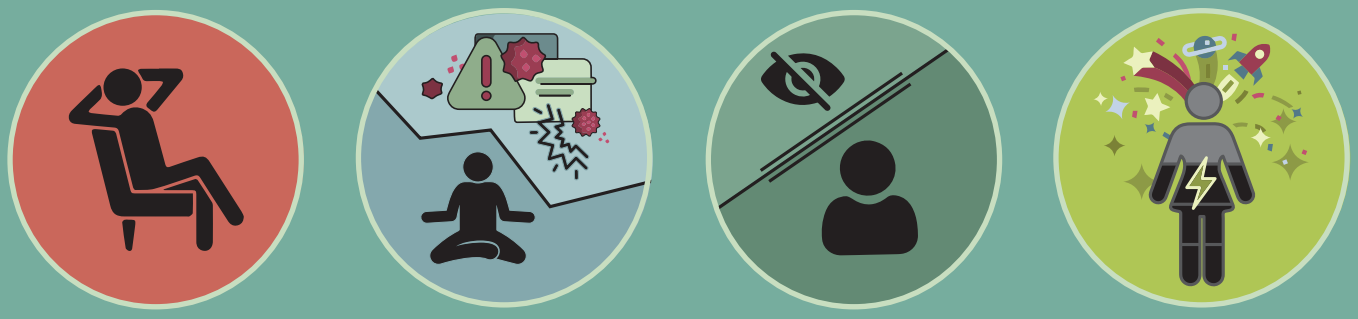
Moody City

R-Spaces as a Public Space Typology for Retreat in the Urban Landscape



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I. Introduction

Daily well-being is being challenged more than ever by rising mental health issues such as anxiety, depression, and stress, as well as ecological concerns in the face of growing climate change. Because of this, cities need sustainable, creative solutions for mitigating despair. Beyond serving as blank canvases for social life, public spaces can go further with their design, addressing specific needs and creating retreats from the cacophony of city life. In addition to community gathering areas and active spaces, people need places to rest, cry, cool down, and reset while out and about. Every day, people are walking around with anxiety, grief, or ennui; people are quietly feeling overwhelmed or burned out, stuck in time-space routines that aren't serving their well-being. What if there were public spaces specifically designed to refresh, re-inspire, or relax people? Using the interdisciplinary nature of placemaking to explore environmental psychology, urbanism, and design, could a network of hybrid indoor-outdoor spaces offer pockets of respite in an urban fabric?

Executive Summary

By their very nature, cities can be overwhelming and filled with stimuli. However, they're also the future of human life globally, with the UN predicting that 68% of the world's population will live in urban areas by 2050[1]. Additionally, it is becoming more evident that density via city living is a key factor in sustainable development. With cities becoming even more important – and crowded – epicenters, they face numerous social, ecological, and infrastructure challenges. There is evidence that city life provides numerous stressors for city dwellers. Therefore, it is crucial that we develop a response system to provide spaces for the breaks urbanites need.

This report is compiled as a thesis submission for degree requirements towards a Masters of Science in Urban Placemaking and Management at Pratt Institute. Ultimately, it is intended to serve beyond a thesis, with the hope that this report will be continued in collaboration with urban organizations to produce a robust toolkit for cities worldwide.

The research underpinning these concepts, as highlighted throughout the report, draws from a blend of scientific studies and non-scientific sources. In addition to statistical data, qualitative data and evaluations are used to enrich and inform. Popular media sources, such as web articles, are included as a reflection of broader trends, opinions, and developments in the field. Quotes from subject matter experts contribute valuable insights, representing well-informed opinions rather than strictly peer-reviewed, study-based evidence. This approach is common in fields such as placemaking, architecture, design, and related built environment subjects, where expert perspectives, broader trends, and new advancements hold significant sway. Unlike disciplines within the realm of social sciences that adhere strictly to scientifically rigorous methodologies, these fields are more often informed by a combination of various inputs, including expert experience, educational training, theoretical frameworks, practical application, and design criticism & analysis. Fundamentally, this report communicates and synthesizes **a range of expert voices.**

Because of the interdisciplinary nature of this topic, research was compiled from numerous fields of study, including, but not limited to: urban studies & urbanism, environmental psychology, sociology, user experience, design (including exhibition design, architecture, & interior design) & design thinking, ecology & climate change, and public health (especially in regards to mental health). This project is undertaken through a placemaking lens, and is intended to contribute to the equally interdisciplinary, emerging field of placemaking.

This report, and the concept of *R-Spaces*, are focused on how the design of cities and public spaces can improve every day mental and emotional well-being and experiences. The implementation of *R-Spaces* should be part of a wider initiative, which will rely on cross-disciplinary collaboration, improved social services & mental health support, and better city policy.

Author's Note

I love living in cities, because I love the variety & excitement they offer – the activities, the food, the people. But I also think they have the potential to be a lot better than they currently are. Our cities have not historically prioritized mental health and well-being. That is a mistake, and one that needs to change for a better future, especially in the face of growing climate change and increased urbanism, with the additional burdens they bring.

Reader, I'm betting that you most likely have experienced some of the stressors of city life this week, maybe even today. Before diving into this report, take a moment to breathe. Pause… When you're out and about in the city, how often are you really able to take a break? Do you ever feel like you need a moment to breathe, but there's nowhere to escape? I certainly do. It's what inspired this entire project for me. I think this lack of places for respite is both a problem and an opportunity with our public spaces. Spaces to retreat and reset in public are crucial to well-being as a part of city living – this is the foundation for a new typology of public spaces which will be explored in this report in depth – named *R-Spaces*.

The idea of *R-Spaces* comes from some of my personal embodied experience of living in cities, things I've heard reflected by many others, and an interest in mental health & everyday well-being. I personally struggle with mental health issues, and a lot of other people in my life do as well, so it has always been important – and central – to me. I see *R-Spaces* as part of a much-needed, larger movement towards shifting values. Acknowledging the work of my peers, many of us are interested in more holistic, embodied, equitable city planning and urban design, re-framing value with people at the center and creating a culture of care. Our cities can do a lot more to address diverse needs, especially in the public space realm. We need public spaces that center comfort, subjective well-being, and the experience of city dwellers.

For more ideas in line with this ideological shift, I recommend looking at the work of other emerging placemakers including:

- *City of Roots: Community Gardens, Civic Value, and a Future of Self-Determination* by Benjamin Ratner[2]
- *Caring Places / Caring for Place: Exploring New Practice and Pedagogies for Public Space in the Planning and Placemaking Field* by Maya Vesneske[3]
- *Built Forms and Social Relations: Designing Disalienated Public Space* by V Hoy[4]
- *A Sound Place: Sustaining Sonic Culture & Communities in the Built Environment* by Lauren Goshinski[5]
- *People, Play, and Placemaking: How Play Can Activate Public Space* by Omar El Feki[6]
- *Embodied Placemaking: The Potential for Collective Healing From Place-Based Trauma* by Sarah Walker Johnston[7]

My research journey and methodology

I had the idea of creating a concept of a public space that can contribute to a more holistic approach to urban design and city planning. I wanted to create a sort of 'toolkit' which could be used as inspiration, with implementable ideas, for cities around the world to use. Throughout the project, I've traced a thread of mental health and well-being. To get to design recommendations and ideas for what this new public space would be, I gathered background research on what exactly the problems and stimuli are that cause stress, urban overload, and poor well-being in cities – specifically within the scope of design and placemaking, acknowledging that a lot of things are larger societal & systemic issues that cannot be solved by design. This included research into urban health, mental health, and how the built environment can be connected to these.

I then worked in an iterative process, with research informing a vision I think is important for the future of cities, needs that aren't currently being met, and details of creating the *R-Spaces*.

Although I have attempted to compile research from a wide breadth of sources, the research boundary is porous and iterative, with the potential to produce numerous ideas and recommendations. Limitations and biases within the current academic sphere may impact the sources and resultant data. The recommendations and solutions presented in this report are not exhaustive, and I am always open to hearing from other designers, urbanists, or anyone with innovative ideas.

I am primarily a design thinker, with a strong background in design, meaning that I have a bias towards built solutions. These will not be possible without policy updates and changes, as well as support from government bodies and public organizations. As a toolkit for cities, this project will benefit from other collaborators, including those more knowledgeable in social sciences, public policy, and economics.

For more information about me, or to collaborate on this project, please see the "**About the Author**" section at the end of this report.

Credit & Thanks

This report was greatly influenced and improved by my advisory team, especially with the cross-disciplinary contributions of Evie Klein, who provided valuable feedback from outside the Placemaking department. All members of the advisory team are also professors associated with Pratt Institute.

Primary Advisor: Margaret (Meg) Walker, M.Arch, B.A.
(Registered architect, licensed urban planner, educator, placemaking consultant)

Secondary Advisor: Evie Klein, Ph.D. in progress, M.Arch, B.A.
(Architect, facilities planner, doctoral candidate in Environmental Psychology, adjunct professor)

Tertiary Advisors: John Shapiro, M.S., B.A.
(Urbanist, city planning consultancy principal, professor)

David Burney, M.S., Dip.Arch
(Urbanist, architect, city government official, program director & co-founder, former commissioner)

I'd also like to thank the following people who gave time, advice, and information, through interviews, consultations, and presentations which contributed to this report:

Alexandra Goldberg
Adjunct Assistant Professor at Pratt Institute, Founder of Phenomena Of, Artist

Elliott Maltby
Adjunct Associate Professor at Pratt Institute and The New School, Principal at Thread Collective

Elizabeth Kelly
Visiting Assistant Professor at Pratt Institute, Principal at EDK Solutions

Josh Langham
Director at NYC Department of Health and Mental Hygiene

Rachel Isacoff
Visiting Assistant Professor at Pratt Institute, Director at The

Rockefeller Foundation

Sara Karerat
Managing Director at Center for Active Design

Suzanne Nienaber
Visiting Assistant Professor at Pratt Institute, Principal Planner at Southern New Hampshire Planning Commission

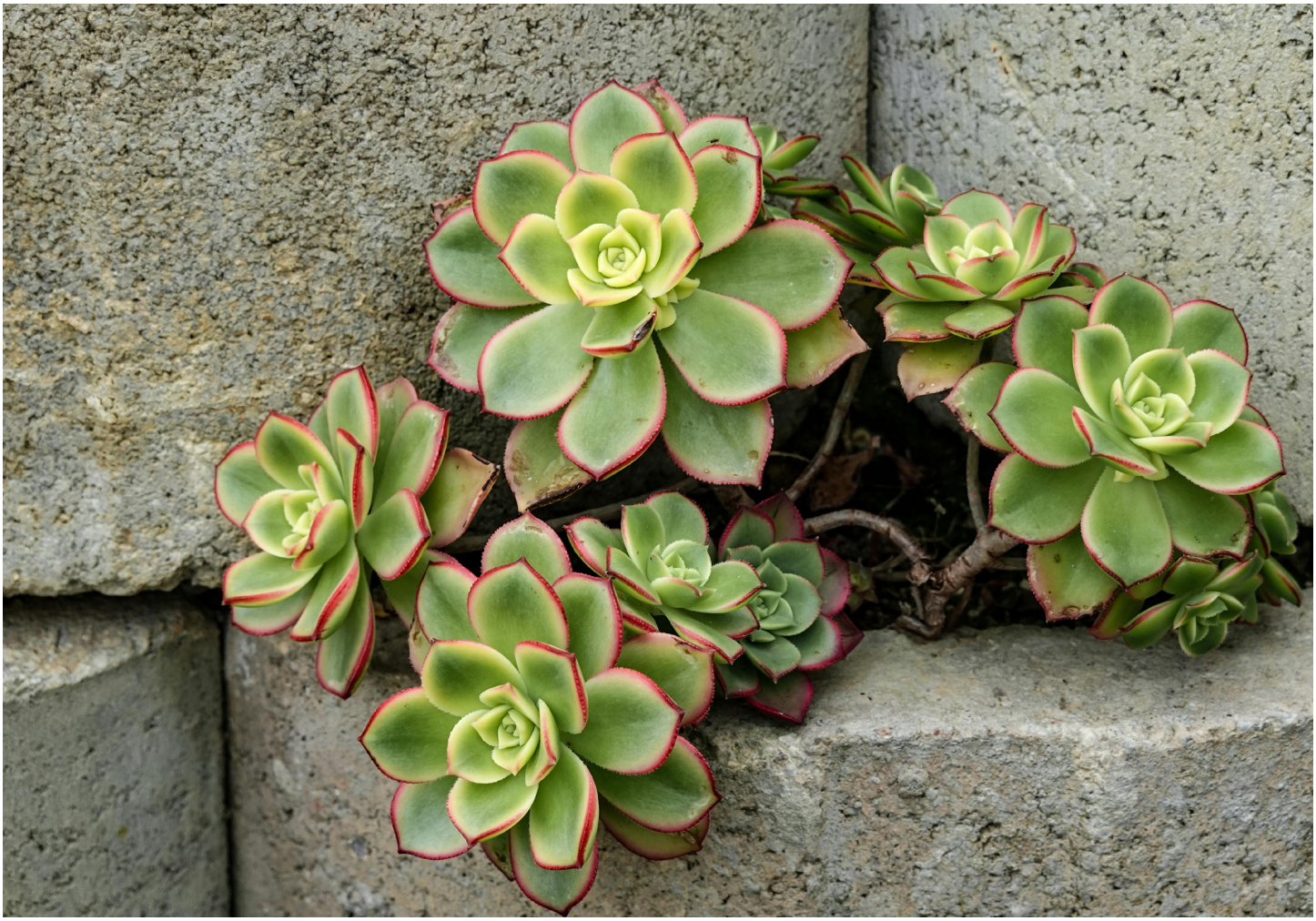
Tanya Tucker
Chief of National Engagement & Partnerships at The Full Frame Initiative

Special thanks to Emily Lavin Leverett for coming through with fast and helpful copy-editing.

Finally, thank you to my support team, including:

- **My UPM '24 cohort:** Ben Ratner, Lauren Goshinski, Lewis Anderson, Maya Vesneske, Noah Miller, Riya Khanapure, V Hoy, and Will Godovskiy
- **Fellow graduate students, for all the work sessions & feedback:** Jack Holmes, Lewis Anderson, Shibani Debnath, and V Hoy
- **My wider GCPE '24 cohort, as well as the UPM '23 cohort,** who were in various classes & events, and inspired me through their own work
- **My widespread network of loved ones, especially the following, who probably had no idea what I was talking about half of the time, but always listened & showed interest during this graduate school journey:**
  Amelia Girard-Reed, Bianca Desai, Carey-Lou Jones, Chelsea Clark, Daniel Piedrahita, Danielle Kingberg, Eliza Evans, Ian McDermott, Justin Henry, Justin Leguillow, Kaitlyn Bush, Kane Jones, Kayli Richter, Laurel Milburn, Lee Williams, Margrethe Williams, Meredith Gillespie, Pamela Fey, Paul Reddan, Paulette Hotte, Ram Jawahar, Ricky Marton; and especially: **my mum, Michele Geraghty; dad, Brett Jones; and second-dad, John Geraghty, who had to answer the most phone calls & random opinion questions**

II.
Cities Today



The Problem

Aside from cities being the future for global sustainability, there are many benefits to living in the city, from exciting experiences and options for food, entertainment, and socialization to increased economic opportunities. However, city dwellers are also faced with numerous struggles, some innate to cities and some part of the human experience in general.

People are stressed...

- 60% of survey respondents worldwide reported feeling "stressed to the point where they felt like they could not cope or deal with things" at least once in 2022[8].
- In Argentina, Brazil, Chile, India, Mexico, Peru, Turkey, and South Africa, over 70% of survey respondents' daily lives were impacted by stress[9].
- The top sources for stress globally (with regional variations) are living conditions, political climates, financial insecurity, and work issues[10].

Acknowledging prevalent, underlying stress outside of the scope of urban design, living in cities increases the amount of stimuli people are exposed to, which can also lead to urban overload. In addition to causing what scientists call 'psychological retreating', urban overload can increase social isolation and cause people to seek quiet, private spaces for relief[11].

➤ **Urban overload:** First defined by American social scientist Stanley Milgram in 1970 to describe the nervous system's response to becoming overwhelmed by stressors common to cities, such as density, crowding, noise, smells, sights, pollution, disorganization, and the constant messaging from every part of the urban environment. With urban overload, the body's baseline levels of stress, arousal, and preparedness are all increased[12].

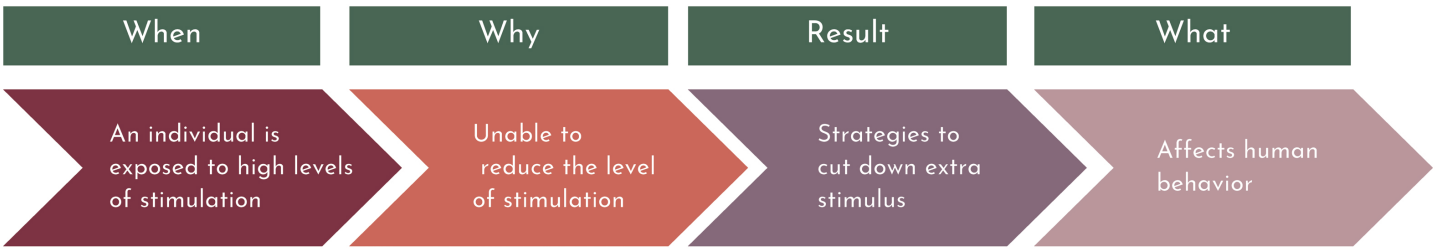


Figure 1: The process of urban overload; *reproduced from UD/MH "Overload and the City"*[13]

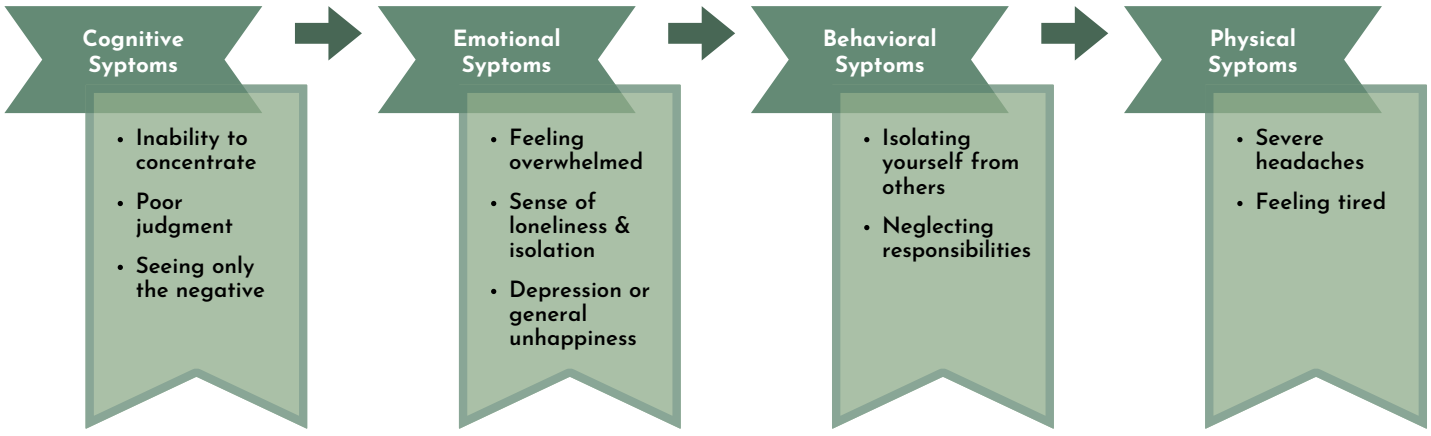


Figure 2: Symptoms of overload; *reproduced from UD/MH "Overload and the City"*[14]

The relationship between stressors in the city is complex, with some factors influencing each other. Many of these stressors exist universally, but are magnified in the urban setting with the increase in population and concentration of infrastructure (including human-made structures, roads that carry traffic, and construction).

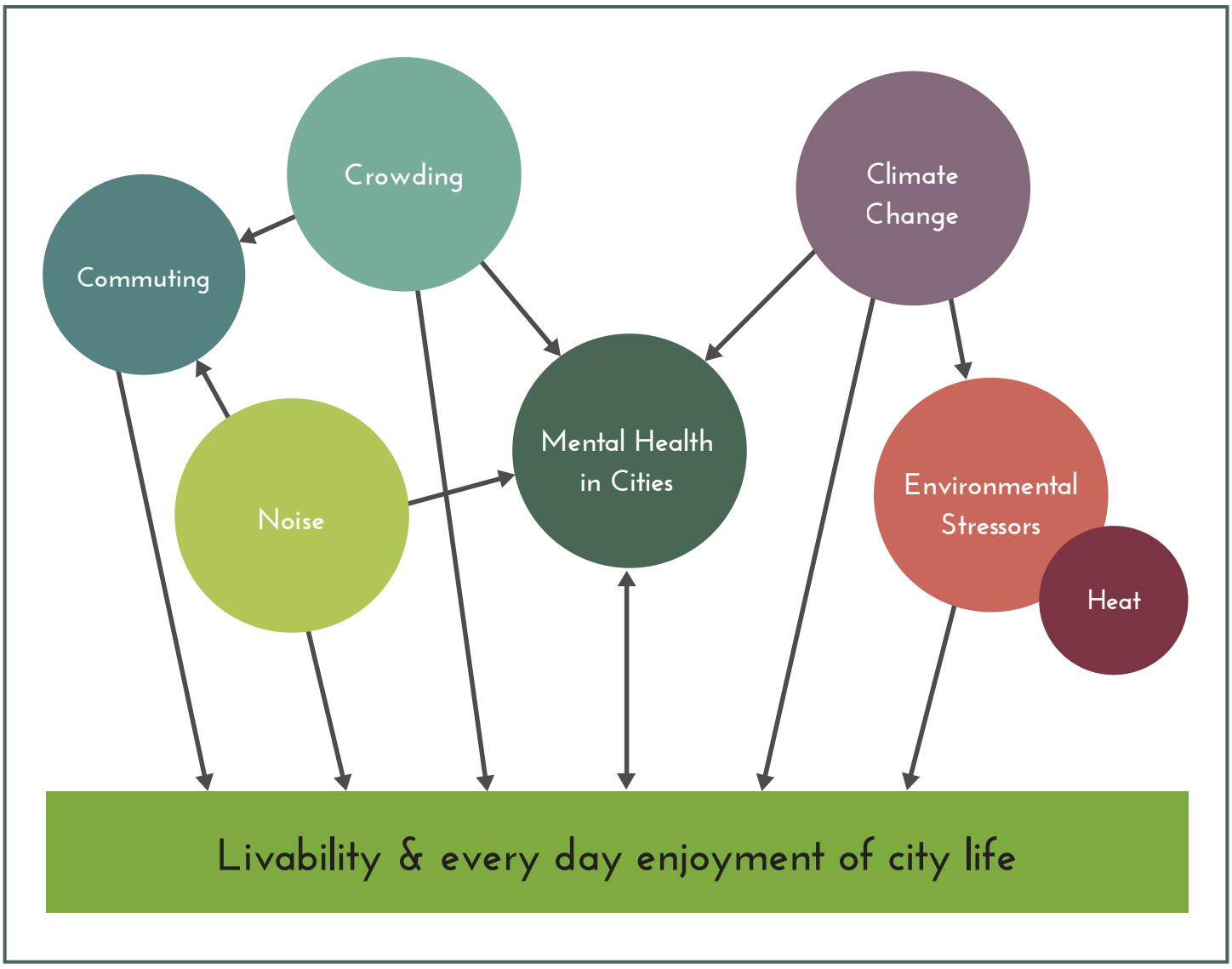


Figure 3: The relationship between major factors in the problem in cities today; *Source: author*

→ Crowding

Crowding is a complex factor in negative city experiences, because anecdotally, it is a clear stressor, yet scientific evidence is inconclusive. An Urban Geography textbook explains that despite it being one of the most widely investigated stress agents, one of the main difficulties in studying it is a lack of "adequate measures" of both density and crowding[15].

Density	vs.	Crowding
"a physical, objective description of people in relation to space and a necessary but not sufficient condition for crowding"		"a psychological and subjective experience that stems from recognition that one has less space than desired"

Figure 4: Density vs. crowding; *definitions sourced from Urban Geography*[16]

It is important to differentiate between density and crowding because density is part of the argument for why cities are important for a future in the face of climate change impacts. Reputable scientific research has found little or no correlation

between density and mental health problems[17]. This means that creating city density for sustainability purposes does not actually cause mental health issues.

However, living in a dense city does cause inevitable crowding, which anyone who has experienced can attest impacts mood and stress levels when there is no escape. While city density is an objective necessity for a sustainable future, crowding is a more subjective experience dealing with the physical, social, and task environments, as well as the individual, including personal space preferences[18]. Although the scientific evidence on correlations between crowding and measurable stress indicators is inconclusive, the subjective experience of those who dislike crowds, or anyone who feels tired of constant crowding, is still important to consider for overall well-being. Furthermore, if the word 'crowding' is replaced with 'crowds' in general, there is a need for escape from crowds – personal space, space to breathe, distance from others – things that contribute to the above definition of feeling crowded and wanting more space (see fig. 4).

→ Climate change itself as a severe stressor

While climate change scientists have been active for many years (for example, an Intergovernmental Panel on Climate Change was established in 1988[19] and consists of over 1,300 scientists), the general public has been more recent in their dawning awareness of the impacts and realities of climate change. As author and PBS NOVA host David Pogue says, "the psychological costs of climate change include spikes in grief, anger, helplessness, shame, fear, disgust, cynicism, and fatalism – feelings that lead to real-world consequences like stress, drug abuse, strain on relationships, and increases in aggression, violence, and crime."[20]

In terms of equity, climate change is hardest on poor countries and those with lower socio-economic status[21], and evidence shows within contexts such as the United States, climate change worsens existing racial inequalities[22].

The United Nations calls climate change a "threat multiplier", wherein it makes bad situations worse[23], people are exposed

to an increase in distressing headlines, and in How to Prepare for Climate Change: A Practical Guide to Surviving the Chaos, there is even an entire chapter dedicated to "preparing for social breakdown."[24] This is the world we are living in.

→ Heat

To begin with, people living in cities already experience urban heat island effects, meaning they are experience global rising heat levels more acutely than rural populations.

The 25 years following 2003 saw more heat exposure deaths worldwide than hurricanes, lighting, tornadoes, floods, and earthquakes combined[26].

Now, the typology being proposed in this report is not a strategy to eradicate the dangers of heat in cities or even save lives – that requires more robust city heat plans with numerous strategies and housing equity – but these staggering statistics highlight an important measure of comfort. Traversing cities

➤ **Urban heat islands** are a phenomenon wherein annual mean air temperatures in cities regularly measure 1.8 to 5.4°F warmer during the day and as much as 22°F warmer at night than surrounding areas[25].

Heatwave in London; *Photo credit: Bloomberg / Getty Images via PBS Nova*

in sweltering temperatures is downright uncomfortable, will likely discourage micro mobility (i.e. walking, biking) when given a choice, and has numerous physical and mental ramifications. In addition to causing heat cramps, heat exhaustion, asthma attacks, and heatstroke, heat also physically weakens people, impairs thinking, and increases aggression[27].

→ Other environmental stressors

Heat was highlighted in this report because of its direct connection with comfort and how it increases a need for breaks. However, there are other environmental stressors exaggerated in cities. Aside from extreme heat,

- Rainfall is 5-10% higher in cities because of greater air turbulence above urban areas[29].
- Soot, dust, and chemical emissions are trapped in the air above urban spaces in *urban dust domes*[30].
- Research has found (but not yet proven) that air pollution (which is associated with a neuroinflammatory reaction) might contribute to depressive symptoms[31].
- Climate change is exacerbating environmental stressors that increase the risk of chronic disease & mortality[32].
- Several studies have shown that air pollution from high traffic volumes may be associated with mental disorders; air pollutants may play a role in the onset or worsening of mental conditions due to their toxicity to the central nervous system[33].
- Air pollution can also lead to oxidative stress, cerebrovascular damage, & neurodegenerative disorders[34].

Global Heat Records

The number of heat records being broken worldwide in recent years due to climate change is astounding. For example:

- From 2050 to 2100, heat waves will triple in frequency.
- In 2019, seven European countries and over 2,000 U.S. cities recorded their highest ever temperatures.
- Siberia, a country certainly not known for its heat, suffered an intense heat wave in 2020, with an all-time Arctic record of over 100°F.
- Cities are experiencing more and more days above 90°F – Miami gets 75 more days than in 1970 and by 2070 Tampa will have 40 more than it does now[28].

- Air pollution alone causes 4.2 million deaths annually and 99% of the world's population is exposed to air quality levels exceeding WHO Air Quality Guidelines[35].

→ Noise

"Stand on a street corner in any major city, close your eyes, and listen. Brakes screeching. Truck cargo clanking. Engines gunning. Fire engines and ambulance and police sirens piercing their way into your ears."

– Sarah Williams Goldhagen in *Welcome to Your World*[36]

Much of the research around stressors in cities comes down to noise – unwanted sound. Vehicle traffic (especially honking), construction, conversation, emergency sirens, loud music, people not using headphones to watch videos or listen to podcasts, dogs barking – of course the *anthrophone* increases dramatically in cities, especially as they become more crowded.

➤ **Anthrophone:** human-made soundscape, in which human activities in general increase background noise levels by around 30 decibels (dBs)[37].

According to the World Health Organization (WHO), "there is overwhelming evidence that exposure to environmental noise has adverse effects on the health of the population."[38] Noise levels are measured using decibels (dBs). The following are safe and unsafe dB ranges for continuous exposure:

- **55-60 dBs:** level of normal conversation; deemed safe for everyday living by public health authorities at WHO & the US Environmental Protection Agency (EPA)
  - ▶ the ambient noise levels on busier streets in large cities significantly exceed this range[39]
- **65+ dBs:** detrimentally affects cardiovascular systems[40]
- **80+ dBs:** more or less equivalent to the sound of a heavy truck on the highway; increased aggressive behavior and vulnerability to mental illness[41]
- **85 dBs:** average noise level in Cairo, Egypt during the daytime according to a 2008 study; equivalent of standing about 15 feet from a moving train (all day long)[42]

- **110 dBs:** experience of standing three feet from a running power saw; noise levels on New York City's subway platforms frequently approach this[43]

The high noise levels of cities are irritating and detrimental to long-term mental and physical health. Environmental psychologist Arline Bronzaft has been battling noise in New York City for over 50 years and suggests perhaps the reason why people in NYC walk so quickly is to get out of the noisy areas. She says the experience of walking the streets of NYC is very stressful in terms of noise, and this additional stress causes long-term issues. While a person's system is physiologically adapting to the noise, what is the cost to the body[44]?

While noise levels vary from place to place, the phenomena of increased noise levels in urban environments is a universal trait – and concern. Take Shanghai, for example, a city of nearly 25 million people, where noise is a constant irritant. Between endless construction to honking from 2 million cars, the government receives an average of 100,000 noise pollution complaints each year, more than both air and water complaints. Despite the existence of spaces where people try to seek quiet, residents report that gardens are for tourists, there are people on their phones in Tao temples, and the popular Fuxing Park has a loud karaoke show. In fact, public karaoke in the city had to be banned after 10pm because the constant noise is such a problem[45].

"A person's psychological problem is like a wound on the body, and the noise from the street feels like salt being poured on the wound, causing it to hurt more. It's like a trigger that escalates their anxiety."

– Yang Shuang Hua, Psychologist & Yoga Instructor, Shanghai's Li Fu Center[46]

Studies have shown that noise has a measurable impact on overall quality of life and well-being. Although WHO is exploring opportunities to reduce the impact of environmental noise on the public health burden, there is currently no set definition of an *urban quiet area*. To meet WHO's environmental noise directive, each European country has chosen its own definition and criteria, meaning there is no one standard in Europe, much less globally[47].

➤ In addition to *urban quiet areas*, researchers & agencies have stated the importance of related terminology such as 'calm areas' & 'tranquil areas'[48].

What are the impacts of noise pollution on city dwellers?

- Sound affects people subconsciously, with noise affecting people's stress levels and sociability[49].
- Noise-induced stress has been associated with annoyance, displaced aggression, reduced well-being, and reduced cognitive function[50].
- Noise is not just an annoyance – it is a danger, too. According to WHO, thousands of people die every year in Europe from heart attacks and strokes caused by high levels of background noise[51].
- Traffic-related environmental noise in Western Europe leads to the equivalent of at least one million healthy life years lost every year[52].
- 40% of EU residents (whose countries offer among the highest general standards of living in the world) are subjected to noise levels "loud enough to imperil their health & well-being" – this is even worse in developing countries[53].
- According to several studies, noise may be associated with neurocognitive functions, mood disorders, and neurodegenerative disease[54].

Figure 5: Train platform, Kawasaki, Japan; Photo credit: Kim Kyung-Hoon/Reuters via Bloomberg

→ Commuting

In Tokyo, 8.7 million people ride the metro daily, with the practice of workers physically shoving people onto crowded trains leading to the Japanese term *tsukin jigoku* – commuting hell[55] (see fig. 5). While the experience may be less extreme in other cities, the idea of *'commuting hell'* would likely resonate with urbanites worldwide.

"Although the experts don't agree on just how the city gets on our nerves, they concur that many of the components of that reaction are incorporated into a ride on the New York subway at eight o'clock on a weekday morning. The global feeling many commuters experience at that hour on the Seventh Avenue line – the combination of dysphoria and jitters that is the hallmark of unpleasant arousal – is actually the cumulative effect of many noxious influences."

– Author, Science Writer, & Editor Winifred Gallagher in *The Power of Place*[56]

Figure 6: A crowded New York City subway car during rush hour; *Photo credit: Move NY via Streetsblog*

From disorientation to congestion, getting around the city can contribute to psychological stress in urban environments. Pedestrian stress can also lead to a decreased desire to engage with public spaces[57]. At the same time, urbanists know that increased city density and improved public transportation systems are crucial to sustainable city living. How, then, can these negative experiences be mitigated? How can cities offset 'commuting hell' and provide positive experiences that are instead beneficial to the well-being of commuters and city travelers?

→ Mental health in cities

The relationship between mental health and cities is a complex one, as some factors are due to association, rather than causation, and it is hard to determine which aspects come first – a 'chicken and egg' situation as the founder of the Center for Urban Mental Health, Dr. Claudi Bockting puts it[58]. With organizations such as Dr. Bockting's at the University of Amsterdam, and the Centre for Urban Design and Mental Health (UD/MH), the field of urban mental health and the relationship between urban design and mental health is clearly important, and fortunately beginning to be studied more. In addition to identifying stressors, experts are also looking to preventative measures and what makes people flourish in these environments. It is important to note that mental health problems do not arise because of one single problem and cannot be attributed purely to city living, or urbanicity. Neurobiology, trauma, personal experiences, national & international (political) influences, and environments all contribute to mental health[59]. For a list of increased and reduced risks on mental health, see figure 233 in Appendix B. That being said, this report is focused on aspects of the built environment and how cities can better handle the mental health issues they contribute to.

So how do cities contribute to mental health issues?

- According to UD/MH's Mind the GAPS Framework, city dwellers have a 40% increased risk of depression and 20% more anxiety[60].
- Hectic cities can be especially challenging for people on the autism spectrum, those who have experienced strokes or brain injury, and people with multiple sclerosis or Parkinson's disease[61].
- A 2020 study in Oslo found higher reported anxiety in residents living close to the city center, even after controlling for other factors[62].
- The city offers increased stimuli and may strip away protective factors (e.g. diminished access to nature, reduced leisure time due to work & commuting), while crowding, light, noise, & stress cause less privacy & sleep[63].
- One of the most important factors in cities impacting mental health is a lack of green space[64].
- Features of urban environments such as noise, light, and social encounters may lead to cognitive overload for attention, memory, cognitive control, and salience processing[65].
- Some evidence shows mental health problems accumulate in urban areas, suggesting humans might not be equipped for adverse influences of urban environments due to a short exposure in evolutionary history[66]. (However, the relations between urbanicity & psychosis vary by geography, so results are inconclusive).
- A majority of city factors that contribute to mental health issues are outside the purview of the built environment alone (or require much more complex systemic approaches): social & economic factors such as deprivation & poverty, social fragmentation, a lack of social capital, community cohesion, and trust[67].
- Those that can be reduced with appropriate planning include noise, toxic pollution, and social over-stimulation[68].

The flip-side

While there are clearly impacts on mental health from city living, a critical review of studies suggesting that urban living actually increases mental illness and unhappiness shows that much of the research is incomplete and biased, and the issues are in reality, complex with trade-offs between risk factors[69]. City living can be stigmatized (particularly apartments and public transit), and people who spend money (and commute time) to retreat to suburbs may "feel threatened by evidence that city living can be healthy and enjoyable, which would

question the value of their sacrifices."[70] Other biases, such as a fear of cities could also contribute to researchers or authors searching for negative supporting evidence against cities. Furthermore, some research on urban mental health impacts only applies to a specific subset of city life, such as distressed neighborhoods or crowded buildings, and is not representative of all city living[71].

There are numerous confounding factors that lead to higher mental illness rates in cities:

- People who move to cities with existing issues because cities provide better services & opportunities
- Concentration of risk factors like poverty & disability
- Better reporting of mental illnesses[72]
- Higher inequality neighborhoods & low socio-economic statuses[73]

These all demonstrate correlation, not causation. In fact, one report suggests that "many people are saner and happier in cities than they would be in smaller communities that offer less opportunity and support."[74] There are many people who choose city life and can attest to being saner and happier in urban environments. For a list of factors affecting urban mental health, see figure 234 in Appendix B.

It is also difficult to generalize mental health in all cities as the same, as there is much diversity of urban settings, a variation between cities around the world, and an inconsistency in socio-economic status and social science approaches[75]. In addition to socio-economic conditions of developed versus developing countries, factors such as public transportation networks can have a major impact. In the United States, Gallup Healthways Index reporting shows a major divide between large, compact, multi-modal cities such as New York, Chicago, Boston, and

San Francisco versus car-dependent, sprawling cities like Indianapolis, Tulsa, Oklahoma City, and Durham-Chapel Hill. The latter have lower rates of exercise and higher rates of depression and other health issues[76]. This is reinforced by a major 2021 study from New Zealand that shows transport poverty and inaccessible street environments as factors that contribute to psychological distress, and reiterates that walkable environments and public transport comfort & affordability have positive impacts on mental well-being[77].

What this means

While cities themselves may not actually cause mental health issues, it is clear that it is still necessary to consider an increase of mental health problems in urban settings and focus on efforts – both responsive and preventative – to improve mental health in cities.

One article recommends moving beyond the "vague and general concept of urbanicity and 'urban stress'" to a more interdisciplinary approach with multi-method collaborations with human geographers, epidemiologists, neuroscientists, and social scientists[78] – and this author would add planners and designers to the mix.

Monocle Correspondent Carlota Rebelo:

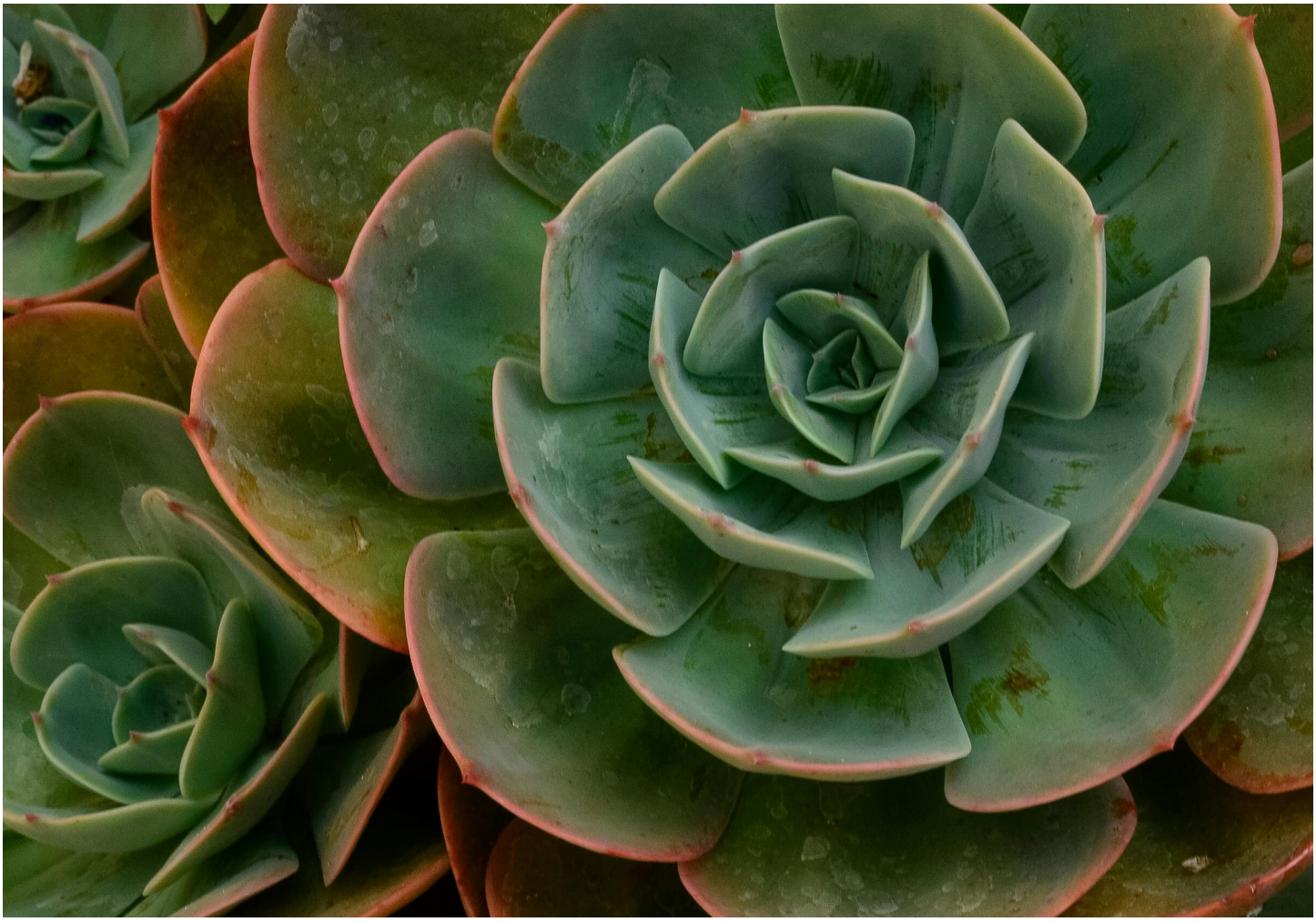
"Is it safe to describe cities as being both the problem and the solution, then?"

Center for Urban Mental Health Founder Dr. Bockting:

"I think you're right. I think there is definitely an opportunity in cities, but if you don't take into consideration the human factor in any kind of things you're trying to plan, it might create more problems..."[79]

Further Reading:

- *Urban Sanity: Understanding Urban Mental Health Impacts and How to Create Saner, Happier Cities*[80]



Existing & Current Research

→ Addressing and informing the topic

Due to the interdisciplinary nature of this project, there is a wide range of existing research tangential to it. However, there is not currently a comprehensive source that examines the idea of a public space typology designed to address a need for rest

and refreshing breaks. To do so, this research for the project explores a myriad of fields: urbanism, sociology, environmental psychology, psycho-geography, phenomenology, architecture & design, public health, and leisure studies.

A built environment around health and well-being may be a newer focus in professional practices, but it is not a new concept – it can be found in history numerous times, from Chinese and Indian design traditions to the Greeks and Romans[81]. There has, however, been a disconnect in modern cities following the Industrial Revolution, as well as a significant lack of empirical research.

"Ancient Greek townscapes were a harmonic combination of temples, clinics, houses for sleeping cures, and theaters from cultural, spiritual and physical relief. The Romans recognized the importance of light, wind, water and its relation with buildings to promote healthy living. In the East, Chinese and Indian design traditions were centered around wellbeing practices like feng shui and vastu respectively."

– Indian architect & writer Ankitha Gattupalli[82]

Figures 7 & 8: The classical gardens of Suzhou (left) and The Forbidden City, an imperial palace built from 1406-1420 (right) exemplify feng shui design principles[83]. 6,000-year-old feng shui is the "ancient Chinese art of design & placement for health, well-being, & prosperity."[84]
Photo credit: (L) Travel China Guide, (R) Chinese Language Institute (CLI)

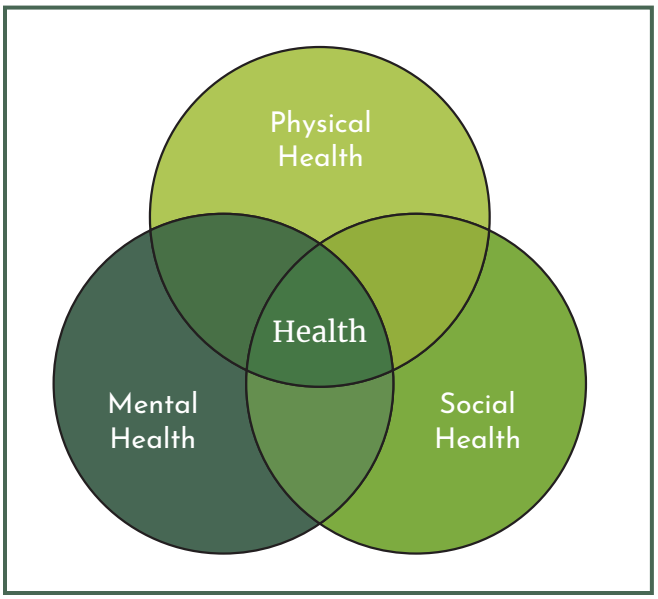
Social value and happiness in cities are relatively new fields of urban research, as opposed to more traditional sociology and urbanism conversations, or even more contemporary social justice questions. As the urban landscape evolves, more creative solutions are not only exciting, but necessary. Urbanists and designers have opportunities to go beyond the established status quo, beyond an expected model of what cities look like today. Future cities should not look the same as they do now, as it is clear they are currently not adequately serving their populations. This is a symptom of several larger issues, from climate change & a lack of greenery, to the reliance on cars & lack of public transportation, to inequality & a culture of consumerism. Many industries will need to address cities more holistically and improve on systemic levels to create better living environments moving forward.

➤ **'Happiness studies'** is certainly a growing field, with discussions such as Charles Montgomery's groundbreaking *Happy City* book[85], podcast episodes on *Urbcast*[86] and *The Urbanist*[87], and an article published in the *Cities* journal[88].

→ Defining urban health

The World Health Organization (WHO) defines health as a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[89] Our cities need to do more to contribute to a holistic sense of well-being. The importance of global health is indisputable; in fact, the third goal of the United Nations (UN)'s internationally accepted and powerful Sustainable Development Goals (SDGs) is to "ensure healthy lives and promot[e] well-being for all at all ages."[90] This directly ties in with goal eleven: "Make cities and human settlements inclusive, safe, resilient and sustainable."[91]

➤ The **17 Sustainable Development Goals (SDGs)** are the urgent call to action by all countries in a global partnership, as laid out in the 2030 Agenda for Sustainable Development, and adopted by all UN member countries in 2015. They are a vital blueprint for the future of the planet and, as of 2024, have contributed to 169 targets, 1,348 publications, and 7,835 actions worldwide[92].



