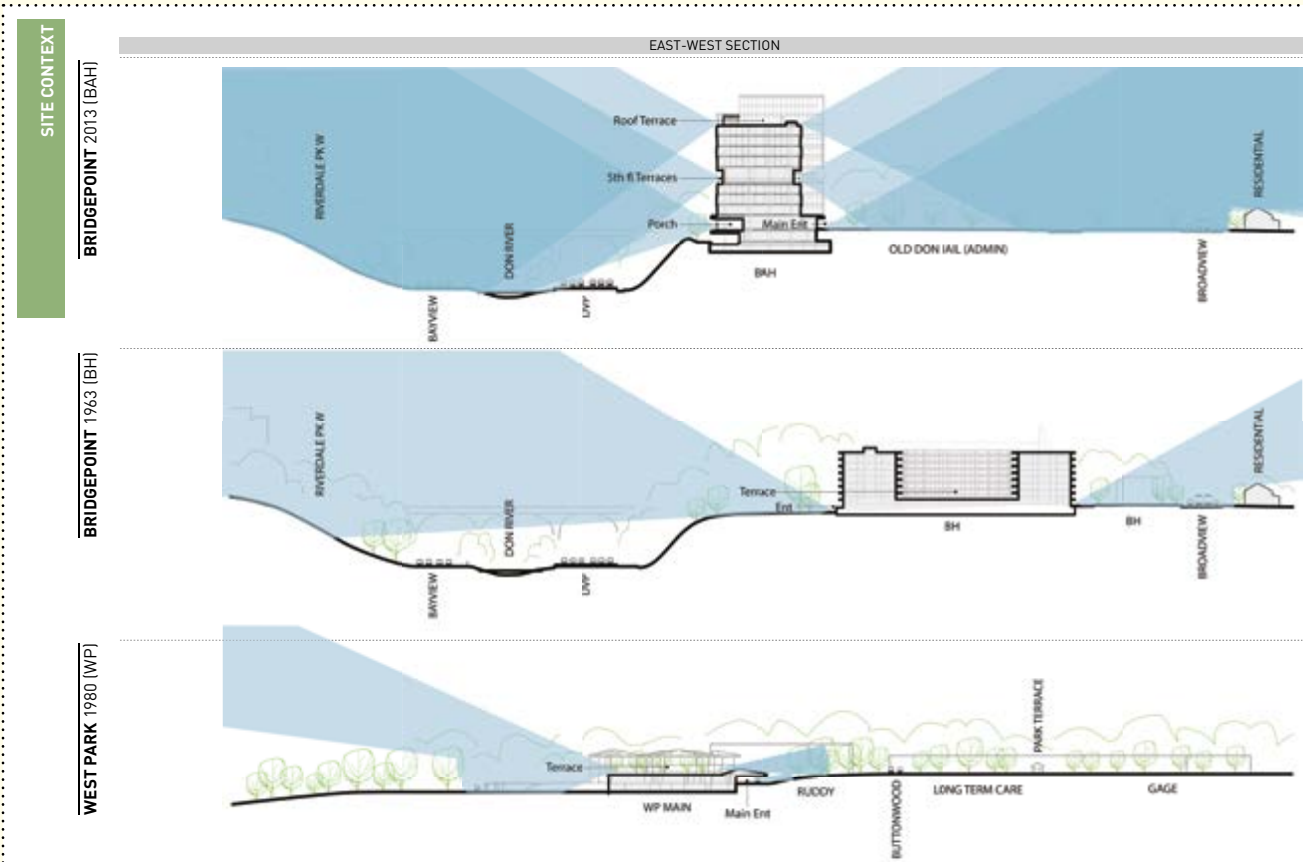


Figure 3: Meaningful views from outdoor social space

- sectional relationships between spaces inside and out;
- plan relationships (proximities and adjacencies) of rooms and spaces;
- travel distances (for patients and staff) to various activities and functions;
- window locations and orientation in the building and site;
- window proportion, scale, dimension and configuration on wall; and
- material type, texture and colour.

The report comparatively presents data collected for these categories with respect to patient rooms, identified social spaces and amenity spaces, circulation spaces, recreational spaces, and their interrelationships with one another and the outside world – actually (physically and experientially) and visually (through fenestration).