< Figure 9: Visual representation of health as defined by WHO

Tracing the history of urban health research, the WHO launched the first 'healthy cities project' in Europe in 1986, which has since developed through five phases across 30 years to become a large global network. In the 1990s, there was a broad spread of healthy cities projects, with countries forming a cooperative network and integrating healthy city planning into their national policies. In the early 2000s, WHO created City Health Development Planning (CHDP) and Healthy Urban Planning (HUP), the latter of which was introduced in 2003 during the fourth phase of the European Healthy Cities Network. Between 1981 and 2020, there was a significant increase in the number of published papers on healthy urban planning, with the number of annual articles increasing from just two in a year to 407 in 2020 alone. However, even within the field of healthy urban planning, topics vary widely from ecological planning and resource equity to public health and evaluation of the urban environment[93].

While there is clearly a positive trend in the amount of research surrounding urban health and designing healthier cities, urban health has only been viewed more holistically in recent years.

→ Situating mental health in the discussion: time to take the Cinderella of urban design to the ball

"There can be no health without mental health. Good mental health is essential not just for our personal wellbeing, but also to achieve resilient, sustainable cities."

– The Centre for Urban Design and Mental Health (UD/MH)[94]

UD/MH director Layla McCay calls mental health the "Cinderella of urban design," saying it is time to "take her to the ball." She cites a combination of "stigma, concerns about the complexity of the causative factors of mental illness, and a vicious cycle of non-prioritization" as the reasons mental

health has become the 'Cinderella' of urban design and health integration[95].

The marked increase in studying urban health and healthier cities displayed over the last 30 years from international, state, and local governments to nonprofit organizations[97] has been important, but not sufficient. While concepts such as health equity have been commonly discussed among scholars, the focus was traditionally on physical health benefits, with some exploration into social, and a lack of consideration for the dimension of mental health. Although mental health is much more frequently entering the discussion, this is a relatively recent addition, and both the research and practical applications need to catch up. For example, New York City's *Active Design Guidelines* (2010), which have inspired many other cities around the world, were only updated to include mental health as part of public health in 2024, following the NYC Department of Design & Construction's use of mental health in their 2016 Guiding Principles document[98].

Sara Karerat, a public health expert currently directing the Center for Active Design, explains that "interest in the relationship between mental health and the built environment has steadily expanded over the past decade, reflecting the increasing awareness of and literacy around mental health across our society." She goes on to say that this interest is reflected in the literature and published evidence becoming available but that "there is still a significant need for additional research examining these relationships to better understand causality and how to apply these relationships in different contexts." She categorizes the majority of the research centering around the topics of "walkability, biophilia, personal control, and access to vital resources, such as public transit, [food access], and community spaces."[99] As research continues and expands, hopefully there will be more developed about the physical and experiential design beyond the existing scope of studies (as correctly identified by Karerat).

➤ **Mental health** encompasses many things. WHO defines it as "a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community."[96]

The importance of mental health

- 1 in 4 people are affected by a mental health problem every year[100], and 1 in 4 people globally will have a diagnosable (chronic) mental illness in their lifetime[101].
- 1 in 6 people is experiencing a mental health problem in any given week[102].
- Mental health disorders are the leading cause of long-term disability worldwide, accounting for 7.4% of the disease burden[103].
- The mental and substance use disorder burden increased worldwide by more than a third between 1990 and 2010[104]. As more people move to cities, and with growing global, non-urban-specific issues (climate change, war, etc.), this number will likely increase.
- Mental health problems increase risk of physical health problems and mortality[105].
- Mental health issues account for 13% of all Disability Adjusted Life Years (DALYs) – DALYs are "years of potential life lost due to premature mortality" plus "years of productive life lost due to disability"; one DALY = one year of healthy life lost[106].
- According to the Organization for Economic Co-operation and Development (OECD), direct & indirect costs of mental illness amount to over 4% of cities' GDP[107].
- Mental health problems cause people to experience distress, discrimination, marginalization, problems with employment & finances, relationship issues, and physical health decline. They impact peoples' abilities to live productive & satisfying lives and to be engaged & participate in their communities[108].
- Good mental health promotion, mental disorder prevention, and support for those with mental health problems are crucial to UN SDG 11 (inclusive, safe, resilient, & sustainable cities).

"It took decades to integrate knowledge about the biomedical effects of the cityscape into [my] profession, but when it comes to mental health we haven't a clue."

– Urban Planner, Basel, Switzerland[110]

While some cities are beginning to listen to the numerous scientists and institutions promoting the importance of mental health for overall public health, there are still two major failings in the connection to urban context (fig. 10 & 11).

Problem One: A Lack of Urban Mental Health Research

The majority of existing urban health research focuses on physical and social factors, with the mental health focused research emerging relatively recently – only really within the last decade[111].

➤ For the purpose of this report, ***physical components*** are defined to include topics such as air quality, clean water, sanitation, security, housing, etc., and ***social factors*** as research into health equity, economics, education, sustainable development, political networks, governance, etc.

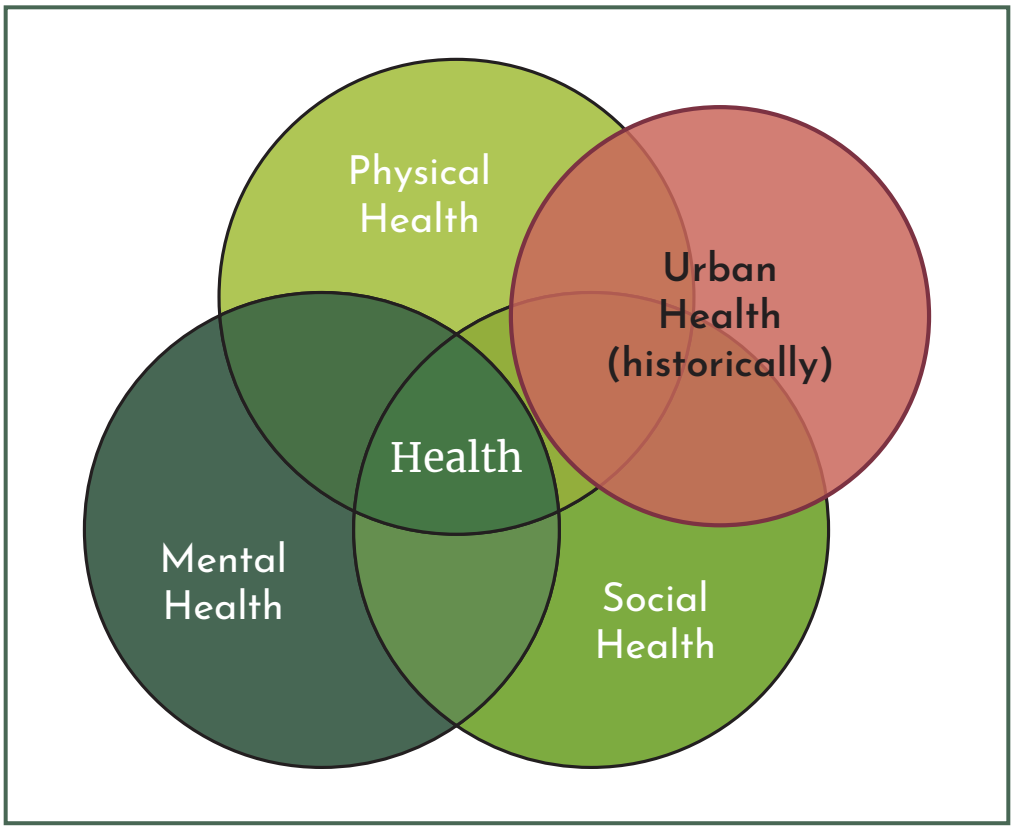


Figure 10: Illustration of problem one: the focus of urban health research

Problem Two: Research Limited to Severe Disorders

Mental health research in particular tends to focus on severe disorders (i.e. institutionalized cases and clinical episodes) over a wide range of neuroexperiences, such as high-functioning disorders, mild conditions, or regular stress for neuro-typical people. Furthermore, most efforts are targeted at treating existing mental health problems, rather than adding protective factors and preventative measures[112].

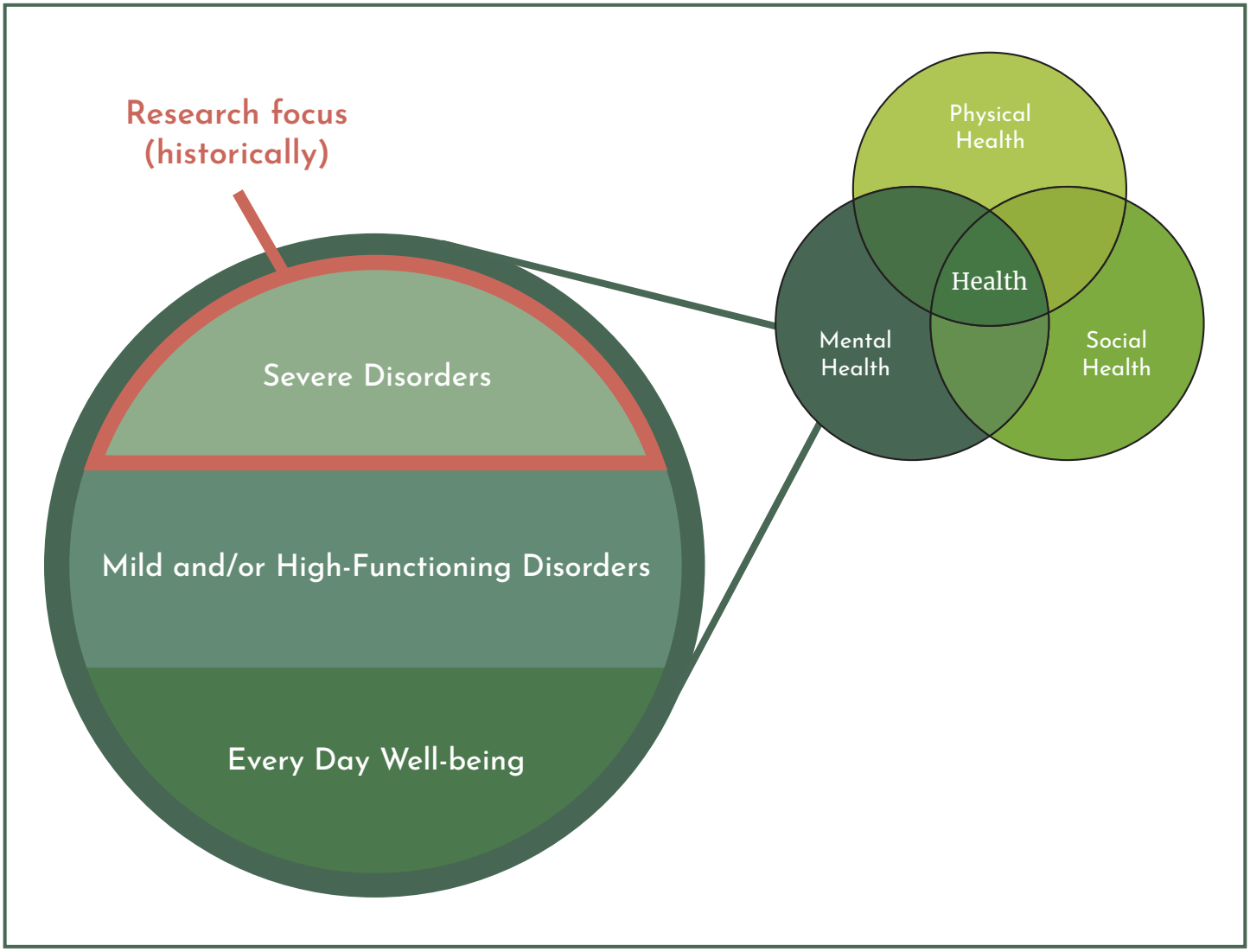


Figure 11: Illustration of problem two: the majority of mental health research

With the first, recent emergence of books such as *Restorative Cities: Urban Design for Mental Health and Wellbeing* and *Designing Mind-Friendly Environments* show promise for the future, although much wider acceptance and implementation is needed in real-world city designs. Post-COVID-19-pandemic times have seen a rise in conversation around healthy building practices, with the World Architecture Day 2022 theme being "Architecture for well-being" and 2022 being designated the International Union of Architects (UIA) Year of Design for Health (in buildings and cities). A 2022 ArchDaily article explored the trend of healthy spaces, predicting such insights would last "well into the future," and including mental health in the discussion[113]. This indicates a positive shift toward a growing focus on holistic well-being, with mental health alongside physical and social health.

As for the second, addressing more debilitating mental illness is a complex societal issue that relies on systemic solutions and goes far beyond the design of the built environment. Acknowledging this limitation, this report and the *R-Spaces* concept are focused on how the design of cities and public spaces can improve every day mental and emotional well-being and experiences. *R-Spaces* are in no way a replacement for institutional care, medication, therapy, or any other wider considerations of mental health.

UD/MH believes the following key areas, which hold particular potential for urban design when it comes to mental health, would benefit from further research:

- conscious cities (collecting and using data to improve urban mental health)
- exposure to nature
- older people's mental health (including reducing depression, anxiety, & disorientation caused by dementia)
- transportation (particularly the question of how to optimize commuting)
- extracting lessons from mental health-sensitive design of healthcare facilities and applying them to the wider urban environment
- sound, color, art, & other sensory opportunities
- traumascapes (where a traumatic event – war, terrorism, or disasters such as extreme weather events, earthquakes, etc. – has happened in a particular place, how can urban design contribute to reducing individual & public distress caused by that place)[114]

Further Reading:

- "Need and Opportunity", Centre for Urban Design and Mental Health website[115]
- "We should think more about the link between urban design and mental health" by Layla McCay[116]

→ The need for a more interdisciplinary approach

Further contributing to the lack of existing evidence-based research around this topic is the siloed nature of involved disciplines. A more interdisciplinary approach to designing cities and public spaces is sorely needed. There is knowledge within therapeutic, medical, teaching, and social science fields that could (and should) be applied to designing built environments. However, according to architect, author, and access consultant Steve Maslin, there is a "significant gap between the therapeutic world and the world of built-environment design when it comes to engaging with people's neurological needs – especially when it comes to inclusive design information that it would be reasonable to expect to be accessed by designers,"[117] (see fig. 12). There are multiple factors at play causing this.

First, built environments are difficult to "reduce to a few easily manipulated variables in a laboratory."[118] Because of this, systemic, scientific research on the relationship between the built environment and human impacts is limited. On the flip side, the field of architecture depends heavily on case studies (partly due to this gap)[119], and the subject tends toward what Maslin calls the "esoteric end…without much apparent practical understanding of diverse human factors."[120] Some architects may even be skeptical of the actual application of empirical data from behavioral scientists[121].

Clearly, more needs to be done to connect the research and social science worlds with designers and those actively tackling real-world projects.

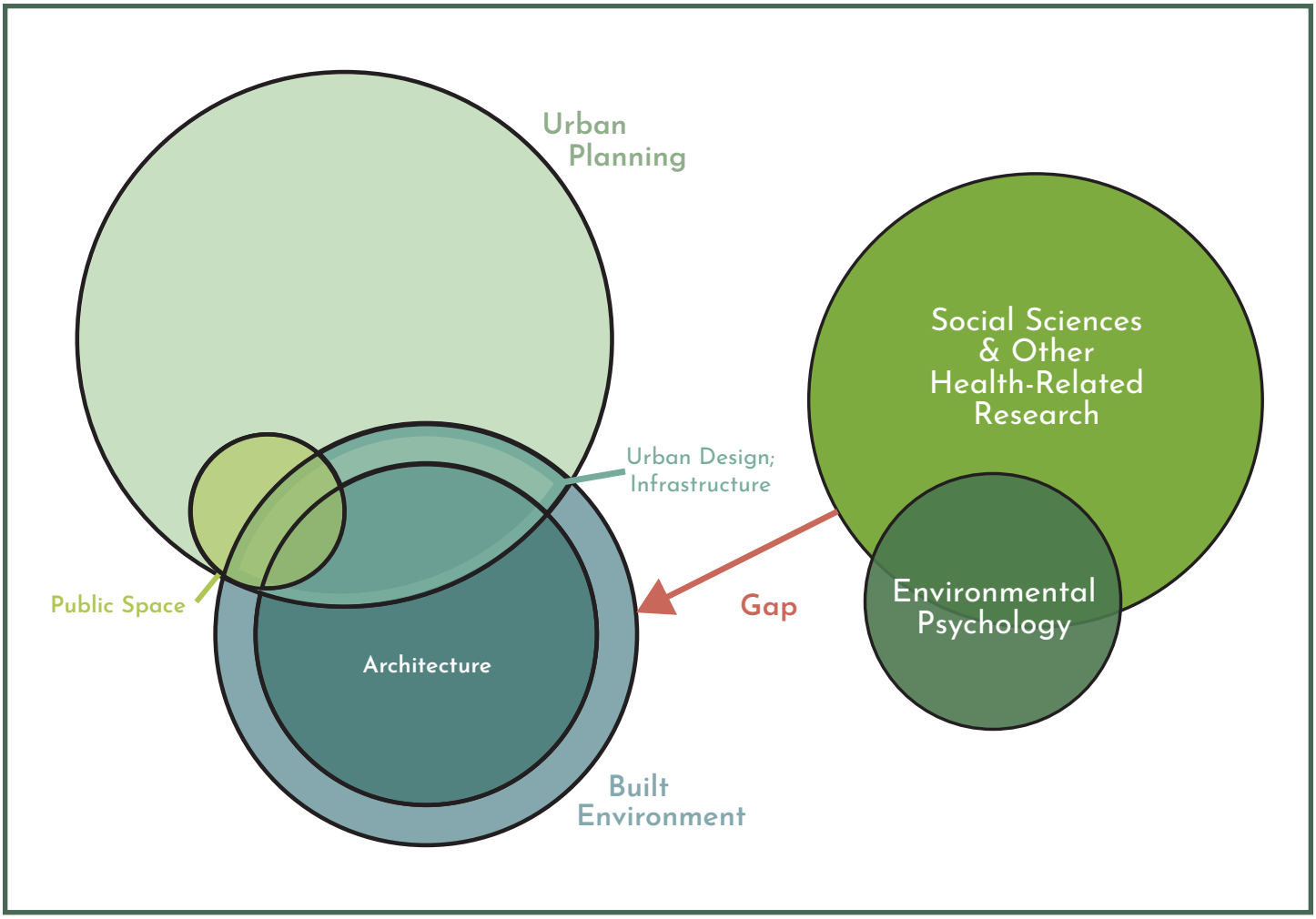


Figure 12: Fields are siloed and there is a particular gap between the social sciences & environmental psychology fields informing the built environment

Although still lacking on a large scale, recent years have shown the beginning of research on the connections between the built environment and health research, seen in publications such as ARUP's *Exploring a health-led approach to infrastructure*[122]. Unfortunately, the majority of existing research has followed the overall urban health trend of focusing on the impacts of physical and social health over mental health (see fig. 10). One goal of this report is to contribute to addressing this social science-built environment gap, particularly in regards to ties to mental health and well-being.

Recently, a new field has emerged called '*neuroarchitecture*', which is ideally aligned with this topic. Although it originated in the early 2000s, popular articles have really only come to light in the last couple of years, mostly since 2022, and the term only came up in the research for this project after hundreds of sources had been studied. Clearly, it is not yet mainstream; however, it shows promise with its interdisciplinary nature and aspirational goals. An ArchDaily article defines it as "designing

➤ The term '**neuroarchitecture**' was invented by Fred Gage, a neuroscientist at the Salk Institute, who created The Academy of Neuroscience for Architecture in San Diego with the American Institute of Architects (AIA) in 2003[123].

efficient environments based not only on technical parameters of legislation, ergonomics and environmental comfort, but also on subjective indices such as emotion, happiness and well-being."[124] A 2023 systematic review of the concept asked two questions: "1) *what is neuroarchitecture of the built-environment, what are its pillars and how can it be represented?*, and 2) *what is the role of neuroarchitecture towards human-wellbeing?*"[125] The authors of the study developed a cyclic model of the relationship between the pillars of neuroarchitecture, which can be found in Appendix B. Much more research is needed; conclusions are sometimes contradictory and often limited to specific environments (such as a color or proportion in schools linked to memory and academic performance)[126]. The primary contribution of the field so far is the concept itself encouraging designers to think more deeply about things like the users' emotions, comfort, reactions, and happiness.

In general, more design decisions need to be informed by research from other fields, and research from the social sciences needs to be better communicated to designers, with considerations for real-world applications.

"Researchers and theorists from disciplines such as sociology, environmental and ecological psychology, social geography, and anthropology often provide important information about humans that are critical for designers to understand – yet is often not communicated in a way that is easily accessible for designers or applicable to a design context."

– Debra Flanders Cushing & Evonne Miller in *Creating Great Places*[127]

→ Subjective well-being and its place in urban planning & urban health

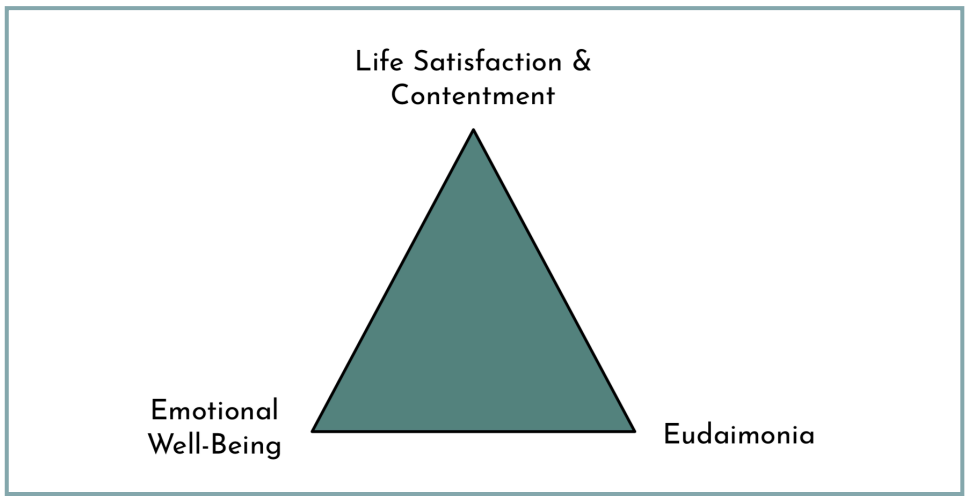
"Unimaginative or inattentive urban design harms us..."

– author and architecture critic Sarah Williams Goldhagen in *Welcome to Your World*[128]

Figures 13 & 14: The difference between a boring, uninspiring urban setting (left) and a street in Quebec, Canada, which is imaginative & interesting (right) – how does each make you feel?

With mental health added as a vital component of urban health, urban planning and design also needs to consider *subjective well-being*, which began appearing in research around 2014[129]. Despite its late appearance, it has been proven that subjective well-being is intrinsically linked with health (and urban health) overall – good health increases subjective well-being, and high subjective well-being ratings contribute to good health and longevity[130].

➤ **Subjective well-being (SWB)**: life satisfaction and contentment plus emotional well-being plus Eudaimonia (a Greek term for happiness, flourishing, & self-actualization[131]); combines measures of overall life evaluation plus emotions at specific times to form a scientific measurement tool for global public policy goals[132] (see 15).



< Figure 15: A visualization of SWB as defined by Mouratidis.

In a paper published in *Cities: The International Journal of Urban Policy and Planning*, University of Copenhagen professor Kostas Mouratidis suggests seven pathways to link the built environment to subjective well-being[133]. This report, (and the new public space model discussed within) focuses on four of the seven: travel (i.e. commuting), residential well-being (specifically city satisfaction), emotional responses, and health.

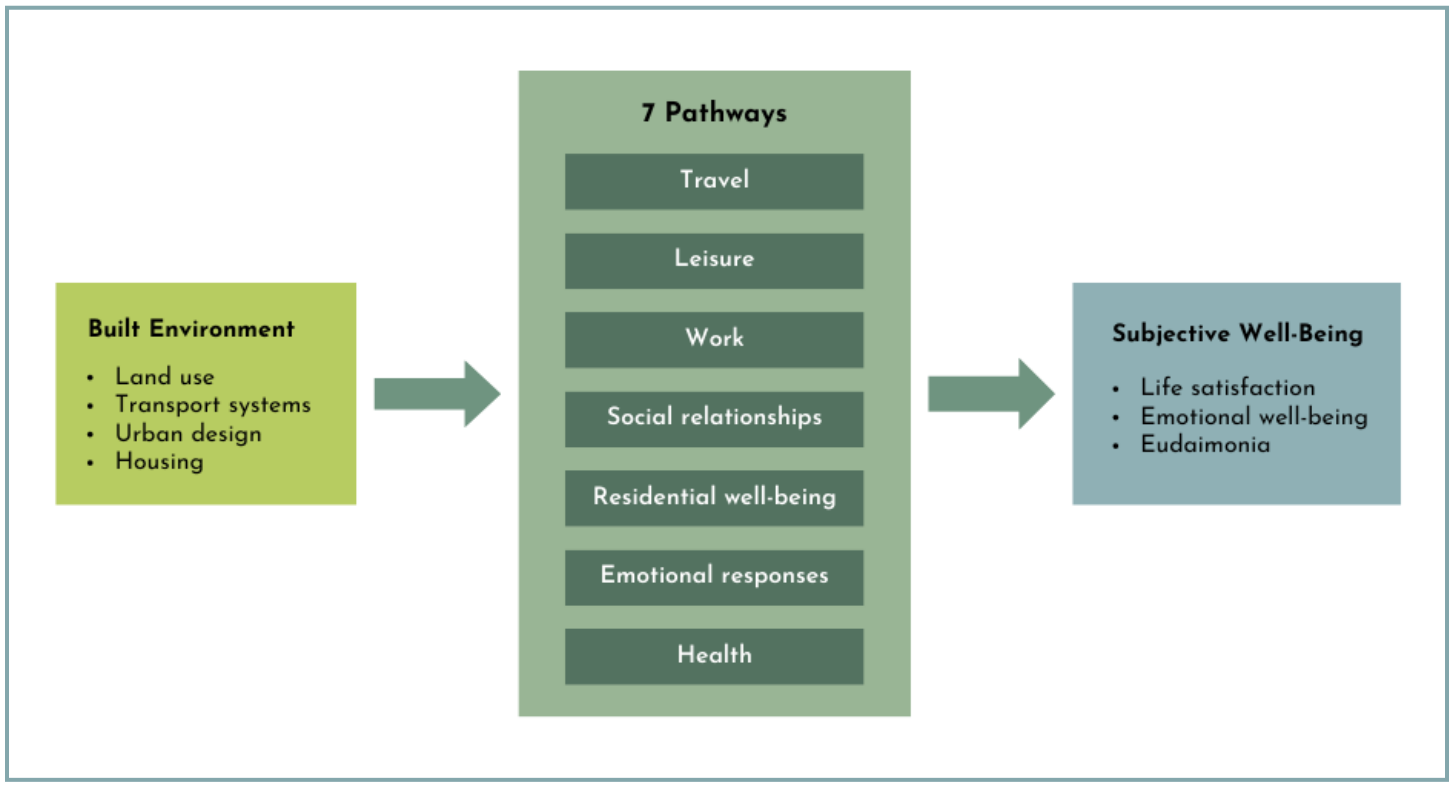


Figure 16: Mouratidis's model of pathways linking the built environment to subjective well-being; *reproduced based on source*[134]

The Full Frame Initiative (FFI) is a nonprofit dedicated to equitable well-being which arose from research into high-performing domestic violence nonprofits. The majority of their approach and partnerships have focused on human services, looking at policy, structures, and practice at a more organizational level. The five domains they have established as the foundation for how they define well-being are primarily rooted in social services and community well-being, with larger goals of re-framing how issues are thought of and systems are designed. They offer "Wellbeing Bootcamps" and their "Designing for a Fair Shot at Wellbeing" implementation tool (see fig. 235 in Appendix B) defines six principles with evaluative questions for systems or institutions to check and re-focus on well-being[135].

Although FFI's pillars and resources do not directly address mental health, Chief of National Engagement and Partnerships Tanya Tucker explains that they see well-being as an "innate biological drive" that is fundamentally intertwined with all health – a focus on access to well-being allows for better health, and not paying attention to this drive can make mental health worse[136].

Within the last couple of years, they have begun exploring the relationship with the built environment, recently piloting a tool for city planners to see the well-being costs of a project (in addition to factors like economic costs), The Wellbeing Insights, Assets, & Tradeoffs Tool (WIATT)[137]. According to Tucker, they are currently growing partnerships with professionals and agencies in the built realm[138], which is promising and indicative of the larger trends discussed in this report.

"Imagine a future where people's wellbeing is the starting place for how decisions are made about what, where, when and even whether we build."

– Full Frame Initiative on the WIATT tool[139]

→ Current considerations for comfort & well-being in cities

"For the last century, we've been doing a pretty poor job of building good habitat for humans..."

– Tristan Cleveland, Urban Planner & Researcher at Happy City[140]


Figure 17:
City Hall Plaza, Boston, USA

Figure 18:
George St, Sydney, Australia


Figure 19:
Place De La Concorde, Paris

Figures 17-19 show poor planning for humans; *Photo credit: PPS*

Although humanistic geographers, phenomenologists, and environmental psychologists have been discussing experience in cities since the 1970s (with the work of Holly Whyte, Yi Fu Tuan, Edward Relph, Kevin Lynch, and others), this topic has only begun to register with architects and designers in the last 15 to 20 years[141]. In the field of urbanism, Jan Gehl is usually considered the pioneer for this people-first placemaking, exemplified in his now-widely-studied book, *Cities for People*[142]. Since Gehl and the rise of placemaking as a field in the last 15 years, designers of the built environment are finally starting to prioritize the actual *experiences* of people in cities. While urban designers often consider organization, aesthetics, and efficiency, goals such as comfort and well-being tend to be lower priorities – or at least they have historically. Author David Sucher uses the term *'urban village'* to attempt to capture the ephemeral feeling behind a comfortable city. The idea of designing cities specifically for comfort and well-being (beyond the more traditional considerations) has been growing in recent years. Many experts are beginning to realize subjective well-being is as important as addressing physical needs and large data sets. *Happy City* (2013) author Charles Montgomery created an entire consultancy based around the principles in his book, and urbanism podcasts like Urbcast discuss how Gehl-like philosophies of creating streets that are comfortable, where people want to spend time, and which have a certain amount of visual diversity are crucial for urban design to boost well-being[143].

< Figure 20: Ferenciek tere, Budapest, Hungary; *Photo credit: Urb-i.com*

"Improving quality of life in cities is becoming an increasingly critical issue for urban planning."

– Kostas Mouratidis, *Cities Journal*[144]

Contributing to the discussion of designing cities for well-being are the following seminal works:

***City Comforts: How to Build an Urban Village* by David Sucher**[145]
This aforementioned book demonstrates research into, and consideration of, the importance of comfort as a worthwhile urban goal. It also looks at design archetypes and their impacts in a legible way that can be beneficial for city planners and urban designers. It is more applicable for wider city planning than for the specificity of this report and *R-Spaces*.

***Creating Great Places: Evidence-Based Urban Design for Health and Well-being* by Debra Flanders Cushing and Evonne Miller**[146]
This book introduces key theories that the authors argue impact urban design for health and well-being. Although the focus is not as strongly on *mental* health as *Restorative Cities* is (see below), this is a foundational work for supporting design decisions through evidence-based theories that can be easily referenced.

***Envisioning Better Cities: A Global Tour of Good Ideas* by Patricia Chase and Nancy K. Rivenburgh, PhD**[147]
This index discusses both comfort in cities and sensory appeal. It is important that a book written by scholars is considering how to communicate creative vibes in cities and enhance the experience of walking down streets. Some ideas presented in this book are used in later parts of the toolkit of ideas.

***Places of the Heart: The Psychogeography of Everyday Life* by Colin Ellard**[148]
Preeminent neuroscientist, author, and design consultant Ellard uses neuroscience to look at how places influence peoples' brains and bodies, in regards to what he calls "places we escape to and can't escape from." This book provides a scientific backdrop for how places actually affect city dwellers and helps to inform why places for escape are integral to well-being.

***Restorative Cities: Urban Design for Mental Health and Well-being* by Jenny Roe & Layla McCay**[149]
While the majority of urban design and city planning books look at socioeconomic factors, physical health, and equity in cities, this book is one of the few, if only, comprehensive sources that looks specifically at designing for *mental health*. This provides part of the argument showing the harm cities can do to mental well-being, something which can be combated through mental health-focused design in the urban environment, of which this project plays a small part. From an environmental psychology, psychiatry, and public health perspective, this book gives a foundation for restorative urbanism, and provides eight types of cities (with key concept definitions and supporting theory) that designers & planners can aspire towards.

Further Reading:

- *Care and Design: Bodies, Buildings, Cities* by Charlotte Bates, Rob Imrie, & Kim Kullman[150]
- "Ten questions concerning well-being in the built environment" by Altomonte et al.[151]

→ The relationship between emotion, the built environment, and experiencing cities

In *Places of the Heart*, Colin Ellard, a cognitive neuroscientist, makes a scientific case rooted in neurological studies for how the built environment affects us. He argues for the importance of emotion in guiding everyday behavior and for understanding psychogeography.

➤ **Psychogeography**: how our surroundings influence us; understanding & making sense of the relationships between lived experiences and the places that contain them; according to Ellard, it is the key to building better places at all scales[152]

"Now, perhaps more than ever before, engaged citizens of the world are keen to understand how place works and even to contribute to the work of building better places…Urbanization, crowding, climate change, and shifting energy balances are challenging us to rethink how we can shape our own environments not only to ensure our survival, but also to guard our mental health."

– cognitive neuroscientist and author Colin Ellard in *Places of the Heart*[153]

Emotions are important to the experience of space, and therefore in designing for specific socio-physical conditions[154]. Western philosophy has historically opposed emotion to the detached scientific mind, along with separating mind from body, nature from culture, and public from private. It is only more recently that the social sciences and humanities have started studying and developing "more reflective, culturally rich and dynamic articulations of our emotional relationship to the urban environment."[155] If the need for more enriched experiences of space and place – beyond pure rationality, objectivity, and passive spectatorship – is being acknowledged (as Burns posits in a *Design Issues* journal article)[156], it would follow that it can be powerful to consider emotions and incorporate emotional experiences into design.

Further Reading:

- Headspace: The Psychology of City Living by Paul Keedwell[157]
- Chapter 10: Environmental Design for Well-Being: A Review of the Impact of Architecture on Human Emotions by Stamatina Rassia & Maria Zervou in Urban Ethics under Conditions of Crisis, pg. 229-240[158]
- "What Is Sensory Urbanism?" by Marília Matoso, ArchDaily[159]

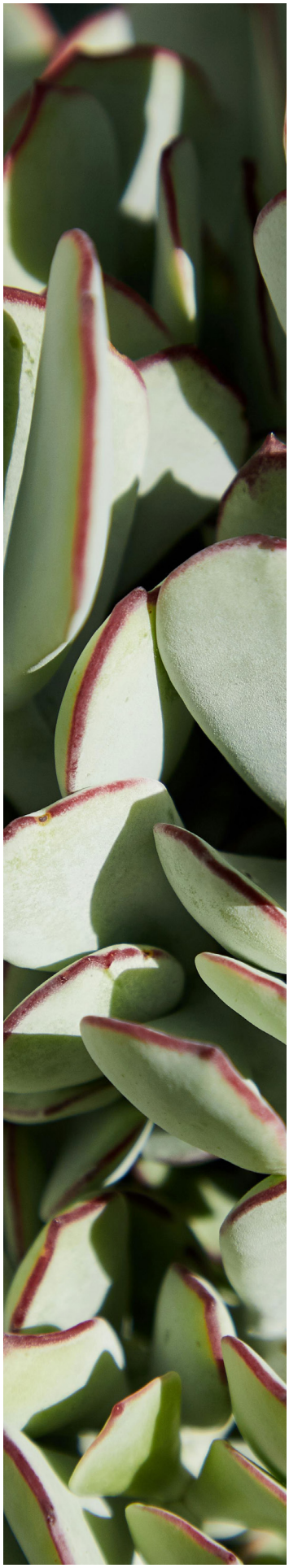
→ Placemaking: socialization & community versus time alone

When it comes to placemaking, a lot of research has been conducted on the importance of socialization and community ties, for example, in Eric Klinenberg's compelling *Palaces for the People*[160]. Olivia Laing explores the "particular flavor to the loneliness that comes from living in a city, surrounded by thousands of strangers," in her book *The Lonely City*[161]. The dangers of isolation and loneliness are studied in journal articles such as "This 'Modern Epidemic:' Loneliness as an Emotion Cluster"[162] and "Effective interventions to reduce loneliness in big cities,"[163] among others. Research such as this would seem to suggest always prioritizing socialization in our cities to avoid community breakdown, isolation, and bereft feelings of loneliness.

However, there are two issues with focusing all efforts and interventions towards this:

> First, urbanites are diverse and do not all possess the same needs – what about the need for a break from crowds? As any introvert can attest, constant socialization – even just being around people – can be exhausting. One award-winning online community for introverts even has an article on the benefits for introverts of spending time alone in public[164]. That is not to diminish the importance of building community and combating loneliness in cities in any way. Instead, the parameters of what placemaking can offer and address should be broadened. It can also be a tool for enhancing other elements of human life, from education and play, to the need for alone time.
>
> Second, loneliness and being alone are *not* the same thing, and should not be used interchangeably. Unlike the negative connotation of *loneliness*, *solitude* (as in spending time alone) can be something to strive for, as with Sara Maitland's book, *How to Be Alone*[165]. Historically, solitude and loneliness became linked during the time of the Romantics and early Modernists, with writers such as William Wordsworth and Virginia Woolf linking loneliness (via solitude) to artistic inspiration[166]. It is now necessary to decouple these terms, recognizing that solitude is possible without leading to loneliness.

While there is clearly awareness – in the public, among experts, and in the media – that loneliness is an issue to address in cities, this should not be completely at the expense of spaces to be alone. Though it is true that feelings of loneliness are often exacerbated in cities, particularly for newcomers, not *all* placemaking efforts have to be focused around group activities or making connections in an effort to address this. Arguably, spaces to breathe, places to reset, are by their nature something to be experienced alone or away from a crowd. Because they are not actively building community, such spaces have by and large been ignored by placemakers and urbanists. This has left urban landscapes with a division between public, outdoor spaces for socialization, and private, indoor spaces for retreat. While research shows that sociability is crucial to happiness, *balance* – via alone time and breaks – is needed for individual well-being. A truly healthy city should provide both in a spectrum of diverse public spaces for a variety of needs, emotions, and moods.



→ Benefits of solitude & shifting the perspective

Solitude is not isolation, and according to psychologists James R. Averill and Louise Sundararajan, it "is a valuable but often under-appreciated resource for both individuals and societies."[167] Social science fields, such as psychology, have conducted more research into the benefits of time spent alone (although rarely through the lens of urbanism). Important factors in keeping solitude from sliding into a negative experience of isolation or loneliness include spending time alone by choice rather than force, choosing how this time is spent, and having the right motivation towards solitude[168].

Historically, the deliberate choice of solitude was primarily available for men, particularly those with enough wealth to spend time away from labor. Figures such as 'the hermit' and 'the scholar' were prized for men, leading to the image of a dignified 'solitary man', with the flip side tying externally-imposed solitude with the 'abandoned woman'[169]. Acknowledging this history of solitude – both in how it was a privilege for some and loneliness for others – means today, researchers and designers should take care in separating the language and allowing for the *choice* of being alone. Keeping

Figure 21: Pod forms are described in a Dezeen opinion article as: "a tool of consciousness exploration," "spaces where characteristics & feelings of the individual human being could be restored," and a rare "place of complete privacy."[170]

those factors in mind, placemakers, urbanists, and designers, should also consider the need and desire for solitude in their plans.

Although Amber Kale's article in the *Journal of Refugee Studies* on solitude as a positive space for wellbeing specifically looks at refugee resettlement research, the same argument could be made for a wider urban setting. Consider this quote, with the substitutions of the words in brackets for Kale's original study area:

> Solitude is overlooked in refugee resettlement [placemaking] research, which instead prioritizes theories of social participation and integration. However, positive experiences of aloneness enabled participants to freely regulate their emotions, express their identities, restructure their surroundings, and build meaningful place-attachments. Such emotionally transformative experiences are central to feeling well in new places, and I therefore argue that solitude requires researchers and policymakers' attention as part of a more *balanced* resettlement [urbanism] approach; where the **stressful work of social participation and integration are tempered with the necessary time and space for individuals to rest, reflect, and rejuvenate**[171].

Solitude is restorative – it eases stress, increases concentration, and promotes relaxation. In addition to being a catalyst for creativity and innovation, it also improves social relationships over time as it provides perspective and breaks for greater appreciation for others[172]. Cultural historian Fay Bound Alberti even suggests that solitude – when in moderation and relating to nature – is crucial to surviving a busy life[173]. Contemplative practices in solitude, including prayer or meditation, have long been a part of human desires, with people across history seeking out solace in churches, temples, and other meditation locations[174].

Benefits of solitude:

- Better regulated emotions
- Time to rest, reflect, & rejuvenate
- Eases stress
- Increases concentration
- Catalyst for creativity & innovation
- Improved social relationships
- Power of choice

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III.
A New Model Needed

Cities of the Future

Although there are many challenges, cities do not have to continue doing the same things; they can be *better designed* for a healthier, happier, more sustainable future. So what is a *city of the future*? What does it mean to design with people prioritized, with the user experience in mind?

Cities of the future should:

be designed for people first, with thoughts to comfort & experience

prioritize holistic health

be resilient and restorative

meet varied needs

These elements are interconnected, mutually influencing and reinforcing each other. While they represent variations of the same core concept, they are broken into subsections below to explore deeper nuances. Each is a facet of the same fundamental concept that should be considered in the design of future cities.

→ Designing cities for people first, with thoughts to comfort & experience

With a thought to Sucher's *urban villages*, what aspects of a city can be improved for user comfort and experience? What do people want and need most in a fulfilling city experience?

It is important to note that there is no one experience of 'city living' and no one 'city' to model this on, complicating the topic. As American psychologist Stanley Milgram put it, "A person's impression of a given city depends on [their] implicit standard of comparison. A New Yorker who visits Paris may well describe that city as 'leisurely,' whereas a compatriot from Richmond, Virginia, may consider Paris too 'hectic.'"[175] Every city will have different user populations and different considerations for comfort and experience. So what does this look like in different

cities around the world? This is a question more urbanists need to be asking and investigating.

Figure 22: Comfortable seating by RS+Robert Skitek enhances the lake-front experience in a redevelopment project in Tychy, Poland; *Photo credit: ©Tomasz Zakrzewski via ArchDaily*

"That is the goal: to build a city so comfortable that one may lie down to rest, safely, in public."

– David Sucher in City Comforts[176]

Working across disciplines, urbanists need to utilize a broad range of research and consider the experience of people first and foremost in every project they take on.

More sources like *Welcome to Your World* need to be developed, which author Goldhagen declares "a call to action, imploring all of us to do whatever it takes to develop a policy agenda and practical initiatives to better human welfare by improving the built environment."[177]

Further Reading:

- "How to Bring Comfort and Warmth to the Design of Public Spaces?" by Eduardo Souza, ArchDaily[178]
- "How Copenhagen is Designed for Delight" by Ankitha Gattupalli, ArchDaily[179]

→ Prioritizing holistic health & well-being

"The complex challenges we face, including sedentary lifestyles, high absenteeism, stress and burnout make a holistic approach to wellbeing essential."

– 10 Priorities for Health & Wellbeing by ARUP[180]

How do you create a truly healthy city, one that considers well-being as well as health indicators and physical factors? This may be a question that started in the 80s with WHO, but as demonstrated in section II, a more holistic approach is still new. Thankfully, it is one that is being asked more and more by urbanists, with an increase in podcast episodes on topics such as "How to Build a Healthy City" (2018)[181], "Wellbeing and cities" (2019)[182], "Happy Cities: how can urban design boost our wellbeing?" (2023)[183], "Urban mental health" (2023), and the apropos "How do you create a healthy city?" (2016)[184] becoming more frequent, and even an entire podcast series, *Healthy City Podcast, Healthy Cities in the SDG Era*[185].

"Health is everybody's business."

– Dr. Agis Tsouros, Former Director of WHO European Healthy Cities Network[186]

For over 40 years, health was considered a private responsibility, but it is finally being acknowledged as a collective, societal responsibility[187]. Dr. Agis Tsouros, the former director of WHO's European Healthy Cities Network sees specific interventions in the way cities, neighborhoods, and roads are built as the government's opportunity to put health high on the political and social agenda[188].

As part of the WHO European Healthy Cities Network's definition of a healthy city, they consider factors of people, participation, prosperity, planet, place, and peace. For place, the considerations of an accessible built environment, they recommend four goals:

- shifting from a needs-based to an assets-based approach
- utilizing human-centered urban development & planning
- integrating health equity & sustainability into urban development & planning
- enhancing inclusiveness in the use & governance of common spaces

Source: WHO European Healthy Cities Network website[189]

"Mental health and wellbeing is within the remit of urban planners, managers, designers, and developers."

– UD/MH's Mind the GAPS Framework[190]

Salutogenic design is important for healthy cities. It focuses on designing places with healthy activities and lifestyles for everyone, on a daily basis. Health promoting environments should be preventative and incorporate placemaking principles to enable and invigorate people[191].

➤ **Salutogenic design** "creates environments that are health promoting by including preventative measures that address the whole person, rather than only focusing on treating disease."[192] Within this, there are also 'salutogenic soundscapes / smellscapes' which are acoustic or olfactory environments that support health & well-being (such as by reducing stress)[193].

Figures 23 & 24: The One Green Mile project by MVRDV & StudioPOD is an example of salutogenic design in an urban setting. *Photo credit: ©Suleiman Merchant via ArchDaily*

"Well-being is an integral part of resilient structures and societies, but too often this leg of the stool is missing. We talk about sustainable cities from an environmental and economic perspective, forgetting the human factors that make these urban ecosystems function."

– Environmental Psychology Consultant Lily Bernheimer in *The Shaping of Us*[194]

Further Reading:

- *Architecture for Health and Well-Being: A Sustainable Approach* by María Eugenia Molar Orozco[195]
- Chapter 7: Salutogenic design: promoting healthy living in *Creating Great Places* by Debra Flanders Cushing & Evonne Miller, pg. 101-117[196]
- "Design for Well-being – Framework for Design Excellence" by AIA[197]
- *Making Healthy Places: Designing and Building for Health, Well-being, and Sustainability* by Timothy Beatley[198]
- "The Architecture of Well-Being" by HOK[199]

→ Cities that are restorative & resilient

"Inviting cities offer an atmosphere that is alive with people. However, it's also important to have public spaces for escape. People need enclaves of peace, quiet, and greenery tucked away from the bustle of city streets."

– Patricia Chase and Nancy Rivenburgh in *Envisioning Better Cities*[200]

The rise of the resilient cities movement is about "shifting from an emphasis on maintaining status quo to building societies that can repair and rework themselves in the face of chaotic change."[201] Resiliency, restoration, and well-being work interdependently, informing and reinforcing each other; resilient cities should prioritize well-being, and an important part of this is offering restorative environments. Urban design innovation regarding protective efforts for mental well-being provides the perfect opportunity to add value to cities by helping strengthen the population's mental health resilience, recovery, and prevention[202].