An appendix in the report includes full statistical, quantitative documentation of each of the studied rooms (areas, volumes, window extent, quantity in building, etc). These room data sheets show analogous spaces from each facility at the same scales in plan and section, with a photo, and the room's location in the overall plan. Aesthetic conditions

were not exhaustively documented, but their primary materials were listed, and qualitative conditions were captured through photography. Architectural terminology used in the report corresponded to the definitions identified in the Centre for Health Design EBD glossary,⁹ along with some definitions of our own as defined in the report.¹³

Graphics comparability

The report is organised with the same data for each facility seen on the same page for direct visual correlation. Consistent scales and orientations of plans allow for easy comparison. Each building is also consistently colour-coded for ease of reference.

A 'comparative overview' at the start of the report (summarises the key comparative findings, in a collective series of diagrams and colour-coded bar graphs – a kind of super-diagram – to compress all data visually into a single image (fig 1, pp60-61). In these summary bar graphs, the new Bridgepoint Active Healthcare building (BAH) is used as the base point, with the two other buildings compared against it (for example, the quantity of patient lounge space – 1.2m² per patient

attributed to the new BAH – is shown as a baseline 100%, with the lounge spaces of the predecessor Bridgepoint measuring 0.31m² per patient shown (30% as large as the BAH), and the lounge space of West Park at 0.66m² per patient, (54% as large as the BAH).

Building scale and density

Basic room data, such as gross floor area, building volume, and building height, are comparatively shown through axonometric diagrams of each building drawn to the same scale. In-patient occupancy statistics and other basic numerical data accompany these diagrams for quick reference.

The significant increase in building volume for the new BAH (four times the height and two times the area of its predecessor) are shown as either percentage statistics or bar graphs adjacent to this information.

The relative physical, quantitative differences for individual rooms are evident in the room data sheets in the report's appendix, where individual rooms are all compared in plan, section and in the same orientation, accompanied by a photo for qualitative reference.

Context and positive distraction

Each building's siting, showing its access to positive and varied views of nature and community, is captured both in the 'Comparative overview' and in the report section titled 'Site context'. These planimetric context diagrams allow one to readily identify the building's relationships to selected criteria (public transit access, urban/suburban, green space access, visibility within its community, etc).

The detailed site sections (figure 3, p63) show the buildings' views, relationships and proximities to both their immediate and larger context of streets, parks, highways and urban communities, and distant landscape features. Stretching to ten stories, with much higher floor-to-floor heights than the 1963 building, the new BAH is approximately twice as tall as the former eight-storey hospital. Consequently, it has a significantly greater variety of "meaningful views", providing positive distraction,⁹ both near and far, than either the old building on the same site, or West Park, a low-rise three-storey building located in a suburban park setting. Patients at the new hospital, which sits on the same site as the old facility, have distant views to the city centre,

adjacent highways, and Lake Ontario, along with views of the adjacent streets, parks and related activities (eg ball games), compared with the more immediate, tree-enclosed, passive views of the other two buildings.

Daylight

Window-to-wall ratios for each building are shown in the 'Comparative overview' as abstracted figure-ground drawings of a similar three-floor, two-bay fragment of each building's typical patient-room façade. Each building's site parti drawing (showing its access to positive and varied views of nature and community) is also captured here. These context diagrams allow one to quickly identify the building's cardinal orientations for daylighting in plan. Here, it is immediately evident that the configuration of the new BAH with its rooms facing only east or west, guarantees that each patient room or activity space receives more than three hours of daylight, whereas only 60% of the patient spaces at the original hospital, with its crescent-shaped plan oriented north-south, received three hours minimum.¹⁴

The 'Daylighting and fenestration' chapter of the report draws the analogous rooms for each facility adjacent to one another;

and plots the amount of direct and indirect daylight received in both plan and section. The individual rooms selected for these drawings were those positioned in plan to receive the greatest access to direct daylight penetration during the Winter Solstice. Figure 3 shows one of these drawings for double patient rooms. The design factors that facilitate or restrict this access to daylight (floor-to-floor height, window size and orientation, overhangs, etc) are self-evident from the section drawings here, where sun angles and direct light versus ambient light are plotted. A separate series of drawings show the significant views from these same spaces in plan and section.

The ratios of bedroom types within each facility were gathered and drawn, and shown relative to the new Bridgepoint in the 'Comparative overview' of the report. This statistic has a significant impact on patient density per floor, as also indicated on the 'summary graphs', with anticipation that this reduced and dispersed population over the floor will impact patient and staff social interactions.