According to Restorative Cities, a restorative environment is any setting that helps people regulate emotions and recover from mental fatigue, stress, and/or the demands of everyday life[203]. Two main theories dominate literature on restorative environments: Kaplan's 1989 Attention Restoration Theory (ART) and Ulrich's 1983-1991 Stress Reduction Theory (SRT). ART "focuses on the effect of environments on cognitive demands," while SRT "looks at the influence of environments on emotional wellbeing and physiological stress recovery."[204]

Attention Restoration Theory (ART):

- Focuses on the effect of environments on cognitive demands

Stress Reduction Theory (SRT):

- Looks at the influence of environments on emotional wellbeing and physiological stress recovery

- Says that urban life taxes cognitive resources, particularly directed attention, to a much greater extent than the environment our ancestors were used to in the past
- States that being present in nature replenishes this cognitive resource due to sensory qualities of natural environments
- Defines four successive stages for a restorative experience:
    1. 'clearing the head' of distracting thoughts
    2. recovery of directed attention capacity
    3. a process of contemplation or cognitive quiet
    4. a deeper state of restoration, reflection on one's life, priorities, possibilities, actions, & goals
- Is supported by hundreds of studies showing that a higher proportion of key restorative ingredients (i.e. fascination, being away, extent, & compatibility) contributes to cognitive & affective restoration

- Understands the immediate response to any environment is an affective & aesthetic response that triggers the body's stress response
- Evokes by visual stimuli of a setting – an immediate like or dislike response
- Emphasizes unconscious effects on the autonomic nervous system to explain how nature may reduce stress (especially natural landscapes which were beneficial for survival in the past)
- Includes the attributes of the complexity of a scene & the presence of a focal point

These explanations of ART & SRT include both direct & edited text from *Restorative Cities*[205] & "Understanding Urbanicity"[206]

In City Comforts, Sucher says that "we desire a place of repose as well as a place of activity."[207] While no one can deny that cities are places of activity, how many also truly offer repose? This is where the new typology, '*R-Spaces*', come in.

Resilient cities are also adaptive to climate change.

➤ Cities will need to address climate change in numerous ways, requiring creative & interdisciplinary approaches beyond technical solutions.

"Adaptation to climate change can be viewed as an opportunity to improve the quality of life in cities."

– Foshag et al. in "Viability of public spaces in cities under increasing heat"[208]

While cities focus on improving themselves and becoming more adaptive, *R-Spaces* can be added to a larger response to climate change and improving quality of life. For example, they could perform a similar function of green (roof) bus stops (fig. 25-27), which add a layer of adaptation (as part of a wider effort) to their already-important purpose as infrastructure.

"If humans are viewed as an integral part of an ecosystem then improving their quality of life must be included in a regenerative solution to climate change."

– urbanist Meg Walker

Figures 25-27 – from left to right: (25) 'Green Bus Stop' by Amphi Consult in Poland, *credit: State of Green*; (26) A green roof by GWS Living Art in Kuala Lumpur, Malaysia, *credit: GWS Living Art via CNN Health*; (27) 'Bee Bus Stop' by Clear Channel in Leicester, England, *credit: Clear Channel*

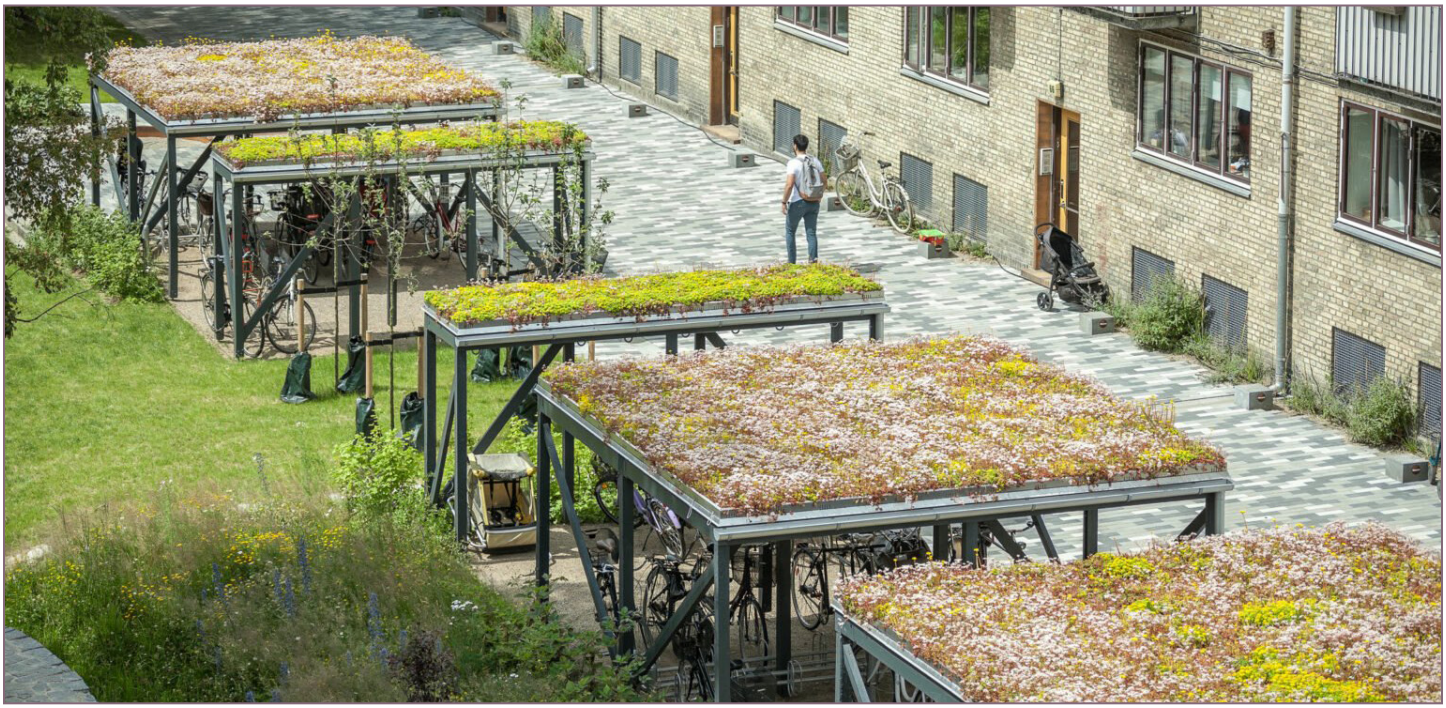


Figure 28: Landscape resilient courtyards in Copenhagen, Denmark add greenery & beauty to a public space while additionally serving as nature-based water management in a larger climate change adaptation strategy[209]. *Photo credit: Niels Lützen Landskabsarkitekter via State of Green*

"Designers will play a significant role in reshaping and reconfiguring many of the determinants of planetary health and human wellbeing."

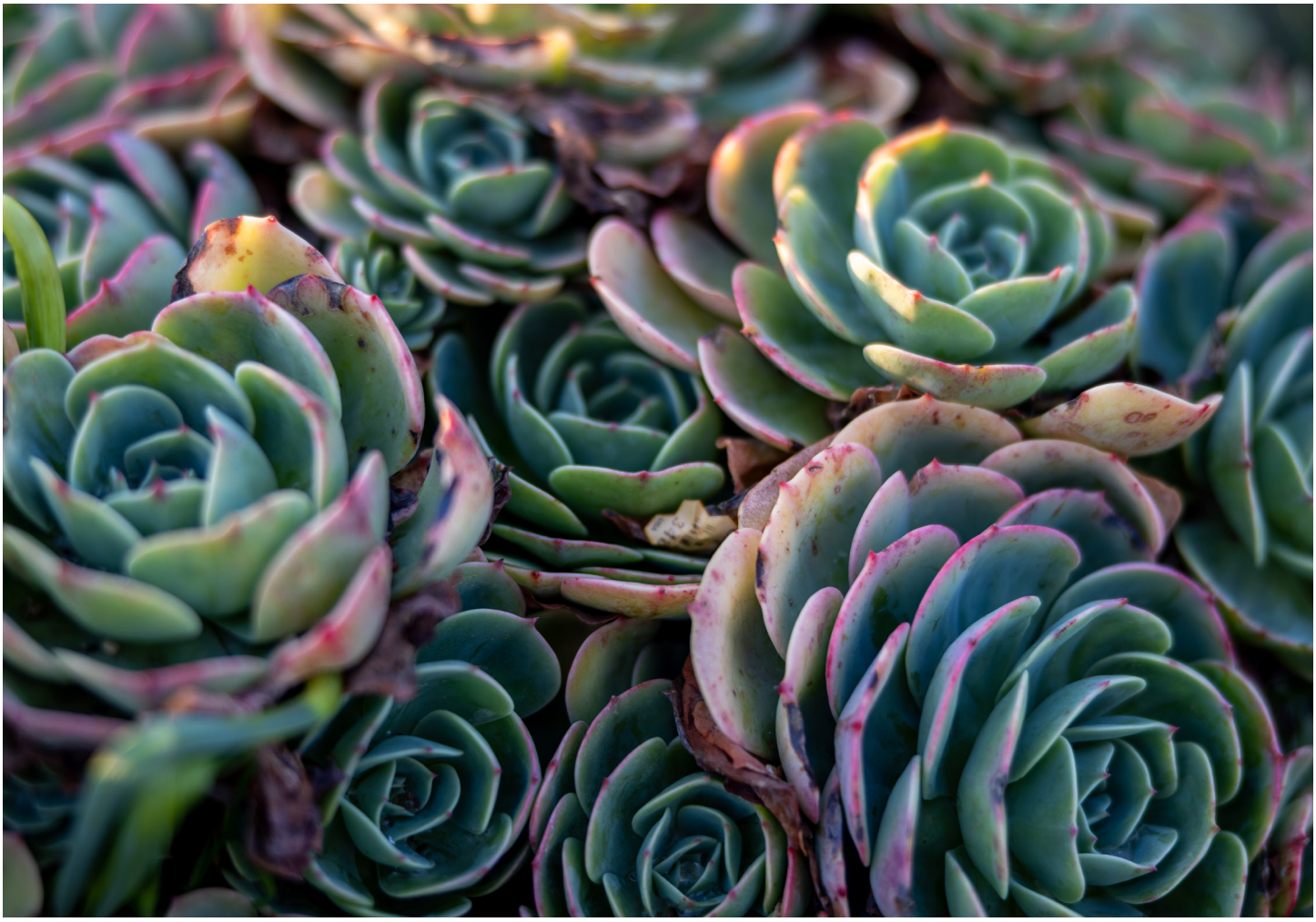
– Rachel Sara & Louis Rice in "Towards an architecture for wellbeing"[210]

In the search of a better future city, designers and planners should always ask these four questions:

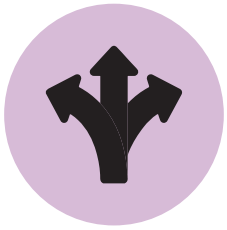
1. *How can this be designed for people first, with thoughts to comfort & experience?*
2. *How can we prioritize holistic health & well-being in this project?*
3. *How does this contribute to a resilient and restorative city?*
4. *What (and whose) needs are and are not being met?*

Further Reading:

- "Designing Resilient Cities: A proposal for multipliCity"[211] by Perkins Eastman



Meeting Needs



If considering the idea of *specialized public space use*, as sociologist Lyn H. Lofland discusses in *Environmental Psychology 2nd Edition* (where she discusses social cues for determining what is appropriate in certain spaces)[212], it is possible to think of existing public spaces as different typologies for behavior. People feel comfortable taking part in different behaviors depending on where they are. While this might be more obvious in terms of

public versus private, there is still variation within the public sphere. Depending on culture and local context, someone might be loud and social in one space or respectful and introspective in another. If different types of spaces cue different behaviors, this leads to the question: what needs are currently being addressed in the domain of public spaces and which are not?

Public spaces have undergone a transformation during their evolution in the postindustrial setting. Previous activities that took place in the public space of preindustrial cities have moved almost entirely into private or semiprivate spaces. Examples from Lofland include educating the youth, eliminating body waste (read: public toilets), punishments & executions, and news distribution. Perhaps this is a subjective improvement, but if societal acceptance of activities is mutable from public to private, there is space to reconsider where other 'private' activities can take place.

While there are common jokes among New Yorkers about crying in public on the subway, plenty of people in cities around the world do not feel comfortable crying in public – that is something reserved for the privacy of their own homes. The same could be said for where people feel comfortable resting, grieving, relaxing, or other forms of taking a break. Why are certain activities restricted to private spaces? Lofland points out that there is a tendency to assign certain activities to certain spaces in our modern cities to avoid the 'pile-up' characteristic of preindustrial cities, where too much was happening in one space[213]. Perhaps this was necessary at some point, and may continue to be for certain activities. But industrialization also led to the parks movement when people needed pockets of green spaces in the dense urban fabric,

especially with the physical health issues of crowded post-industrial cities[214]. Although cities may be healthier than they were in the 1970s in terms of environmental measures, there has also been an increase in cars, technology, and other factors, as previously discussed. It is clear that cities need more public, free spaces for people to escape the chaos of city living.

It is easier to continue producing public spaces that follow pre-established models – widely accepted types like parks and plazas. But key needs are not currently being met in the public realm of cities, and part of sustainable development is meeting human needs[215]. This creates an opening for a new typology of public space to emerge.

→ A need for time alone

Sociologists Georg Simmel and Louis Wirth claimed that people living in cities coped with intense city sights & sounds by shutting down meaningful social contact in public[216]. As a possible explanation for detachment in city settings, if true, this would suggest in order for people to connect in public, they also need breaks from city stressors, including crowds. People frequently get more tired from overwhelming sensations in cities, but do not want to give up the positive amenities of city living. Not everyone wants the same things, some need more time alone and quieter lifestyle options than others. If cities only provide a high energy atmosphere without consideration for different needs, they cannot be truly sustainable for global populations. There needs to be a range of typologies (of buildings, public spaces, etc.) and density levels within a city for it to be as successful as possible[217].

In *Creating Great Places*, Cushing & Miller include *'personal space theory'* as one of 'six critical theories for contemporary urban design'. They explain part of the theory using environmental psychologist Robert Sommer's classic 1969 *Personal Space: The Behavioral Basis of Design* book. In it, Sommer explains people's "innate need for privacy" in how they "will find it, using corners, alcoves, a 'broom closet, fire escape, or toilet stall.'"[218] While it is important to consider personal space when designing spaces, it can also be tricky due to its subjective nature. The needs for personal space vary greatly based on the individual including factors such as nationality, culture, ethnicity, personality, gender, age, location, situation, experience of PTSD, autism spectrum disorder, and extroversion vs introversion[219]. This means there need to be different opportunities for people to access personal space when they need more of it.

Zeisel's 1975 behavioral approach to urban design decrees a need to address six common human needs: security, clarity, identity, social interaction, convenience, and ***privacy***[220]. Where are the public dimensions of urban design that address a need for privacy? An article on urban sanity references Larsen & Rambøll's 2022 book that identifies five qualities that have positive impacts on well-being in homes and neighborhoods; one of these five is a balance of private and communal spaces[221]. If this impacts residents' well-being at home and in their neighborhoods, could it not also do so in a larger urban context?

If someone feels uncomfortable expressing certain emotions in public due to what sociologists call the *social shaping of emotion in public*, where do they go if they need to express themselves? Cahill and Eggleston explain public etiquette proscribes muted emotional displays, where emotions may be camouflaged behind more distanced, conventional social interaction. Hochschild calls this *'surface acting'*, wherein people prevent intense – or more true – emotional displays from reaching the surface[222]. This might not apply to all cultures, or all individuals, but it is something that influences public behavior. Therefore, it follows that public spaces lack the freedom to express oneself as fully as might be needed. If this is true, and someone requires privacy to feel their full range of emotions, could there be a space designed for this?

Where R–Spaces Come In

- Allowing people privacy and alone time

→ A search for relief

"Can we find a touch of zen in an everyday routine?"

– Andrew Tuck, The Urbanist[223]

There are plenty of news articles and blog posts on managing pressures & over-stimulation in cities[224], where & how to find peace & quiet[225], and city-specific lists[226]. Scientists even use a tranquility rating prediction tool (TRAPT) in academic research[227]. One entrepreneur launched an app, Breather, which monetizes the need to find quiet space. It has been successful, with over 500 locations across 10 cities worldwide. However, it is primarily used for business meetings, phone calls, and as a workspace[228] – because it costs money and requires an online or app booking. It addresses a need – but not for everyone – and not easily accessible. Other digital apps and tools addressing a similar need have also arisen in recent years - see Appendix C for a list.

"It should be a right to have access to quiet spots."

– Soundscape Scientist & Architect Antonella Radicchi[229]

Antonella Radicchi, a soundscape scientist and architect at the Technical University of Berlin, created the app Hush City to attempt to identify what people look for in everyday quiet areas. In this context, quiet areas have been defined as "public places within a city where residents can relax, read, walk, and chat within walking distance from the building where they live or work."[230]

From an analysis of 196 places recommended (in a compilation of 22 online lists) across 40 cities around the world (full data list in Appendix A), it is possible to get a better idea of where people are currently seeking relief. The online lists of place recommendations were selected based on the usage of words such as *peace*, *quiet*, *relaxing*, *escape*, *serene*, *unwind*, *places to clear your head*, *chill out*, *calm*, and *introvert's space/guide*.

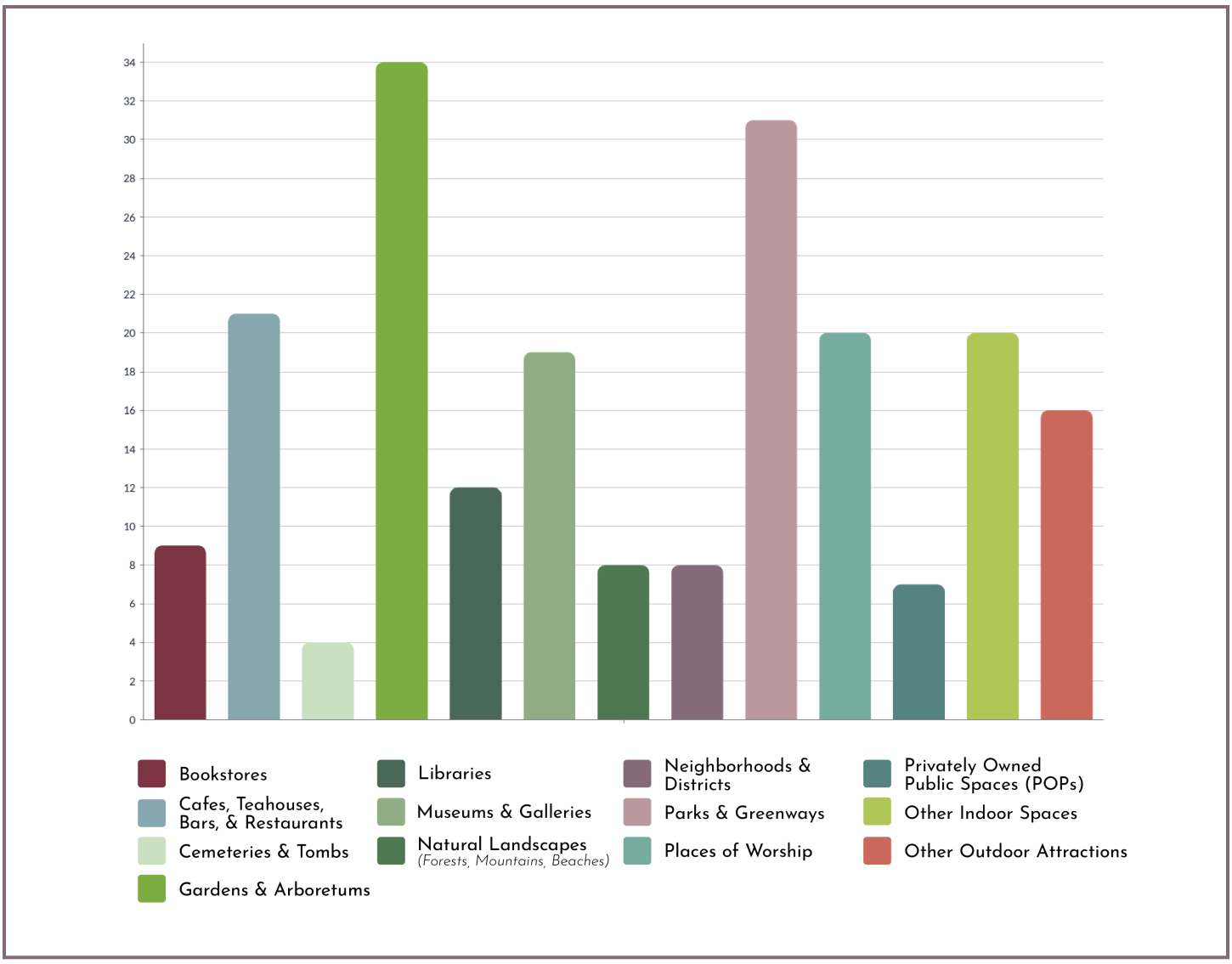


Figure 29: Graph analysis of existing places for respite by type; *Source: author*

The group with the most representation of places was 'Gardens & Arboretums', with 'Parks & Greenways' in second, and 'Cafes, Teahouses, Bars, & Restaurants' in third (see fig. 29). Other space types included bookstores, cemeteries & tombs, libraries, museums & galleries, natural landscapes (i.e. forests, mountains, beaches), neighborhoods & districts, places of worship, privately owned public spaces (POPS), and other indoor & outdoor spaces/attractions. The prevalence of such lists shows that many people are searching for relief in cities. However, various problems come with the majority of existing spaces.

The most common issue with existing places of relief is an entrance fee or cost, with a reservation or ticket coming in second, and the expectation of spending money in third (see fig. 30). For full descriptions of each accessibility issue, see Appendix A.

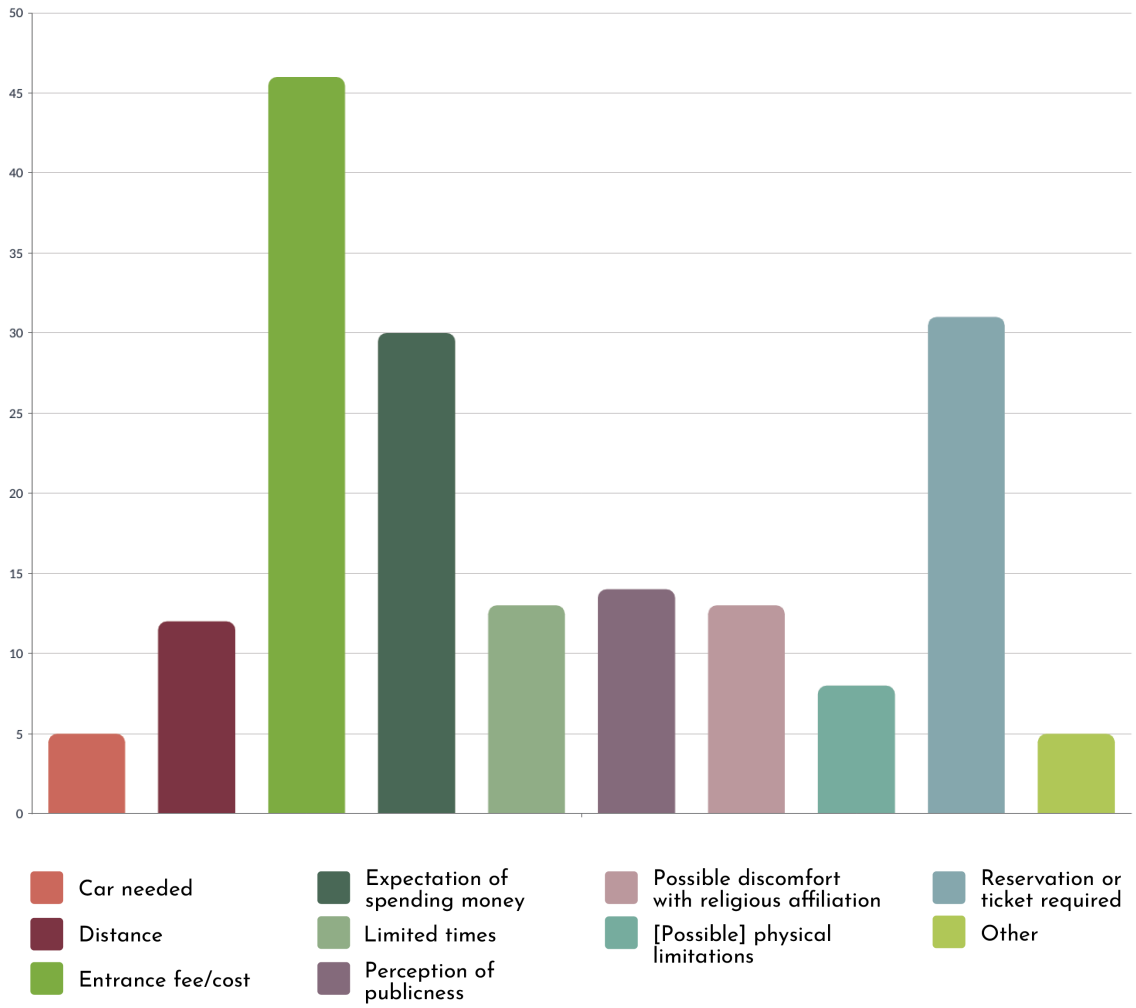


Figure 30: Graph analysis of existing places for respite by accessibility issue; *Source: author*

Precedent Study: Audiorama Parque España | Mexico City, Mexico

About:

- Tiny garden built specifically to provide peace & serenity
- Located in the middle of a park in a busy neighborhood
- Entrance has a trunk with books
- Has tables, benches, & swings
- Filled with trees & flowers
- Small speakers play music to cover street noise
- Provides a relaxing contrast to surrounding busy avenues
- Mostly made of recycled materials from other projects managed by mayor's office

The popularity of places like Audiorama Parque España, the discussion around quiet spaces in cities, and the existence of apps, tools, and online lists (see Appendices A & C) all demonstrate a larger trend of city dwellers searching for relief.

Where R–Spaces Come In

- Providing **free** public spaces for relief & respite

Further Reading:

- Tranquil City Manifesto

→ A need for a better every day experience

In general, for overall well-being, cities should focus on creating better everyday experiences for people. This means looking at the mundane and improving systems & spaces that might otherwise be overlooked because they are part of a common backdrop accepted as 'normal life'. Phenomenologist David Seamon says that one of the tasks of phenomenological geography is to "understand how people live in relation to everyday places, spaces, and environments."[233] The everyday is just as important as times of crisis or excitement, and the public sphere (including places people pass regularly) can be improved to offer better everyday moments.

Getting around

Commuting is a fact of life in the city, one that is rarely studied and even more rarely the focus of design improvements for quality of life. And yet, it takes up a significant portion of many people's time and can directly impact subjective well-being. What person living in a city has not had a strong emotional

reaction to getting around the city (both positive, and sadly, more often negative)? When traveling, the individual loses a lot of control, subjected to noise, smells, temperatures they cannot escape, bodily restrictions (and often crowding), and anxieties dealing with wait times and connections[234].

➤ '**Travel**' in this publication refers to every day transportation from point A to point B, not traveling to far-away locales or vacations.

Beyond commuting to work, 'travel' around the city allows for socialization, shopping, and access to everything from services to recreation to education – all of which are important to mental health[235]. Why, then, is the quality of the experience largely ignored beyond rallying cries for improved public transportation? Of course improved public transportation should be the loudest call – it is easily the most important factor for improving every day city travel experiences. But why stop there? If there were more public spaces that break up unpleasant commuting experiences, perhaps more urbanites would choose walking or cycling, which have been identified as the most pleasant ways of city travel[236] in addition to promoting better health. As walkability becomes more centered in urban planning & design, more supportive models of public space (and better distribution of such spaces) will be necessary.

In the support of better commute & every day travel experiences, there are many good ideas urban designers and planners and incorporate, such as these from Maslin's *Designing Mind-Friendly Environments*[237] and UD/MH[238]:

- Quiet, comfortable, mind-friendly waiting areas
- Active transport options like protected bike lanes and walking infrastructure
- Enhanced public transit services, networks, and bus-only routes
- Improved pedestrian plazas

Where R–Spaces Come In

- Encouraging active commuting by providing more rest stops while out and about
- Enhancing public transit services if incorporated into them
- Adding moments of visual (and other sensory) interest while going about everyday activities
- Addressing mental health & well-being needs on an everyday level, not just in clinical settings

R–Spaces: The New Public Space Model

A 2021 article in *Psychological Medicine* discusses a need to enable urban designs which both offset the risks of urban stress and enhance protective factors. 2016 and 2017 studies by Söderström et al. established three tactics for handling urban stress – creating sensory 'bubbles', programming mobility, and creating places of comfort. Furthermore, ethnographic data studies showed that 'niches' or 'atmospheres' of recovery are critical for mental health[239], and many cities lack such spaces. All of these terms are good descriptors for *R-Spaces*: risk mitigation, protection, sensory 'bubbles', places of comfort, and 'niches' or 'atmospheres' of recovery.

➤ '**Niches**' is the term used by anthropologists Milena D. Bister, Martina Klausner, and Jörg Niewöhner (in their 2016 book chapter). Meanwhile, '**atmospheres**' is the term of choice for geographers, psychiatrists, and researchers Cameron Duff, Ola Söderström, Dag Söderström, Zoé Codeluppi, Lilith Abrahamyan Empson, Philippe Conus, and Philipp S Baumann (in their 2016 and 2017 journal articles).

→ Typologies of spatial occupation (the range of R–Space refuges)

Based on the needs of city dwellers, four typologies of *R-Spaces* are proposed to enhance the public space landscape and improve overall well-being in cities. These four typologies – *Rest*, *Relax*, *Restore*, and *Revive* – cover a diverse spectrum of user needs.

Typologies of Occupation

These typologies can be mixed and matched based on the needs of particular spaces and locations in different cities. Where space is available, a structure with all four typologies as individual 'rooms' or 'pods' would be ideal. However, when limited space is available or an area has one main activity or deficit(s), urban planners and designers may choose to focus on only one or two (or three) of these typologies.

→ Rest: the model for physical discomfort

A place to escape heat, cold, rain, etc.

"Climate is one of the most compelling things in your life. It ranks in importance alongside nutrition, sleep, mental health... drastic weather changes actually alter your body's mechanism. Temperature changes are reflected in your metabolism – the rate at which you turn food into heat and energy. Blood pressure goes up and down with the thermometer. So isn't it obvious why climate affects your energy, your ambition, and your efficiency?"

– Elizabeth Gordon, *House Beautiful* (1949) as quoted in *Atmosphere Anatomies*[240]

With worsening climate change, being outdoors is becoming increasingly draining, whether it is from extreme heat, pouring rain, or something else. It follows then, that cities need more places to escape these conditions which have such impact on peoples' every day enjoyment and the walkability of an area. When it rains, it is easy to see people ducking into restaurants or stores, or seeking refuge under building overhangs. In general, cities need to increase shade and protective structures to increase the comfort of urbanites. In line with this, *Rest*

Spaces can offer another structure to escape undesired weather – without an expectation of spending money.

Day laborers can be particularly vulnerable to heat risk[241]. How can public spaces better provide for a variety of populations, such as this? Unfortunately, current legislation is not protecting outdoor workers – both Texas and Florida recently voted against legislation requiring employers to allow outdoor workers to take breaks from the heat[242]. This is the opposite of the supportive infrastructure (both policy and built) needed for better well-being. Public spaces should contribute to a wider culture of care in every way possible.

A place to rest when tired

"Anyone who has spent time in hot, humid climates will also tell you that the amount of shade and hills will impact whether 500 meters is an acceptable [walkability] distance."

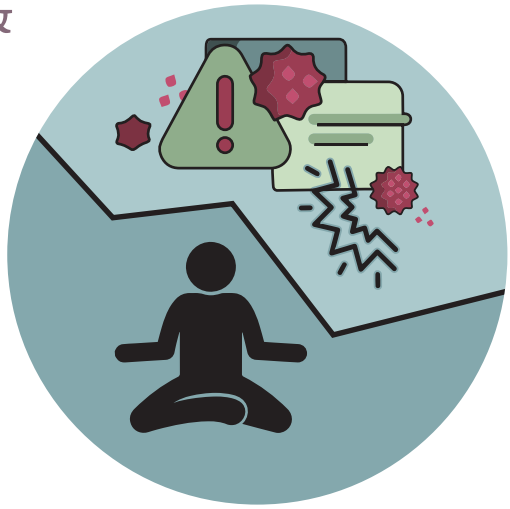
– Debra Flanders Cushing & Evonne Miller in *Creating Great Places*[243]

Anyone can get tired and desire rest while walking around. However, this is becoming an even bigger concern with the aging global population, with projections for the population over 60 to double[244], and the 80 and over population to triple, by 2050[245]. Furthermore, walking around cities can be especially challenging for certain disabilities, even temporary ones such as injuries or pregnancy. Increasing seating opportunities in cities (via park benches or other infrastructure) is important. To that point, *Rest Spaces* can offer well-designed seating opportunities that are also protected from the elements. These will be especially important on long stretches between public transportation and other destinations. Walkability distances depend on multiple factors, from how interesting an area is, the condition of the walking surface, the temperature and amount of shade, etc[246]. In places where the common walkability distance of approximately a quarter of a mile or 500 meters feels longer, less manageable, or less acceptable, *Rest Spaces* can be located to break up the distance.

Ben Channon says in *The Happy Design Toolkit* that, "when encouraging people to be active, it is important to not just

think about sports and high-intensity activities, but also gentler ways of being active, such as a stroll around the village."[247] Benefits of walking include reducing the risk of heart attack & diabetes by 50%, colon cancer by 30%, and femur fractures by up to 40%. Research shows that the availability of seating directly affects how older people felt about participating in city activities, which impacts loneliness and social isolation[248]. In addition to making a place more walkable, having places to rest provides other opportunities, such as reflection, interacting with nature, or appreciating a view or piece of art.

→ Relax: the model for stress & over-stimulation



A place to escape crowds, noise, visuals, etc.

Section II proved how hectic and over-stimulating cities can be; cities need to provide opportunities to escape the stimuli. In response to this, and to the unmet needs previously discussed, *Relax Spaces* offer a place one can temporarily get away from whatever stimuli is becoming overbearing. *Relax Spaces* will be particularly useful in crowded city centers and other areas where city stimuli are at their strongest.

According to sensory accessibility nonprofit KultureCity, one in four individuals have a sensory need or invisible disability. This includes people with autism, PTSD, dementia, strokes, Parkinson's disease, and others[249]. *Relax Spaces* are especially important for these populations.

➤ **Sensory needs** are a common medical condition where someone's brain has trouble receiving & responding to information obtained through the senses[250]. People with sensory needs are at especially high risk for sensory overload.

A place to de-stress

Where does one go when they are out on the town and become overly stressed? The existing places people seek out (see fig. 31) are not sufficient. Even if someone is not stressed by the stimuli of the city itself, they could be stressed by any number of factors in their personal lives. Perhaps they need a moment to collect themselves or breathe for five minutes before setting back out – if a *Rest Space* is nearby, they can duck in to take their breather. These might be especially useful in typically high stress environments, or wherever residents or commuters report feeling more stress.

"[City life] is overstimulating. Over-stimulation can make people feel tired, stressed, overwhelmed, cranky, and irritable."

– Dr. Camille Dieterle, Assistant Professor of Clinical Occupational Therapy, USC[251]

→ Restore: the model for privacy

A place that provides privacy

"Privacy is precious in cities. It is indispensable."

– Jane Jacobs[252]

In addition to opportunities for connectivity, cities need to provide opportunities for privacy to balance out these fundamental needs. Also see 'Benefits of solitude' in section II.

"In a place where we are so rarely alone, we find privacy in public... [sometimes] it can be easier to find privacy outside."

– Author Melissa Febos, The New York Times[253]

Restore Spaces might be particularly necessary where there are crowds and high levels of surveillance.

Privacy allows for:

- Self-protection
- Time to process emotions & resolve internal conflicts
- Decompression time for improved social relationships
- Self-awareness & growth
- Personal boundaries, both physical & psychological
- Feelings of safety

List based on "The Psychology of Privacy"[254]

A place to cry

"If you live in New York, you're bound to end up crying in public eventually; there just aren't enough private places."

– Melissa Febos, The New York Times[255]

There is no shame in crying in public. Plenty of people cry in public, whether from grief, stress, or random existential feelings. That being said, not everyone feels comfortable doing so, and some will refrain completely until they can be alone. But crying is healthy – it is self-soothing, releases endorphins, and it promotes a sense of well-being[256]. Why, then, is it so hard to find a comfortable place to cry? These are dimensions of human life that urban design has not yet considered, but certainly could moving forward. *R-Spaces* can, in one small way, be part of letting people experience a full range of human emotion and *life*. One place to consider placing *Restore Spaces* could be near sites of trauma, healing, and/or memorialization, although people could easily feel a need to cry anywhere.

Further Reading:

- "Crying in Public" by Litsa Williams[257]

→ Revive: the model for monotony & boredom

Why are so many public spaces, to put it bluntly, boring? It should be a requirement for urbanists – *especially* designers – to inspire, excite, or otherwise engage people in the public sphere. This obviously comes down to the design itself of any project – the goals, the aesthetic qualities, engagement with the community it serves, etc., but why could there not also be places that specifically function to take people out of the monotony of everyday life?

"Creating places that are not boring, but are stimulating, interesting, unique, and fun can increase our health and wellbeing. Boring or monotonous situations can be detrimental to our health."

– Debra Flanders Cushing & Evonne Miller in *Creating Great Places*[258]

A place to re-charge & re-energize

Life – not to mention city life – can wear people down; everyone has felt tired or burnt out at some point. This means there is an opportunity for public spaces that help combat this. *Revive Spaces* can serve to break up an otherwise draining commute, to provide a chance for people to re-charge their battery (physical, social, or emotional) and/or continue their day with more excitement or vigor. One way cities could do better in this aspect would be to increase play in everyday life. Beyond opportunities for play, *Revive Spaces* can serve as spaces to jolt people out of feeling stuck in endless cycles – or not feeling much at all. To this point, *Revive Spaces* should be the most heavily *designed* of the four types, in terms of providing activities, exhibitions, diversions, or other engagement.

A place to stimulate creativity

"Solitude is my opportunity to reboot. It's essential to my health and well-being and it also helps me to be a more attentive, patient wife and mom and a more focused and creative writer."

– Polly Campbell, wellness author[259]

Solitude itself can help with creativity. Furthermore, creativity in general makes cities better for well-being because when the parts of the brain more associated with creative thinking are activated, people tend to feel more energized, relaxed, and happier[260]. *Revive Spaces* can liven up otherwise lackluster cityscapes, and would be particularly useful in parts of the city where people feel stifled, bored, or otherwise uninspired.

Further Reading:

- "People, Play and Placemaking: How Play Can Activate Public Space" by Omar El Feki[261]

→ Who are R–Spaces for?

R-Spaces are for anyone who needs a break, any time, any day, regardless of age, gender, ability, or background.

That being said, they are one type of public space in a larger landscape and cannot serve every need of society. They are meant for short breaks, not long stays. At-need populations, such as the unhoused, are welcome to enjoy the spaces in the exact same manner as anyone else – temporarily. *R-Spaces* are not mobile shelters, and are not a replacement for necessary policy to address the growing housing crisis. This is important to explicitly state because the commodification of housing has led to people experiencing homelessness needing to meet their basic needs in the public sphere. Additionally, the unhoused are often made to feel unwelcome or outright excluded from public spaces. Design cannot be responsible for addressing complex social issues which should be handled through better policy and resource allocation, and the attempt to do so often results in exclusionary practices and unwelcoming spaces.

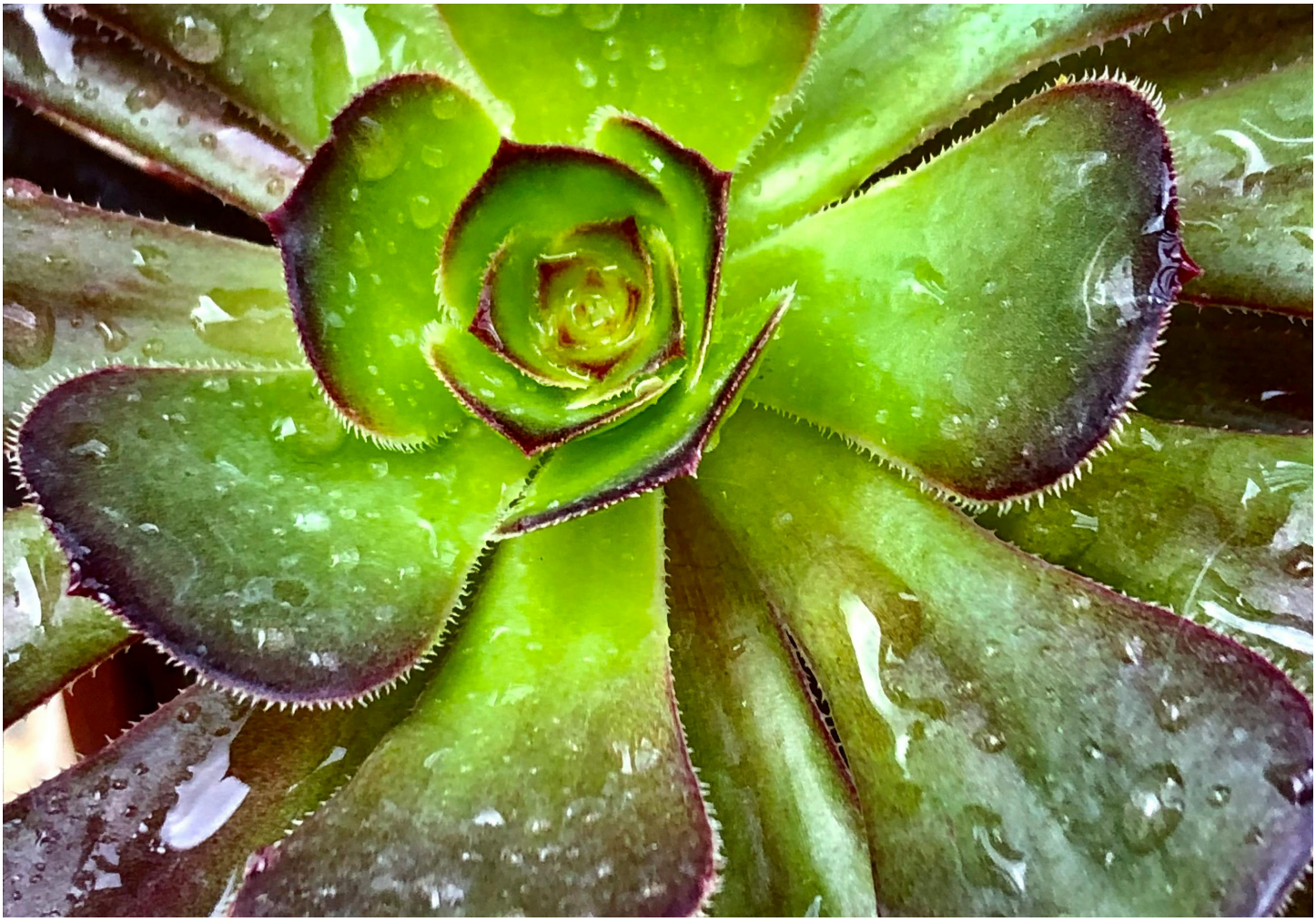
Any issues, such as safety, perception, limitations for use, and management & maintenance should be carefully considered in the design process, so that the highest number of people can (and will want to) regularly use the spaces.

→ Comfort away from home

Depending on one's definition of *home*, the majority of people – at least those who have a home to go to – feel most comfortable and relaxed in their own space, usually in their

own dwelling. But as many people living in cities – especially big cities – know, home is not always the most convenient place to reach. Aside from possibly sharing home space with intrusive roommates, people often work or socialize more than half an hour away from where they live. So where do they go when they need a place that provides the affordances of the home – space to take a break or a breather, have a cry, take a brief nap, re-invigorate their mood? The idea behind *R-Spaces* is providing spaces for these needs while someone is out and about in their city, especially in places where they feel the least amount of comfort. *R-Spaces* are not meant to be 'owned' by any one neighborhood, nor are they community-based spaces for meeting neighbors or like-minded groups. They are for independent breaks away from home, contributing to a more holistic, comfortable city, spread out across districts, edges, and long commutes.

Where do you go when you can't go home for five minutes? Half an hour? An *R-Space*.



Existing Models (and Why They Aren't Enough)

Some may argue that the needs referenced previously are being met by various existing places. While there may be spaces where people retreat to relax or find a form of respite, it is clear by the problems in urban settings that they are not sufficient (see fig. 31). In fact, of the 196 spaces analyzed from around the world (in Appendix A), only 34% had no access limitations and a majority (59%) were not public and free.

Existing model	What it addresses	Where it falls short
Nature retreat	• Exposure to nature • Escape from urban conditions	• Access limited by socioeconomic status, mobility, work requirements, & other factors • Infrequent • Not possible to access in moments of need
Parks	• Exposure to nature • A growing movement around increasing nature in urban environments (& showing many benefits to urban parks) • Mental health benefits (access to parks reduces anxiety & loneliness) • Existing funding structure (many cities have parks departments)	• Outdoors impacted by weather & climate change • Does not address physical breaks from weather • Dispersion in cities is not equitable • Often a destination, rather than accessible in moments of need • Users do not always have time to seek one out • Noise levels (kids playing, groups socializing) & crowds – not always possible to relax in solitude
Vest Pocket Parks	• Exposure to nature (usually) • A growing movement around increasing nature in urban environments (& showing many benefits to urban parks) • Best in terms of urban acupuncture – smaller scale distribution throughout cities (easier to add to areas of high need which lack open space) • Some creative examples globally	• Outdoors impacted by weather & climate change • Does not address physical breaks from weather • Often lacking interest or creativity of design • Still growing, not enough currently accessible • Some are temporary installations, which are disabled after a period of time • Does not provide protection from noise levels or stimuli • Some are privately owned, with limited hours of public access

Existing model	What it addresses	Where it falls short
Libraries	• Breaks from over-stimulation • Free and public • Indoors (not impacted by weather & climate change) • An important type of public space which needs more attention, funding, & creativity – certainly an opportunity	• Limited funding depending on city • Wide variation in success of design & comfort • Does not address need for privacy • Some limitations in the perception of publicness (e.g. security guards posted at the main branch of the Brooklyn Library)
Healing gardens	• Exposure to nature • Specifically designed for healing properties	• Limited access (restricted to hospitals or other healing spaces) – could this be expanded?
The humble park bench	• Addresses physical breaks for mobility purposes • Depending on city & location, often numerous regularly available • It "can address a paradox, that of deliberate isolation in a crowd as well as enabling a presence in the public arena"[262]	• Depending on city & location, not always well-distributed or available • Not always comfortable • Outdoors – impacted by weather & climate change • Does not address need for privacy • Does not address over-stimulation • Does not address physical breaks from weather • Sometimes designed for sociability instead of solitude • "Benches are artifacts, the purpose of which is to punctuate architectural photos. They are not so good for seating. There are too few of them; they are too small…" — William H. Whyte, The Social Life of Small Urban Spaces[263]

Existing model	What it addresses	Where it falls short
Digital apps/tools	• Some help people find locations near them in a moment of need • Crowd-sourcing for wider variety of spaces & locations	• Relies on existing locations only (see above issues) • Locations are opinion-based (recommended by other users & not necessarily what someone is looking for) • Requires access to smartphone & knowledge of app(s) • May not address need for privacy, break from over-stimulation, physical breaks from weather, etc.