Proximity / travel distance / wayfinding

Travel distances between nurse stations and the most distant patient rooms were

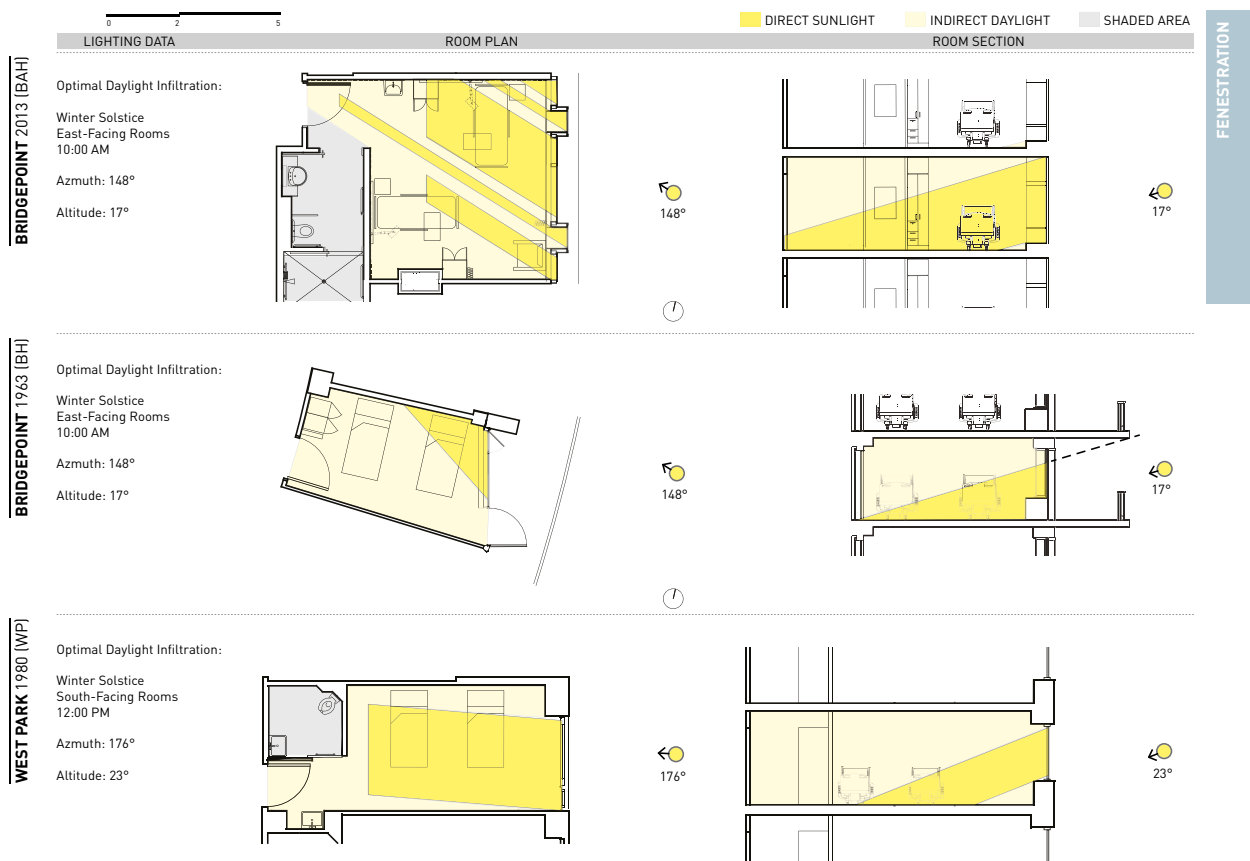


Figure 4: Fenestration / daylighting for analogous double patient rooms

diagrammed in plan and compared, as were travel distances between patient rooms and patient lounges (figure 4, p64). It is evident that, despite the larger floor plate and overall building size, the maximum travel distance for staff to the furthest patient room is similar to the old Bridgepoint, but fewer patients are accessible per nurse station. Patients travel a similar distance to reach the patient lounge in both new and predecessor hospitals. The relationship between the vertical circulation points and these lounges are very different, however; with the new Bridgepoint lounges located some distance from elevators.

Programme / amenity spaces

Programme allocations for each building were drawn showing relative quantities of other non-clinical “amenity spaces” provided in each facility, in order to reference findings on patient satisfaction, access to positive distraction, as well as incentives to be mobile and active.

The new BAH has significantly more quantity and variety of patient amenity spaces (seven times as much as the previous building, and twice as much as West Park). These spaces include communal dining spaces, physiotherapy, a swimming pool, cyber

café, hair salon, library, lecture theatres, and spiritual areas.

Patient amenity spaces are evenly distributed throughout the plan and section, with feature spaces organised hierarchically, (eg roof garden versus therapy pool). These spaces all have distant views to the park and the city, opposing solar orientations, and are intended to motivate patients to travel these destinations for different views, activities and daylight conditions. Particular attention was paid in this study to patient lounge space (as the primary social space in the comparison buildings) and their characters and furnishings, as well as their locations and orientations within the building and site.

Each building is drawn as an “exploded” axonometric with its programme colour-coded into the selected categories of patient care, patient amenity, staff work, staff amenity (lounge space), public areas, and outdoor amenity. This facilitates a comparative understanding of the scalar, distribution and organisational differences of these programme categories over the entire buildings (figure 6, p67). These axonometric diagrams, through their colour-coding, also indicate circulation patterns in both plan and section across the buildings. Parti drawings,

travel distance diagrams, and room data sheets for the interior social spaces fill out the graphic information for these spaces.

Outdoor amenity

Outdoor amenity spaces for each building were mapped in the exploded programme axonometrics, and parti drawings and their relative area metrics were drawn relative to the overall gross floor area of each facility. The new BAH has significantly more of these outdoor spaces with significantly different characters (eg sunny versus shady, open versus closed, noisy versus quiet and contemplative, etc) and activities at each destination (roof terrace, north-facing ‘labyrinth’ terrace, west-facing porch, west-facing garden). The other two facilities each have (or had) only one terrace space per building.

Planning / building parti

The parti drawings, shown in figure 7 (pp68-69), allow for a comparison of key environmental variables. These drawings allow us to see overarching organisational patterns and hierarchical relationships between circulation and social spaces, circulation and views, proximities, and relationships to fenestration for orientation, daylight and view.