Figure 31: What current models address and where they fall short in the public space landscape; *Source: author*

→ Nature retreats

With entire books dedicated to the healing power of nature – *The Nature Fix: Why Nature Makes Us Happier, Healthier, and More Creative* by Florence Williams being a compelling example – it is fair to say researchers have determined nature to be a potential solution to healing well-being, particularly in terms of the idea of escaping the city. While retreating to nature – on holiday, for a weekend getaway – is of course desirable to many, and proven beneficial, it is also not a very accessible prescription. Due to socio-economic status, mobility, work requirements, or other factors, a large portion of people living in cities are unlikely to be able to reap the rewards of regular nature retreats. Furthermore, a concept called the *nature pyramid* (fig. 32), created by internationally recognized biophilia expert, Dr. Timothy Beatley, recommends the "bulk of our nature diet" include daily connections to nature on smaller scales, interspersed in city life[264]. This means looking to nature solutions at the city level.

Fig x: Recreated '*nature pyramid*' based on original model by Timothy Beatley[265];
Photo location & credit: ***Top row*** – Waterton Lakes National Park, Alberta, Canada, credit Travel Alberta;
2nd row – (L) Oregon Caves National Monument & Preserve, credit National Park Service, (R) Forces of Nature Trailhead, Yellowstone National Park, credit National Park Service;
3rd row – (1) Oak Grove Regional Park, credit San Joaquin County Parks, (2) Imperial Palace East Gardens, Tokyo, Japan, credit JapanGuide, (3) Teirgarten Park, Berlin, Germany, credit Maxi-Lena Schuleit/visitBerlin;
Bottom row – (1) Hal's Parklet, Albany, California, credit Bonnee Elterman via Project for Public Spaces, (2) Guildford Lane, Melbourne, Australia, credit City of Melbourne, (3) Bosco Verticale, Milan, Italy, credit Elijah Less via Bioneers, (4) Sankt Kjelds Square & Bryggervangen, Copenhagen, Denmark, credit SLA

A note on the *nature pyramid model*: Although interesting as a concept, this model is still very privileged in its expectations of contact with nature (weekly park trips, monthly escapist excursions, and yearly awe-inspiring wilderness therapy from national or international trips[266]).

Professor of Urban & Environmental Geography at the University of Sydney, Phil McManus, explains that escaping the city allows for a longer recovery period from stimuli, but cautions that while people get caught up in getting out of the city, it is equally important to make cities as environmentally friendly and sustainable as possible.

"We shouldn't have to go to the countryside for calm and wellbeing. We deserve it in the city too."

– Grant Waters, founder of The Tranquil City[267]

→ Parks

Parks are vital to cities. They do meet some needs, particularly in terms of exposure to green space and sociability – for example, a decline in self-reported loneliness (by up to 26% in adults if 30% of urban land were dedicated to public green space such as parks)[268]. Free public parks are an important resource, offering spaces for recreation, socialization, and relaxation. However, the dispersion of them is not equitable in cities, and there is not always a park nearby when one needs an escape. Furthermore, they're not always an escape from the chaos, as the more appealing and well-maintained ones are usually very popular and often busy. They are rarely quiet and do not offer protection from the elements on a hot, rainy, or snowy day.

→ Vest pocket parks

Vest pocket parks, also called pocket parks, vest parks, or mini parks, are a fairly successful form of urban intervention, particularly in more densely populated neighborhoods. Originally created in Europe after World War II, they were popularized in the United States following the 1950s and in part due to American professor & landscape architect Karl Linn[269]. Perhaps the most iconic pocket park is the much-lauded Paley Park in Midtown Manhattan (see precedent study below).

"The conviction that parks must be large is being questioned. In the urban setting the number of open spaces takes precedence over size. Much of the usefulness of park facilities can be measured in terms of accessibility. Small parks scattered throughout a neighborhood are more accessible than larger but more widely spaced facilities."

– The American Planning Association in a 1967 report[270]

Precedent Study: Paley Park, 1967

By: William Paley and Zion & Breene Associates

Location: Midtown Manhattan, New York City, USA

About:

- A "microenvironment for well-being and delight" – Silvia Benedito in *Atmosphere Anatomies*[271]
- Creating Great Spaces references this as a good example of a refuge space that works because of design features such as:
  - Lighted waterfall on the back wall
  - Windows from neighboring buildings overlook the space, creating Jane Jacobs's 'eyes on the street'
  - A gate that closes at night
  - A wider than a typical alleyway, making it more inviting[272]
- Described on its website as "a tranquil oasis…[which] offers visitors a welcome and unexpected respite from the clamor of NYC"[273]

Photo credits: (top) Paley Park website & (bottom) The Cultural Landscape Foundation

Defining vest pocket parks

While there is no strict definition for pocket parks, they are generally recognized as occupying less than one acre of land, with scaled down features and amenities to more widely distribute the benefits of larger parks. They are inserted into residual or in-between spaces in cities, can be built relatively inexpensively, and are opportunistic, without a uniform template. As they are meant to serve residents within close proximity, they conform to context and will vary due to site and the people they serve[274].

According to the National Recreation and Park Association (NRPA), successful pocket parks have four key qualities:

1. They are accessible.
2. They let users engage in activities.
3. They are comfortable spaces with a good image.
4. They are sociable places where people meet each other and take visitors[279].

Close, but as inspiration for something more

A main similarity of this model to *R-Spaces* is the concept of inserting them into gaps throughout cities. So, while these are the best model in terms of urban acupuncture, unfortunately, in their existing iterations, they do not meet the varied needs *R-Spaces* look to address. Pocket parks are often planned for sociability, rather than a need for time alone or search for relief. Also, some are privately owned, managed by foundations (or non-profits), and may have limited public hours[280].

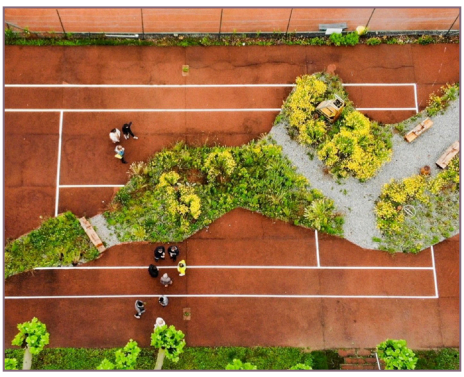
Although there is a wide range of pocket parks (and this list is not exhaustive), The Cultural Landscape Foundation defines their traditional design elements as:

- hard surfaces
- movable furniture
- water features (often to cover city noise)
- potted plants[281]

➤ **Urban acupuncture**: a concept first coined by Spanish architect Manuel de Solà referring to the improvement of social & urban issues through precise interventions & consolidated urban planning strategies[275]. Los Angeles architect & professor John Southern puts it best, explaining that urban acupuncture "treats cities like a living organism… micro-targeting, low-cost, democratic, and empowering tactics [that] provide urban residents the much coveted green space that they desire without driving to a specific location."[276] The creation of the movement is attributed to a number of people. The Ethnologist calls American artist & architect Gordon Matta-Clark the mastermind and Polish-Brazilian architect, advocate, & mayor Jamie Lerner the pioneer. Finnish architect Marco Casagrande put urban acupuncture into practice[277], and since, many urbanism professionals have become advocates, including Southern who supports the implementation of pocket parks over large-scale central parks, as well as a focus on streetscaping[278].

However, they are not prescriptive, and more creative iterations can serve as inspiration for *R-Spaces*. They can be traditional parks or playgrounds on smaller scales, or they can be:

Figures 33 & 34: (L) Green Cloud by ZHUBO-AAO, Montreal, Canada, *Photo credit: John Siu via ArchDaily;* (R) Sant Antoni Superblock by Leku Studio, Barcelona, Spain, *Photo credit: Del Rio Bani via ArchDaily*



Figures 35-37 – from left to right: (35) Portland Street Rest Garden by Design Trust, Hong Kong, *Photo credit: Design Trust via CNN;* (36) The Crack by Alive Architecture + Taktyk, Brussels, *Photo credit: SLRB-BGHM via Landezine;* (37) Pocket Park on Xinhua Road, Shanghai, *Photo credit: Hao Chen (ArchDaily) via The Architects Diary*

Further Reading:

- *Pocket Park Toolkit* by The Trust for Public Land[282]

→ Healing gardens

Healing gardens, or therapeutic gardens, are not new, dating back to Japanese Zen gardens, monastic cloister gardens, and Indo-Persian gardens, and informally even earlier[283]. Gardens themselves have been, and continue to be, extremely popular worldwide. However, recent years have seen an upturn in interest in gardens specifically designed for therapeutic purposes. The American Society of Landscape Architects even maintains a professional practice network specifically for consultants specializing in designing such gardens[284]. While any garden could arguably be considered 'healing' due to the innate positive impacts of nature on well-being (see biophilia tenet in section IV), healing gardens in the modern definition tend to be found within or adjacent to the following indoor healthcare settings:

- Hospitals, including children's hospitals or mental health hospitals
- Centers for the disabled
- Hospices & nursing homes
- Alzheimer's treatment facilities[285]

According to a variety of experts, the most effective ones offer:

- Access to nature[287] and wildlife[288]
- A sense of control with areas of privacy (can be enhanced by involving users in the original design process)[289]
- Accessible features such as
  - wide & gently graded accessible entrances & paths[290]
  - raised planting beds & containers[291]
- Multi-sensory experiences such as layering water, sound, and lighting[292] & sensory-oriented plant selection (considering color, texture, & fragrance)[293]
- Seating, especially seating which is lightweight enough to move to favorable spots or specifically designed with comfort and/or retreat in mind[294]

American Horticultural Therapy Association (AHTA)'s 7 Characteristics of Therapeutic Gardens:

1. Scheduled & programmed activities
2. Features modified to improve accessibility
3. Well defined perimeters
4. A profusion of plants & people/ plant interactions
5. Benign & supportive conditions
6. Universal design
7. Recognizable placemaking

Created with exact wording of characteristics from AHTA's "Therapeutic Garden Characteristics" feature[286]

- Focal points such as a sculpture, special plant, interesting rocks, or water fountain (while avoiding brightly colored objects & unnatural art materials[295] and abstract art, which ill people can interpret in negative ways[296])
- Social support[297]
- Physical movement & exercise[298]

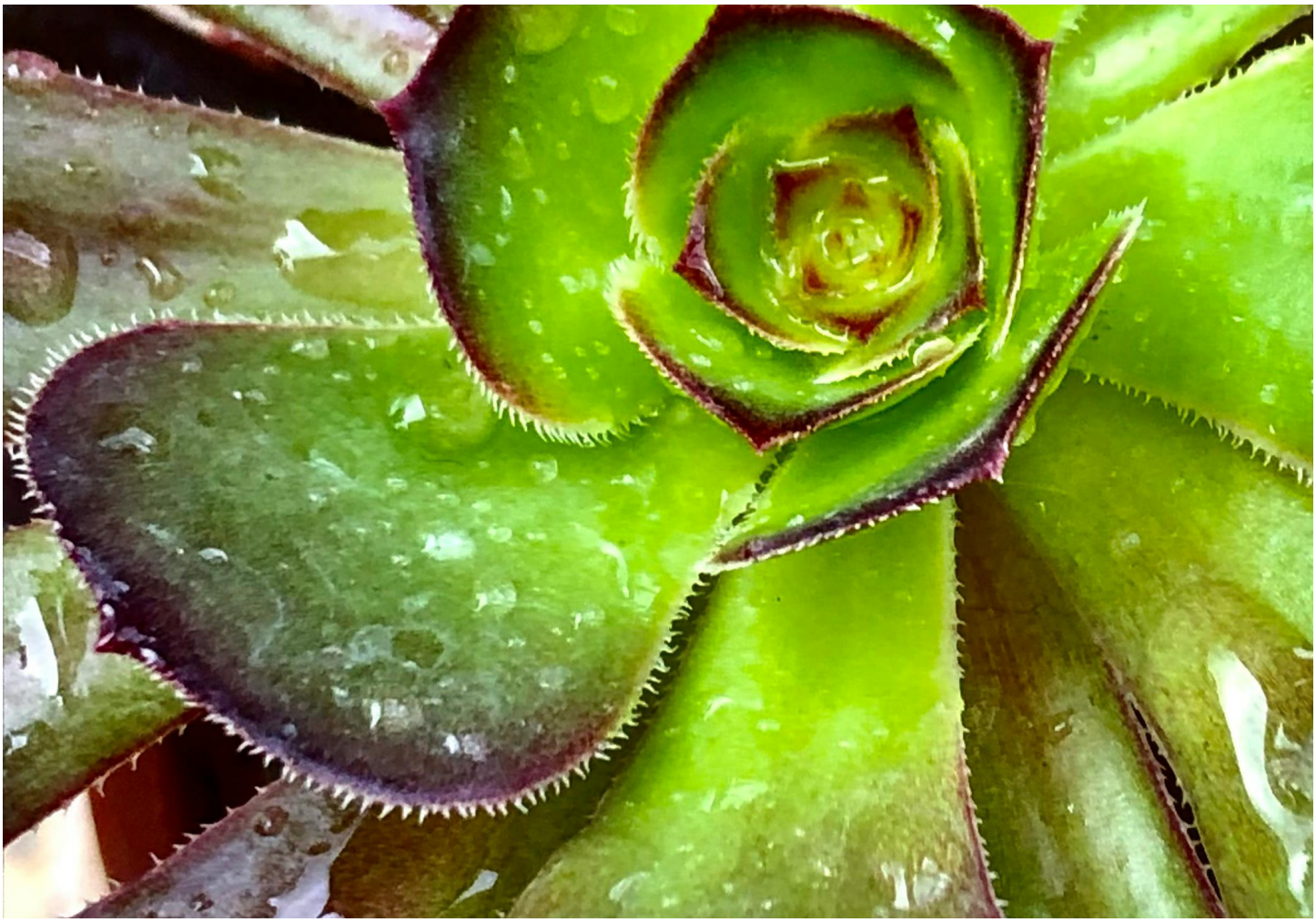
Figure 38: Horatio's Garden in the Queen Elizabeth national spinal injuries unit in Glasgow, Scotland has distinct spaces to stimulate different senses and a greenhouse with horticultural therapy activities; *Photo credit: Queen Elizabeth University hospital via The Guardian*

The current 'model' of healing gardens is mostly limited to healthcare, and is therefore not sufficient in providing healing spaces city-wide. However, healing gardens can be informative for urbanists to study because they are clinically supported and proven in healthcare settings, but could have wider design implications for urban settings. Many of the features which have been found to be beneficial in the middle of a hospital per se, have the potential to contribute to well-being in non-medical settings. Once again, the system treats, rather than prevents – how can these principles be shifted to become

more preventative measures? They are also a positive sign of an interest in stimulating the sense of smell in urban design practice, as they often rely in part on the restorative effect of the natural floral & plant aromas[299]. It is a good idea to apply the principles of the most sensory healing gardens to other public spaces for increased multi-sensory engagement and immersion[300].

Further Reading:

- "Healing Gardens" by Betsy Severtsen[301]
- "Neuroarchitecture and Landscaping: Healing Spaces and the Potential of Sensory Gardens" by Ciro Férrer Herbster Albuquerque, ArchDaily[302]



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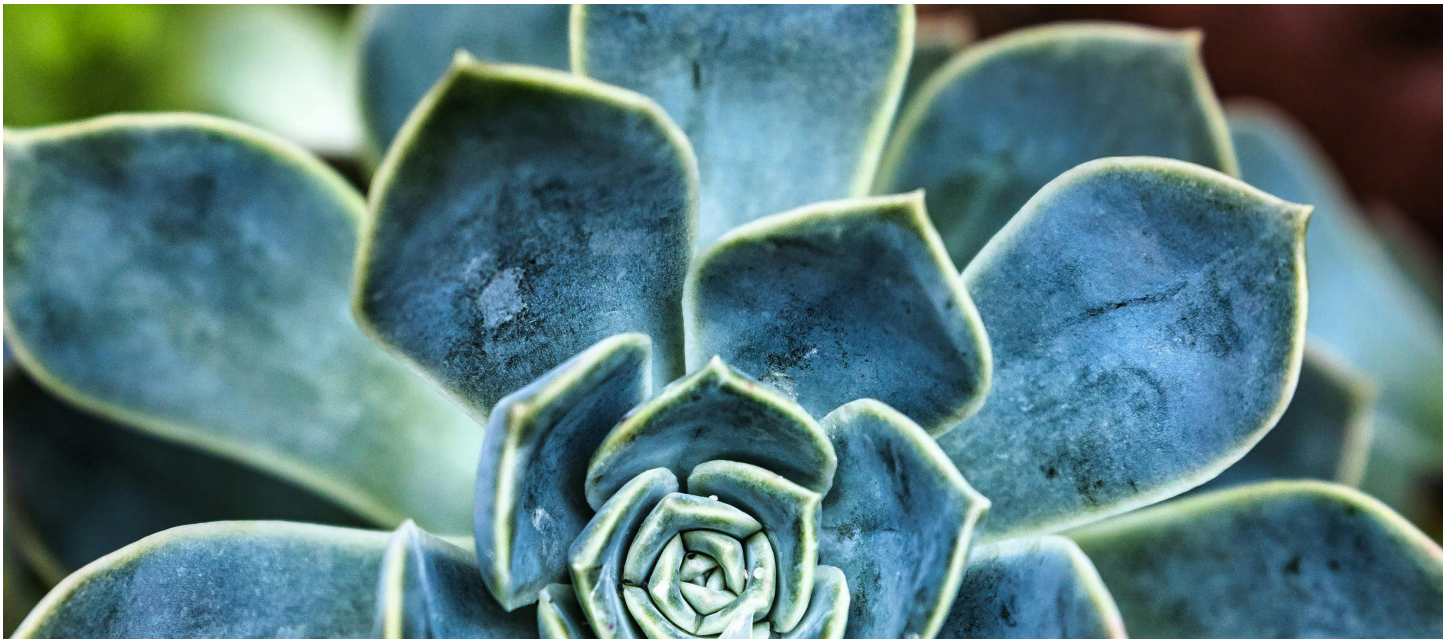
IV.
Design



Core Tenets

While there are different typologies of occupation, and some suggested typologies of form, the design of all *R-Spaces* should follow six core tenets:

1. Follow universal design concepts
2. Include aspects of biophilic design
3. Design for multiple senses
4. Offer elements of prospect-refuge
5. Seating is important
6. Consider context

→ Follow universal design concepts & design for diversity

1

While it is not possible to design for every single person successfully, by ensuring *R-Spaces* are designed for people with more atypical needs, a wider breadth of the population will be addressed. Furthermore, because these spaces are of particular use to people who experience neurodiversity, they should be designed with more accentuated neurological needs in mind.

"People with disabilities are diverse and heterogeneous, ranging in disability type, age, ethnicity, gender, sexuality and socio-economic status. Disability is a universal experience, and is not something that happens to only a minority of people.

Disability encompasses the child born with cerebral palsy, the teenager paralyzed after a car crash, the young soldier who loses her leg to a land mine, the doctor with autism, and the older man with severe arthritis. At some point in life...almost everyone will experience temporary or permanent disability."

– Debra Flanders Cushing & Evonne Miller in *Creating Great Places*[303]

➤ **Terminology** varies widely when discussing neurodivergence and disabilities. For neurological differences alone, there are many different terms: *neurological impairments* or *difficulties*, *neurological experiences*, *neurodiversity*, *neurodivergence*, *neuro-typical* vs *neuro-atypical*, etc. People with disabilities have personal preferences for language usage. For the purpose of this report, *neurodiversity* and *disabilities* will be the most commonly used terms, allowing for a wide range of diversity with needs, and noting that all language usage is intended with respect.

The World Health Organization (WHO) estimates that over one billion people – approximately 15% of the world population – have some form of disability. This includes people with:

- functional limitations in mobility, vision, or cognition

- hearing or sensory-processing difficulties
- mental illness
- arthritis
- dementia
- stroke
- acquired brain injury
- temporary disabilities such as pregnancy, accidents, illness, etc.[304]

Furthermore, universal design considers other cases, like the 1 in 7 people who experience migraines, the 1 in 20 who will have a one-off seizure (which can sometimes come from sensory stimuli), and the 1 in 6 people experiencing a mental health problem (not necessarily an ongoing illness) in any given week[305].

As access consultant Maslin puts it, "It is better to learn from a variety of experiences and let these diverse experiences inform an inclusive and universal approach to design."[306] Global policy initiatives such as United Nations Habitat III and the New Urban Agenda emphasize the philosophy that while accessible environments enable people with disabilities, they also benefit a wide range of people[307].

The Clinton–Maslin Envelope of Need embraces 5 types of needs:

1 mobility

2 visual

3 auditory

4 neurological

5 metabolic

...while addressing design implications of:

- Logistics: people's personal logistics/journey
- Legibility: the environment's legibility (consider how different users perceive & understand the environment)
- Clarity: auditory & visual clarity of spaces
- Psychology: neurological implications of the environment
- Ergonomics: the implications of how people interact with the details & layout

Figure 39: Clinton-Maslin Envelope of Need; *Source: Designing Mind-Friendly Environments*[308]

A key basis for Urban Design Forum's publication *Good Form* is to "establish a design framework for all public spaces to center mental health and neurodiverse individuals."[309] This is a crucial sentiment that should be core to all urban design and city planning.

Good Form builds off initiatives such as NYC Department of Health and Mental Hygiene's *Care, Community, Action: A Mental Health Plan for NYC* and The Bentway's *Safe in Public Space* in Toronto. As cities begin to realize the importance of planning for mental health and neurodiversity, *R-Spaces* can lead the initiative of inclusive spaces.

"Quite simply, inclusive and universal design practice is good user-centered design practice [for all]."

– Cushing & Miller in *Creating Great Places*[310]

7 Principles of Universal Design

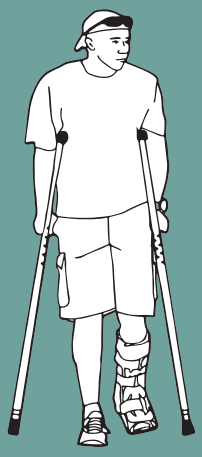
The following principles were originally developed by a working group of architects, product designers, engineers, and environmental design researchers at North Carolina State University in 1997[311].

1. **Equitable use:** Design that is useful and marketable to persons with diverse abilities
2. **Flexibility in use:** Design that accommodates a wide range of individual preferences and abilities
3. **Simple and intuitive use:** Design that is easy to understand, regardless of individual experience, knowledge, language skills, or concentration level
4. **Perceptible information:** Design that communicates necessary information effectively, regardless of ambient conditions or an individual's sensory abilities
5. **Tolerance for error:** Design that minimizes hazards and the adverse consequences of accidental or unintended actions
6. **Low physical effort:** Design that can be used efficiently and comfortably and with a minimum of fatigue
7. **Size and space for approach and use:** Design that provides appropriate size and space for approach, reach, manipulation, and use regardless of an individual's body size, posture, or mobility

Wording of the seven principles is directly from *Creating Great Places*[312]

_____ need...

Crutches users

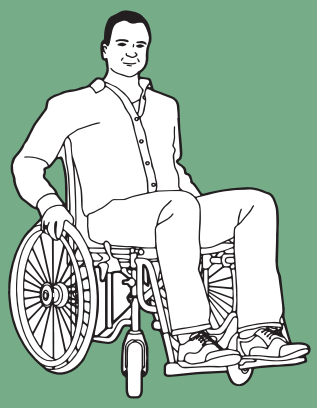


- slip-resistant surfaces
- even & unobstructed footpaths
- resting seats (+ arm supports)
- gentle gradient ramps
- step-free entrances
- wide automatic doors
- enough space to turn around

People who are blind/ have low vision

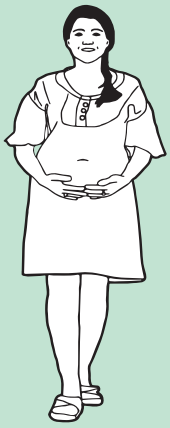
- level, wide, unobstructed footpaths
- strong tonal contrast between street furniture & pavements
- texture & color contrast to provide pathway guidance
- audible or tactile indicators for warning or wayfinding information
- clear signage with appropriate color contrast & font

Wheelchair users



- step-free entrances
- gentle gradient ramps
- level, slip-resistant surfaces
- wide corridors
- wide automatic doors
- enough turning space
- curb cuts

Pregnant women



- handrails on both sides of stairs
- even, slip-resistant surfaces
- resting seats w/ arm & back supports
- easy-to-open doors

People with hearing impairments

- even, diffused lighting
- clear sightlines, mirrors for blind corners
- textiles/soft surfaces (e.g. carpet) to reduce echo
- wide corridors/footpaths for sign language communication

Older persons

- slip-resistant, wide, level footpaths
- seat with arms & back supports
- even & sufficient lighting
- handrails on both sides of ramps & stairs
- clear & easy to read signage
- good sightlines for wayfinding
- automatic or easy-to-open doors

Figure 38: Some universal design personas; graphic recreated with modifications from the *Auckland Design Manual*[313], which was developed in conjunction with the Universal Design Forum

Designing for psychosis

There is clear evidence that cities are more difficult for people experiencing psychosis – 26.8% of early psychosis patients experienced sensory overload vs. 10.2% for the control group; this also worsened significantly after illness onset[314].

From research informed by four studies between 2016 and 2019, four main elements of stress and three response tactics were identified for people with psychosis in cities[316].

> Patients with early psychosis mentioned the main stressors in cities as:
>
> - Crowd density
> - Excess of stimuli, mainly auditory (sensory overload)
> - Situations of unavoidable social interactions
> - Hindrance to mobility (either by physical obstacles or by traffic)[317]
>
> Although not fully expanded upon with practical application recommendations, the tactics for people diagnosed with psychosis handling stress in cities were cataloged as:
>
> - Mobility planning
> - Fabricating protective 'bubbles'
> - Creating atmospheres of comfort[318]

According to the 2017 study, these findings are important for urban planning in that "they show how noise limitation, free access to calm public spaces, and clear means of orientation matter for mental health."[319] *R-Spaces* can directly address this through two of the three tactics: by serving as protective 'bubbles' and creating atmospheres of comfort.

One surprising thing to note for design is that psychosis patients may be more in need of a break from *visual* stimuli than from sound, which tends to be what more neuro-typical urbanites look for. While noise is regularly studied as an irritant, psychosis patients in Conus et al.'s study were more likely to consider visual elements (such as the complexity & excess of visual stimulation) unpleasant (as opposed to the control subjects prioritizing noise)[320].

➤ **Early psychosis patients:** According to National Alliance on Mental Illness (NAMI), *Early (or first-episode) psychosis* refers to an episode where a person first shows signs of beginning to lose contact with reality. This is a symptom, not an illness, and approximately 3 in every 100 people will experience such an episode at some point in their lives[315].

Application to specific typologies

Rest Spaces are particularly important for people with physical disabilities and limited mobility, and should therefore reflect as many (if not all) universal design considerations for physical needs as possible (see fig. 39).

Relax Spaces can be of particular use to people on the autism spectrum or with various mental health-related disabilities. These spaces should especially address neurological needs, as well as visual and auditory (decreasing stimuli). For example, some autism-friendly design ideas include:

- Insulation from environmental noise & soft textures to absorb sound
- Avoidance of fluorescent lighting; potential to limit lighting (dimmable or shades)
- Areas segregated by color and/or materials/finishes
- Use of calming, muted, matte, or simpler colors like creams & pastels (avoiding contrasting & over-stimulating colors, as well as bright white)
- Clear navigation with straight-forward language (avoid figures of speech)
- Curved walls that eliminate surprises around corners[321]

Additional universal design recommendations:

- Hire a registered access consultant who understands theoretical & practical knowledge of people's neurological needs. In the UK, there is a National Register of Access Consultants[322].
- Make sure there is a perception of permission to enter and feel welcome.

Further Reading:

- *Auckland Universal Design Manual* (https://www.aucklanddesignmanual.co.nz/design-subjects/universal_design)[323]
- *Designing for Autism Spectrum Disorders* by Gaines et al.[324]

- *Designing Mind-Friendly Environments* by Steve Maslin[325]
- *Doing Disability Differently: An alternative handbook on architecture, dis/ability and designing for everyday life* by Jos Boys[326]
- Universal Design Tool (http://universaldesigntool.co.nz/)[327]
- *Visual Stress* by Arnold J. Wilkins[328]

→ Include aspects of biophilic design

2

"Green space should be integrated into all designs."

– The Centre for Urban Design & Mental Health (UD/MH)[329]

Figures 41 & 42: Green Tower, Shiroiya Hotel in Maebashi, Japan by Sou Fujimoto Architects, part of a larger community of projects around the theme "Where Good Things Grow"; *Photo credit: Katsumasa Tanaka via Dezeen*

The basis of biophilia

As a theory, biophilia is "the inherent desire humans have to connect with nature, and other forms of life."[330] Historically, humans had an essential, interconnected relationship to nature, which has been broken in part by rapid urbanization[331]. This increased urbanization means that people have far fewer

opportunities to regularly access and engage with nature[332]. From an evolutionary perspective, people were not wired to live in urban settings. Supporters of biophilia argue that humans have an innate need, at a deep & unconscious level, to be close to, and connected to, nature[333]. This means there is a crucial need for nature embedded into the urban fabric, through biophilic design and green interventions.

Biophilia itself is not new; in fact, ancient civilizations often embraced connections to nature. Ancient Greeks in 5th century BC believed that human health was affected by the environment and the same four elements made up all living things (from humans to plants). Romans prioritized pure/clear air, epitomized in writings by Pliny the Younger and Vitruvius in 1st century AD and the Roman gardens of Pompeii[335]. These are just two examples from a long history of a human need to connect with nature.

➤ Origins of the term 'biophilia':

- Word roots: 'bio' = 'life or living things' + 'philia' = 'love'
- First defined by German psychoanalyst Erich Fromm in 1973
- Popularized by American botanist Edward Wilson in his 1984 book *Biophilia*[334]

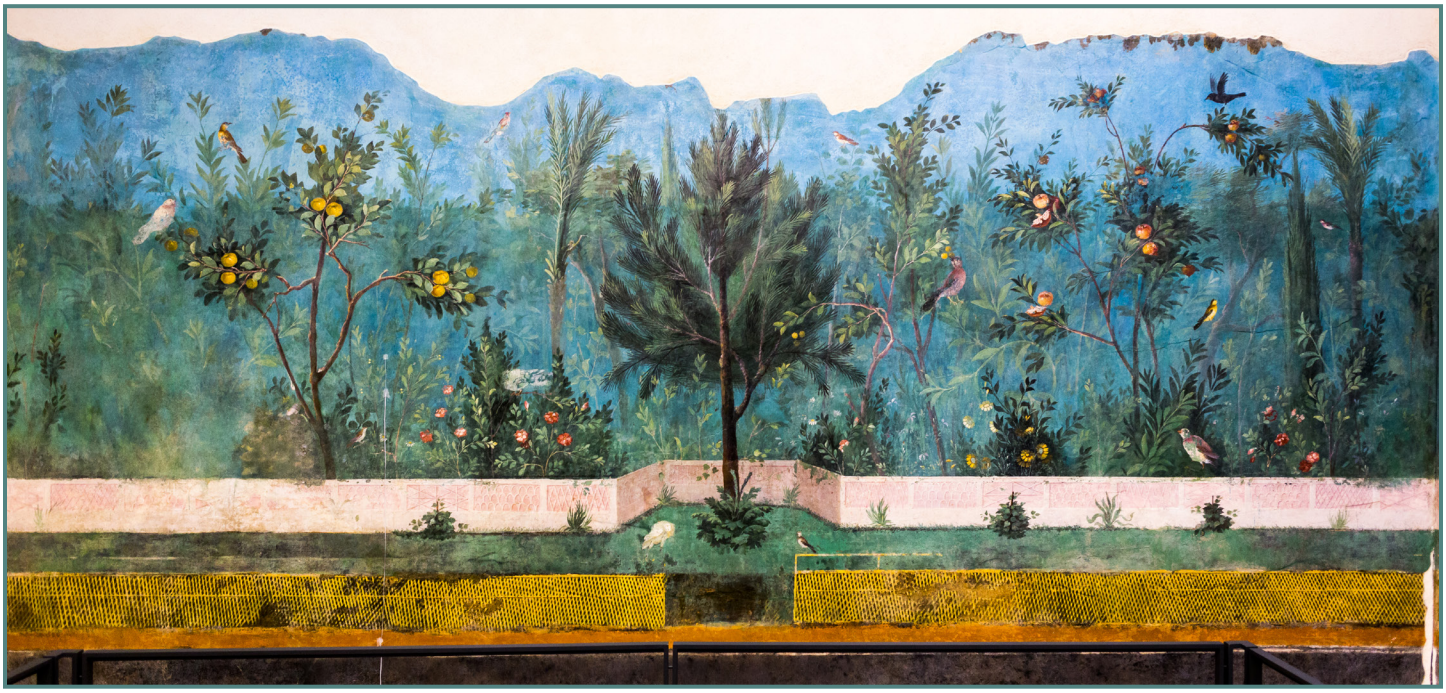


Figure 41: *Hortus conclusus*, from the Villa of Livia (wife of Augustus) on Palatine Hill, 1st century BC (now at Museo Nazionale Romano, Palazzo Massimo Alle Terme in Rome). The detailed fresco shows the importance of the care & keep of plants to the ancient Romans[336], and is an early example of a nature wall, popular in biophilic design. *Photo credit: Wikimedia Commons.*

Figure 42: How connected to nature do you feel? *Photo credit: Planterra.*

Healing benefits of nature

"Multiple qualitative, quantitative and experimental studies from a broad range of disciplines reveal that even a tiny dose of nature (e.g. a view from a window, a walk through a park, or simply looking at pictures of nature) has a positive impact on our health, happiness, and overall wellbeing."

– Cushing & Miller in *Creating Great Places*[337]

The Shaping of Us offers one potential explanation for why seeing nature is so restorative and pleasing for people. It says that "modern urban environments tend to be formed of harsh angular lines & blocky buildings. Curvature may calm because it reminds us of natural forms like eggs, plums, and puddles. Forests and cliffs are built with a different scale of detail and variety than the asphalt deserts and concrete canyons we find ourselves in today."[338] Perhaps city dwellers need this connection to nature on an every day scale for overall well-being.

Both Attention Restoration Theory (ART) and Stress Reduction Theory (SRT) (see pages 47-48) recommend nature as beneficial to mental health and well-being.

For each, being in and looking at nature...

ART	SRT
lets the brain recover from mental fatigue, which also restores attentional focus	benefits well-being through its stress reducing properties

Figure 45: Nature for well-being according to ART & SRT[339]

Benefits of contact with, and exposure to, nature & green spaces:

- General mental well-being
- Reductions in:
  - stress[340]
  - depression[341]
  - anxiety[342]
  - mental fatigue[343]
  - blood pressure[344]
  - heart disease[345]
  - workplace stress[346]
  - aggression[347]
  - rates of domestic violence[348]
  - diabetes & obesity rates[349]
- Improved social & cognitive functioning (including for ADHD)[350]
- Improved mood & reduced aggression in people with dementia[351]
- Attention recovery[352]
- Improved feelings of safety[353]
- Greater happiness[354]

Beyond exposure to nature, McEwan et al.'s 2019 research paper focuses on connectedness to nature. The article reviews Lumber et al.'s work which uses the nine values of biophilia as a framework to identify five pathways to nature connectedness: "i) contact through the senses; ii) emotions; iii) appreciation of

nature's beauty; iv) finding meaning in nature and v) displays of compassion for nature."[355]

Biophilic design & biophilic cities

"...biophilic urbanism and biophilic design help make the experience of, and interactions with nature, a part of everyday urban life..."

– Cushing & Miller in *Creating Great Places*[356]

Figure 46: Super Tree Grove at Gardens by the Bay, Singapore; *Photo credit: Coleen Rivas/Unsplash*

Biophilic design theory takes the concept of biophilia and the wealth of evidence showing the benefits of connection to nature, and looks at how to design the built environment to better reflect (or integrate with) the natural one. *Creating Great Places* says that biophilic cities foster health and well-being by "challenging the artificial separation of the built and natural environment."[357]

The idea of biophilic design has deep roots throughout history, with references to nature in architecture & design in many of the oldest cultures (lotus ponds & porcelain fish bowls in ancient China, animals in Egyptian architecture & papyrus ponds in homes of Egyptian nobles, flowering acanthus leaves on Greek temple columns, the Alhambra's garden courtyards in Spain, the aviary in the ancient Mesoamerican city of Teotihuacan, and the hanging gardens of Babylon as examples[358]). Examples of connecting people to nature through the built environment can be found globally across history. Higher education buildings and medical institutions in the medieval Islamic Golden Era applied strategies to connect people with nature[359]. Late 19th century architects like Antoni Gaudí (see fig. 46) and Victor Horta experimented with vegetal forms[360]. In addition to researchers and writers like Stephen R. Kellert, Judith H. Heerwagen, William Browning, Tim Beatley, Elizabeth F. Calabrese, and others, who actually formalized the movement as it is understood today, 20th century architects like Frank Lloyd Wright and Louis Kahn had influence on the movement, with their approaches acknowledged as precursors to modern biophilic design[361].

The biophilic design movement has grown in popularity, by providing a framework to design with nature, for nature, and

inspired by nature[362]. Beyond all of the health benefits mentioned already, the nature-based solutions of biophilic design give designers an opportunity to simultaneously design for restorative & regenerative sustainability. This helps with climate change mitigation & adaptation, which helps address some of the growing problems of city-living (section II) and in designing cities of the future (section III).

The modern biophilic design framework was first developed by Stephen Kellert with six elements and 70 attributes, which Browning, Ryan, & Clancy consolidated into 14 core patterns. They are listed below in figure 47.

Context	Pattern	Design features and examples
Nature in the space: The 'direct, physical and ephemeral presence' of nature in the built environment, through movement, diversity, and multi-sensory interactions. Includes the presence of plants, inside and out, green roofs and living walls, water features (fountains, aquariums), butterfly and courtyard gardens	1. **Visual connection with nature**	A view to elements of nature, natural and living systems. The internal birch tree & moss garden, centrally located at the entrance/exit to the *New York Times* building in NYC provides an oasis of calm in busy Times Square.
	2. **Non-visual connection with nature**	Often undervalued, non-visual design interactions stimulate our other senses (sound, touch, smell, and taste; auditory, haptic, olfactory, or gustatory) to deliberately and positively remind us of our connection to nature. Obvious examples include the smells of fragrant herbs & flowers, and sounds of flowing water.
	3. **Non-rhythmic sensory stimuli**	This is the rich sensory non-rhythmic stimuli of nature, in consistent and unpredictable motion. Buildings located near natural habitats enable these ephemeral experiences for residents; leaves blow in a breeze, the water ripples, and insects buzz. In Australia, Urban Arts Projects have created an ever-changing kinetic façade on the walls of Brisbane's Domestic Airport Terminal car park – which moves and ripples in the wind, and with the sunlight creating patterns of light and shade. This façade also addresses sustainability considerations, providing both ventilation and shade. The waterfront façade of the Bund Finance Center in Shanghai also moves with the wind.
	4. **Thermal and airflow variability**	Here buildings and spaces have subtle changes in airflow and surface temperature that mimic natural environments. Khoo Teck Puat Hospital in Singapore, described below, is a good example of how thoughtful design maximizes daylight, light/shade variability, fresh air, and natural breezes to increase thermal comfort.

Context	Pattern	Design features and examples
	5. **Presence of water**	Seeing, hearing, or touching water is immediately calming. A water-filled channel runs down the central courtyard of Louis I. Kahn's 1965 Louis Kahn Salk Institute in California, towards the Pacific Ocean. The simple power and beauty of this space, where 'concrete meets calm' is immeasurable.
	6. **Dynamic and diffuse light**	Clever use of light and shadows displays the natural circadian processes occurring in nature, conveying movement, intrigue, and calm. For example, the Paramit factory in Malaysia, built in 2017, receives diffused natural light from open glass walls and skylights, shaded by surrounding vegetation.
	7. **Connection with natural systems**	Being directly connected with natural systems raises awareness of nature's seasonality, and is often a relaxing or profound moment. Think, for example, how the use of natural materials, plants and sunlight bring the surrounding forest to life in E. Fay Jones's Thorncrown Chapel, or how the pedestrian bridges of Biophilic Singapore directly connect users with water.
Nature analogues: Use of organic, non-living and indirect evocations (patterns, materials) of nature	8. **Biomorphic forms and patterns**	Bringing the shapes and forms of nature indoors, this is the symbolic reference to contoured, patterned, textured, or numerical arrangements as seen in nature. The biophilic patterns of the Kungsträdgården underground metro station in Stockholm are a clever example.
	9. **Material connection with nature**	Materials and elements from nature, with minimal processing, reflect the unique local ecology and create a distinct, authentic sense of place. For example, all materials for the ecologically sustainable development of Alila Villas Uluawtu (in Bali, Indonesia) designed by Singapore firm WOHA were sourced locally. Stones were from the site, only recycled bamboo and timber was used, and the terraced roof is made from Balinese volcanic pumice rock.
	10. **Complexity and order**	This pattern is seen when rich sensory information adheres to a similar spatial hierarchy as encountered in nature. Browning et al. list the cathedral-like Allen Lambert Galleria and Atrium at Brookfield Place in Toronto, Ontario as an example. Designed by Santiago Calatrava (1992), orderly columns form a canopy of complex tree-like forms shining diffused light and intriguing shadows onto the courtyard.

Context	Pattern	Design features and examples
Nature of the space: How humans respond, both psychologically, and physiologically, to different spatial configurations	**11. Prospect**	Prospect is when an unimpeded long view enables a sense of safety and control. The central plaza of the Salk Institute is often cited as an example, with the presence of balconies and open floor plans enabling prospect.
	12. Refuge	A refuge is a protected place that provides concealment. Spaces with weather and climate protection, including seats with the sides covered, are common examples.
	13. Mystery	Mystery taps into that sense of discovery or anticipation offered by partially obscured views enticing people to explore. Browning et al. list the obscured views in Prospect Park in Brooklyn, New York, designed by Frederick Law Olmsted and Calvert Vaux, as exemplary examples.
	14. Risk/peril	A space with risk/peril feels a little dangerous, but has a reliable safeguard. An often-cited example is the public outdoor artwork Levitated Mass at Los Angeles County Museum of Art, where people walk directly underneath a large boulder.

Figure 47: Browning et al.'s fourteen core patterns of biophilic design as reproduced in the book *Creating Great Places*.

For in-depth explanations, examples, benefits, tools for designers, and case studies of each of Browning's 14 biophilic design patterns, see the 'Patterns' section of the Biophilic Design Institute's website (Rooted in Nature)[363] (*note: new website coming soon, current URL might not be in commission much longer*).

Figure 48: The forest canopy inspired the columns & ceiling view in Gaudi's Sagrada Familia; *Photo credits: (L) blew_s/ Shutterstock via South Seattle Emerald, (R) CuddlyNest*

"Green interventions which connect people with nature to improve wellbeing are increasingly being applied to tackle the current crisis in mental health."

– McEwan et al. in "The good things in urban nature"[364]

Evidence for greening cities and reconnecting them to nature is abundant. In fact, research on green spaces in urban areas is perhaps the most studied element of connecting the built environment to well-being, and of how to improve mental health in cities. Some of these study results include:

- A large, cross-sectional, UK-wide study of almost 100,000 participants, controlling for other social & physical built environmental variables, showed a connection between residential greenness and lower odds of depression[365].
- Studies in natural & lab environments show nature views reduce stress within 5 minutes – measured by heart activity, muscle tension, brain electrical activity, & blood pressure[366].
- A study which used video footage of water proved that even viewing nature in an image or video can reduce cardiovascular stress within 20 seconds[367].

Green space in cities, including trees & vegetation, has positive correlations with mood, attention, physical activity, and mental health, while decreasing mortality, heart rates, and violence[368]. According to colleagues at University College London, even small amounts of green space – in street networks, for example – can actually change the process of the gut's

Figure 49: Invasión Verde by Denise & Claudia Ampuero, Lima, Peru; *Photo credit: Architizer*

microbiota, changing the way food is processed, increasing health. Smaller urban green spaces are also particularly beneficial for lower socioeconomic groups who may have less time to spend in, or travel to, larger green spaces. They claim regular exposure to small spaces results in fewer sick days off work and a general state of feeling better[369]. Encouragingly, a 2020 research paper from *Landscape and Urban Planning* says that, "green interventions which connect people with nature to improve well-being are increasingly being applied to tackle the current crisis in mental health."[370] For other ways to increase interaction with nature in cities, see figure 237 in Appendix B.

Some ideas from supporters:

- Ecologist & landscape architect Alexander Felson & architect-landscape architect Linda Pollak recommend "situating urban ecological experiments in public space" (title of their chapter in *Ecological Urbanism*)[371].
- University College London professor Nick Tyler suggests that if every bus stop had some green space, with London's 20,000 bus stops, they could greatly improve health[372].
- University of Bradford professor of environmental acoustics Greg Watts explains that calming sound spaces are 50% sound & 50% sight, and that seeing greenery & plant life will give a space a higher tranquility rating[373].

While many cities are now clearly aware of, and acknowledging, the value of urban green space, from street trees & planters to parks, that seems to be where they have all stopped.

Biophilic design is a larger concept than just green spaces and trees – how else can designers incorporate biophilic concepts into urban projects?

Planners and designers need to be creative and push the envelope with adding more innovative biophilic design to cities (see fig. 50 & 51).

Figures 50 & 51: (L) Sculpture outside Tate Modern highlighting London's endangered species by Es Devlin, *Photo credit: Max Alexander via Dezeen;* (R) Installation at Dubai Design Week by OBMI, inspired by the UAE's mangrove forests, *Photo credit: Sebastian Böttcher via Dezeen*

Blue care

"The sound of water is worth more than all the poets' words."

– Poet & Diplomat Octavio Paz[374]

Figures 52 & 53: (L) Siam Paragon Mall, Bangkok, Thailand, *Photo credit: Nicole Craanen via Rooted in Nature;* (R) Cloud Arbor, Buhl Community Park, Pittsburgh, PA, USA by Ned Kahn, Andi Cochran, & the Pittsburgh Children's Museum, *Photo credit: Ned Kahn*

Blue care is a subset of biophilia that is directly linked with #5 of Browning's biophilia patterns: presence of water.

For *R-Spaces*, water features are the most likely example of blue space. It is important to note that the maintenance of urban water features is critical if they are going to assist with psychological well-being[376]. If the water appears dirty and stagnant, not only do the benefits disappear, but there can be negative effects[377].

➤ **Blue care**: "a therapeutic nature-based intervention using blue space". Blue space traditionally includes coasts, lakes, rivers, and engineered water features such as canals & urban fountains, but can be considered on a smaller scale too[375].

Figure 54: A rill in the Morelondon office development in London by Townshend Landscape Architects; Rills are narrow, inset channels of water which originated in historic Persian & Moorish Spanish gardens, such as Alhambra in Grenada, Spain[378]. *Photo credit: Townshend Landscape Architects.*

As with green spaces, there is evidence to suggest minds may be less stressed (and recover from stress faster) in blue environments[379]. Other well-being benefits of the presence of water include:

- Increased heart rate recovery
- Restored energy
- Improved relaxation
- Positively impacted emotional state

- Reduced feelings of anger, aggression, & fear
- Increased attentiveness
- Improved mental engagement
- Increased productivity[380]

Figures 55-58 – clockwise starting top left: (55) Freyberg Place, Auckland, New Zealand by Isthmus, *Photo credit: Landezine International Landscape Award;* (56) Ogmios City, Vilnius, Lithuania by DO ARCHITECTS, *Photo credit: ©Norbert Tukaj via Mies van der Rohe Award;* (57) 'Fascination frames' encouraging pedestrians to linger on waterfronts in a study in West Palm Beach, Florida, USA, *Photo credit: Happy City, Street Plans, University of Virginia via The Conversation;* (58) Tainan Spring, Tainan City, Taiwan by MVRDV, *Photo credit: ©Daria Scagliola via ArchDaily*

Ideas & considerations for design:

- Well-maintained vegetation (upkeep & order) and openness of space are qualities found to trigger positive emotional responses[381].
- It might be easier for humans to process fractal geometry (which is linked with nature)[382], meaning designs that include these are possibly less overwhelming for people.
- Varying air flow & temperatures more similar to natural conditions improve well-being & comfort[383].