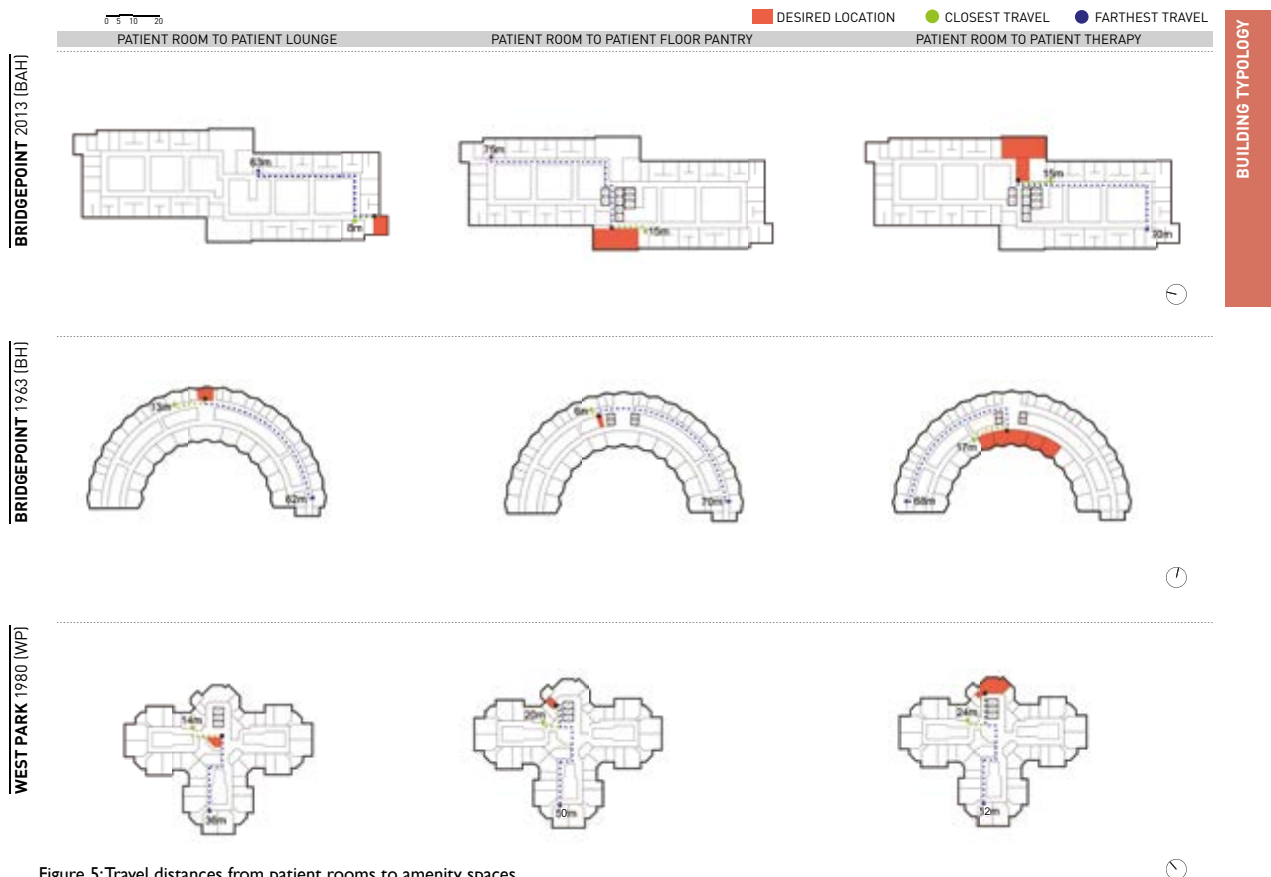


Figure 5: Travel distances from patient rooms to amenity spaces









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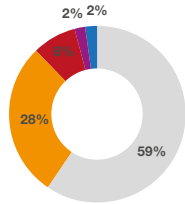


ARCHITECTS
& ENGINEERS

PROGRAM OVERVIEW

-  PATIENT ROOMS
12,335 m²
-  PATIENT AMENITY
5,897 m²
-  STAFF WORK
1,703 m²
-  STAFF AMENITY
450 m²
-  PUBLIC AREA
518 m²
-  OUTDOOR AMENITY
4,500 m²

INTERIOR PROGRAM BREAKDOWN



20,903 m²

OUTDOOR AMENITY RATIO



4,500 m²

*N.B. Indoor Program Ratio is the breakdown of the selected spaces shown in legend only i.e. patient rooms and amenity spaces for staff and patients, net of circulation and services). Outdoor Space Ratio is expressed as a ratio of these selected spaces studied in this particular POE.

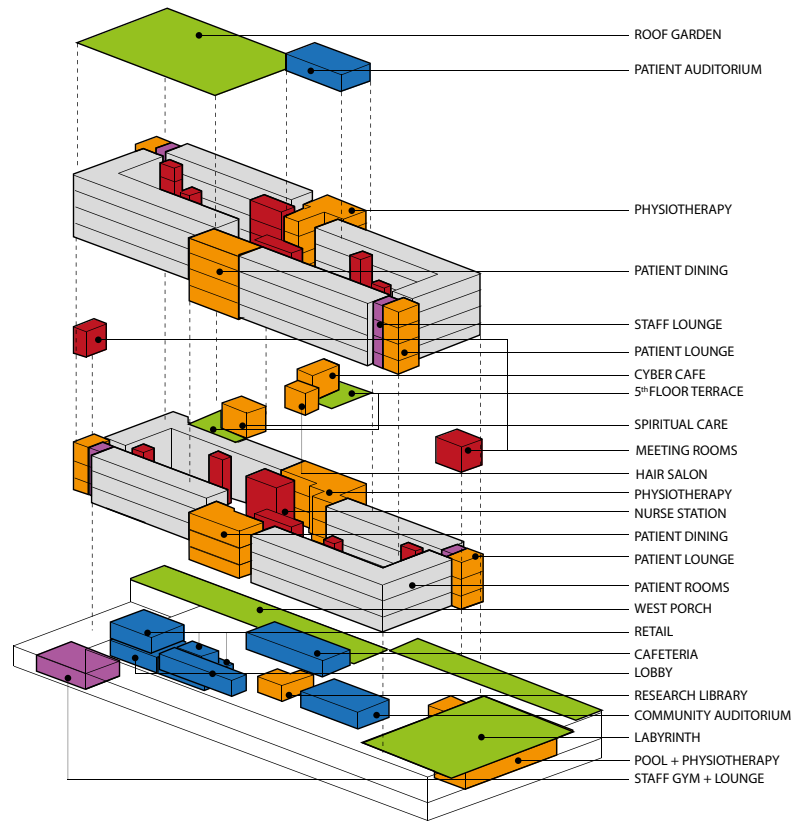


Figure 6: Exploded axonometric of new BAH

Research questions

This architectural data is expected to figure significantly in the final synthesis of this POE when the data collection and analysis from the social scientists are complete. Our team has been looking at these differences in use by patients and their perception of space at each building, and cross-referencing them with architectural data on differences in densities of patients and staff in relation to: floor; quantity and variety of amenity spaces competing for patient use; consideration of travel distance to such spaces; visual porosity; and proximity to elevators and other high-traffic circulation conditions that promote casual social interface and interaction.¹⁵⁻¹⁶

From preliminary observations, the popularity and use of similar spaces is significantly different between the three buildings. The architectural data collected create both questions and preliminary suggestions of cause.

At West Park, for example, unlike the other two buildings, the patient lounge has no access to daylight or exterior views, yet this space, so central to the primary

horizontal and vertical circulation paths for both patients and staff, is heavily and regularly occupied. On analysis, it is understood that this space is accessed from multiple points. Open on all three sides, forming a 'T' of circulation and serving 78 in-patients and the elevator lobby; it is the only available communal patient social space per floor.

Similarly, the double-loaded crescent-shaped corridor of the old Bridgepoint had one patient lounge, which was located centrally, open and adjacent to the elevator lobby, and with physiotherapy space visible on the opposite side of the hall. This space, which was north-facing (to the park) and three-sided, with its large open side toward the lobby, served up to 100 patients per floor.

By comparison, the plan of the new Bridgepoint Health has two destination lounges available at the distant ends of each corridor. There are two corridors per floor; each serving 30-32 patients. Patients have access to four different amenity spaces per floor (each with two fully glazed walls); a lounge at each end; a dining area separated but adjacent to the elevator lobby; and a

therapy space also adjacent to that same lobby. Sixty-four in-patients use this same elevator core and share a minimum of four separate amenity spaces per floor. These diminished densities and single circulation options suggest a potential impact on social interaction.¹⁵⁻¹⁶

The following are some of the wider questions that our research team is seeking to answer by integrating the data collected across mixed methods in the social scientists' broader programme of research, as considered against the various diagrams and plans:

- what are the ideal quantity, type and physical characteristics of social spaces in a hospital?
- where are they best located relative to horizontal and vertical circulation hubs?
- what is the impact of circulation design on social interaction?
- what is the impact of increased quantity and variety of amenity spaces on social connectivity?
- what is the impact of extensive amounts of daylight and view on wayfinding,

- patient mood, and movement patterns?
- what is the impact of significant patient-room occupancy changes (transitioning to single patient rooms) on the overall size of a hospital infrastructure, patient density, and social interaction? and
- what is the role of increased visual and physical access to nature with respect to patient satisfaction?

Practical implications

Every building is a unique entity, the product of a complex construct of variables. These analytical templates have the potential for adoption as a standard for collecting, unbundling and analysing the complex, interrelated, large-order architectural components and conditions that distinguish different projects.

The Ontario Ministry of Health¹⁷ sees these templates as a valuable research tool to creating a graphic database for health facilities in the province. The Ministry is poised to spend \$11.4 billion over the next decade in new and expanded healthcare infrastructure¹⁸ for Ontario's ageing population, and, at present, it has virtually no research or data

collected on its current facilities from which to plan.¹⁷ While grappling with the life-cycle maintenance and utility costs of these facilities over 30-year timeframes in new public-private partnership (PPP) models of project delivery, evidence on the impact of design on human behaviour and psychosocial health will be extremely valuable.

Conclusion

To quote Edward Tufte, a pioneer in the field of data visualisation: "What is to be sought in designs for the display of information is the clear portrayal of complexity. Not the complication of the simple; rather the task of the designer is to give visual access to the subtle and the difficult – that is, revelation of the complex."¹⁹

Large and complex amounts of information can be readily understood, synthesised and acted on if they are presented in a well-organised and systematic way. Arrows and lines communicate forces and flows of weather; sun, wind, people and materials, while icons and symbols provide legibility by abstracting and compressing information.²⁰⁻²¹

Architecture is a physical construct

conceived and developed in visual, two-dimensional sketches and analogues, all of which begins with the diagram. Consequently, if the diagram is the "starting point of synthesis",²² then the diagram should also be the starting point for analysis.