- Integrating presence of water:
  - Waterfalls, fountains, or cascading water features
  - Materials or lighting that evokes water
  - Audible water features or digital representation of water as white noise
  - Reflecting pools, ponds, or aquariums
  - Connection to a nearby river, stream, or lake
  - Ability to touch water or watch aquatic elements (e.g. fish tank or movement of natural water & animal life surrounding it)[384]
  - An inset rill (for example, daylighting part of a 'lost river' below ground to reference the place's history with a moment of joy)[385]
    - Particular attention needed to preventing public safety concerns such as tripping, twisting ankles, etc. – consider width, depth, location, & visual cues[386]
    - Remember universal design needs – cannot be too wide to easily cross for those with limited mobility
- Consider ways to incorporate some of the ten main themes urbanites noted as "good things in urban nature" in a 2020 study:
  - Sensations (i.e. sounds, smells, feelings of grass)
  - Growth & temporal change (i.e. blooming flowers)
  - Reflections on the water
  - Colors of nature
  - Wildlife being active & interacting with each other[387]
- How can biophilic design inform the experiences of the four typologies of occupation (*Rest*, *Relax*, *Restore*, *Revive*)? Meaning, for example, what in nature provides comfort, promotes, relaxation, or revitalizes creativity[388]?
- See "Biophilic Design Elements & Their Corresponding Attributes" chart in Appendix B.
- For morphological types of water elements in hardscaped urban public spaces, see figure 239 in Appendix B.

Note: *Biophilic design is also closely integrated with multi-sensory design (and includes principles of such), which is explored in the next tenet. Following that, prospect-refuge theory, which is one of the 14 core patterns, is discussed in depth in its own section.*

Further Reading:

- *Biomimicry: Innovation Inspired by Nature* by Janine M. Benyus[389]
- "Biomimicry vs. biophilia: A primer" by Allison Bernett[390]
- *Biophilic Cities: Integrating Nature Into Urban Design and Planning* by Timothy Beatley[391]
- "Biophilic design in architecture and its contributions to health, well-being, and sustainability: A critical review" by Zhong et al.[392]
- *Biophilic Design Toolkit*[393]
- Chapter 2: The green city in *Restorative Cities* by Jenny Roe & Layla McCay, pg. 17-39[394]
- Chapter 3: The blue city in *Restorative Cities* by Jenny Roe & Layla McCay, pg. 41-61[395]
- Chapter 6: Biophilic design theory in *Creating Great Places* by Debra Flanders Cushing & Evonne Miller, pg. 80-97[396]
- "Cities, Green Space, and Mental Well-Being" by Jenny Roe[397]
- *Ecological Urbanism* by Mohsen Mostafavi & Gareth Doherty[398]
- *Handbook of Biophilic City Planning & Design* by Timothy Beatley[399]
- "How to use biophilic urban acupuncture to promote good mental health" by Jonce Walker[400]
- "Making the Economic Case for Biophilic Design" by Martin Pedersen[401]
- *Oxford Textbook of Nature and Public Health: The role of nature in improving the health of a population* by Matilda van den Bosch & William Bird[402]
- "Reconnect to our life-giving systems: The potential of biomimicry for urban planning" by Britt Snellen[403]

→ Design for multiple senses

3

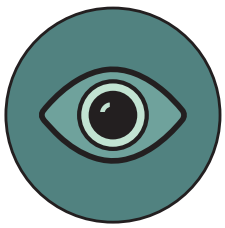
"Scientific evidence is increasingly demonstrating that the senses can be harnessed within urban design and planning to exert positive impacts on mental health and well-being."

– Jenny Roe & Layla McCay in *Restorative Cities*[404]

What *are* the senses?

The 'Big Five' senses, which have been acknowledged for thousands of years, were first numbered by Aristotle in 350 BC[405]. According to the Sensory Trust, there are anywhere between five and 21 recognized senses[406], and neurologists generally agree on at least nine[407]. Other senses could include radiation senses (i.e. sense of color, sense of moods associated with color, sense of temperature), feeling senses (i.e. sensitivity to gravity, air, wind pressure, motion), chemical senses (i.e. hormonal needs), mental senses, sense of self, and nociception (the perception of pain) among others[408]. This report will use the framework of the ten used in Maslin's *Designing Mind-Friendly Environments*, as they were identified for relevance to design and the goals most closely align.

In addition to the five well-known senses...



Sight (vision / ophthalmo-ception)

Hearing or Sound (audition / audioception)

Taste (gustation / gustaoception)

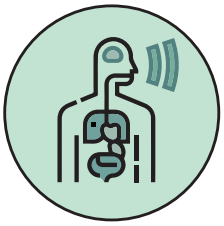
Smell (olfaction / olfacoception)

Touch (tactition / tactioception)

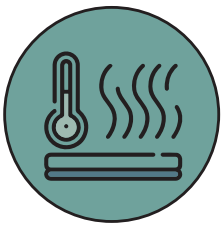
...there are five more senses to consider for design. These come from a combination of physiotherapy, occupational therapy, sensory integration therapy, and physiology[409].

Balance (vestibular/equilibrioception):
sense of physical balance via inner ears, processed into discernible vertical & horizontal orientation by neurological processes[410]

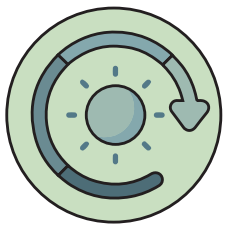
Kinesthetic or External Body Awareness (proprioception):
sense of body position awareness, knowing where your body is in space[411]



Internal Body Awareness (interoception):
sense of internal body awareness, neurological processing of internal systems (coronary, breathing, digestive, etc.) telling your body about their performance and stress[412]



Temperature (thermoception):
sense of temperature, processed by nerves & neurological processes into sensations of being cold, warm, or hot[413]



Time (chronoception):
sense of time passing or the perception of time, in design, due to seeing the progression of changing light[414]

On sensory urbanism

"I experience myself in the city, and the city exists through my embodied experience. The city and my body supplement and define each other. I dwell in the city and the city dwells in me."

– Juhani Pallasmaa[415]

There is a growing interest and field of research surrounding how people experience urban environments through their senses. Dr. Raymond Lucas, Co-Editor of *Sensory Urbanism Proceedings* and Architecture Lecturer in Manchester, explains that certain sensory cues (auditory, movement of people, cultural signifiers, etc.) make for more unique experiences by differentiating spaces that may otherwise be physically or geometrically similar. He argues that it is okay to have spaces that some people like and others do not to contribute to a more dynamic urban fabric overall[416]. This is supportive of the concept of *R-Spaces*, which are not generic public spaces for everyone's use, but rather, address a specific need for a specific time, providing individuals with an experience that others may not need or want right then. Cities need urban environments that offer a multitude of experiences for the diversity of users, and to create a more sensory-rich landscape.

"If we try to even the world out into something that everybody can agree on, then we might end up with actually very bland urban environments."

– Dr. Raymond Lucas[417]

The way one experiences and understands a city is a subjective occurrence, with temporal elements that create depth and vibrancy. From a "Smells like Wien spirit" scent tour of Vienna, Austria[418], to Dr. Kate McLean's 'scentscape' maps of cities like Singapore, Amsterdam, Glasgow, & Kyiv (generated from research-based, participatory 'smellwalks' with residents; see fig. 59)[419], sensory urbanists are diversifying the experience of city living.

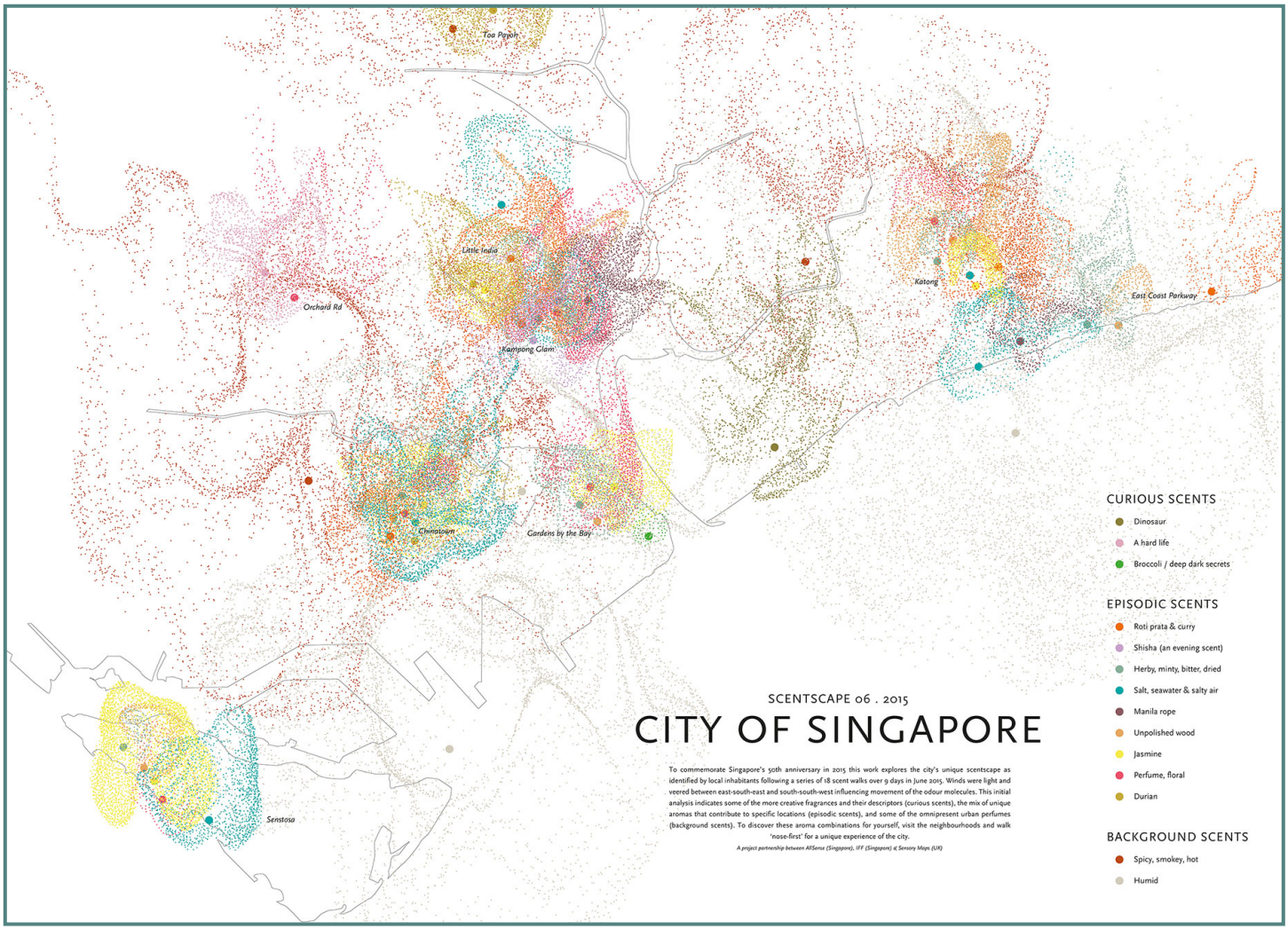


Figure 59: One of Dr. Kate McLean's scentscape maps based on 18 scent walks with local inhabitants; *Image credit: Kate McLean / Sensory Maps*

Some sensory urbanists around the world*:
**A very abbreviated list of some major players*

Sheffield, England: In her 2013 work *Urban Smellscapes*, **Victoria Henshaw** (1971-2014) explored how scents contribute to placemaking and shape the city, looks at case studies & smellscape mapping, and suggests tools for urbanists for the design process around urban smellscapes[420].

Istanbul, Turkey: **Oğuz Öner**, researcher, academic, and musician, organizes soundwalks in Istanbul, identifying locations for muffling or amplifying sound around the city, and hoping to one day use such conclusions to influence policy[421].

Montréal, Canada: **David Howes**, professor, anthropologist, and author of *The Sensory Studies*

Manifesto, uses an ethnographic approach of observation & interviews in his work at Concordia University's Centre for Sensory Studies. The center's work spans the field of sensory urbanism, including studying best practices for sensory design in public spaces[422].

Melbourne, Australia: To add layers to virtual-reality environments that city officials use in presenting planning projects, Deakin University architecture professor **Beau Beza** is adding sounds, smells, and textures to the VR urban locations[423].

"Walking and cycling must be considered a multi-sensory experience which includes vision, auditory, somatic sensation, olfaction and vestibular stimulation..."

– Alex Erath, Professor for Transport & Mobility[424]

***R-Spaces* in the sensory urbanism landscape**: Various methodologies being explored in sensory urbanism could contribute to perception-driven policy for implementing *R-Spaces* where they are most needed (for more, see Section V). Also, beyond the experience within *R-Spaces*, as public spaces, they contribute to the overall urban landscape as places themselves. Could the structures themselves contribute to a richer sensory experience – visually, acoustically, tactilely, or otherwise? An Urbcast podcast episode, 'Happy Cities', discusses the importance of having soft surfaces on streets, such as trees, umbrellas, terraces, etc., for absorbing sound, towards the goal of better urban design for well-being[425]. How could parts of the exterior of *R-Spaces* be softened to contribute to a better streetscape overall?

Designing for the senses

Finnish architect, theorist, and writer, Juhani Pallasmaa can be credited with connecting architecture to embodied perception, particularly with his book *The Eyes of the Skin: Architecture and the Senses* (first published in 1996, now on the fourth edition in 2024). He criticizes the modern assumption that sight is the most prominent sense, seen through architecture's traditional focus on aesthetics and visual power. He argues that we can only understand how someone really senses a place when the complexity of sensations is interpreted together,

leading to what he would call '*atmosphere*' (of which there are multiple – environmental, cultural, social, interpersonal, etc.)[426]. Atmosphere (or ambiance) is multisensory sensation of 'simultaneous perception', which requires deliberate multisensory design. His concepts can be extrapolated to fit the design of the wider built environment. Roe and McCay, authors of *Restorative Cities*, claim that, "attention to all five senses (plus ambiance) has the potential to offer new ways of thinking about the planning and design of a city – and particularly so when designing a city to promote good mental health and well-being."[427]

Kim Dovey, Professor of Architecture and Urban Design at the University of Melbourne, and author of *Becoming Places*, explains '*assemblage*', which can be considered analogous to '*atmosphere*'. Assemblage theory says that a place is more than the sum of its parts, it goes beyond a mere site to include the connections, relations, and "intensity of experience."[428] Combining Pallasmaa's atmospheres and Dovey's assemblage, one can better understand the importance of designing for a multi-sensory experience. Considering the ambiance of combined sensory cues, designers can display a deeper process of thought around spaces created for well-being.

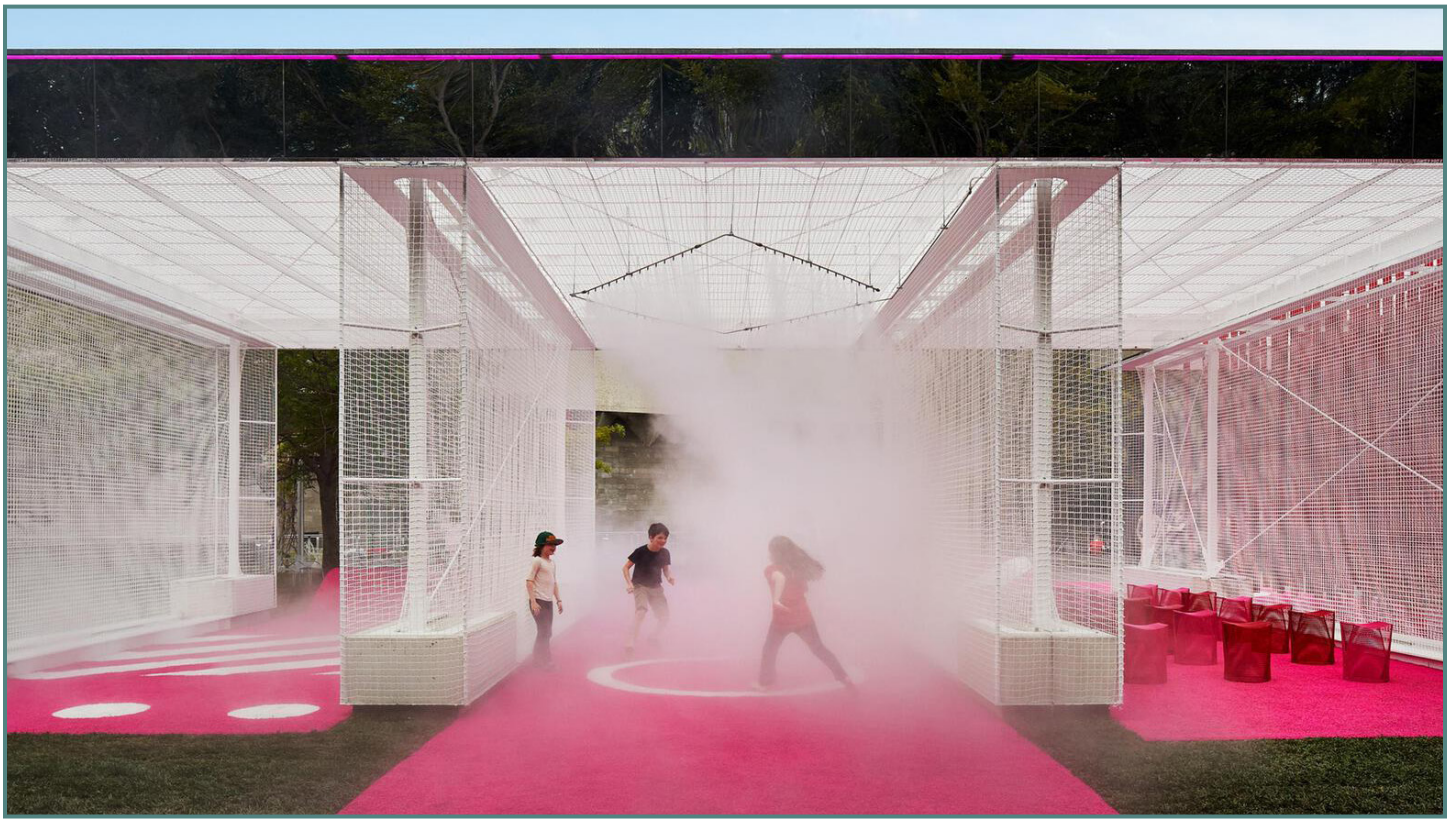


Figure 60: "Haven't you always wanted...?" by M@ Studio Architects recreates the sensory-engaging environment of a suburban car wash in an urban setting, meant to spark "exuberance of feeling"[429]; Photo credit: Peter Bennetts via ArchDaily

While it is clear that our senses are vitally important and connected to place, it is difficult to successfully design public spaces for the senses because of the subjective nature of sensory experience. Sounds that might pleasant to one person may be irritating to another (consider musical taste, for example); a scent that recalls a positive memory for one may be connected to a negative one for someone else. Because of this, as well as the relatively recent emergence of relating research, further studies are needed for a full list of conclusive, concrete recommendations.

Restorative Cities has compiled a research basis for three main design approaches to harness the senses in urban design to promote mental health:

1. **Salutogenic sensescapes**: "leveraging positive emotions, connotations and other impacts evoked by senses to deliver a salutogenic sensescape"
2. **Reducing stressors**: "reducing distress by removing or reducing people's exposure to sensations commonly deemed to be unpleasant"
3. **Engaging landscapes**: "overcoming the negative psychological impacts of monotony with sensory diversity and visually engaging, cohesive urban landscapes (in turn, facilitating fascination, an integral component of restorative well-being)"[430]

"We appreciate a place not just by its impact on our visual cortex but by the way in which it sounds, it feels and smells..."

– Frances Anderton, *The Architectural Review* [quoted in "Sense of place"][431]

Precedent Study: Sensory Well-Being Hub, 2017

By: HKS

Location: Lane Tech College Prep High School, Chicago, Illinois, USA

About:

- Thought to be the first of its kind in an American public high school[432]
- Designed for the neurodiverse student body, to allow students to refocus & calm down
- Provides a range of activities from quiet to stimulating
- "Audio, visual, kinesthetic and tactile features in the hub help students reset from a state of either hyper- or hypo-stimulation"[433]
- Includes textured panels, a Light Bright wall & peg wall, musical instruments, a rubber tubing curtain, and a movable 'cocoon' space with soothing sounds & lighting, plus biophilic videos[434]

Photo credits: HKS & HKS via Medium

Takeaways:

- Offering options and a range of stimuli "empowers [an individual] to create an experience that works for them in order to find balance"[435].
- A sensory experience can be diverse & impactful when consolidated into a 'cocoon' or 'hub' – this precedent is an excellent example of what an *R-Space* can be.
- In line with *R-Spaces*, this project aims to enable escape of one's surroundings in solitude, meaning it supports the needs of the larger *R-Space* concept.
- There is an open-source guide from this project for potential construction ideas[436].
- Funding came from a blend of sources (in this case, donations from HKS, HKS employees, the American Society of Interior Designers, the Lane Tech Alumni Association, and in-kind donations from HKS design industry partners[437]) – how could the placement context of an *R-Space* help fund that particular model?

Ideally, elements can be designed for multiple senses at once. As *Restorative Cities* says, "sensory experience is rarely confined to one modality; rather, the senses should be considered together."[438] This could be particularly applicable in choice of materials due to the growing body of research around how the senses combine for a more complete shitsukan perception (see 'Ideas for materiality' on pages 212-223). Another thing that can be designed around multi-sensory stimulation is the landscaping around and in the space; consider plants that are visually appealing, with pleasant aromas, and different textures – also use for shade (thermal control).

➤ ***Shitsukan***: Japanese word conveying 'a sense of material quality' or how people perceive a material, surface, or object[439]

However, for practical reasons, specific design ideas for *R-Spaces* will be separated by sense below. These sections and ideas are meant to be inspirational for designers, and are not at all exhaustive – designers should use their own creative practice & experience to incorporate strategies, ideas, and evidence of how to support well-being.

➤ Sight/vision

Visual perception is the most referenced sense for design and architecture. Because of this, the sight subsection will be the briefest, as the purpose of encouraging multisensory design is to enhance and include the other senses beyond vision.

Ideas & considerations for design:

- Daylight, sunlight, shade, & shadow can be managed via design to make spaces more visually uplifting and calming.
- As part of a streetscape, an interesting structural form can add to visual complexity, which may reduce depression
- Design for visual interest and stimulation – boredom is associated with stress and risky behaviors such as addiction
- Source public art & creative design
- Lava lamps or other visual sensory toys to promote relaxation
- Avoid featureless expanses, especially on the exterior – visual interest, natural features, fine-grain fronting, and public art reduce monotony & boost interest in the urban landscape

- For structural ideas, see 'Typologies of Form' on pages 172-208.

➤ Sound/hearing

There is clearly extensive literature on the dangers and annoyances of unwanted noise (see pages 9-11). Because noise has been identified as an important trigger, the acoustics of any design should be well thought-out (with noise minimized if and where possible). Traffic noise could be reduced through strategies like berms, trees, barrier walls, & sound-masking facades[446]. For *R-Spaces* near viaducts, see page 107 of Arup's *Under the Viaduct* report[447].

"Studies have shown that just 15 minutes of sitting in silence, alone and comfortable, helps us self-regulate and fosters relaxation."

– Sophie Cleff, The Decision Lab[448]

Beyond reducing excess noise, environmental acoustics engineer asks an interesting question: what *should* a public space sound like[449]? Complete absence of sound – silence – is controversial. It can be particularly important for highly sensitive persons (HSP)[450], and studies have shown numerous benefits for well-being[451], but at the same time, many people find it uncomfortable[452] and prefer some sound (especially natural ones)[453]. In one study, many people said they would rather receive an electric shock (which they had previously said they would pay to avoid) than continue to sit in silence[454]. Although many fear being alone with their thoughts without any distractions (forcing thoughts they may want to avoid), creating intentional silent retreats can actually help with anxiety and inspire new ideas[455]. Still, an argument could be made for creating salutogenic soundscapes in *R-Spaces*, at least as an option (see fig. 62).

Benefits of silence:

- Lowered blood pressure
- Calming racing thoughts
- Stimulation of creativity
- Gateway to mindfulness (which helps with anxiety)
- Lowered levels of the stress hormone cortisol[456]
- Reduced muscle tension
- Steady breathing[457]

If silence is not the goal, designers and planners can consider how appealing sounds can add to the sensations of the environment[458]. Differentiating between sounds – things people might want to hear like relaxing music, audiobooks, & birdsong – and noise – like traffic & construction – is important for multisensory design for well-being. Some sounds can be beneficial; for example, there is research showing that nature sounds can improve moods and listening to music can alter perception of time and moods[459].

Figure 61: The 'Sea Organ' by Nikola Bašić in Zadar, Croatia enhances sounds of nature by using polyethylene tubes & resonating cavities to "sing" as waves & wind lap the shore.
Photo credit: ©Tim Ertl via ArchDaily

Crafting a soundscape for *R-Spaces*

	Constant	Optional
Functioning	Background noise (piped through hidden speakers in space if needed)	A button to turn on speakers for the entire space **or** Secured headphones to listen to a variety of audio selections (as seen in museum exhibits & music stores)
Options	• Stimulating acoustics as a goal: water features, rustling leaves, human activity, bird sounds, soundscapes like cafes or other music[460] • Nature sounds as white noise in *Rest*, *Relax*, or *Restore Spaces* – when using this technique in louder urban environments, restoration can be up to 37% faster[461] • Creates 'sonic refuges'[462] • For example, the use of waterfalls as white noise to mask street noise[463]	• Mindfulness meditation music for a sense of tranquility[464] in *Relax Spaces* • Upbeat tunes for euphoria[465] in *Revive Spaces*
Considerations	• Ensure sound is not too loud or repetitive in a way that makes it become noise (an annoyance) • Maintenance of ensuring whatever is producing the sound is always working	• With music's power as a complete mood changer, preference and choice are important – someone being forced to listen to music they do not like is likely worse than no music at all • Maintenance of button (or other "on/off" tech) and/or maintenance & hygiene of public headphones

Figure 62: Considering salutogenic soundscape options for *R-Spaces*

➤ Scent/smell

How many scents have you noticed today? The human nose can differentiate a trillion different odors, but people breathe around 24,000 times a day (so the nuances can go unnoticed)[466], and not everyone is as in touch with their sensory environments. Scent is particularly subjective, as it is closely related to memory; think, for example, how people from different places might describe the scent of 'home'. Furthermore, scent researcher Dr. McLean says that smell is often where hidden prejudices can be found, noting that much more research is needed to unpack this[467]. Regardless, focusing on the smells of different places in conjunction with identity is interesting.

"It's very unlikely that two people standing in the same place would smell the same exact scent. So rather than seeking precise definitions and classifications, the way classic scientific cartography does, I am interested in negotiating different perceptions."

– British artist, researcher, & designer Dr. Kate McLean[468]

It may seem far-fetched, but the idea of purposely creating a scent for public spaces dates back as far as 1913 with the opening of the Marmorhaus cinema in Berlin, Germany[469]. Could there be an opportunity with *R-Spaces* to design 'signature' scents as suggested in one article in the journal *Cognitive Research: Principles and Implications*[470]? A city could choose to fragrance their *R-Spaces* by typology (*Rest, Relax, Restore, Revive*) to differentiate them from each other and add to the desired experience, or to match them all to city branding of some kind.

It is important to note that not everyone likes the same scents, so strong scents in a space that is meant to be a break from city stimuli is most likely ill advised.

Figure 63: The physic garden at Castle Park in Bristol (designed by Emma Coleman for St Mungo's) includes many plants inspired by ingredients from Jo Malone London (the garden's sponsor) scents, like sage & basil; *Photo credit: Future / Mark Bolton Photography via Homes & Gardens.*

Ideas & considerations for design:

- Due to the subjective nature of preferred scents, it may be most successful to first and foremost focus on reducing exposure to unpleasant odors[471].

- Positioning spaces near locations that have clean, natural, fresh, and/or familiar smells[472]
- Optional aromatherapy activations/activities available – giving users the option to inhale specific essential oils for benefits (not forced or constant scent, as it could be overwhelming or unwanted, especially if someone dislikes a specific scent); see figure 240 in Appendix B for essential oil benefits
  - *Rest* – citronella, ginger, grapefruit, gully gum, juniper twig, neroli, rosemary, scots pine
  - *Relax* – angelica, basil, bergamot, geranium, labdanum, lavender, may chang, palmarosa, patchouli, petitgrain, roman chamomile, sweet orange, sweet marjoram, valerian, ylang-ylang
  - *Revive* – basil, coriander, everlasting, lemon, peppermint, spearmint
- Research healing gardens and any ties between restoration and the smell of various flowers & plants
- *Restorative Cities* claims that "smell may be harnessed to evoke feelings of place and belongingness" – what could this mean for creating spaces of comfort? Consider how to contextualize this to city/region/culture.

Figures 64 & 65: Dufttunnel (Scent Tunnel) by Olafur Eliasson, Autostadt Wolfsburg, Germany, 2004; *Photo credits: Olafur Eliasson*

➤ Tactile/touch

"Tactile urban design includes the haptic sensation of contact with skin: exploring objects in terms of their texture, consistency, form and movements."

– Roe & McCay in *Restorative Cities*[473]

Many designers are realizing that as peoples' worlds become more digital, they crave more physical things, things they can experience through touch, that feel more 'real' in balance[474].

Figure 66: Toxin-absorbing algae coated tiles by Shneel Malik combines biomimicry with the tactile sense for a unique building material[475]; *Photo credit: Shneel Malik / Yanko Design*

Evidence of the importance of tactile stimulation:

- Infant monkeys chose artificial mothers covered in cloth over ones with milk (in a 1958 study by psychologist Harry Harlow)
- When holding something warm, people are more likely to perceive others as being generous & friendly
- Premature babies make faster recoveries when touched & moved regularly[476]

The strongest way of connecting to, and designing for, the sense of touch for people alone is through the use of texture.

What can textural immersion do?

- Give a sense of connection to place
- Create enjoyable somatic sensations
- Encourage playfulness & feelings of empowerment
- Increase physical activity (ground surfaces)[477]
- Aid in wayfinding
- Communicate to those with low or no vision

Can certain types of materials influence emotional reactions?

One 2023 study attempted to connect tactile sensory experience to emotional responses in interior design choices. Respondents were asked to select one of eight defined emotions from past experiences touching certain materials. While some of the specifics of the study cannot be deemed conclusive or reliable, some more general trends emerge. For specifics, see figure 241 in Appendix B.

- **Smoother, matte textures** (like smooth cotton fabric, finished wood, frosted glass, honed marble, and matte ceramic) were most connected with feelings of calm and/or comfort (and therefore show potential for *Rest*, *Relax*, & *Restore Spaces*).
- **Glossy & dramatic textures** (like velvet, regular glass, and glossy ceramics) inspired feelings of joy and/or excitement (and therefore, show potential for *Revive Spaces*).
- **Rougher textures**, particularly ones that looked ill-maintained or potentially dangerous (such as rusted metal & unfinished wood with exposed splinters) were most likely to evoke negative emotions of discomfort, unease, fear, and/or anxiety (and therefore, should maybe be avoided or finished to a higher level in some way for use in *R-Spaces*).

Figure 67: Connecting materials' tactile properties with emotional responses; *Data source: "The Tactile Sensory Experience in Interior Design: Exploring the Impact of Touch on Emotional Responses"*[478]

Figure 68: Meike Harde's textural knit lamp; *Photo credit: ©Teresa Mahler via ArchDaily*

Ideas & considerations for design:

- Maintain even surfaces & walkways for a universal design experience that does not frustrate those with mobility limitations or struggles
- Consider unique materials that showcase specific textural choices (see 'Ideas for materiality' on pages 212-223)
- Textural variation, including nature-based textures, (as part of the ground, landscaping, and/or structure) can encourage healthy use of spaces[479]
- Rough & soft surfaces make spaces feel more intimate, absorb sound, and increase senses of comfort & well-being[480]
- Textural choices could be informed or inspired by similar research to that seen in figure 67 above (but likely needs further research)

- Thoughtfulness to connecting body with place – feet on ground, hands on doors/walls, etc. – one example is the Japanese garden of Katsura, which has stepping stones that tell people where to place their feet, which in turn forces people to engage with their environment and be more grounded in place[481]
- Raw & natural materials offer a sense of warmth and connection[482]
- Bubble wrap for popping (can manage stress & anxiety) – this is recommended for adults with autism[483], but is still sensory stimulation for anyone
- Textured lighting could shift light & shadow and soften interiors (such as German designer Meike Harde's knit lamps, fig. 68)[484]
- Textures can trigger emotions & memories[485] – is there a textural element connected to the history or culture of the location that could be used to trigger happy memories?
- How creative can you get with haptics in experience? What role can technology play? (See Precedent Study: CRYSTAL)

Figure 69: The textural facade of the Kalahari Condos in Harlem, New York by architect Jack Travis is founded in Black heritage and inspires emotional connection. "Intense use of color, pattern, and texture" is one of his 10 guiding principles for African design exploration[486]. *Rendering credit: Jack Travis via Architect Magazine.*

Precedent Study: CRYSTAL, 2012–2018

By: Studio Roosegaarde

Location: Natlab, Eindhoven, Netherlands

About:

- Hundreds of open source crystals that light up when touched (visitors can change hue & intensity)
- Wireless LED "rocks" of varying sizes on a black charging mat
- Designed to create endless potential for play

Takeaways:

- Prioritizing a sense of touch for tactile experimentation in a 3D environment
- Interaction for people that encourages experimentation & brings joy
- Idea of light & color activation by touch
- Could *R-Spaces* have activities or installations like this – a calming wall of smooth rocks in blues in a *Relax Space*, rough & movable crystals in a rainbow of colors in a *Revive Space*?

Source & photo credits: Studio Roosegaarde[487]

➤ Thermal

"In an age exacerbated by environmental change, to what extent has our thermal comfort been modified by the landscapes and urban environments that we have created?"

– Silvia Benedito in *Atmosphere Anatomies: On Design, Weather, and Sensation*[488]

In addition to providing breaks from uncomfortable weather (one of the key goals of *Rest Spaces*), thinking about ways to emphasize or mitigate aspects of the thermal sense add another dimension to designing environments. Design clues can add to a perception of warmth in winter or coolness in summer[489]. Thermal design considerations are especially important for *Rest Spaces*.

Ideas & considerations for design:

- For particularly cold & bitter winter environments, sun traps could be designed in or around the *R-Spaces* for improved thermal comfort[490] (for ideas on creating these, see "Gardening with Sun Traps and Sun Scoops"[491])
- Shelter from wind (especially important in areas of higher wind speeds, such as wind tunnels created by buildings in cities)
- Shelter from hot sun (especially important in areas lacking other sources of shade like street trees, areas of high pavement exposure, near reflective glass buildings that create hot spots in streets/ squares below, and hotter climates in general)
- A combination of elements that can convey a notion of coolness (as inspired by Persian gardens): reflecting pools, patterns of light & shadow, gurgling fountains, gentle (cool) breezes, fresh scents (flowers & fruits)[492]
- In colder climates, use of materials that convey a sense of warmth
- What are some creative ways to convey thermal design (with or without actually changing temperatures)? For one example, see figure 70.

➤ **Sun trap**: a landscape feature that absorbs solar rays during the daytime while blocking colder winds; usually horseshoe-shaped, possibly of trees, shrubs, soil, and/or stone; used to create a microclimate that is warmer than its surroundings[493]

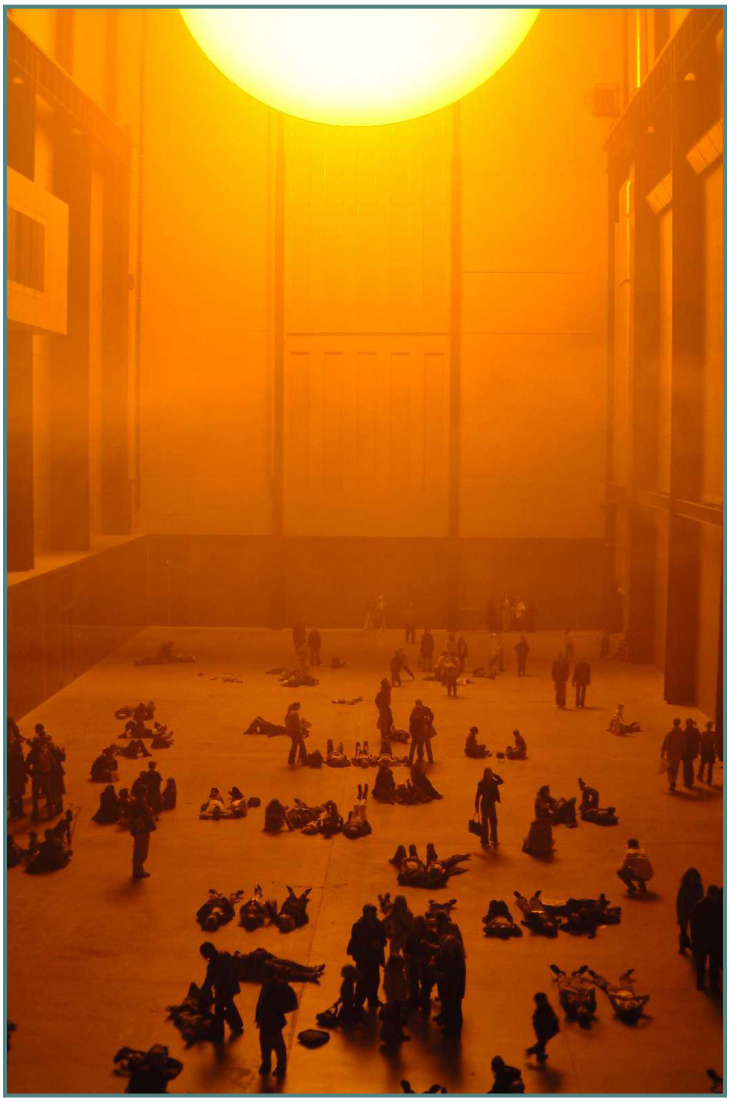


Figure 70: The Weather Project by Olafur Eliasson in the Turbien Hall, Tate Modern (Oct 16 2003 - Mar 21 2004); *Photo credit: Tate Photography ©Olafur Eliasson*

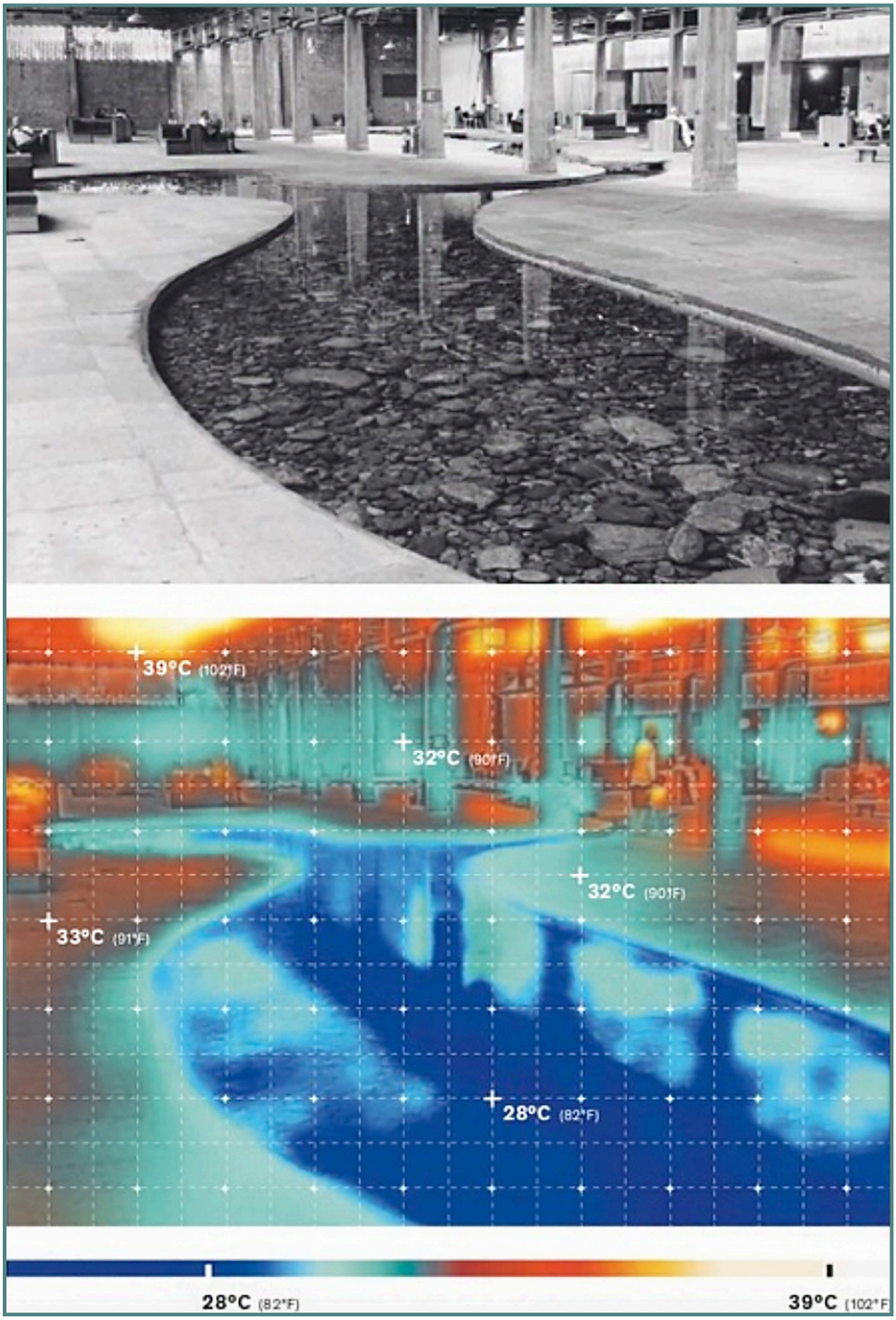


Figure 71: Infared thermal reading of the gathering center & reflecting pool (River São Francisco) in SESC Pompéia Community Center in São Paolo, Brazil, where water is clearly cooling; *Image credit: Iwan Baan / Silvia Benedito, Atmosphere Anatomies*

Sensory perception for inclusivity

Creating multi-layered environments with consideration for various senses further emphasizes the first principle (to follow universal design concepts & design for diversity). Sensory

design can both aid individuals with diminished sensory perception or to amplify specific senses to cultivate the desired user experience. For the first, an excellent example is architect Alan Dunlop's design of Hazelwood School in Glasgow, Scotland for children who are both blind and deaf. The multi-textural wall allows for wayfinding for students to get between classrooms with minimal help, increasing their confidence[494] (fig. 72).

Introducing people to alternative sensory environments increases understanding and empathy for the experiences of others.

Figures 72 & 73: (top) A student navigates a linear route in Dunlop's Hazelwood School; *Photo credit: Architizer;* (bottom) The Salem Rehab Adaptive Playground by 2.ink Studio in Salem, Oregon is an inclusive playground designed to stimulate all children, regardless of physical or mental disabilities. *Photo credit: ©2.ink Studio via Re-Thinking The Future*

For example, Olafur Eliasson's "Your blind passenger" 2010 installation (fig. 74) visually 'blinds' its visitors with dense fog, which at first disoriented most people. Eliasson explains, "Very quickly you realize, and I mean this quite literally, that you are not completely blind after all, you have a lot of other senses which start to kick in. It shows that the relativity of our senses is much higher than we think, we have it in our capacity to recalibrate or at least stop being numb."[495]

Figure 74: A view of Eliasson's 45-meter tunnel of fog in "Your blind passenger"; *Photo credit: Thilo Frank / Studio Olafur Eliasson*

Important note: When designing for the senses, be careful to not over-design or overwhelm. Too much multi-sensorial input contributes to sensorial overload, attention disorders, and hypervigilance – and is the opposite goal of *R-Spaces*, which are meant to help with overload.

Further Reading:

- Chapter 4: The sensory city in *Restorative Cities* by Jenny Roe & Layla McCay, pg. 64-88[496]
- *Haptic* (Catalogue of the 2004 Takeo Paper Show) by Ltd. Takeo Co.[497]
- *Haptics* by Lynette Jones[498]
- Chapter 8: Homo Faber in *Architecture is a Verb* by Sarah Robinson, pg. 127-152[499]

- "How to Create a Sensory Garden" by Mary M. Fischer & Brittnay Haag[500]
- *Living Sensationally: Understanding Your Senses* by Dr. Winnie Dunn[501]
- Sensory Integration Education website[502]
- "Why sensory design?" by Ellen Lupton & Andrea Lipps [excerpted from *The Senses: Design Beyond Vision* by Ellen Lupton & Andrea Lipps][503]
- "Your Ultimate Guide to Sensory Garden Plants & Their Therapeutic Benefits" by Katie McGillivray[504]

→ Offer elements of prospect–refuge

4

"Prospect-refuge theory is a critical theory for understanding and designing places that people find most comfortable."

– Cushing & Miller in *Creating Great Places*[505]

Prospect-refuge theory

At its core: "now you see me, now you don't" / "see without being seen"[506]

Field of origin: geography

Schools of thought: evolutionary biology, anthropology, aesthetics, phenomenology[507]

➤ The name – "**prospect-refuge theory**" – was first coined by British geographer Jay Appleton in his 1975 book, *The Experience of Landscape*[508].

Prospect-refuge theory references humankind's hunter-gatherer evolutionary beginnings, wherein people needed to see out across landscapes while being protected from predators[509]. Because original studies on the theory tend to focus on natural, rather than urban, environments, evidentiary support can be unreliable for adopting it depending on the context[510]. Regardless, it is popular across design disciplines, including architecture, interior design, landscape architecture,

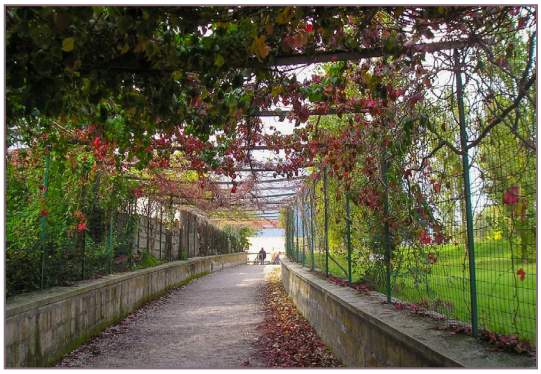
and urban design, and is perhaps one of the most well-known environmental preference theories[511]. Also, the need for prospect or refuge can change over time and be influenced by time of day, seasonality, and/or life situations[512], complicating its applications. Although the origin of survival from wild animals is no longer applicable for people living in cities, studies do seem to suggest an innate preference for spaces that offer both prospect and refuge. The theory has been used to explain common behavioral preferences that people display such as preferring seating next to large windows, choice for edge environments/conditions for people to sit & survey (researched by Ruddell & Hammitt in 1987 and confirmed by urban planner Kevin Lynch), or the comfort of narrow streets with alcoves in historic cities[513].