Acknowledgements

This research is a sub-component of a larger post-occupancy evaluation (POE) of patient experience led by Dr Celeste Alvaro, Bridgepoint Collaboratory for Research and Innovation, and adjunct professor, Department of Architectural Science, Ryerson University. The architectural research, led by Cheryl Atkinson, assistant professor of the Department of Architectural Science, Ryerson University, has been assisted by Ryan Alexander and Margot De Man of Ryerson University. These projects are funded by the Canadian Institutes of Health Research (CIHR) Partnerships for Health System Improvement via the Strategy for Patient-Oriented Research and the Rx&D Health Research Foundation (Fostering Innovation in Healthcare Initiative). Additional funding was provided by the Health Capital Investment



Typical floor parti diagrams

Branch of the Ontario Ministry of Health and Long Term Care and Ryerson University.

The core research team also includes: Renée Lyons, Paula Gardner, Gregory Colucci, Clifford Harvey, Tony Khouri, Kate Wilkinson, Stuart Elgie, Mitchell Hall, Andrea Wilkinson, and Deyan Kostovski.

The new Bridgepoint Hospital was designed by Stantec Architecture / KPMB Architects (planning, design and compliance architects) in joint venture, and HDR Architecture / Diamond Schmitt Architects (design, build, finance and maintain architects).

Author

Cheryl Atkinson BArch, MRAIC is assistant professor at the Department of Architectural Science at Ryerson University.

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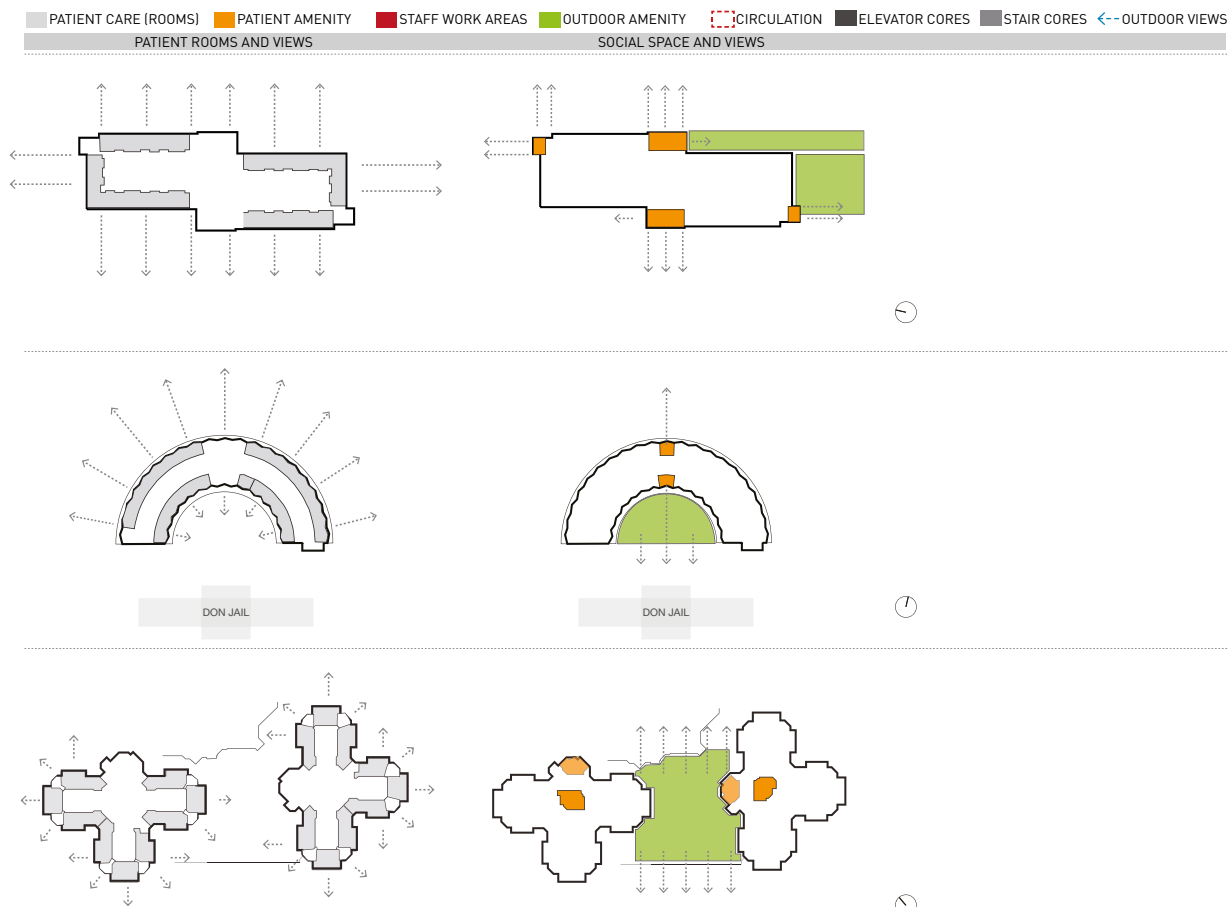
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BUILDING TYPOLOGY