Figures 75 & 76: Anderson Japanese Gardens, Rockford, Illinois showing both prospect (left) and refuge (right) views; *Photo credits: Nicole Craanen via Rooted in Nature*

Prospect vs. Refuge (in Nature)

	Prospect ("The Meadow")	Refuge ("The Cave")
Creates ability to…	observe opportunities or foresee dangers in environment[514]	hide or remain concealed from danger[515]
Locations in the natural environment	Elevated places such as mountains & hill tops Unobstructed views like plains & valleys[516]	Semi-enclosed areas such as caves Opportunities for shelter & concealment like large rock formations & canopies[517]

Figure 77: Prospect & refuge in the natural environment (see fig. 84 for built environment)



Figures 78-80 – from left to right: (78) A 'prospect' view in Venice, Italy; (79) 'Refuge' shown in Boboli Gardens, Buontalenti Grotto in Florence, Italy; (80) An example of both prospect & refuge - the tunnel-like trellis over the walkway provides refuge, with elements of prospect in the transparency of the trellis & the view framed at the end of the tunnel; *Photo credits: Nicole Craanen / Rooted in Nature*

Critiques & complications

Although the theory itself is popularly referenced, and has potential beneficial applications, it is important to note that empirical evidence has led to inconsistent results, particularly for the urban environment. Dosen & Ostwald did a meta-analysis of 34 quantitative studies on environmental preference and found conflicting examples across environmental psychology, architecture, and urban design – citing ones that both support the theory and ones which show no significant connection between prospect-refuge and spatial preferences. Furthermore, they conclude that although there is

supporting research in natural settings, the same spatio-visual configuration looking out on a city setting could trigger a different psychological reaction (which is yet unknown)[518].

Safety – or perceptions of safety

The preference for spaces that offer both prospect and refuge – or ways to anticipate threats & protect ourselves – is connected with perceptions of safety[519], and *Creating Great Places* posits that it has implications for safety in public spaces[520]. In addition to feelings of fear for an individual, potential offenders may select environments with a high degree of refuge, with blind spots directly influencing fear and crime.

A 2000 study of a Vancouver university campus found that participants rated areas with low prospect + high refuge as least safe, and high prospect + low refuge as most safe. The study (also informed by previous research) went on to explain that women experience much higher levels of fear than men (particularly in these areas of low prospect + high refuge) due to differing life experiences and gender inequality in society as a whole. 67.6% of the women said they would avoid such spaces that made them fearful, while only 6.41% of men said they would modify their behavior[521]. This is interesting for planners and designers to *consider*, but in reality, cannot be clearly extrapolated to design solutions.

Furthermore, the study goes on to recommend designing places with less refuge (and increased prospect) as a cost-saving alternative to increasing lighting as a safety measure (which they cite as expensive)[522] – this is a very problematic conclusion. Not only does it not address the problem of potential attacks on women to begin with, but other research makes it clear that refuge itself can also be important for holistic, healthy spaces (consider, for example, queering public spaces on pages 149-150). Also, some sources have indicated a male preference for prospect, with women tending to prefer refuge, which would contradict the idea of women avoiding refuge spaces for safety reasons.

The correct conclusion to draw from the university study in regards to environmental design and fear, is that there can be some correlation, particularly in perception, and designers should be mindful of this. Furthermore, the elements of prospect and refuge should be presented in balance, because one without the other (refuge without means of escape and views for safety) can contribute to fear (and potentially unsafe

➤ What is **'eyes on the street'**? A concept described by Jane Jacobs in her seminal 1961 book, The Death and Life of Great American Cities on the importance of community members watching over a space; the idea that people being able to observe what is happening somewhere can be a crime deterrent[523].

spaces) – ***not*** the existence of refuge itself. Reducing refuge and increasing prospect in public spaces cannot be – and is not – the answer to making places safer.

The problem with designing for safety is that such appraisals are subjective and impacted by individual characteristics like gender[524], and wider societal issues such as gender-based violence and homophobia. Studies, like the aforementioned one in Canada, rely on a binary system (without data from queer populations or statistical breakouts of others who may struggle with fear in public spaces for non-gendered reasons) and fail to take into consideration other complexities (and solutions) for this fear. This is part of a wider, valid argument that design cannot be the sole solution for fixing societal issues, as discussed in *Built Forms and Social Relations: Designing Disalienated Public Spaces* by V Hoy[525]. While it is possible to incorporate theories that address preferences – like prospect-refuge theory – and make design choices that support well-being, the complexity of societal issues is not going to be fixed by the built environment, and therefore related issues (like safety) cannot be solved by design.

Figure 81: *Creating Great Places* cites Paley Park as a good example of refuge that works in terms of safety perception, because of design features such as the lighted waterfall on the back wall, windows from neighboring buildings overlooking the space, a gate which closes at night, and a wider-than-typical (inviting) alleyway[526]. *Photo credit: introspecs.*

CPTED (crime prevention through environmental design) approaches have proven problematic in the past despite positive intentions (consider, once again, *Built Forms and Social Relations*[527]). Therefore, prospect-refuge cannot be THE solution for safe public spaces – but, it is also clear that there is a correlation between the concepts of prospect-refuge theory and the perception of safety in public spaces. Furthermore, there is a strong argument for a need for more privacy and escape in the public sphere, which cannot be ignored in favor of sightlines for safety across a flattened public landscape. If, for a moment, we disregard the deeper theoretical conversation around this paradox, the ideas presented in prospect-refuge theory are still important for public space design – and due to the nature of *R-Spaces* as retreats, particularly relevant when designing *R-Spaces*. It is also essential to not disregard the importance of *perception* of safety in design towards well-being and comfort, even if the evidence for actual impact on safety levels is lacking.

Application

Prospect and refuge are two of the 14 core patterns of biophilic design (see fig. 47), meaning that offering elements of prospect and refuge also enhances the second tenet regarding biophilia. So why have these ideas of prospect and refuge been determined important enough to be one of the six core design tenets? While there may be varying conclusions of its exact impact on the built environment (and the extension to the urban from the natural), the authors of the extremely well-researched book, *Creating Great Places: Evidence-Based Urban Design for Health and Wellbeing*, chose it as one of their six critical theories for contemporary – *evidence-based* – urban design, and this cannot be lightly dismissed.

At the least, *Creating Great Places* suggests that prospect-refuge theory can help designers to better understand how people feel in regards to spatial arrangements, and particularly seating vs. activity areas[528]. It is particularly relevant to *R-Spaces* because it is linked to spatial preferences. For spaces to feel like areas of respite (as the *R-Spaces* intend), the space needs to be attractive, feel safe, and feel comfortable – all things that relate to this theory.

A 2021 journal article in *Planning Quarterly* and Arup's *Queering Public Spaces* report both recommend the concept of refuge in the goal of making public spaces more queer-friendly[529]. The concept here is called 'cozy corners' where

"queer people (or anyone visibly different and at risk of public bigotry) can see out into public space while retaining some privacy." Their example is of a bench in Hamilton's Civic Square (fig. 82), which reduces the visibility of the people sitting on it without compromising their safety – given them the 'eyes on the street' while having built in planters that reduce the risk of being snuck up upon[530]. The design of this bench, while simple, is a perfect example of successful prospect-refuge theory application.

Figure 82: Civic Square, Hamilton, New Zealand; *Photo credit: Kiri Crossland*

Consider, for example, the experience of sitting with your back to a wall in a restaurant or coffee shop, and being able to survey everyone coming and going. While you may not have consciously chosen that position, and maybe there are other factors that more strongly influence your seating choice – windows, lighting, noise levels, etc. – but you almost certainly feel more comfortable there than if you were in a seat in the middle of the room, with your back exposed to multiple approaches. This psychological response is at the core of these scientific investigations around prospect-refuge theory and a preference for edge environments.

It is important to provide *both* elements (prospect *and* refuge) in balance with one another for the theory – and subsequently, the space – to be successful.

Well-being benefits:

Figure 83: Well-being benefits of prospect-refuge in design; *Source: Rooted in Nature*[531]; *Graphic by author*

Prospect vs. Refuge (in Built Environments)

	Prospect ("The Meadow")	Refuge ("The Cave")
Key goals	Awareness & observation[532]	Safe place to retreat[533], some researchers prefer more inclusive concept of 'shelter' for refuge[534]
Characteristics	Open, often bright, often elevated[535]	Limited visual access in[536], easily accessible within the larger environment[537]
Examples	Balconies, staircase landing, viewing platforms, observatories, watch towers, open floor plans with low partitions[538]	Seating with high backs, porches, covered balconies, canopied landscape design, covered walkways, gazebos, telephone pods/booths, lowered ceiling height with lower lighting[539]

Figure 84: Prospect & refuge in the built environment (see fig. 77 for natural environment)




Figures 85-88: The Piyalepaşa Istanbul project in Istanbul, Turkey by mimaristudio is a beautiful example of biophilic design. Specifically, it exemplifies well-done prospect and refuge in the way it allows views out and comfortable enclosure through its staggered openings in the vertical wood panels. *Image credits: ©Gurkan Akay via Archello.*

Ideas & considerations for design:

- Light levels, ceiling heights, and transition areas can all affect perception of prospect & refuge[540].
- Successful prospect has focal lengths of more than 20 feet or 6 meters (preferably 100 feet or over 30 meters) & partition heights of less than 42 inches or 107 centimeters[541].
- Successful refuge areas have focal lengths of less than 20 feet or 6 meters[542].
- Shifting ceiling heights can create prospect & refuge opportunities[543].
- Water could be complementary to feelings of prospect-refuge (referencing its long history of providing life, security, & defense)[544].

- Choice of what to focus peoples' attention on & what is being viewed; selecting what is hidden from view can also be important[545].
- Freedom of movement between points of prospect & refuge should be allowed (and ideally obvious)[546].
- While refuge is desirable, entrapment is not – ensure routes of escape (this is particularly important for women, who report amplified perceptions of danger in spaces with higher levels of entrapment[547]; this includes anyone who is at risk of gender-based violence).
- Limited visual access into the area allows someone to feel safe, while still having a connection to the larger space[548].
- The division between the prospect & refuge could user-operated as wanted (e.g. adjustable partitions, lowerable blinds, etc.)[549].
- For safety considerations with prospect-refuge designs, one option could be playing with transparent materials – walls or panels with varying levels of transparency for enabling prospect or refuge at various moments in the space. See 'Transparent materials' under 'Ideas for materiality' on pages 219-221.

Further Reading:

- Chapter 2: "Prospect-Refuge Theory" in *Creating Great Places* by Debra Flanders Cushing & Evonne Miller, pg. 28-39[550]

→ Seating is important

5

"This might not strike you as an intellectual bombshell, but people like to sit where there are places for them to sit."

– renowned urbanist William H. Whyte[551]

By now, the importance of seating in public spaces is widely accepted in the placemaking industry. Seating, like all public spaces, can fulfill multiple needs in the public realm. "A Place of Both Solitude and Belonging: In Praise of the Park Bench" points out cultural differences: e.g. people in England prefer a solitary moment, while in Mediterranean countries, benches are social spaces. In addition to varying contexts and cultures, as discussed in section III, there are multiple influences on the variety of city dwellers' needs, which are not all sufficiently met. Seating is a cornerstone of comfort, which is why it is one of the six core tenets for designing *R-Spaces*.

Figures 89 & 90: Many cities had, and still have, a lack of accessible, comfortable public seating, as seen in these two examples - in Hong Kong (left) and Shell Plaza in Houston, Texas, USA (right).
Photo credits: (L) UD/MH, (R) Social Life Project.

According to the Social Life Project, the mere existence of a seat makes a strong statement towards whether or not people feel welcome[552].

Priorities for seating:

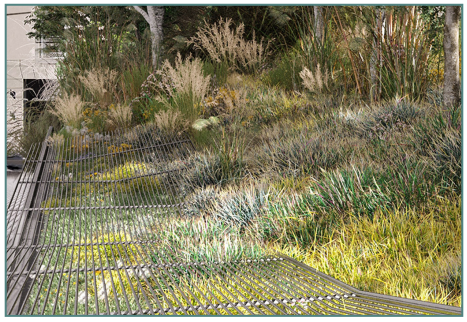
- comfort
- durability
- dimensions
- materials appropriate for the climate (ideal for all seasons)
- shorter versus longer benches to prioritize personal space

In addition to a variety of seating, consider places & **opportunities for leaning** (see the Station of Being precedent study on page 207) and **wheelchair space allowances**.

"Why do all seating facilities in public spaces sum-up to rigid benches?"

– Amsterdam-based designers Jair Straschnow & Gitte Nygaard[553]

Seating is obviously most vital to *Rest Spaces*, but all *R-Spaces* would benefit from it. The one exception would be when there is a reason intrinsic to the design, such as in the aforementioned Station of Being project, where leaning replaced seating, or in a smaller space that is meant to be experienced briefly (as more of a walk-through). The bottom line, however, is that public spaces should be designed for comfort, which includes the basic right to sit and rest. The challenge for designers is to incorporate the seating into the design, rather than randomly placing basic chairs or uncomfortable benches as an afterthought. How can the seating and leaning spaces be designed to add as much comfort and well-being as possible in the public sphere?

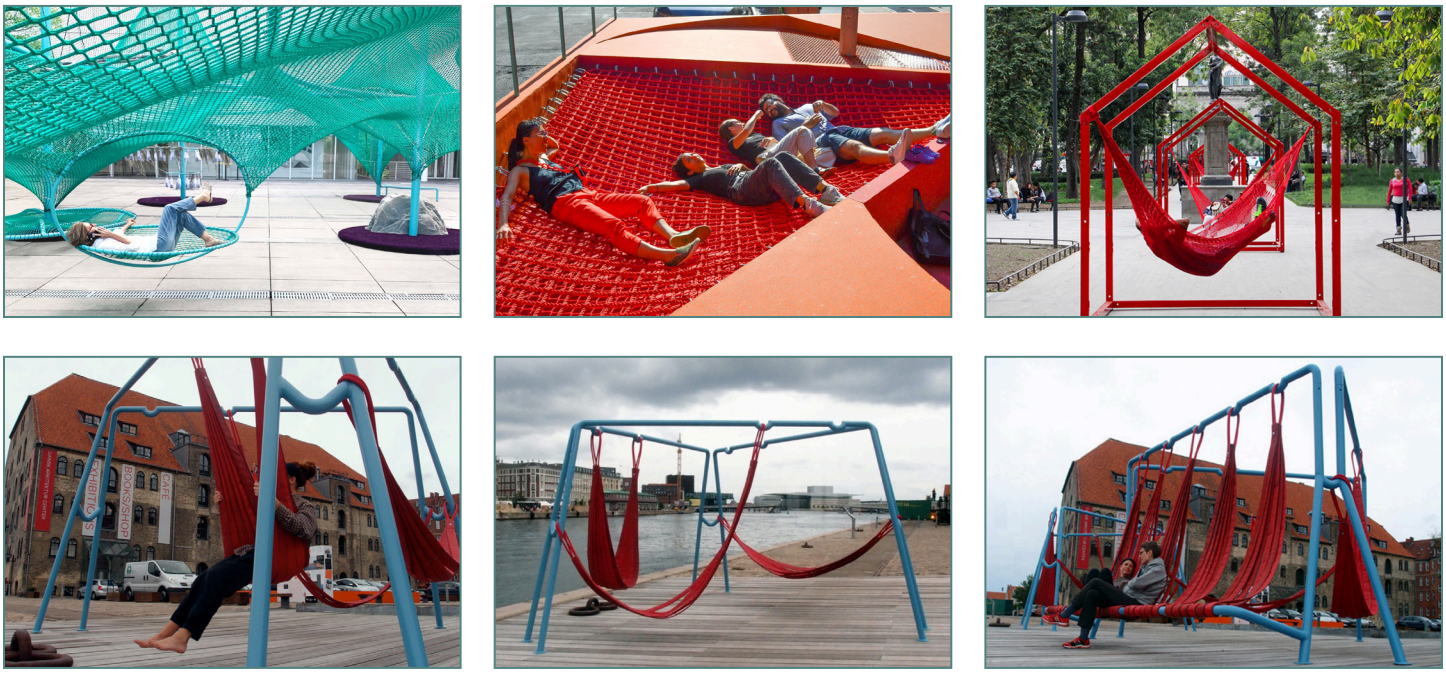


Figures 91-96 – from L to R, *top row*: (91) Playful "Look Up" seats by Oli Colman at the 2020 London Festival of Architecture; (92) Superverde: Modular, hybrid seating-tree planters by Stefano Boeri Interiors; (93) LUX seating area by AllesWirdGut in Esch-sur-Alzette, Luxembourg; *bottom row*: (94) Bamboo corner seat, part of Symbiotic Urban Furniture project by BLUE Architecture Studio (at the Bi-city Biennale of Urbanism/Architecture in Shenzhen, China); (95) "Quick Getaway" bench by Ex Architectures & Flu-or Arquitectura, a "holiday-inspired oasis in the heart of the city"[554] (at the 2021 London Festival of Architecture); (96) Sculptural bench by Jeppe Hein in Brooklyn Bridge Park, NY, USA

Figures 91-96 continuing – Photo credits: (91) *Luke O'Donovan via Dezeen;* (92) *Dezeen;* (93) *Roger Wagner via AllesWirdGut;* (94) *Anson of Araw Culture Communication via Dezeen;* (95) *Agnese Sanvito via Dezeen;* (96) *James Ewing, courtesy of Public Art Fund, 303 Gallery, König Galerie and Galleri Nicolai Wallner via Dezeen*

Ideas & considerations for design:

- Snug furniture with pressure that replicates the sensation of being held and/or hugged could be comforting[555].
- Hammocks are one great option – they are versatile, comfortable, playful, and can be made of durable, sustainable materials.



Figures 97-102 – from L to R, *top row:* (95) Mesh structure by SO-IL, Atlanta; part of an effort to give migratory birds a place for respite in the city, *Photo credit: Fredrik Brauer via Dezeen;* (96) 'Restorative Ground' streetscape installation in New York City, USA by WIP Collaborative, *Photo credit: WIP Collaborative;* (97) 'Mi Casa, Your Casa' installation by Esrawe Studio + Cadena, Mexico City, Mexico, *Photo credit: Esrawe Studio + Cadena; bottom row:* (98-102) 'Off-Ground' playful seating installation in Copenhagen, made from recycled materials, each seating element can be easily shifted between a hammock, low seat, and swing, *Photo credits: Jair Straschnow + Gitte Nygaard via Designboom*

- For *Revive Spaces*, seating could be interactive and inspire creativity, such as the playful spin-top chairs installed in New York City's Little Island (fig. 103).
- Prioritize comfortable seating designs that only allow for one user at a time (rather than communal seating, which would encourage groups or socialization) like the 'Quiet' chair or 'The Planet' (fig. 104 & 105).

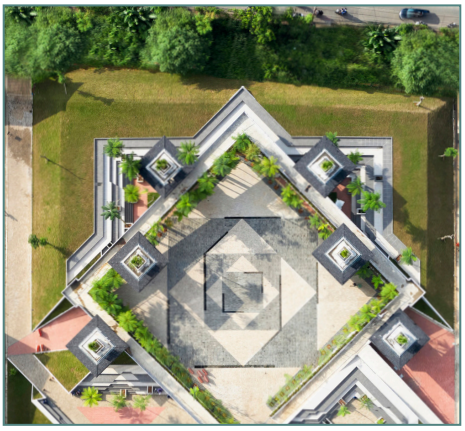
Figures 103-105 – from L to R: (103) "Spun' chair by Magis, *Photo credit: Archiproducts;* (104) "Quiet' chair by TILT, *Photo credit: Contemporist / Studiotilt;* (105) "The Planet' by MZPA, *Photo credit: MZPA*

→ Consider context

6

R-Spaces need to serve the local populations and feel approachable & comforting, all of which are improved by contextual design.

Beautiful urban projects around the world serve as examples of successfully considering context in public space design. Archohm Consults' haat (local, open-air market) design in New Delhi, India (fig. 106) celebrates local culture, including music & artisans, and visualizes rhythm in free-flowing spaces[556]. RAD+ar's Octagram Plaza in Indonesia (fig. 107) highlights Islamic character through cultural symbolism while providing respite from a nearby streetscape[557]. The ChongGae Canal project by Mikyoung Kim Design in Seoul, Korea (fig. 108) uses local materials, includes lighting for night use, connects people with water, and plans for the local Monsoon season[558].



Figures 106-108 – from L to R: (106) Dilli Haat, *Photo credit: Amit Mehra via The Architectural Review;* (107) Octagram Plaza, *Photo credit: ©William Sutanto via ArchDaily;* (108) ChongGae Canal, *Photo credit: ©Taeoh Kim via ArchDaily*

The design of the Friendship Center in Gaibandha, Bangladesh by Kashef Chowdhury – URBANA (fig. 109) was inspired by Buddhist monasteries in the region. It addresses site-specific concerns, such as flooding & earthquake risks, and project limitation of means. Construction is from local, handmade bricks, with form designed specifically to facilitate natural light and ventilation[559].

Figure 109: Friendship Centre; *Photo credit: ©Aga Khan Trust for Culture / Rajesh Vora via ArchDaily*

The winning plan for a public plaza in Bogotá, Colombia, by Obraestudio (fig. 110), was designed to bring nature into a highly urban space, and was inspired by the nearby Bogotá Savannah Wetland[560]. The native plants, integration with nearby steel structures, and free-growing landscape elements contrasting with the neighboring business center all demonstrate consideration for context.

Figure 110: Usaquén Urban Wetland; *Photo credit: ©Daniel Segura via ArchDaily*

Heatherwick Studio's design for a public square and new educational facility (fig. 111) takes into consideration both the creativity intrinsic to the city of Bogotá and the city's status as a center for sustainable development. Furthermore, the columns are covered in a playful weaving technique that is inspired by the Werregue basketry of the indigenous Wounaan community, showcasing respect for regional culture and craft traditions. The form of the architecture itself includes elements of the nearby cloud forest, and the open terraces will house native plant species[561], making for a context-specific biophilic project.

These examples all include ways for city planners and designers to consider context in the design of public spaces, which is crucial to the success of *R-Spaces*, although there are many more possibilities.

Figure 111: Public space & façade design (rendering) for Universidad EAN in Bogotá, Colombia by Heatherwick Studio; *Image credit: NOD/Heatherwick Studio via ArchDaily*

Contextual elements could include:

- Selection of project siting (with regard to topography, surrounding buildings, availability of nearby public spaces, etc.)
- Cultural influence or representation
- A focus on local (designers who understand the city & culture, partnerships with community organizations/ universities, local materiality sourcing, local labor that contributes to areas of need or vulnerable economies, etc.)
- Addressing local weather or other environmental conditions
- Requests from local citizens (which type of *R-Space*(s) is/ are most needed, nighttime lighting, integrated green infrastructure, shelter, etc.)

Other Design Conditions

→ Sustainability

With the environmental crisis the world is currently facing, consideration of sustainability factors should be central to any design project, and that includes *R-Spaces* and other public space typologies. Designers are urged to carefully consider selection of all materials involved in the design of *R-Spaces*, and their impact on the environment. They should be careful to

avoid greenwashing and taking claims of "sustainability" at face value.

1) **Research and choose construction materials carefully.**

   Deeper research is required into the manufacturing process and impact of every potential building material. Pros and cons should be weighed for each material. For example, concrete is low-maintenance, durable, and can help with sound-proofing; however, cement manufacturing accounts for at least 8% of global CO2 emissions – even more than aviation, and the cement sector is one of the most carbon-polluting industries worldwide[562]. In fact, according to scientists, the cement industry will need to decrease its emissions by a minimum of 16% by 2030 to meet Paris Agreement standards[563]. So, is there a more environmentally-friendly alternative to concrete? What about using lower-impact concrete companies like Solidia and CarbonCure[564] – are these feasible? Does the durability offset the high initial impact, as it may last longer without disruptive maintenance?

2) **Consider the life-span.**

   In addition to materiality, designers should also consider the long-term life of such spaces and their flexibility for meeting changing needs of cities.

3) **Can the structure be integrated into larger city green infrastructure or other city sustainability initiatives?**

   Furthermore, any co-benefits to the infrastructure, such as adding a green roof, integrating stormwater management, or adding solar panels could be beneficial to the overall sustainability of the city.

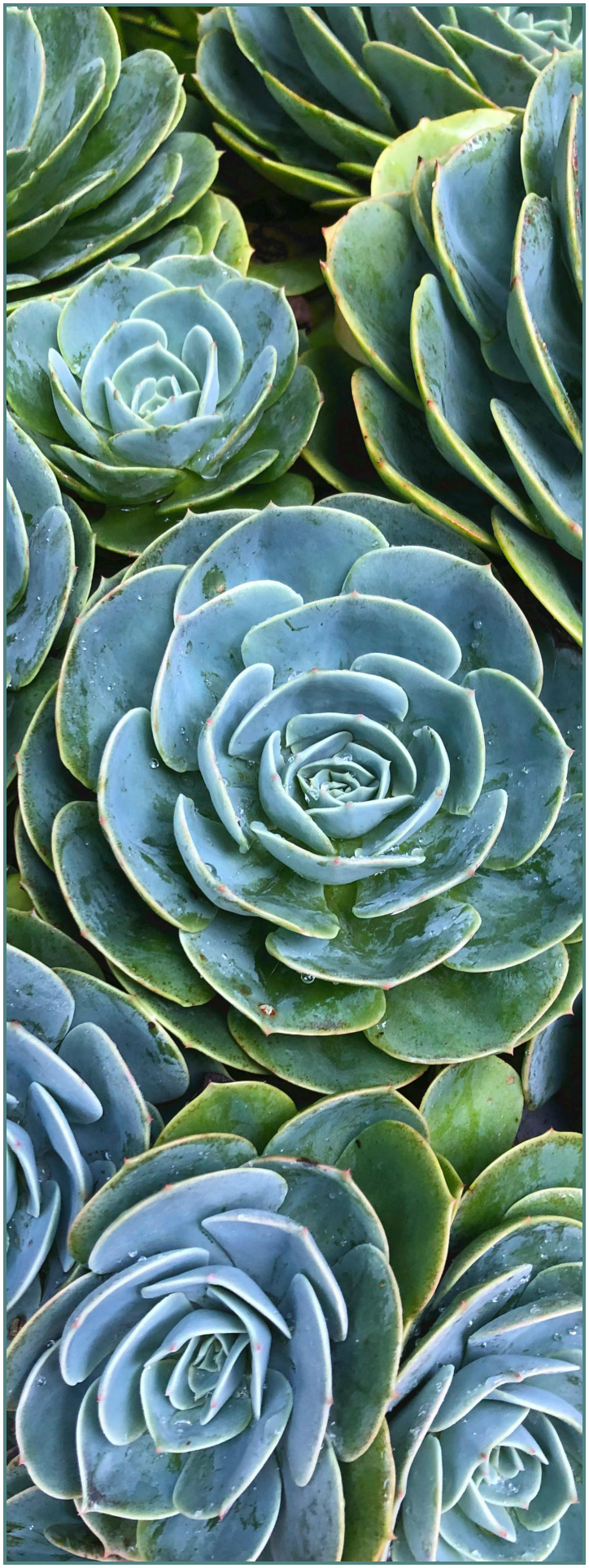


Figure 112: Delighthouse by Nick Green & Greig Pirrie, UK, 2023: this installation was inspired by coastal lighthouses in Canada, "serving as a warm beacon of joy, excitement, and hope."[565] The colors & patterns show a way to brighten someone's day by evoking a sense of play. *Photo credit: ©Phil Marion via ArchDaily.*

→ Colors & patterns

Use of color

The psychology of colors is controversial, particularly due to a long history of contradictory claims and colors having different meanings in different cultures. However, according to the behavioral scientist Brian Cugelman, PhD, newer research into color psychology is highly scientific and technical, helps to contextualize older contradictory studies, and shows promise for future research[566]. The scope of this report's research means not delving into the complex field of color psychology, weeding out which conclusions are supported by robust, empirical data.

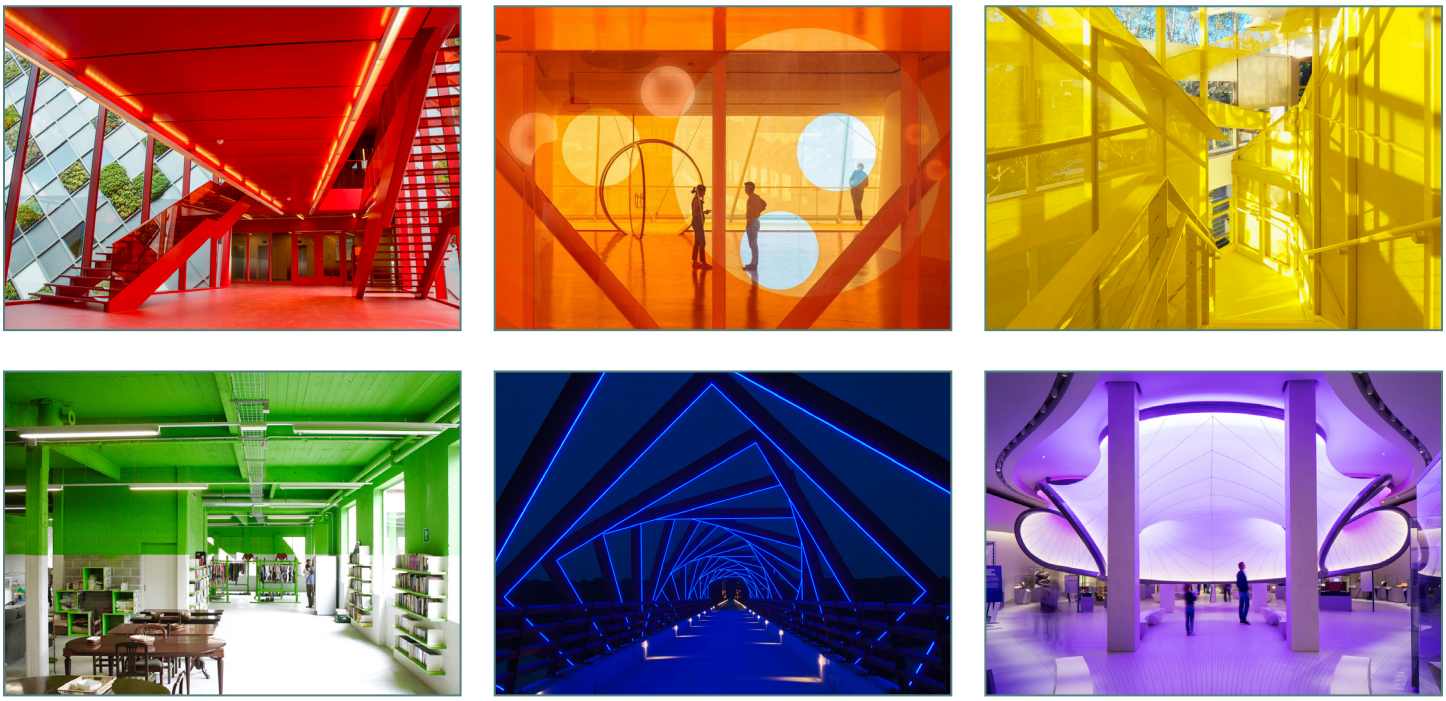
Broadly, there is some evidence that blue and white are linked with relief, orange and yellow with joy, and green with contentment. This study involved 4,598 participants across 30 countries[567], so there may be some credence to the universality of these emotional connections.

Despite a lack of thorough understanding, there are case studies showing an impact of color on behavior. In Tokyo train stations, the introduction of blue lighting apparently

reduced suicide rates, and even revised studies show it had at least some impact[568]. Furthermore, in general, color has the ability to inspire people, to create joy, and to brighten up an otherwise dull urban environment. Ingrid Fettell Lee's book *Joyful* explains how Edi Rama, the mayor of Tirana, Albania, reinvented the city by repainting historic buildings with bright colors[569]. Following decades of violence and oppression, he hoped the lively colors and designs would, in his words, "revive the hope that had been lost in my city." According to Rama, "When colors came out everywhere, a mood of change started transforming the spirit of the people. Beauty was giving people a feeling of being protected. This was not a misplaced feeling – crime did fall."[570]

"As designers, we should not...be afraid of using color, but instead seek to understand its power to spark joy, create pleasure, to surprise, or to reference a place's history or heritage."

– Ben Channon in *The Happy Design Toolkit: Architecture for Better Mental Wellbeing*[571]



Figures 113-118 – from L to R, *top row*: (113) Herstal City Hall, Herstal, Belgium by Frederic Haesevoets Architecte, *Photo credit: ©Christophe Vootz via ArchDaily;* (114) Plasencia Auditorium and Congress Center, Cartagena, Spain by Selgascano, *Photo credit: ©Iwan Baan via ArchDaily;* (115) Unite Here Health LA Office, Los Angeles, USA by Lehrer Architects, *Photo credit: Lehrer Architects via ArchDaily; bottom row:* (116) I AM Recycled, Arrasate, Spain by PKMN Architectures, *Photo credit: PKMN Architectures via ArchDaily;* (117) High Trestle Trail Bridge, Madrid, USA by RDG Planning & Design, *Photo credit: ©Iris22 Productions via ArchDaily;* (118) Mathematics: The Winton Gallery, London, England by Zaha Hadid Architects, *Photo credit: ©Luke Hayes via ArchDaily;* **How does each color make you feel?**

Ideas & considerations for design:

- Ensure a consistent color palette throughout the various elements & components to enable clarity[572]
- Keep color palette from being imposing by mixing neutral background tones with limited, stronger signature colors specifically where they aid in placemaking[573]
- Color can be helpful for wayfinding & legibility (there is proof it improves memory storage & retrieval)[574]; however, make sure that any color-based signage & wayfinding information also use other sensory channels – relying on color will be prohibitive to people with color blindness or limited/no sight[575]
- Find ways to integrate patterns that either a) add visual richness, b) enhance sense of quality, or c) create a deeper meaning or connection to the place or history[576]
- Fractal patterns (like those found in nature) and a fractal approach (where smaller scale patterns reflect the larger spatial design language) are recommended, as people generally respond positively to them[577]
- Avoid highly repetitive patterns – patterns that repeat 3 times within a single degree of visual field are likely to be perceived as unwanted cognitive noise (approximately 1.8 cm / 0.7 in in width when viewed from 1 meter / just over 3 feet away)[578]
- Some tonal contrast is recommended, but excessive contrast can be confusing, as well as cognitively demanding[579] (especially avoid in *Relax Spaces*)
- Avoid confusing patterns that make it difficult for people with visual impairments or depth perception issues to see clearly (particularly underfoot, but also for larger wall areas) or cause sensory overload for people with accentuated neurological needs[580]
- Highly reflective surfaces & busy patterns hinder communication for people with sensory processing difficulties, people who lip read or use sign language, & those with impaired vision[581]
- Avoid surface finish changes or patterns on floors that could be mistaken for steps or other level changes[582]
- Do not be afraid to play with color – colorful projects can be fun & add character, whimsy, or joy to their surroundings

- Consider if patterns could add context, through cultural connections (fig. 69 is one strong example), continuing other city patterns, or reflecting a historic or nearby environmental landscape

Figure 119: Pixieland by 100architects, Mianyang, China is an example of color and pattern in an urban project; *Photo credit: ©100architects*

Further Reading:

- "How Color Affects Architecture" by Lilly Cao, ArchDaily[583]
- "How color affects architecture and design" by Shailee Bhatt, Urban Design Lab[584]

→ Public art

"Art is certainly a powerful force in affecting our mood and can significantly support better well-being."

– Channon in *The Happy Design Toolkit: Architecture for Better Mental Wellbeing*[585]

In the pursuit of better public spaces and a streetscape that promotes well-being, including positive mental health, good moods, and improved urban livability, *R-Spaces* could be ideal canvases for public art projects. In a 2018 study in London, 84% of people said they believed that participating in public art projects benefited their well-being[586].

"Public art is proven to drive economic activity, boost mental health, and instill a sense of public safety."

– Kristin Luna, founder of public art nonprofit DMA-events[587]

Figure 120: The 'Flower Flash' ice cream truck by Lewis Miller Design brings a moment of joy to an otherwise bland façade in New York City, USA; *Photo credit: Tishman Speyer via Designboom*

Why public art?

1) There is empirical data supporting the link between public art and mental health benefits.

Studies have shown that public art can:

- reduce levels of stress-related cortisol, leading to decreased stress
- inspire awe (which can lower levels of cytokines that are linked to major health disorders including clinical depression, Alzheimer's, heart disease, and more)
- foster empowerment
- help with identity (especially shared identity) & belonging[588]
- improve mood & anxiety[589]

2) The creation itself of public art is linked to well-being.

Cities are starting to recognize a link between creativity and well-being. The Mayor of London website says that "creativity can build pathways to wellbeing and confidence."[590] In addition to promoting local communities, public art gives individual artists a chance to express themselves creatively and see this prominently displayed as part of their city's character. Giving more artists opportunities means more participation in the arts, which can increase self-acceptance, self-esteem, & self-worth[591].

3) It improves every day experiences and can inspire others.

Pedestrians tend to pause when seeing public art, relating to more mindfully appreciating their environment. A study by neuroscientist Colin Ellard found that people who walked past public art slowed to half the speeds of average city dwellers passing sites without public art[592]. Lively façades contribute to these people absorbing their surroundings, leading to a positive affect on the nervous system[593]. It has the ability to add a bright spot to someone's day, even if only for a minute. Furthermore, it has the ability to pass on inspiration to others, who could feel pride in their city and a sense of community. It activates the imagination, and can also encourage self-reflection and awareness. All of these elements help with well-being[594].

4) Public art funding provides another funding stream for R-Spaces.

This could provide another funding source for *R-Spaces*, as there is funding available for public art. Many cities have robust public arts funds and programs, like Vancouver[595] & Paris[596], and others have percent for art initiatives, such

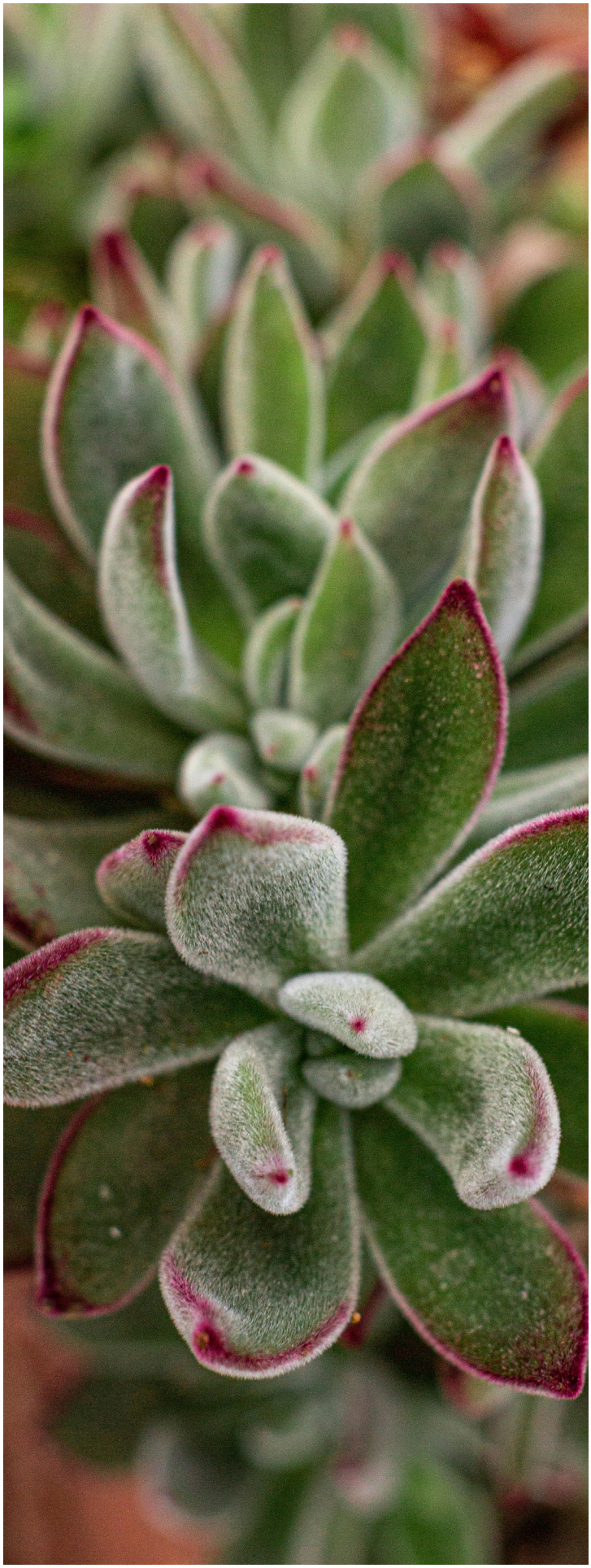
as New York City[597], Berlin[598], and Portland[599], to name just a few. Others have specific agendas and programs focusing on increasing and supporting public art, like Austin's Art in Public Places (AIPP)[600] & Melbourne's Public Art Framework 2021-2031[601]. In addition to municipality budgets, there are also organizations that fund public art like Bloomberg Philanthropies[602], Canada Council for the Arts[603], Cultural Action Europe[604], Foundation for Indian Contemporary Art[605], among others.

5) Public art increases overall city appeal and livability.

Arts & culture is a big draw for people choosing to live in cities, and vibrant, art-filled streetscapes increase walkability. In a 2016 survey, 52% of Millennials and 54% of Generation Xs said they would "strongly consider whether a community is rich in the arts when deciding where to locate for a job." With a growing focus on city livability, this interest is likely to increase. Also, many cities take pride in their arts culture, and online lists[606] promote cities known for their public art.

6) It is art for the people.

Public art (as long as it has an ethical vetting and funding process) is the most equitable type of art, allowing for free and widespread exposure to the arts outside of museums and galleries. It can communicate messages, identity, cultural value. Americans For The Arts calls it a "reflection of its place and time" and a "place marker in all human settlements," noting that it gives people "ongoing encounters with art."[607] It has social value and is collaborative, and can stimulate thought about art, society, and community, as well as increasing social interaction for those who want it[608].



"Public art is uniquely accessible and enables people to experience art in the course of daily life, outside of museums or other cultural institutions."

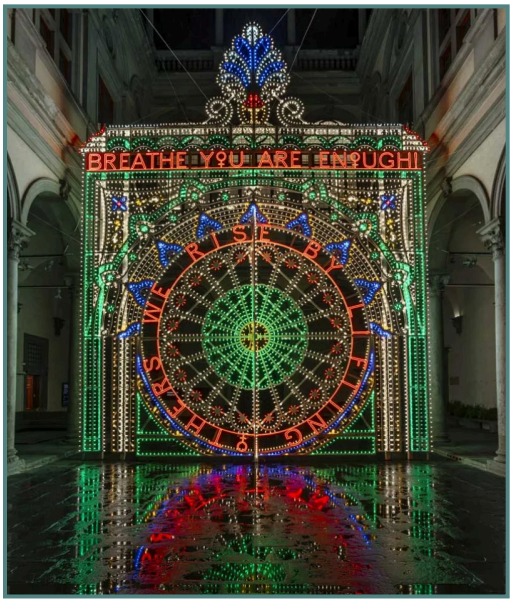
– Americans For The Arts[609]

Considerations for integrating R-Spaces with public art:

- Ensure all artworks are designed and completed by **local** artists.
- A major challenge is that of taste – in a study of 91,162 people's art preferences, everyone had different tastes, which corresponded with personality traits (at least more than demographic factors)[610]; however, it is impossible to please everybody, so a diversity of styles across a city would be beneficial. For *R-Spaces*, a direction would be to theme the artwork around the goal(s) of the specific space (*Rest*, *Relax*, *Restore*, and/or *Revive*).
- There are three ways to combine *R-Spaces* with public art:

  1) The exterior of an *R-Space* could be a blank canvas for a 2-dimensional art piece;
  2) The form of the *R-Space* itself could be a 3-dimensional public art piece; or
  3) Public art could be showcased inside an *R-Space*.

- If the exterior of an *R-Space* is used as a canvas, could the art piece raise awareness about mental health and better well-being?



Figures 121-123: top (121) The Trust Project, Philadelphia, PA, USA, *Photo credit: Teve Weinik / ©2021 City of Philadelphia Mural Arts Program / Creative Resilience Collective;* bottom L (122) 'We Rise by Lifting Others' by Marinella Senatore, Florence, Italy, *Photo credit: OKNOstudio via Wallpaper;* bottom R (123) "Hope, Community, Dignity" by Michael Ezzell installed at Community Care Alliance in Woonsocket, RI, USA as part of a partnership supporting community well-being through art, *Photo credit: The Avenue Concept*

Note for spatial design overall: A separate, but complementary model, named "The Big Six: Factors for Restorative Spatial Design" can be found in Appendix B.

Typologies of Form

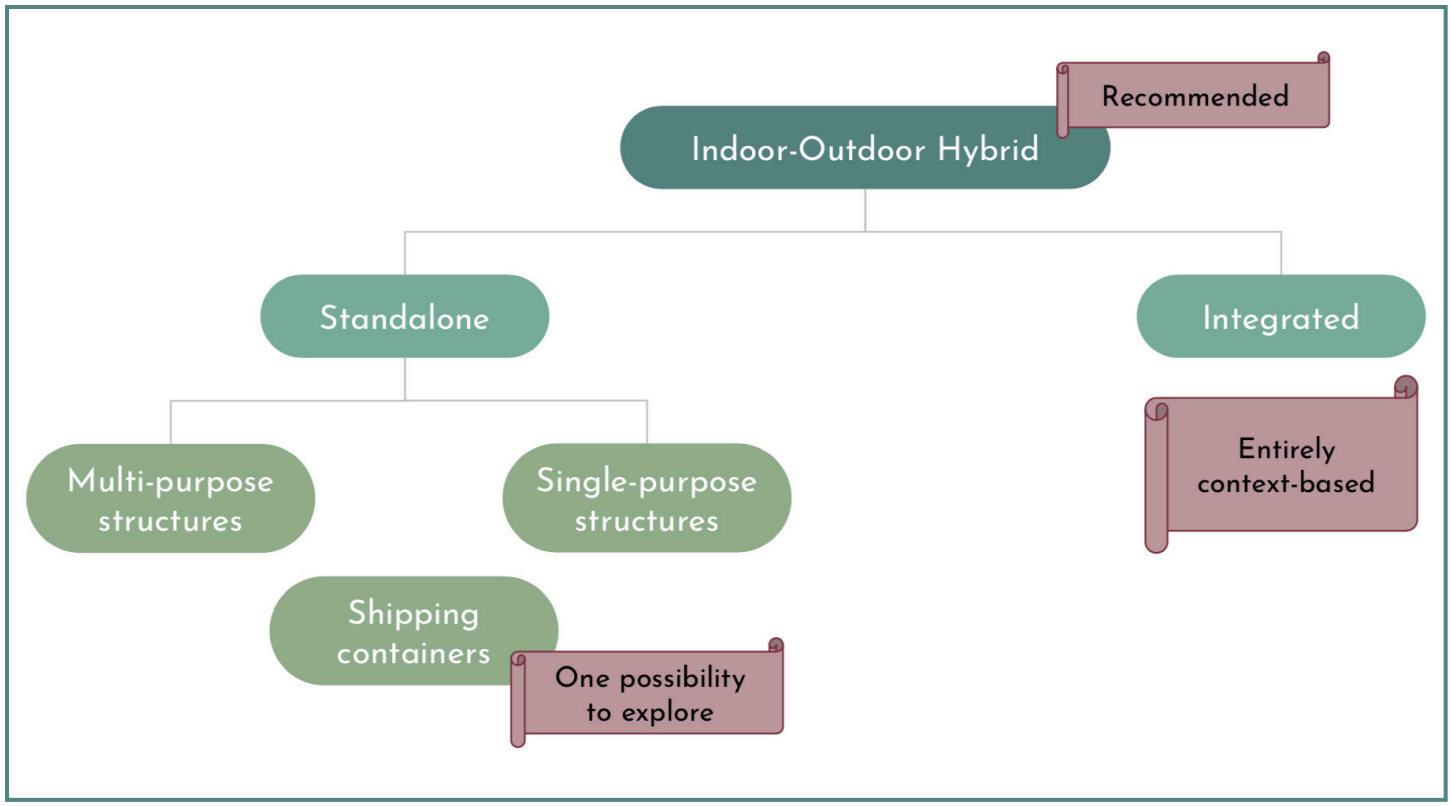


Figure 124: Typologies of form for *R-Spaces; Graphic by author*

→ Indoor–outdoor hybrid

Regardless of the typology of form selected for an *R-Space*, it is recommended that there are both elements of interiority and exteriority.

Does public space equate outdoor space?

"Maybe with the sole exception of railway stations, public space is generally understood as outdoor space… Especially now with heightened concerns around security, there seems to be this determined way of privatizing everything that is indoors, even as we are increasingly aiming to improve access to public space outdoors. But in the layered systems of our cities of the future, we will need to focus on the public spaces that are found inside buildings – and make them accessible."

– Kjetil Trædal Thorsen, co-founder of Snøhetta[611]

If you ask people to list or define public spaces today, the majority of people will list outdoor spaces such as parks, streets, or plazas. Does that mean that public spaces are only found outdoors? Not at all. However, unfortunately, there has been an increase in privatization of indoor spaces, and the majority of indoor public spaces face perception of publicness issues. Also, there just are not enough indoor public spaces in cities currently – it is true that while they are not the only public spaces, outdoor spaces do account for the majority of public spaces today.

In 1748, Giambattista Nolli created a map of Rome that told a different story than the mainstream assumption of public spaces today (fig. 125). While typical figure ground drawings shade positive masses and white areas define a void of mass, Nolli shaded private spaces, leaving public spaces as white areas[612]. In Nolli's world, interior did not equate private, with public spaces only existing outdoors. This needs to become the mainstream perception again; does public space equate outdoor space? It might sometimes seem like it, but the short answer is no, it does not.

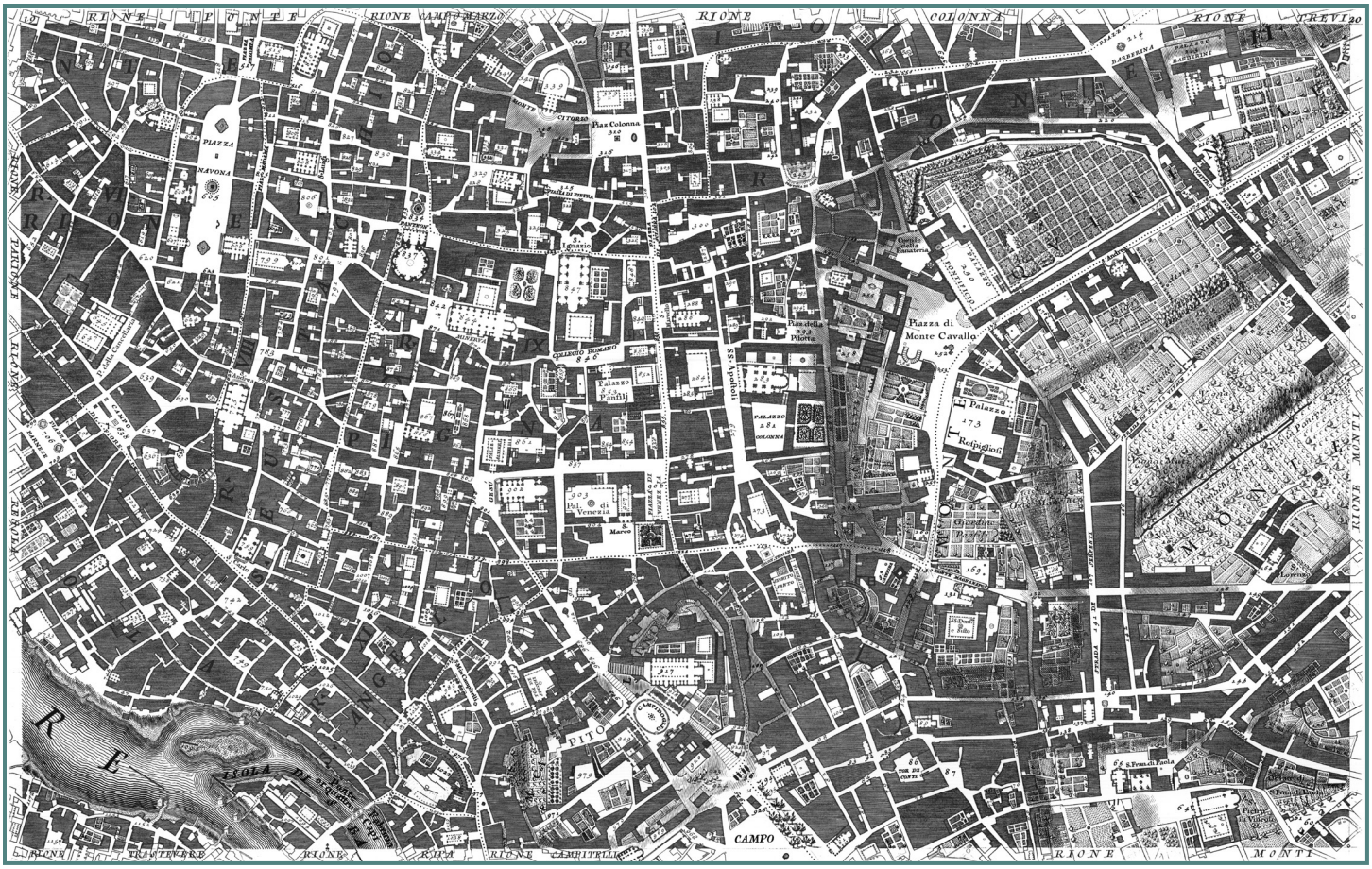


Figure 125: The New Plan of Rome by Giambattista Nolli (part 5/12); *Image credit: Wikimedia Commons*

The importance of indoor public spaces

"Architects must begin considering indoor space as just as public as outdoor space."

– Thorsen, co-founder of Snøhetta[613]

There are three main issues with a lack of indoor public spaces and placing the burden of public life squarely in the outdoors.

1) Winterization

As author Alanah Heffez of Canada's *Spacing* magazine says, "what public spaces exist for a city in hibernation?" Many cities tend to mostly shut down in the wintertime (with the exception of cultures used to extreme cold such as the Nordic countries). With summer, comes all sorts of vibrant activities around public spaces – concerts, movies under the stars, markets, and more. The majority of public spaces design their programming around the summer season. Yet

these same spaces die out to winter wastelands when the temperature drops. Why aren't there spaces designed for year-round experiences? Rare cases of winter placemaking have to be highlighted. Nova Scotia's PBJ Design leaders attribute people's perception of winter as a barrier to winter placemaking, elaborating that a sense of place could help people view winter as exciting[614]. *R-Spaces* can address a gap in winter public spaces – and if they are designed as only outdoor spaces, where can people go to meet the same needs they address in the winter? Well-designed cities should meet their residents' needs year-round.

2) Heat

While heat tolerances vary, many people do not enjoy spending extended periods outside when it is hot out. Even people who like warmer weather might face health concerns in extended heat waves. This will also continue to get worse with climate change (#3). If it is uncomfortable walking long expanses of unprotected space in the hot sun now, how much worse will it be when the days are even hotter & the number of over-90-degree days increases?

3) Climate change

Time to wake up, the world is changing. With increasing climate change impacts like increased weather events (including the aforementioned extreme heat) and air pollution, repositioning interiority into the public realm will be important for sustainable cities of the future.

What this means for R-Spaces

To achieve their goals, including offering people a place to rest, they must include shelter from the elements. In addition to the other issues with existing outdoor

urban places as places of respite explored in Section III, there is a clear need for more indoor public spaces. However, indoor spaces come with their own set of issues. Figure 126 below shows the limitations of an entirely outdoor or entirely indoor public space.

Limitations of outdoor spaces	Limitations of indoor spaces
• Minimal or no protection from uncomfortable temperatures (including extreme heat, humidity, cold, wind chill) – heat in particular is increasing with climate change • Exposure to weather (rain, snow, storms, wind) • Exposure to other climate change impacts such as flooding or increased air pollution • Discomfort (due to environmental or built design issues) • Increased stress stimuli – higher noise levels (i.e. exposure to traffic, construction), visual overexposure • Possibly higher maintenance due to outdoor exposure in combination with user damage • Lack of privacy	• (A lack in) perception of publicness • Ownership – who is this space for? Do owners have control over users & how space is used? Who feels comfortable & welcomed or excluded? • Securitization (particularly in an age of increased policing of space) • Less exposure to benefits of nature (unless injected with high levels of biophilia) • Lower perception as liminal space (outdoor spaces are highly rated for "in between" activities[615], while fully indoor might be considered more of a destination) – hopefully the purpose of *R-Spaces* as specific break spaces would encourage spontaneous use • Less contribution to the streetscape (although the design of form can mitigate this)

Figure 126: Limitations of entirely outdoor or entirely indoor public spaces; *Source: author*

Combining elements for an indoor-outdoor hybrid model helps to mitigate the majority of these issues.

Elements of 'exteriority' should...	Elements of 'interiority' should...
• make it clear these are inviting public spaces that anyone can enter • increase connection to nature and the urban landscape • keep the spaces from becoming too privatized	• allow for year-round weatherization & use • add comfort that is more difficult to achieve outdoors (for example, furniture can be padded & upholstered) • create barriers to exterior stimuli (e.g. noise insulation)

Figure 127: Combining the best of exteriority & interiority in an indoor-outdoor hybrid model; *Source: author*

Figure 128: Storefront Library by Abruzzo Bodziak Architects in New York, NY, USA; *Photo credit: ©Naho Kubota via ArchDaily*

Figure 129: Songzhuang Micro Community Park by Crossboundaries in Beijing, China; *Photo credit: ©Yu Bai via ArchDaily*

Blurring lines

Jane Jacobs called moments where indoor life meets the outdoor public realm 'the sidewalk ballet,' which can create powerful shared experiences[616]. Some strategies for blurring the lines between indoor and outdoor, public and private space, could include:

- 'front porches' on buildings (i.e. patios, verandas, etc)
- sidewalk displays which animate the streetscape[617]
- playing with transparency (for more on transparent materials, see pages 219-221)

Figure 130: The Cultural Constellations series conceptualizes translucent, inflatable PVC with stacked books as a unique bus stop design by Ulises / Ricardo Orts using AI; *Image credit: Ulises via Designboom.*

→ Structural option 1: Standalone forms

Building an *R-Space* as a standalone form has the potential to add interest and joy to cityscapes. According to Jan Gehl, "a good city street should provide something interesting to see every five seconds for the average person walking five kilometers per hour."[618] Standalone *R-Spaces* could be created in many shapes and iterations and offer an opportunity for designers to play with the structural arrangement. As established in Section II, urban design should include visual diversity to boost well-being. Therefore, these spaces can, and should, be creative and interesting.

"Aesthetically pleasing public spaces and architecture are linked to greater momentary happiness."

– Mouratidis in *Cities* journal article[619]

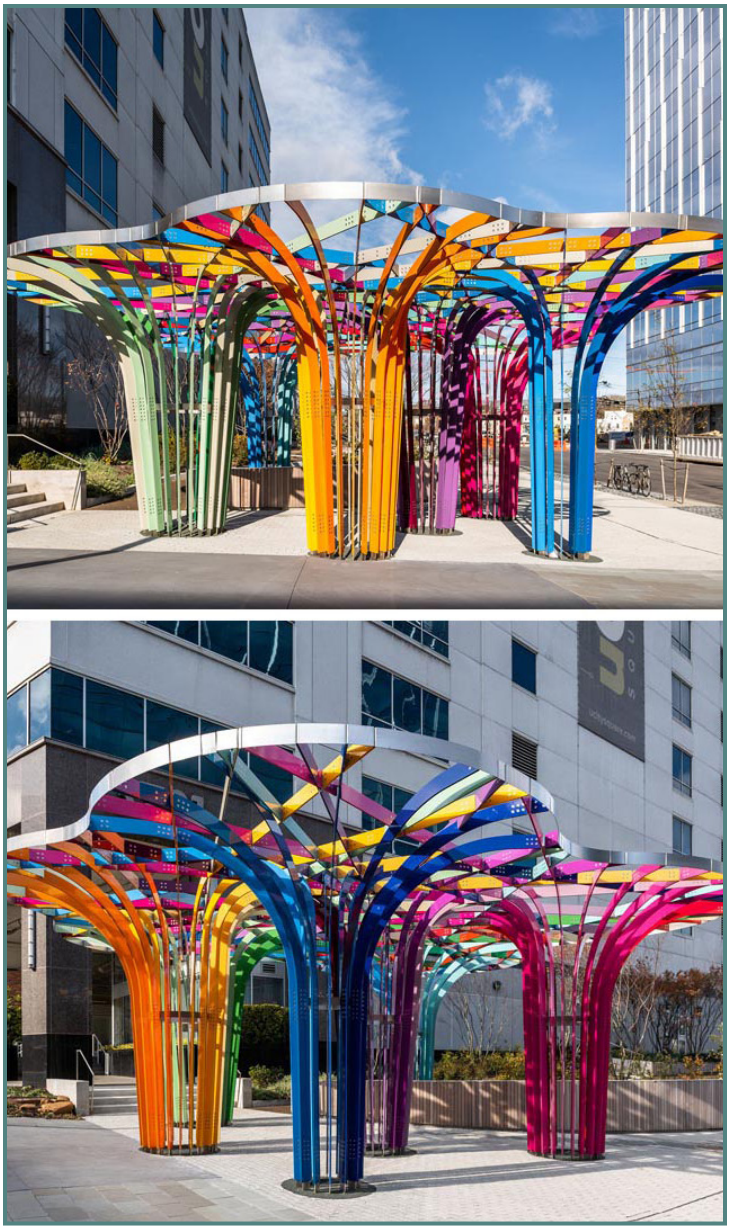


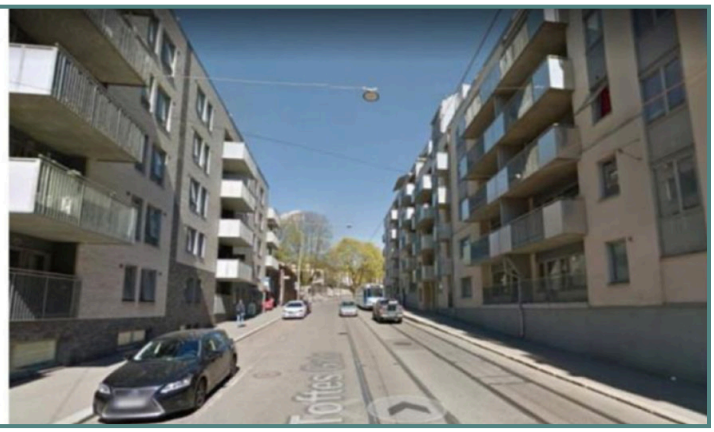
Figure 131: Interesting structures can add to a vibrant streetscape, like SOFTlab's 'Spectral Grove' installation in Philadelphia, PA, USA; *Photo credit: Alan Tansey via Contemporist.*

However, the sixth core tenet (consider context) is especially important for this typology of form. Their creative structures should support their context, and not feel arbitrarily placed without thought for the community they are serving – a common problem with many contemporary architecture projects. 'Aesthetically pleasing' could be a problematic term, depending on whose lens the space/design is being viewed through. Aesthetics and aesthetic preferences are complex, with a high degree of subjectivity, and are greatly influenced by culture, background, experiences, and personal preference.

Aesthetics (and environmental perception) are not a matter of pure opinion – studies have shown that they significantly contribute to subjective well-being. With empirical research

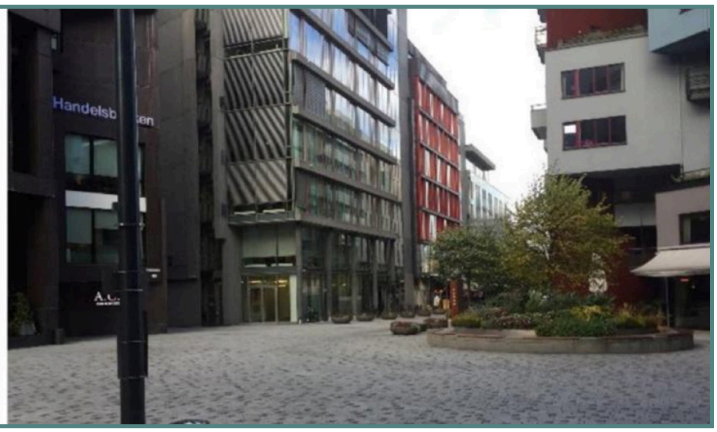
lacking in understanding contemporary versus traditional architecture & urban design, the first study on the topic, published in 2019 in Cities, found a general preference for the traditional architecture. Mouratidis & Hassan were able to conclude that contemporary architecture scored lower in environmental preference of the two. However, they did note that the overall perceptions of public space were more difficult to determine because they depended on a wider variety of factors beyond the specific design style (including vegetation, upkeep, car restrictions, public seating, water features, public art, history, safety, inclusiveness/exclusiveness, inequality, and the degree of publicness)[620]. This, of course, is a complexity urban planners and public space designers are fully aware of and familiar with.

Traditional street example: Toftes Gate lower, Oslo, Norway



Contemporary street example: Toftes Gate upper, Oslo, Norway

Traditional square example:
Sehesteds plass, Oslo, Norway



Contemporary square example:
Olav Selvaags plass, Oslo, Norway

Figures 132 & 133: Traditional versus contemporary examples of a public street (top, fig. 132) and a public square (bottom, fig. 133); Examples sourced from a study in a *Cities* journal article[621]; *Photo credits: Google images, Kostas Mouratidis, Ramzi Hassan*

Traditional	Contemporary
Symmetry Ornamentation	Asymmetry Lack of ornamentation Industrial appearance

Figure 134: Traditional vs. contemporary architecture as defined by study authors[622]

If this is true, perhaps elements of ornamentation, nostalgia, and visual interest for the eye could be beneficial. Even if this is not true, it is advisable to use local designers and forms of co-creation to embed any structural design within the city's culture it is serving.

Is curvature more pleasing?

Numerous scientific studies have found an innate preference for curvilinear objects over rectilinear ones (even when controlling for symmetry & balance), and that curvature tends to elicit pleasant emotions. A study published in the *Proceedings of the National Academy of Sciences (PNAS)* journal proved this extends to the built environment, with participants being "more likely to judge spaces as beautiful if they were curvilinear than rectilinear," activating a cortex in the brain associated with reward and emotional salience[623]. This finding is also in line with the concepts of biophilic design. People typically rate curvilinear forms as more approachable than rectilinear ones.

Figures 135 & 136: (L) The Pantheon, Rome, Italy; (R) Heydar Aliyev Center, Baku, Azerbaijan by Zaha Hadid; *Image credits: Adapa*

Some studies show that angular forms (especially ones that point downward/towards people) can be perceived as threatening, and trigger an avoidance response[624]. Organic forms can be incorporated through curves or arches in materials that complement these shapes, like timber, stone, and brick, or even understated elements like a gently curving piece of furniture or parapet[625]. Ingrid Lee, former design director at IDEO New York and author of the book *Joyful*, says that angular objects inhibit playful impulses, while round ones do the opposite[626]. Could this be scaled up to a sense of play at the urban level?

Figures 137-139 – from left to right: (137) SHOP NO. 851 by Studio Ardete, *Photo credit: ©Purnseh Dev Nikhanj via ArchDaily;* (138) Wormhole Library by MAD Architects, *Photo credit: MAD Architects via ArchDaily;* (139) The Other Nest, Chengdu, China by 100 Architects, *Photo credit: 100 Architects*

Of course, there are still people who prefer gridded structures and straight lines. This is in no way suggesting curved forms are the only option for *R-Spaces*, or advising for a lack of any rectilinear shapes or angles; it is simply interesting to consider in terms of designing a space specifically for comfort, approachability, and respite.

Typologies of form:

1. Multi-purpose structures (stacked/connected rooms, pods, zones, etc.)
2. Single-purpose structures (pockets, corners, encompassing shapes, etc.)
3. Shipping container(s)

1.1 ➤ Rooms, pods, zones – multi-purpose R-Space structures

Urban areas with larger footprints are ideal for placing

R-Spaces with more than one typology of occupation (i.e. a combination of *Rest*, *Relax*, *Restore*, and *Revive Spaces*).

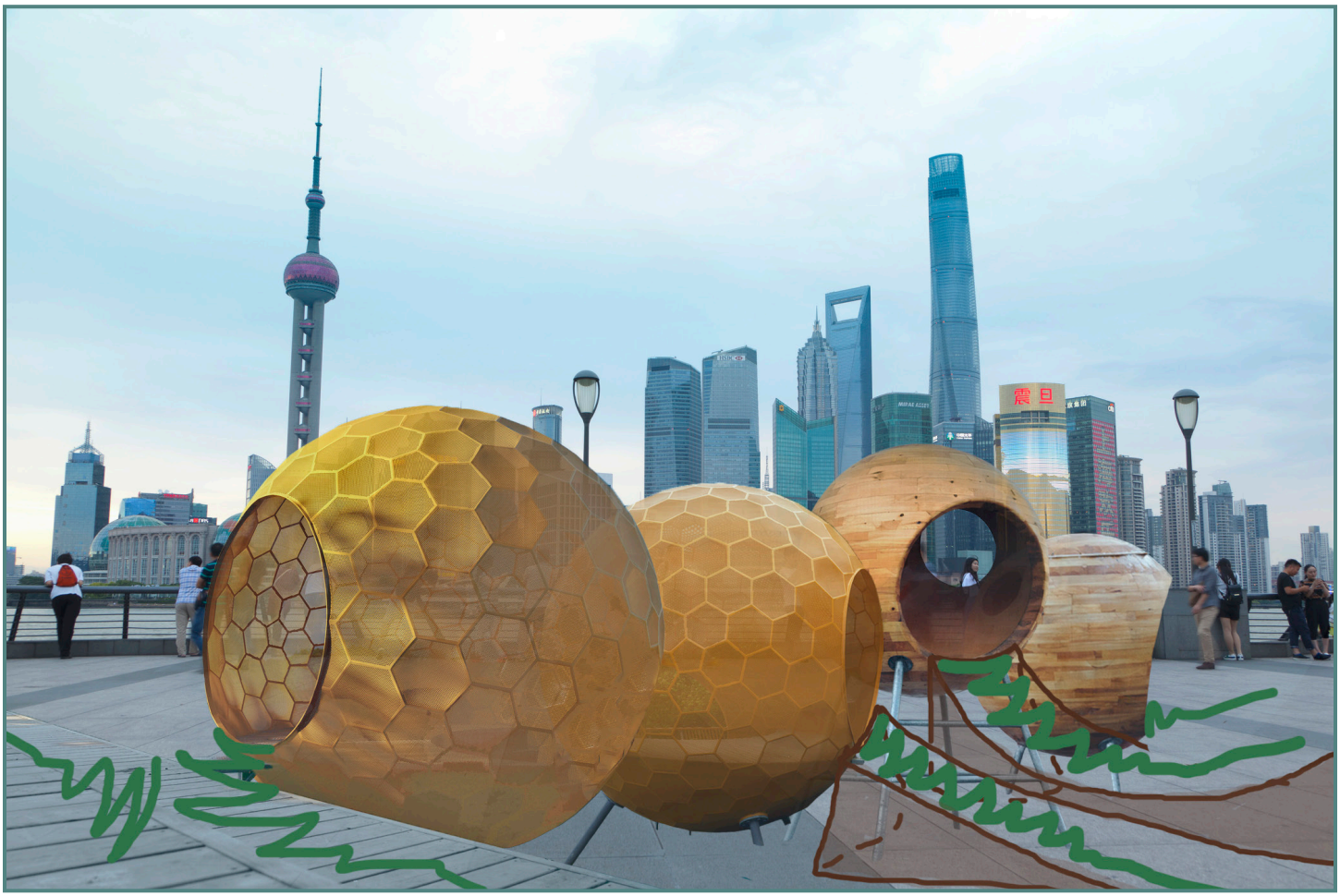
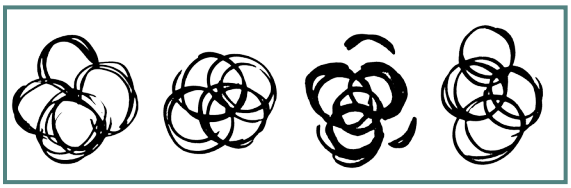


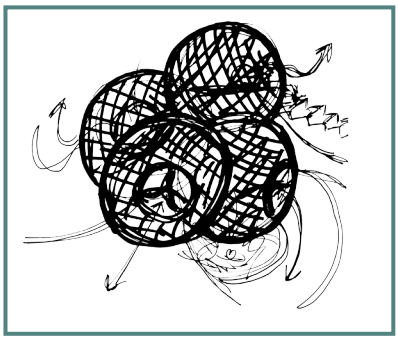
Figure 140: A rendering sketch imagining one possible multi-purpose, multi-space *R-Space* iteration on the Shanghai waterfront, with entrance & exit paths marked in green – image elements are representative of an idea only and are not to scale; *Rendering credit: author*

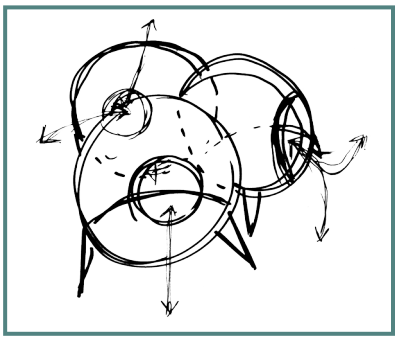
The biggest strength to this typology is the ability to address multiple needs in one location. As earlier discussed, a city is comprised of many different personalities, with different needs (due to independent persona factors or a particular moment in time). If an *R-Space* can offer one of each of the typologies of occupation simultaneously, it is serving the largest number of needs in one space; plus, it gives users the power of choice.

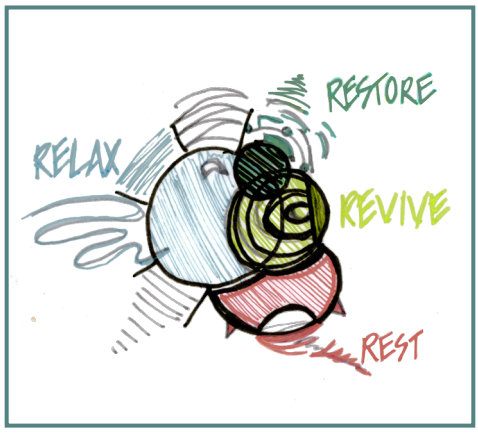
Figure 141: The arched chambers of Confluence Park loosely create different areas, which could become 'rooms' or 'zones'; *Photo credit: Casey Dunn via ArchDaily*

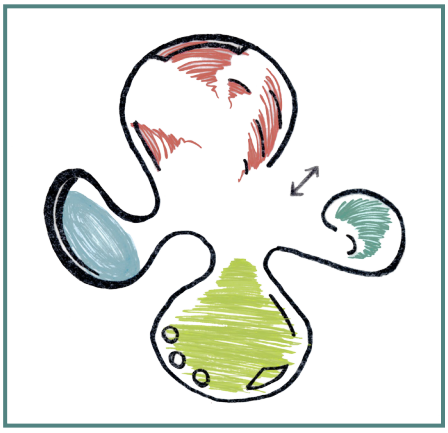
Inspiration











Figures 142-147: Various sketches for inspiration of multi-purpose forms; Figures 145 (bottom left) & 147 (bottom right) are in plan view with colors coordinating to space allocated for the four typologies ("raspberry" red = Rest, "morn" blue = Relax, "aloe" green = Restore, "lime" green = Revive); *Image credits: author*

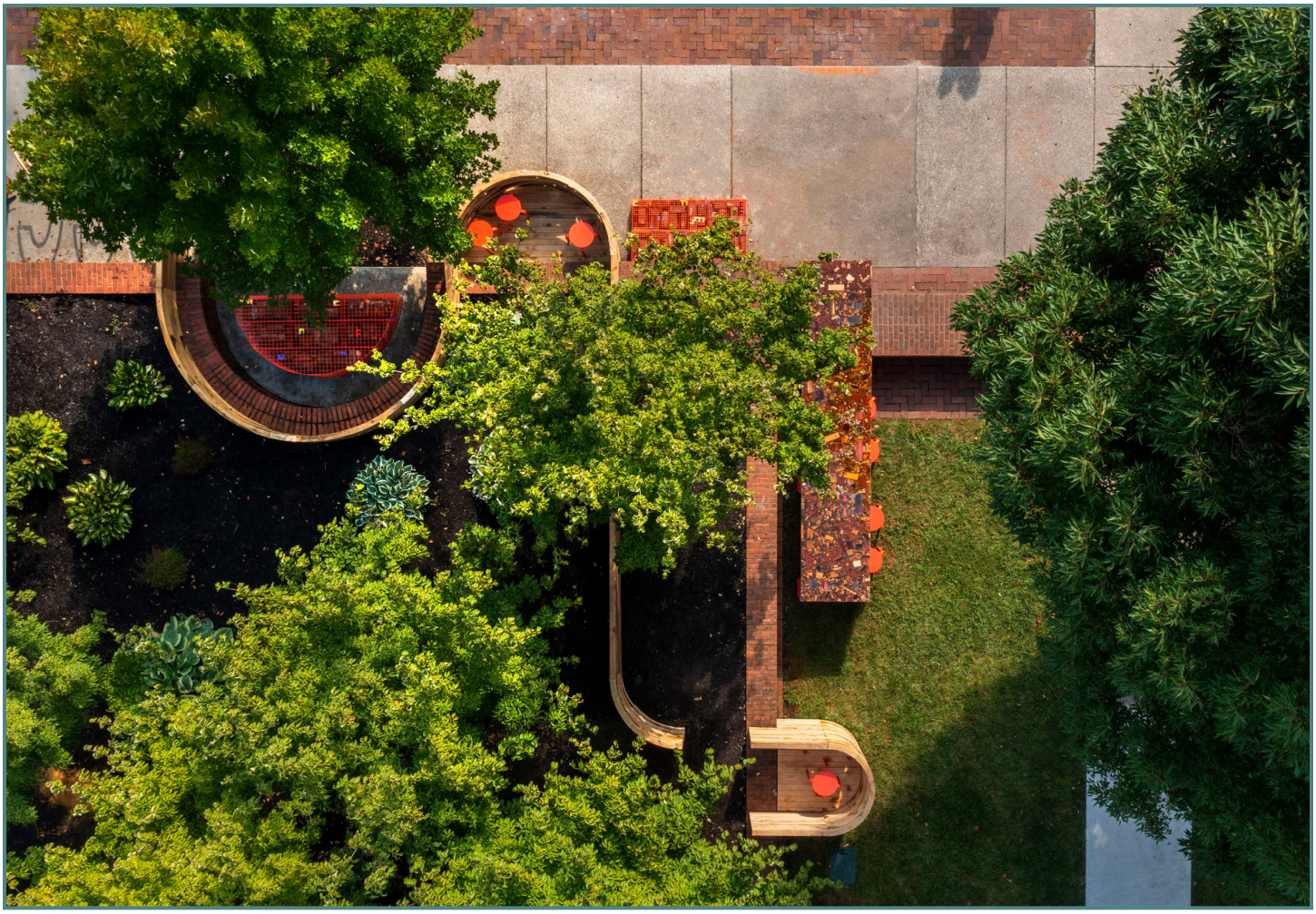


Figure 148: Aerial view of Sylvan Scrapple exhibit at Exhibit Columbus 2023 by Katie MacDonald & Kyle Schumann; *Photo credit: Hadley Fruits via Dezeen*

Considerations for this form:

- How to differentiate between the various purposes (rooms, pods, zones, etc.) – through spatial design differences, acoustics, etc.
- How many purposes need to be addressed in a specific location? If not all four, which two or three, and why?
- Can one 'room' still address multiple needs – for example, an *R-Space* designed as both *Rest* & *Relax* in one?
  - *Rest + Relax*, *Rest + Restore*, *Rest + Revive*, *Relax + Restore*, and *Restore + Revive* could all work
  - *Relax + Revive* is not advised unless separated into sections
- Should there be connections between the various rooms or areas?

Typology of form: Multi-purpose structures (stacked/connected rooms, pods, zones, etc.)	
Pros	Cons
• Addresses multiple needs in one location • Opportunity to be highly creative, unique, and interesting with the structure	• Takes up the largest footprint (potential space limitations) • Likely to be more expensive

Figure 149: Examining viability of multi-purpose structures as a typology of form for *R-Spaces*

1.2 ➤ Pockets, corners, encompassing shapes – single-purpose R-Space structures

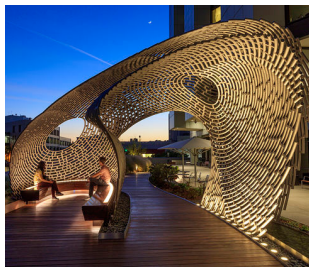
When there is a smaller amount of available space, or one need has been identified as much more prominent in an area than the others, an *R-Space* with just one typology of occupation could be built. Ideally, this would still be part of a larger network throughout the city with multiple spaces for each "R" function (*Rest, Relax, Restore, Revive*).

Precedent studies for form inspiration:

Fab Tree Hab
Pg. 187

Sclera
Pg. 188

Maximilian's Schell
Pg. 189



Healing Pavilion
Pg. 190

Precedent Study: Fab Tree Hab

By: Mitchell Joachim, Terreform ONE, and a large supporting team

Location: Natlab, Eindhoven, Netherlands

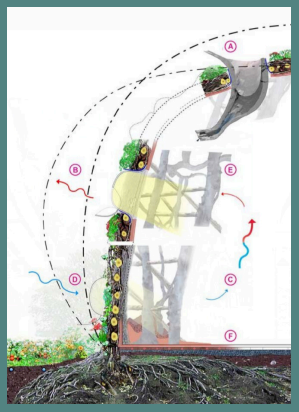
About:

- A method to grow homes from native trees[627]
- First of its kind – combines indigenous tree-grafting techniques with computationally-designed cross-laminated timber (CLT) arch scaffolds[628]

- Intent: for visitors to forest bathe & visualize themselves as being directly linked to the ecosystem[629]
- Living laboratory that changes with the seasons[630]
- The trees support the modular 'multi-species wall system' (made of crocheted jute fibers & 3D-printed bioplastic volumes that increase biodiversity) after a year's growth[631]

Takeaways:

- Although designed as housing concept, the theory & shape could be adopted to urban public spaces
- Indoor-outdoor hybrid structural arched shape that provides shelter with public access and safety of escape routes



- Full integration of biophilia into the built environment
- The way it grows & generates over time could symbolize the flexibility & changing nature of urbanism
- Beautiful example of radical design pushing the limits of traditional design expectations; shows the futurism potential to design better & more creatively

Photo credits: Terreform

Precedent Study: Sclera, 2008

By: Adjaye Associates

Location: London, UK

About:

- Located in a small square within the Southbank arts complex for a month-long design festival (Size+Matter: London Design Festival)[632]
- Inspired by the human eye as an exploration of form & space[633]
- Architect David Adjaye: "I'm fascinated by spaces that are transparent from one perspective, and opaque from another. But here I wanted complete immersion, it's about slowing down in order to perceive."[634]
- Described by Moskow & Linn in *Small Scale* as "a meditative chamber"[635]

Takeaways:

- An example of providing both prospect and refuge, views and shelter, which encourages a feeling of safety while being enclosed – described as shifting and turning, "alternatively screening and revealing the sky outside"[636]
- Interesting play with daylight and materiality

Photo credits: Adjaye Associates & Leonardo Finotti via Designboom

Considerations for this form:

- Wayfinding & signage/branding for which type of *R-Space* this is and its intended use
- How can the architecture support the specific function? What three-dimensional shapes and spatial configurations encourage rest, relaxation, restoration, or revival?

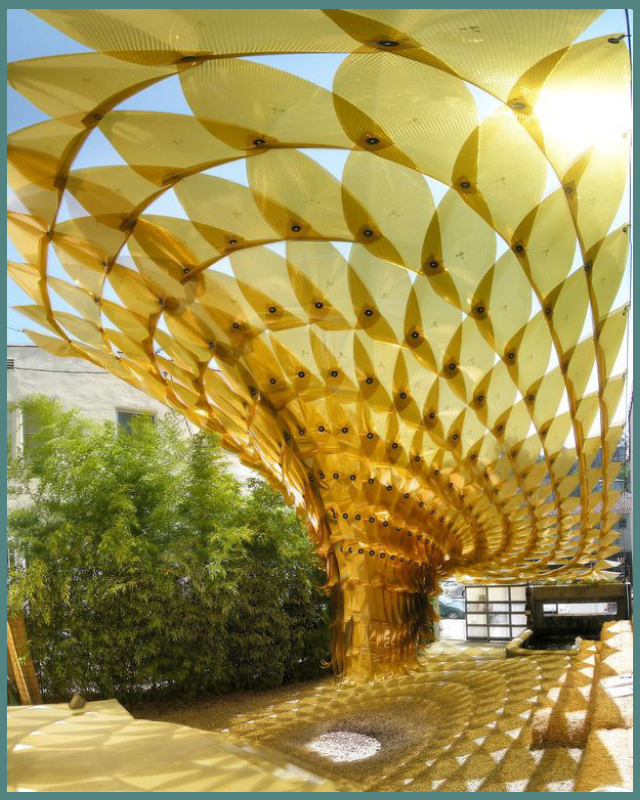
Precedent Study: Maximilian's Schell, 2005

By: Ball-Nogues Studio

Location: Los Angeles, CA, USA

About:

- A vortex-shaped, temporary, outdoor installation that provided shade in the form of an experimental outdoor room[637]
- Provided space for both social interaction & contemplation
- During the day, canopy cast colored fractal light patterns on the ground + integrated ambient sound installation by composer James Lumb[638]



Takeaways:

- Materiality (which is both transparent & reflective) contributing to indoor-outdoor, hidden-private, and prospect-refuge experience – in this case, it is amber-colored, UV-resistant film with a laminated metallic gold finish[639]
- Use of playful light and shadow inspire imagination and/or contemplation
- Example of integrating a soundscape for added sensory experience
- Structures which provide shade & shelter can have unique, creative forms that add interest to the streetscape

Photo credits: Oliver Hess, Neil Cochran, Joshua White, & Benny Chan, all via Ball-Nogues Studio

Typology of form: Single-purpose structures (pockets, corners, encompassing shapes, etc.)	
Pros	Cons
• Opportunity to be highly creative, unique, and interesting with the structure • Potential to take up less space than a multi-purpose one	• The more targeted approach means it might not be the exact *R-Space* that someone needs at a specific time (however, it is still better than not having any respite space)

Figure 150: Examining viability of single-purpose structures as a typology of form for *R-Spaces*

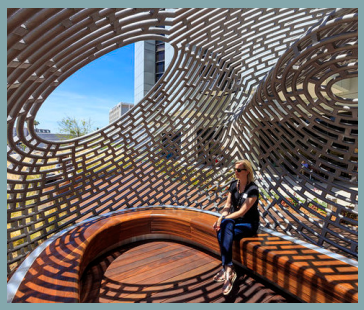
Precedent Study: Healing Pavilion, 2017

By: Ball-Nogues Studio

Location: Cedars-Sinai Medical Center,
Los Angeles, CA, USA

About:

- Shade & seating for visitors in the garden of an urban hospital
- Meant to temporarily transport the visitor's mind away from illness through intricate patterns & shadows that capture the imagination[640]



Takeaways:

- Use of patterns to redirect attention & offer distractions
- Cutout views
- For darker environments & places with long evening hours, openness & lighting for feelings of safety

Photo credits: Ball-Nogues Studio

Further Reading:

- "Design for Human Flourishing: A Novel Design Approach for a More 'Humane' Architecture" by Stevens et al.[641]

Considerations for standalone structures (both multi- and single-purpose):

- Sustainability of construction materials & methods
- City budget vs. available existing (vacant or convertible) spaces
- Where best to place these (see section IV)

1.3 ➤ Shipping container(s)

"A shipping container is a ready made, self-supporting structure that doesn't require any foundations and is easily customizable to allow for bespoke design."

– Alexander Giarlis, co-founder of Neubau[642]

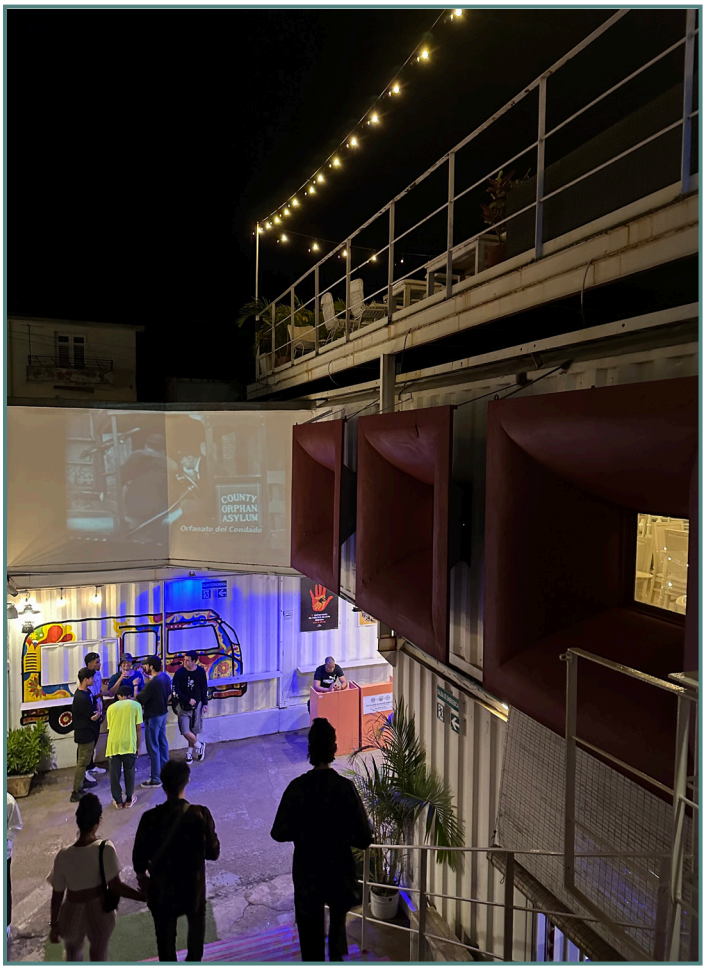
What can shipping containers become?

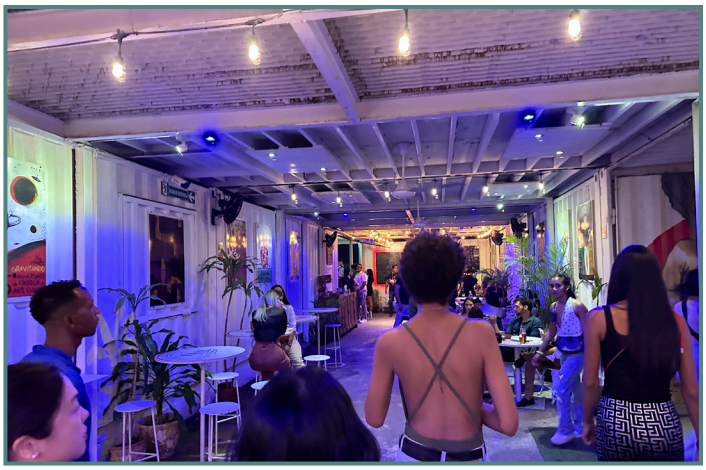
- Pop up exhibitions
- Pop up markets & food hubs
- Art galleries & cultural spaces
- Co-working & office spaces
- Vertical gardens & urban farming
- Disaster relief & emergency shelters
- Educational facilities & amenities
- Pop up parks, mini-golf courses, & other recreational facilities
- Public art installations[643]
- *R-Spaces?*

According to Marketresearch.biz, the shipping container market is expected to reach 16.1 billion USD by 2032, growing from 8.7 billion USD in 2022[644]. In addition to a certain trendiness, they are growing in popularity as a structural form due to a number of factors, such as their movability, adaptability, and durability.

Designers can consider the use of shipping containers as a

base structure for *R-Spaces*, although they should be modified so that any finished design follows the six core design tenets previously explained. While separated out in this toolkit, technically shipping containers could be used to design either multi-purpose or single-purpose structures, as defined above. They are unique in that they are both a construction material, and a pre-existing structure. Unlike other potential construction materials for standalone *R-Spaces*, they are prefabricated (to work within, manipulate, or build off), and they are modular & movable[645]. Their unique aesthetic has proven popular worldwide, from food hubs to university buildings to cultural spaces[646], such as the Fábrica de Arte Cubano (FAC) (fig. 151-153).





Figures 151-153: The re-purposed shipping containers that make up parts of the FAC in Havana, Cuba add to the unique atmosphere and patchwork feel of a place that patches together many spaces with different spatial conditions & activities into a blended dance-club-art-gallery-performance-venue. The aesthetic fits well with the wider cultural (and architectural) landscape of Havana, which is characterized by resourceful, inventive uses of limited resources. *Photo credits: author.*

Their sustainability is somewhat controversial, since some consider them a reuse of an existing material, reducing waste, while critics, such as San Francisco architect Mark Hogan, say it is better to recycle the container into steel & build with that instead of using the actual container[647]. Although Hogan is vocally opposed to their use specifically for housing, some of his concerns would extend to their use in *R-Spaces* as well. A key issue is insulation – they have poor temperature regulation (wherein they get very cold & very hot inside)[648], requiring energy resources if modified for maximum comfort. Hogan explains they can also be structurally problematic – needing reinforcement for almost any modification – especially when stacking[649]. Furthermore, the CEO of Conexwest, a nationwide shipping container supplier, told NPR that the majority of his customers opt for new or nearly new ("one-trip" containers) instead of used ones, essentially negating the eco-friendly recycling element of their appeal[650]. In fact, some municipalities, like Los Angeles, do not even allow the use of containers that are damaged, more than two years old, have previously been repaired. Really, the use of a shipping container only fits its environmentally-friendly narrative when it is being diverted from a landfill and not purchased brand new[651].