Landscape and urban design for health and wellbeing: Using healing, sensory and therapeutic gardens

Gayle Souter-Brown

Routledge: New York City

Pages: 340pp

ISBN-13: 978-0415843522; ISBN-10: 0415843529

Both comprehensive and informative, this publication adds immeasurably to the growing interest in the health-giving properties of green space to enhance livable, sustainable cities. Covering design from school grounds to public parks, from public housing to private gardens, this richly illustrated text builds the case for including green spaces throughout our urban environments.

The author includes illustrations of her own designs, and she presents many case studies where degraded or bleak landscapes were improved by often-simple interventions. Images from many different countries enhance the text, and it is to her credit that the author also includes depictions of what not to do, reminding the reader of the many so-called 'landscapes' in our cities that do little to support health and wellbeing.

Divided into four parts the text looks at "... where today's renewed interest in healing gardens has come from, why we need them, how they are relevant today, and what we can expect from them".

The book opens with consideration of historic examples of restorative outdoor spaces, including monastic and Islamic gardens, and what they have to teach us. The case for improving the extent and quality of urban green spaces is argued from the viewpoint of stress, human health, and environmental degradation.

A major portion of the book is encompassed in a section titled 'Who will benefit from healing gardens?' Evidence-based design proposals cover outdoor green spaces for children's play, for adults, for adults and children with disabilities, and for stressed executives. As in the rest of the book, these chapters are well illustrated with good (and a few bad) examples, explanatory diagrams, and 'boxed' case studies.

Particularly helpful to designers, decision-makers and students will be the chapter on 'The salutogenic design process', in which the author asks: "What do clients really mean when they ask for a healing, sensory or therapeutic garden?" A fascinating case study of the design process for a revitalised schoolyard recounts the kind of problematic issues that can occur between designer and client but which are rarely reported in the design literature.

A chapter on 'Salutogenic design guidelines' is, in some sense, the 'meat' of the book. However, greater attention here to clearly differentiated heads, and sub-heads, along with how the guidelines apply to different user groups, would have made this material a little more accessible to the reader.

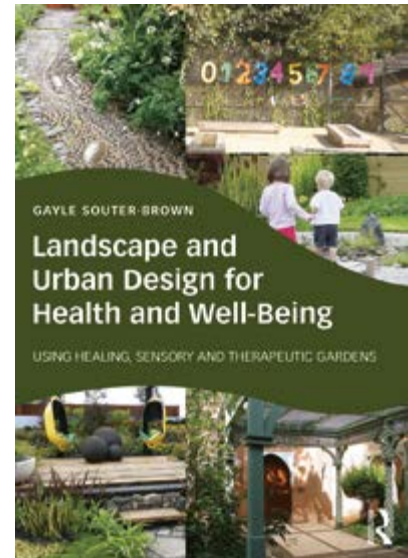
These criticisms aside, it is refreshing to see coverage of not just the health benefits of urban green space, but how interventions – large and small – provide social and economic benefits to communities. This is a rare, inclusive approach to thinking about how green nature can support us in our homes, neighbourhoods, schools, workplaces and healthcare facilities.

In a book as exhaustive as this, it is inevitable that some aspects of health and nature receive less attention than others; for example, design for people who have autistic spectrum disorder is covered in several pages of detailed guidelines. In contrast, there is no specific set of guidelines for people with dementia, although this group is referred to in a number of places and in a few case studies.

The book ends with a glossary of disability-related terms, including respite care and traumatic brain injury. For a designer or planner unfamiliar with these terms, this will surely be a useful resource.

It is heartening to see attention paid – in this book and others – to the importance of nature to our bodies, psyches and communities. From being viewed as barely relevant to our lives, access to nature is increasingly seen as critical to the health and overall wellbeing of all of us. This book is a rich and welcome addition to the debate.

Clare Cooper Marcus Hon. ASLA, MA, MCP is Professor Emerita, at the Departments of Architecture and Landscape Architecture, at the University of California, Berkeley.



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