Figures 154-156 - clockwise from top left: (154) El-Box, 2019 by NYC Department of Transportation, Old Seaport Alliance, & Ore Design, Manhattan, NY, USA, *Photo credit: El-Space Toolkit;* (155) Concert for One, 2019 by Rayna Yun Chou, Harvard's Science Center Plaza, Cambridge, MA, USA, *Photo credit: Naomi S. Castellon-Perez via The Harvard Crimson;* (156) A&DO Lab, 2021-2023 by Design Museum in Helsinki & MC Containers, *Photo credit: MC Containers*

Figures 157 & 158: (L) Hughes Hall at Cambridge University, 2018 by Neubau is a reception for visitors & office for porters, with pigeonholes for students. They chose a container because it is a quick to deploy, non-permanent structure that is highly adaptable to specific use[652]. *Photo credit: Nick Guttridge via Dezeen.* (R) Cool Cool Seaside was constructed in 2017 by Atelier Let from 3 containers with sides folded out over seating, providing shelter for players & spectators at a basketball court[653]. *Photo credit: Yi-Hsien Lee Photography via Dezeen*

Considerations for this form:

- It is more sustainable to use shipping containers that might otherwise be meant for landfills, not brand-new ones – Italian architects Tolla & Lignano of LOT-EK prefer ones that are 10-15 years old[654]
- Should have sides opened, visibility cutouts, and/or multiple entrances – if completely closed in with only one entrance, safety concerns
- If cutouts are added, structural reinforcement is necessary[655]
- They *may* be a more environmentally-friendly option than other traditional building materials (such as concrete), but this is not definitive (and would require further research)

Typology of form: Shipping container(s)	
Pros	Cons
• Modular, movable, & adaptable • Highly adaptable to specific use • Durable • Unique aesthetic, can be fair easily customized and/or exterior as public art	• Temperature regulation (they get very cold & very hot inside) • Sustainability is controversial – further research into environmental concerns needed • May not fit certain contexts

• Prefabricated structure to work within, manipulate, or build off • Quick to deploy	

Figure 159: Examining viability of shipping containers as a typology of form for *R-Spaces*

→ Structural option 2: Integration into existing structures

The other structural option for *R-Spaces* is to integrate one into existing structures. Some potential ways this could be done (which are explored below) include:

- Under viaducts
- In vacant storefronts or building lobbies
- Attached to public transportation stops

2.1 ➤ Idea: under viaducts

"Viaduct arches have proven to be versatile spaces for conversion to a wide range of uses."

– *Under the Viaduct*, Arup[656]

Viaduct structures are disruptive to the pedestrian experience of cities, and are often considered eyesores and/or community dividers. They are noisy, sometimes unsafe, and often surrounded by poor air quality due to exhaust pollution from cars (in the case of elevated highways). At the same time, when supporting public transportation such as a light rail or metro, they can be vital infrastructure for growing cities. In modern urban planning, the majority of cities have been designed, or redesigned, for cars, making car-centric infrastructure like elevated highways a common reality. As cities become denser, it is likely many will build new elevated transport infrastructure to minimize surface level impacts[657]. While these spaces are often under-used and neglected, historical precedents of 19th

Century railway viaducts of London, Paris, and Berlin show that these structures can "become sewn into the city fabric."[658] These spaces can be viewed as assets. Many currently have informal community uses or provide essential storage facilities for municipalities[659], although many can also be improved with better design and holistic planning.

Figure 160: Viaduc des Arts, Paris; *Photo credit: ©Alamy via Under the Viaduct (ARUP)*

Two key publications investigate opportunities for the left over or residual void spaces below viaducts: Arup's *Under the Viaduct: Neglected Spaces No Longer*[660] and Design Trust for Public Space's *El-Space Toolkit*[661].

Under the Viaduct identifies four typologies of form for viaducts: elevated rail, elevated highways, highway junction, and bridge ramp undercroft[662]. The third type, the highway junction, lacks pedestrian connectivity, and therefore, would not be an appropriate place for an *R-Space*.

When it comes to urbanism projects surrounding viaducts, there are two possibilities: a large-scale urban design project completely overhauling the underneath space (like all of the case studies in *Under the Viaduct*), or small-scale interventions (like many of the case studies in the *El-Space Toolkit*).

For a large-scale design project, such as Westway London (see callout box & fig. 161), one or more *R-Spaces* could be included as part of the network of spaces. Along with the studios, shopping, market place, recreation spaces, etc. being planned out, *R-Spaces* would provide another type of space to meet more needs.

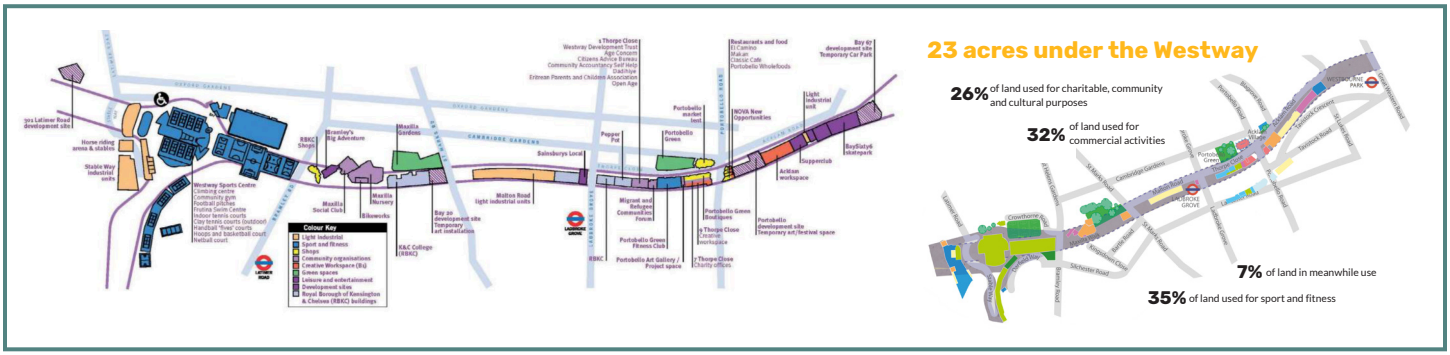


Figure 161: Illustrations of the layout of Westway Trust (in plan view); *Image credit: The Westway Trust*

Figure 162: Addis Ababa's Light Rail, Ethiopia; *Photo credit: Alexander Savin, WikiCommons*

Projects such as Westway London (fig. 161) and Addis Ababa LRT in Ethiopia (fig. 162), with a large number of commuters and pedestrians, are examples of viaduct infrastructure that would benefit from inserted *R-Spaces*. However, *R-Spaces* are not well suited to all viaduct space design overhauls. With regards to projects in more suburban areas, and sites with less pedestrian connectivity, such as Sydney, Australia's M4 Expressway (fig. 163), they do not make sense. Projects in these areas tend to have different priorities for activation, in which an *R-Space* is not necessary. This is another case where it is important to consider the context of the project.

About Westway Trust

North Kensington, London, England

- Area under the Westway (viaduct) created & managed by the Westway Trust, a charity established in 1971 in response to the Westway motorway being built through the community in the 60s
- Extremely successful venture with many community benefits
- Series of community & commercial facilities including:
  - independent retailers
  - offices for charities
  - market & events space
  - fitness center with indoor climbing wall & outdoor sports facilities
  - a skate park
  - performance spaces
  - an arts & cultural center
- Physical challenges included:
  - the physical road barrier to pedestrians
  - lack of light
  - air & noise pollution
  - restrictions on attaching to structure
- Shows success of deep & deliberate engagement with both the community & the government (and management by a nonprofit)

Figure 163: Case study image collage of the M4 Expressway project in Sydney, Australia displaying low pedestrian traffic areas around the project site; *Collage source: Arup's Under the Viaduct report*[663]

A city does not have to plan a massive overhaul project to improve spaces around viaduct infrastructure. The El-Space initiative proves that small-scale interventions, from musical booths & seating prototypes to green infrastructure (fig. 164 & 165), can add a lot to the environment[664]. A smaller scale allows for prototyping and a high amount of innovation, hopefully which will be pursued by designers and planners. To this end, viaduct infrastructure could potentially provide space for standalone *R-Spaces* interventions.

Figures 164 & 165: (L) "Boogie Down Booth" installation with seating, solar-powered lighting, & directional speakers, Bronx, NY, USA, *Photo credit: Design Trust for Public Space via El-Space Toolkit*; (R) Above ground planters capturing stormwater, Sunset Park, Brooklyn, NY, USA; *Photo credit: NYC Department of Transportation via El-Space Toolkit*

R-Spaces under viaduct structures	
Opportunities & benefits	Drawbacks & difficulties
• Large amounts of empty space under in the majority of cities • In cases where attachments to the structures are allowed, could minimize built additions • Even without attaching to the structure, viaduct provides overhead shelter/shade	• Increased air & noise pollution – acoustics will be particularly difficult here & not the best location for quiet spaces • Restrictions on attachments to viaduct structures • Consider potential safety issues around pedestrian crossings in high traffic areas (where roads are crossing around & under viaducts)

Figure 166: Examining viability of *R-Spaces* under viaduct structures

2.2 ➤ Idea: in vacant storefronts or building lobbies

Cities worldwide have a lot of usable space in the form of vacant storefronts. For example, in Manhattan in 2019, there were 5,313 reported ground-level vacancies, which approximates to 31.2 million square feet of space[665]. Following the COVID-19 pandemic, cities are suffering from even more vacant storefronts, which can be (and in some cases, are already

being) re-purposed in many ways, including:

- retail incubators[666]
- urban agricultural laboratories[667]
- libraries
- senior centers
- cooling centers
- childcare services
- after-school programs
- community centers
- public bike parking
- public restrooms[668]

Even more creatively, some cities have turned these vacancies into new *third places*. The following is a brief list:

- **Boston, USA**: former restaurant --> tea room with afternoon tea service, live music, & art exhibitions
- **Amsterdam, Netherlands**: former bank building --> multipurpose community hub with a cafe, library, co-working space, yoga studio, & cinema
- **Melbourne, Australia**: former clothing store --> pop-up art gallery with public workshops, talks, & performances
- **London, England**: former pub --> social enterprise cafe, bakery, catering service, & cultural event venue that trains & offers employment opportunities for refugees & asylum seekers[670]

➤ **Third places**: informal spaces that foster community, where people can gather, socialize, & interact outside their homes (first places) and workplaces (second places); examples include cafes, libraries, community centers, & bookstores[669]

Figure 167: Pop-up community hub by Spaceus in Harvard Square storefront, Boston, MA, USA; *Photo credit: Carlen Deskin / ©Spaceus via ArchDaily*

With the diversity of reuse ideas, *R-Spaces* could fit into the urban network of vacant storefronts. In addition to storefronts, there is an opportunity in building lobbies. Many are uninspired in their design and lack public amenities, when they could double as public spaces. This is a larger issue of public vs private spaces and what should be provided to urbanites, but regardless, it is another location to consider for the placement of interior *R-Spaces*.

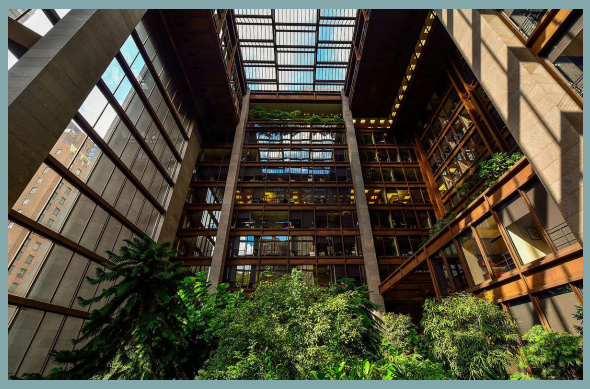
Precedent Study: Ford Foundation Atrium, 1967

By: Kevin Roche John Dinkeloo & Associates and Dan Kiley / rehabilitated & restored from 2015-18 by Gensler Architects & Raymond Jungles[671]

Location: Manhattan, NY, USA

About:

- Glass walls create the temperate environment for subtropical garden
- Tiered, 3-level garden terraces[672]
- 40 species of trees, vines, & shrubs
- Reflecting pool & reverberating fountain to hear the surrounding garden
- Sensory section with braille signage & audio interpretation for people who are blind or have low vision to interact with the plants



- Wheelchair-accessible path
- Prohibitive policy that requires visitors to complete a registration process[673]

Takeaways:

- A rare example of a well-designed indoor space with elements of nature & respite
- Considers universal design
- The nature of it being a privately owned public space with registration required is prohibitive

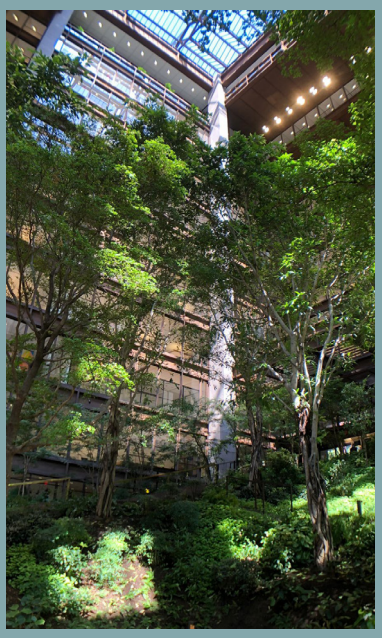


Photo credits: Ford Foundation, Patsrodriguez/Atlas Obscura, Wikimedia Commons

R-Spaces in vacant storefronts & building lobbies	
Opportunities & benefits	Drawbacks & difficulties
• Incorporating into existing indoor space saves resources & costs • Climate control • Likelihood of locations that are in high-traffic areas like downtowns • High number of storefront vacancies following the pandemic • Might work best as temporary installments in vacant storefronts; could be more permanent in lobby spaces	• Poor perception of publicness • Potential for private ownership to be prohibitive, exclusive, etc. (consider how to keep spaces under public ownership) • Less visibility in terms of people knowing where the *R-Space* is – consider signage & wayfinding • Opening up a connection to the outdoors will be a challenge • Design will need to be customized for lobby to section off from main entrance/ room for privacy • Limited access hours • Need for close, trusting relationships with property owners • Potential to neglect economic needs

Figure 168: Examining viability of *R-Spaces* in vacant storefronts & building lobbies

Further Reading:

- Regional Plan Association's *Vacant Storefront Toolkit*[674] (especially Part 4: 'Activate Interior Space of Vacant Ground-Floor Space')
- *Vacant Spaces NY* by Michael Meredith & Hilary Sample[675]

2.3 ➤ Idea: public transportation stops

The experience of using public transportation can range from pleasant & convenient to exhausting & dreadful (see 'Getting around' in section III for more). The design of outdoor transportation infrastructure like bus stops varies widely around the world and can change an agreeable 10-minute wait sitting under shelter into misery, standing exposed in

the glaring heat or pouring rain. This section focuses on the exterior stations which could be added to or modified as *R-Spaces*; for the placement of *R-Spaces* inside more interior transportation infrastructure like train stations, see 'Potential focus areas' in Section V. These 'exterior' stations include tram stops/stations, streetcar stops, light rail systems, and bus stops. As of December 2018, tram and light rail systems (LRT) were available in 389 cities globally, with major growth since 2000[676]. However, due to the infrastructure of LRT (often in the middle of roads), space may be limited around these stops, making bus stops a more likely location for *R-Spaces*. (This does not mean that all LRT stops should be completely discounted – if there is a larger footprint around a stop, it still could be viable).

Figures 169-173 – from left to right, *top row* (169) Piotrkowska Centrum, the central tram station in Lodz, Poland, *Photo credit: Mariola Anna/Shutterstock via futureRAIL*; (170) Tram stop in Moscow, Russia, *Photo credit: Aleksei Golovanov/ Shutterstock via futureRAIL; bottom row* (171) One of 1,700 tram stops in Melbourne, Australia, the current longest LRT network[677], *Photo credit: Gagliardi Photography/Shutterstock via futureRAIL*; (172) Causeway Bay in Hong Kong, *Photo credit: istock*; (172) A vintage tram in the centre of the Old Town of Milan, Italy, *Photo credit: kavalenkava/ Shutterstock via futureRAIL*

Interestingly, bus stops have been an opportunity for many designers around the world to play with infrastructure at a small scale for improved everyday use. Photographer Christopher Herwig traveled 18,000 miles (30,000 km) documenting bus stops across 14 countries of the former Soviet Union for his 2015 book (and later, 2022 documentary) Soviet Bus Stops. In this project, the bus stop showed individual expression and artistic experimentation during the Soviet period, subverting state control. In addition to the Soviet examples, there are examples of creative bus stops all over the world. From playful forms to beautiful structures to thoughtful interventions, bus stops in particular have proved to be open to interpretation, and could be an ideal place to target well-being on the everyday scale in cities.

Figures 174-177: Examples of bus stops around the world with unique forms; from left to right: (174) Gagra, Georgia, *Photo credit: ©FUEL / Christopher Herwig via Architectural Digest;* (175) Balykchy, Kyrgyzstan, *Photo credit: ©FUEL / Christopher Herwig via Architectural Digest;* (176) Isahaya, Japan, *Photo credit: Yuko Yamada via Architectural Digest;* (176) Ventura, California, *Photo credit: S. Peschel, Berkeley via Architectural Digest*

Figures 178-180: Examples of bus stops that provide services in addition to seating & shelter; from left to right – (178) This bus stop considers contextual well-being with its use of integrated ultraviolet light therapy in in Umeå, Sweden, where the sun sets as early as 2:30pm[278], *Photo credit: Johan Gunséus/SYNK/Umeå Energi via Conde Nast Traveler;* (179) One of the book stop libraries sponsored by the Municipality of Bağcılar, Istanbul, *Photo credit: Daily Sabah;* (180) Air conditioned bus stop in Dubai's hot climate provides relief for commuters, *Photo credit: Elvis Payne/Flickr via The Guardian*

Figure 181: Studio Ulises's 'Cultural Constellations' bus stop concept combines innovative structural design with prioritization of the commuter experience. It is designed to promote a culture of reading, while bringing the community together, and serving as a platform for local artists & writers. Meant to be "aesthetically pleasing to uplift the public realm," the inflatable PVC structure is easy to transport & install, allows for plenty of natural light, and provides a comfortable "cozy nook to read & rest while navigating the city, becoming integrated with the urban fabric..."[679] *Photo credit: Ulises via Designboom.*

In *City Comforts*, Sucher recommends building bus shelters with public services to make small stops more pleasant. He suggests transportation authorities could build kiosks with pop-outs for entrepreneurs to plug in their own gear[680]. This is in line with the thinking behind *R-Spaces*, which could be added as a sort of kiosk or public service (for mental health).

R-Spaces could be attached to existing bus stops or designed in conjunction with a stop. If added as an extension, they would be best as *Relax*, *Restore*, or *Revive Spaces* (with the stop itself providing rest seating). If the stop itself was designed as an *R-Space*, it could be a *Rest Space* – essentially an elevated bus stop that follows the core tenets of design – or it could add *Revive* elements to refresh and inspire people at the same time.

One existing project which embodies some of the core values and goals of *R-Spaces* is the Station of Being bus stop prototype, detailed in a precedent study on page 207.

R-Spaces in vacant storefronts & building lobbies	
Opportunities & benefits	Drawbacks & difficulties
• Examples of unique bus stops around the world show flexibility in the structures • Particularly addresses the 3rd need (for a better everyday experience) • Could be funded by city transportation departments • If designed in tandem with the entire shelter structure, would utilize a space already needed for infrastructure	• Space may be limited, especially in busier areas • Will likely have to contend with high traffic volumes in term of noise (& possible sound insulation) • May have to work within more restrictions than other areas (sidewalk rules, transit department rules, structural limitations, etc.)

Figure 182: Examining viability of *R-Spaces* at public transportation stops

Precedent Study: Station of Being, 2019

By: Rombout Frieling Lab & Research Institutes of Sweden

Location: Umeå, Sweden as a prototype for the entire Arctic region

About:

- Designed to improve passenger experience of waiting in the cold weather around the Arctic region
- Lights & sounds alert passengers to approaching buses
  - Passengers do not have to keep lookout
  - Change based on destination of bus (i.e. glassy tones for the bus headed to the glass factory)
- Research found that people prefer to stand or lean in cold, snowy conditions, so there are leaning pods instead of seating
- Timber pods rotate to offer privacy & protection from wind
- Consumes the same amount of energy as a standard bus stop, but with much better amenities

Takeaways:

- Better design for commuter experience, with thought to comfort & relaxation
- Rotating leaning pods could potentially be implemented in *R-Spaces* – they allow for the choice to be more private & address prospect-refuge theory

"I find it important that people get a chance to escape the rational humdrum of the everyday, to do things differently and to engage their bodies."

– Station designer, Frieling

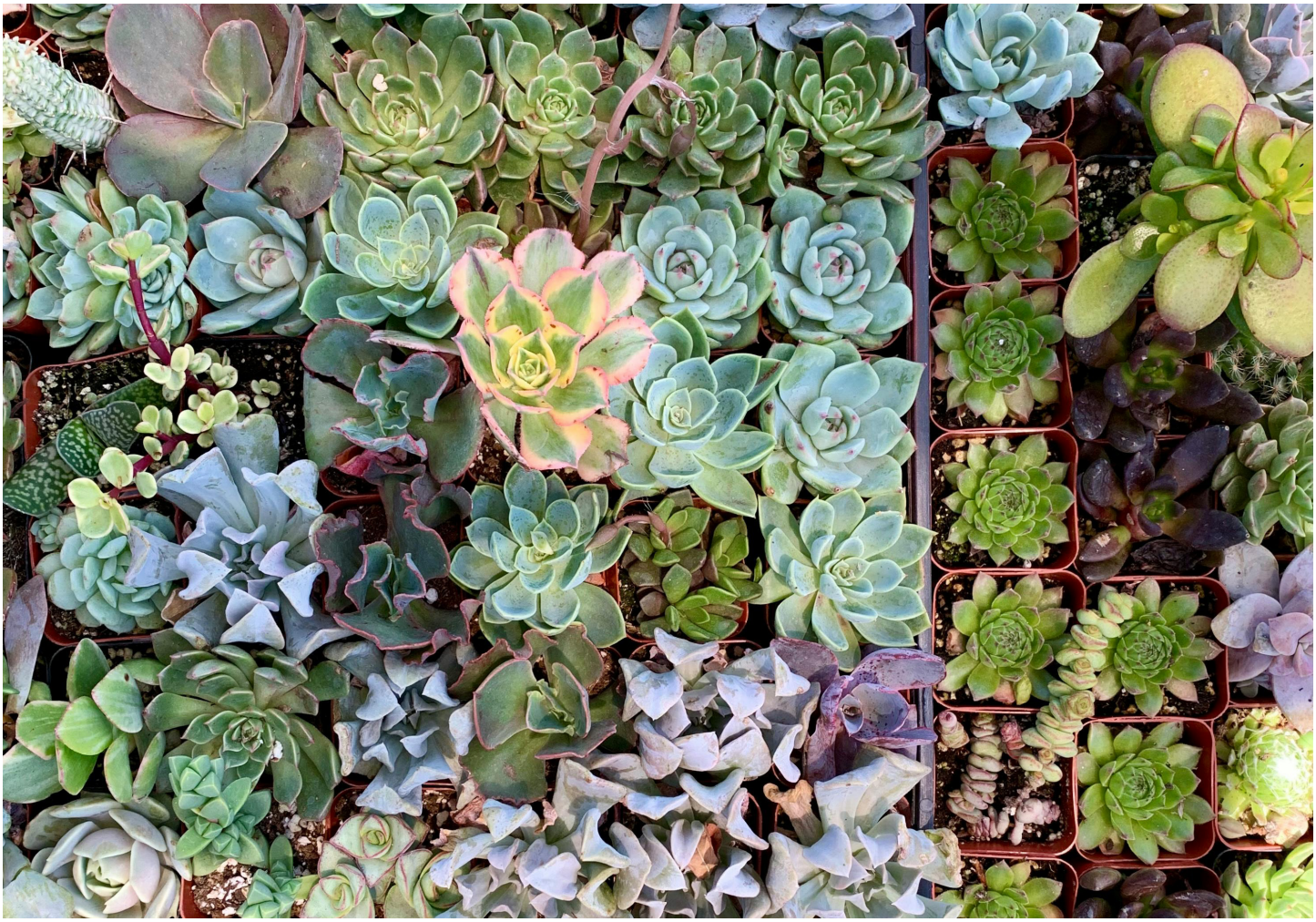
Precedent study informed by Dezeen article[681]; *Photo credits: Samuel Pettersson via Dezeen*

→ Standalone vs integrated

Standalone structure	Integration into existing structure
• Opportunity to be highly creative, unique, and interesting with the structure (especially if existing structures are basic/poorly designed/boring) • Structure adds to the streetscape (and can add variety, which is good for urban well-being) • Do not have to worry about existing structure restrictions (specific codes, historic preservation, materiality, etc.) • Really makes it a new public space typology that adds diversity to the urban landscape • More freedom with design choices • Can insert into high trafficked areas as an intervention • More flexibility with placement (instead of relying on another space to allow additions)	• Use of existing resources & spaces • Potentially more budget friendly • If adding to an interior space like a train station or library, the weatherization is already taken care of (air con, etc.) • Good exposure for people who are already using/passing the existing structure to discover *R-Spaces* (where they could miss a standalone one not realizing it is there) • Depending on how it is designed & integrated, could use less environmental resources in the construction • Opportunity to be part of a larger project (e.g. the example of viaduct build-outs like Westway London) • Possible funding source from however the existing building / structure is funded

Figure 183: Potential benefits of designing as a standalone structure vs. integration into an existing structure

Figures 184 & 185: Growroom by Husum Lindholm Architects, Copenhagen, Denmark;
Photo credits: ©Husum Lindholm Architects via Architizer



The Experience

→ The general experience

The experience of the space deals with the programmatic functions of the *R-Space*, the interior design (or more interior elements), and how users engage with it (or them). Obviously, the form and experience are interrelated and should reinforce each other. If an *R-Space* is being designed by an interdisciplinary team, this would be the place for an exhibition

designer's expertise, or possibly an interior designer or installation artist. Where the exterior forms previously discussed fall more under architecture, this is experiential design.

Fleeting social contact

Sociologist Lyn Lofland links 'transitory public sociality' – brief social interactions in public – with a sense of emotional well-being through enjoyment and amusement[682]. Introducing an interactive feature in *R-Spaces* to facilitate fleeting interactions between strangers could foster a supportive environment of shared struggles, wherein users are reminded other people need breaks or inspiration too. This could be done in any number of creative ways, from a system to share messages to somehow creating trace imprints of previous users. This is just one way that these spaces could feel connected to a larger network and culture of care, and reinforce connections over loneliness, even in a space created for solitude.

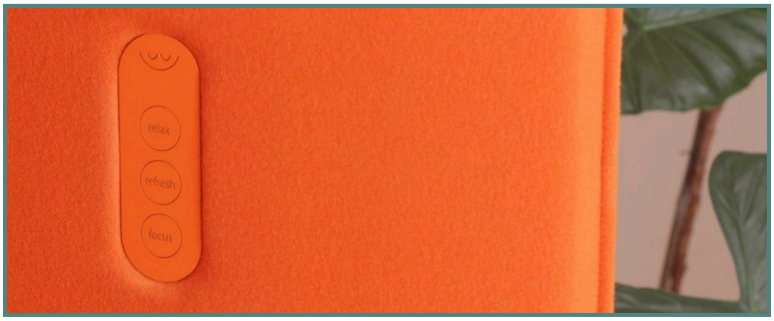
Safe spaces

Places that support subjective well-being and emphasize a comfortable experience should be safe spaces. 'Safe' can mean different things to different people, but Designing Mind-Friendly Environments advocates for the following measures in creating a safe space:

- A sense of refuge, prospect, and opportunity to escape (reinforcing tenet three of *R-Spaces*) leads people to feel more relaxed and secure. There should not be a fear of being snuck up on from behind – people want to be able to achieve their own natural surveillance from a defensible space[683]. This is not in support of excessive monitoring and control through rigid CPTED-inspired designs. Instead, as previously discussed in the prospect-refuge section, simple elements like seating backed against a wall can make a space feel safe without resorting to overly restrictive measures.
- Elements like windows overlooking passerby or some other presence of habitation & nearby activity – a perception that others are around – can help with a sense of security in enclosure[684]. For *R-Spaces*, it is of course important to balance this with the need to be alone.
- Ways for people to adjust the amount of sensory input they receive so they have control over sources of sensory overload. Some stimuli might actually help calm people[685], so offering optional audible or visual interactions like

sounds & projections that can be turned off & on might be beneficial.

- According to Maslin, when people are stressed, they may want to activate their vestibular and proprioceptive senses[686] (which are fully defined on page 121). This could mean providing therapeutic exercises that engage the body and increase embodiment in the space for grounding and calming.



Figures 186-188: The Headspace Pod by Mike & Maiike (partnered with the meditation app Headspace) includes built-in directional audio with three button options: relax, refresh, and focus – each providing a 10-minute meditation break[687]. *Photo credits: Yanko Design.*

General ideas

Some ideas & considerations for the interior experience of *R-Spaces*, informed by well-being research, include:

- When people sing, they show signs of trust, well-being, & a reduction in stress. On the hormonal level, this is indicated by increased levels of endorphins & oxytocin and reduced levels of cortisol[688]. Could singing somehow be incorporated into the experience?

- Nature begins with light – natural light gives bodies more physiological & psychological benefits[689].
- Different neurological needs require different environments, but providing multiple sensory opportunities in an environment can help address multiple needs; it is important to provide a choice of options[690].
- As a designer, do you resonate with any of the ancient well-being spatial practices, such as Chinese feng shui or Indian vastu?

Textural wood wall in Nha Trang, Vietnam;
Photo credit: Nicole Craanen/Rooted in Nature

→ Materiality

There are more options for materials than possible to review in the scope of this report. There are exterior building materials & façades, interior wall & floor coverings, and materials for furniture & fixtures. However, it is an important topic to explore; author Goldhagen explains in *Welcome to Your World* that people experience surfaces emotionally and palpably, and that their response to them significantly influences a holistic experience of place – even more so than reactions to form[691]. Included here is only a brief review of some options for inspiration and contemplation; deeper research should be conducted for specific materials for the actual design of any *R-Space*.

In line with healthy building standards, all materials used in *R-Spaces* should be free of toxic substances; natural materials are preferred whenever possible, although synthetic materials are fine as long as they have been proven safe. A lot of traditional building materials contain volatile organic compounds (VOCs) and other toxic substances[692]. These toxic chemicals can cause stress to the body and negatively impact mental health[693]. Prolonged exposure has been linked to headaches, fatigue, respiratory problems, and cognitive impairment. Although people will not be spending the extended time in R-S[694]paces for such prolonged exposure (i.e. as they would in living or working spaces), why not reduce toxins in the built environment as much as possible? Natural materials reinforce biophilia and reconnect people to nature. Also, many, such as wood and bamboo, are renewable, contributing to a more sustainable future. Furthermore, there is evidence that just "knowing one's environment is built from sustainable, non-toxic materials can also contribute to a sense of well-being and reduce anxiety related to health concerns"[695].

It is also important to consider the impact of any material on the universal design concepts discussed under the core design tenets. Underfoot surfaces should be durable and reduce risks of slipping, tripping, or falling. They should help facilitate ease of movement and mobility for diverse needs[696]; this is especially important in *Rest Spaces*, which may have more increased populations with physical disabilities. Furthermore, the acoustic properties of materials can affect the experience – think reflective surfaces versus ones which absorb sound, as well as insulation from street noise. Acoustic properties should be considered in the most depth in *Relax Spaces*.

Sourcing

The sourcing and creation of materials can have major impacts on the environment and local communities and, therefore, should be carefully researched and selected for sustainable futures. Building a space designed for better mental health and well-being in one location from materials that detract from the health and well-being of another (with unethical practices such as wage labor exploitation or toxin-releasing extractive practices in another community) is counterintuitive. Choices, especially in areas of higher wealth, have global ramifications. We are one world, and *R-Spaces* are part of a movement to do better. Project planners and designers should carefully source materials and use local materials as much as possible. Look into the company policies (including ethics and sustainability)

for any potential material source. For example, look for companies committed to sustainable practices who work with local communities and provide fair labor wages. Reclaimed and/or recycled materials can also contribute to a better global supply chain.

Wood

"Whether it be through a haptic, olfactory or visual experience, users tend to be more drawn to wood and timber architecture in comparison to other materials...Our inherent preference for wood essentially stems from its ability to create healthier, greener, and happier spaces."

– Chilean architect Valeria Montjoy, ArchDaily[697]

One material which has been often researched and widely recommended is wood. Scientific studies and architectural discourse alike seem to agree that wood contributes positively to peoples' experiences and well-being. It is generally perceived as relaxing, comfortable, and warm.

AMORIM black cork wall by josé neves in Lisbon, Portuga; *Photo credit: Francisco Nogueira*

Why wood?

Benefits include:

- Reduced stress & anxiety
- Lowered heart rate, blood pressure, & sweat
- Enhanced parasympathetic nervous system activity leading to relaxation
- Improved mood & concentration
- Perceptions of warmth (as a comforting sense)

Also...

- Studies have shown people have a visual preference towards wood & it generally has positive associations. People like & are drawn to wood.
- It provides a multi-sensory experience.
- Although purely opinion, it could be considered to have an enduring aesthetic appeal, as some call see it as 'timeless' (and it has proved persistent throughout construction history).
- It is associated with biophilia, with a perception of being connected to living things.
- It is versatile with many unique types & patterns.
- The wood industry contributes to efforts for habitat protection & resilience of local economies.
- When harvested using sustainable forestry, it could reduce global emissions if used to replace other materials in buildings & bridges.

Figure 189: For further explanations of scientific evidence supporting the above health claims, see figure 242 in Appendix B; *Sources informing this list: "17 Innovative Construction Materials Changing How We Build,"*[698] *"Can your environment and surroundings affect your mental health?"*[699], *"Designing for Human Wellbeing,"*[700] *"How Do Materials Affect Human Psychology?"*[701], *"The Biophilic Response to Wood,"*[702] *"The Nature of Wood"*[703] *& Welcome to Your World*[704].

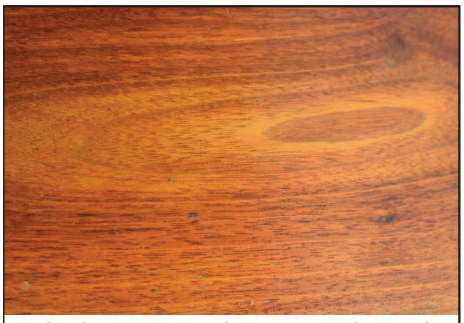
"Whether it be through a haptic, olfactory or visual experience, users tend to be more drawn to wood and timber architecture in comparison to other materials... Our inherent preference for wood essentially stems from its ability to create healthier, greener, & happier spaces."

– Frances Anderton in *The Architectural Review*, quoted in "Senses of place: architectural design for the multisensory mind"[705]


African Padauk


American Hard Maple


American White Ash


Black Locust (Chinese Teakwood)


Black Walnut


Brazilian Rosewood


Bubinga


Cedar


Ebony


European Ash


Oak


Red Oak


Tigerwood


Weathered (Unknown)


Zebrano

Figure 190: A range of wood types showing the diversity of grains & patterns, varying in affordability & recommended usages; *Photo sources: Architexture, Duffield Timber, Home Stratosphere, & fwstudio / freepik.com*

In addition to traditional wood, laminated wood or cross-laminated timber are also great options, particularly for structural elements. Because the wood is pressed into a solid block, as laminated panels, it becomes much stronger than ordinary wood. Laminated wood and cross-laminated timber are both highly fire-resistant[706].

Fully demonstrating the versatility of wood, between 2016 and 2020, scientists developed transparent wood (fig. 191) using an extract from orange juice production. Could transparent wood be the best of both worlds? It is:

- 100% renewable and eco-friendly
- A potential replacement for plastic or glass. In comparison to glass, it is at least 5 times stronger & lighter, and more thermally efficient. The production costs are also lower and have a lower carbon footprint[707].

Figure 191: Transparent wood (infused with a clear bio-plastic made from citrus fruit) developed by KTH Royal Institute of Technology in Sweden; *Photo credit: Céline Montanari via KTH*

Ideas & considerations for design:

- Bring out the natural beauty of the wood – people have more positive reactions to more recognizable aspects of wood (such as grain pattern, natural surface color, and features like knots) than when the original color & grain are hidden (by deep stains, clear coatings, or semi-opaque finishes)[708].
- Rooms with approximately 45% of surfaces made from wood lower blood pressure & improve perceptions of comfort[709].
- Use interesting wood grains in *Revive* spaces. Multiple research groups over 10 years (most recent, 2019 Slovakian study) concluded "wood grain as a texture positively influences creativity"[710].

Other natural & biophilic materials

- Bamboo
  - A 2017 study at Sichuan Agricultural University found that viewing bamboo can decrease anxiety, help calm stress, & improve concentration[711]
  - Naturally occurring, abundant, renewable resource that grows quickly
  - "Emphasizes pliability, sustainability, and plasticity, heralding a new era of architecture"[712]
  - Affordably priced compared to alternatives in many regions around the world
  - Could help offset deforestation
  - Negative carbon footprint – the plant releases roughly 35% more oxygen & absorbs 35% more carbon dioxide than most trees
  - Resilient enough to not need harmful pesticides & fertilizers
  - Combines the tensile strength of steel & the compressive strength of concrete – stronger & more flexible

Figure 192 & 193: *top* (192) Bamboo Courtyard Teahouse, ShiQiao garden, Yangzhou, China by HWCD Associates; *Photo credit: Dezeen; bottom* (193) Bamboo as a finished material, *Photo credit: Home Stratosphere*

- As stable as timber, but weighs less (hollow inside)
- Resistant to high-temperatures with a low heat transfer coefficient
- It does need to be treated to extend the lifespan, especially outdoors[713]

- **Stone**
  - Raw, natural feel – unpolished stone will feel more biophilic
  - Can create an interesting textural moment on the exterior, or bring the outdoors in when used for the interior
  - In particular, travertine offers rich associations – Goldhagen describes it as combining hard permanence, porous fragility, and the creamy, opulent, pockmarked stone of ancient Rome[714]
- **Clay**
  - A 2015 study tested people in four different types of interiors which were furnished in the exact same way with different structural & surface materials (cross-laminated timber, clay, steel, and steel retrofitted with clay elements). Participants had better attention & reaction times, and most importantly, rated their well-being higher in the spaces with clay or cross-laminated timber[715].
- Consider earth architecture for certain contexts (see 'Further Reading' below for a source for more information on earth architecture)

Materials that play with transparency

Transparent and semi-transparent materials are ideal for use in *R-Spaces* because they can help with creating

Considerations for biophilic materiality:

- Research sourcing location (the more local, the better).
- Use textures that reflect natural elements.
- Prioritize natural & minimally processed materials over synthetic recreations.
  - If using synthetic, how closely they mimic the real material increases the chance of any inherent property benefits.
- Materials that "reflect time and use" will increase biophilia in the design.
- Offering varying scales (down to small details) connects with the 'richness' & 'complexity' properties of biophilic design.
- The lack of geometric structure of exposed concrete can lead to negative sensory feedback; adding aggregates in or patterns on the concrete creates fractal scaling that feels more natural and adds interest[716].

Figure 194: The raw, natural feel of stone exemplified in the Voortrekker Monument, Pretoria, South Africa; *Photo credit: Mike van Schoonderwalt*

areas of prospect and refuge and increasing feelings of safety; additionally, they contribute to blurring the lines between exterior and interior for an indoor-outdoor hybrid space. This does not mean every *R-Space* should be transparent – designers should play with transparency in strategic places to create opportunities to see in or out where desired.



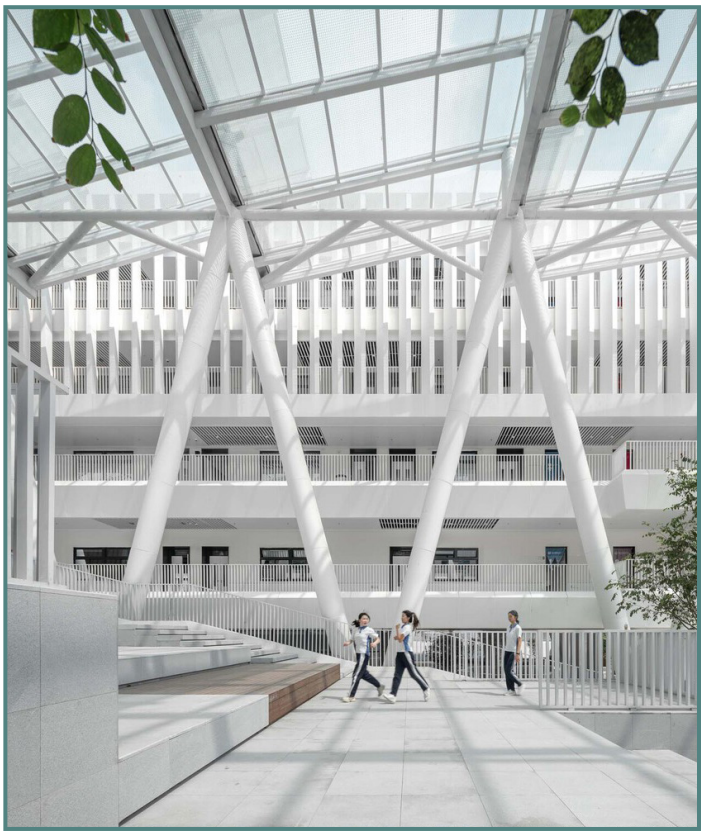
Figures 195-197 – from left to right: (195) CO2 Pavilion by Superimpose Architecture, Beijing, China, *Photo credit: ©Beijing Shardisland Technology Co., Ltd. via ArchDaily;* (196) Odette Estate Winery by Signum Architecture, Napa County, CA., United States, *Photo credit: ©Signum Architecture via Architizer;* (197) Wire mesh sculpture by Edoardo Tresoldi, Simbiosi, Italy, *Photo credit: Robert Conte via Dezeen*

Some potential materials that can be used to play with transparency include:

- **Fabric partitions**
  - Different types of fabric can allow in different amounts of light/transparency
  - ArchDaily suggests white fabric creates calm spaces[717]
  - "The translucency of the fabric also functions as a kind of hazy filter, reducing people and objects into surreal, dream-like silhouettes." – Cao for ArchDaily[718]

The spatial design for fashion designer LEE Younghee's special exhibition Baram-Baraem, created by Farming Architecture, uses fabric partitions to create a space showing the unique characteristics of hanbok (traditional Korean garments)[719]. *Photo credit: ©Kyungsub Shin via ArchDaily.*

- Glass
  - Could be particularly interesting as roofs for natural lighting (see examples in fig. 199 & 200), but must be careful it does not become too hot in sunlight (greenhouse effect) or too cold in winter (uninsulated)
  - Recommended reading: "How to Improve Internal and External Environments with Glass Ceilings" by James Wormald, ArchDaily[720]
  - Provides shelter while allowing for maximum sunlight for indoor greenery (see fig. 199)



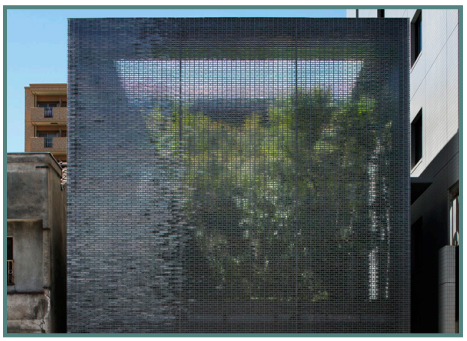
Figures 199 & 200: (L) Albert Einstein Education and Research Center by Safdie Architects, São Paulo, Brazil, *Photo credit: ©Timothy Hursley via ArchDaily;* (R) Shenzhen Hongshan Middle School by CAPOL, Shenzhen, China, *Photo credit: ©XINLEE via ArchDaily*

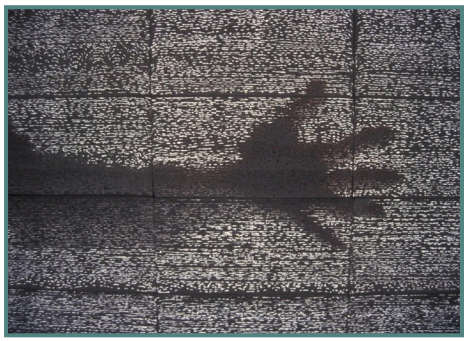
- Glass blocks
  - Thermal & acoustic insulating properties
  - Interesting external facades (see fig. 202)
  - Does not need any special treatments or finishing – simple use & maintenance[721]

- **Polycarbonate**
  - Transparency
  - Versatile with diverse usage – facades, roofs, partitions
  - Insulating qualities, reduce heat transmission
  - Strong, light, easy to shape
  - High resistance compared to glass systems
  - Can be made from upcycled plastic objects to be eco-friendly[722]

Figure 201: L'Architecture est dans le Pré by Claas architectes, Les Lucs-sur-Boulogne, France,
Photo credit: ©Myriam Héaulmé via ArchDaily

- **Flexicomb (fig. 203)**
  - Inspired by honeycombs (fits biophilic & biomorphic design)
  - Upcycles drinking straws (eco-friendly)
  - Translucent & flexible[723]
- **Translucent cement (see fig. 204)**
- **Transparent wood (see fig. 191)**



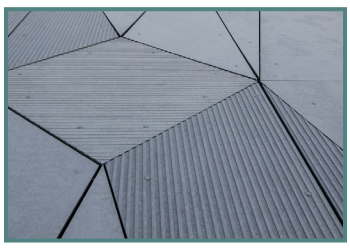


Figures 202-204 – from left to right: (202) Glass block façade, Optical Glass House by Hiroshi Nakamura & NAP, Hiroshima, Japan, *Photo credit: ©Koji Fuji / Nacasa & Partners Inc via ArchDaily;* (203) Flexicomb material, *Photo credit: PlanRadar;* (204) Translucent cement material, *Photo credit: ©Aron Losonczi via Rethinking the Future*

Other interesting materials

- Acoustic Wall Tiles by Impact Acoustic[724]
  - These – or similar – can help with sound insulation (particularly important in *Relax Spaces*)
- Planocolor Microcement Wall Coating Systems by novamix[725]
  - Nature-inspired relief patterns could add aspect of biophilia (fig. 205)
- Textured Fiber Cement by EQUITONE[726] (fig. 206-208)
  - Heightens sensory experience & provides visual interest



Figures 205-208 – from left to right: (205) Application of Planocolor Microcement Wall Coating System by novamix, *Photo credit: novamix;* (206-208) Various Textured Fiber Cements by Equitone; (206) On a project in Velle-Sur-Moselle, France by GENS, *Photo credit: ©Ludmilla Cerveny;* (207) *Photo credit: Equitone;* (208) On a project by ASA Architects, *Photo credit: ©Patrick Coulie Photography; All images sourced from ArchDaily*

Further Reading:

- "A Complete Guide to Types of Wood Grain Patterns" from Northcastle Hardwoods[727]
- "A New Generation of Living Buildings Using Hygromorphic Materials" by Eduardo Souza, ArchDaily[728]
- *Material Health: Design Frontiers* by Parsons Healthy Materials Lab[729]
- *Prescription for Healthier Building Materials* by ARUP & AIA[730]
- "Understanding Earth Architecture" by Harsha Varthine, Rethinking the Future[731]

→ The specific experiences

R-Spaces are an opportunity to design locally and contextually for the well-being needs of a particular city population. There are endless ways to create and curate these experiences, and the hope is that the spaces can be designed to reflect the zeitgeist of the time, and promote new, novel, and even experimental ideas. This means that there is no prescriptive experience for each space. Instead, each typology (*Rest*, *Relax*, *Restore*, *Revive*) has well-being goals, and these can be translated in creative ways into the space depending on the location, the designer, and the community. An *R-Space* can be designed perfectly simply and purely for reduced stimuli and comfort, or it can be a brief interactive experience that engages the user and provides something transformative.

Designers are encouraged to be as creative and innovative as possible; basic, formulaic public spaces are everywhere and they are not serving cities' well-being. *R-Spaces* are a model to break from a boring mold, to add to a network of better designed public spaces with creativity and diversity in mind. These experiences can be art installations, multisensory interactives, pop-ups. People are going to an *R-Space* to escape something, whether that is physical, mental, or emotional. Therefore, the goal is to provide them with ambiance, an *environment* beyond a set of spatial conditions.

An *R-Space* ***is*** an experience; a bench under a basic shelter is not.

Each 'R' typology has a section of ideas to hopefully spark inspiration for what these experiences can be, keeping in mind these are not exhaustive lists. Anything that accurately achieves the goals for each typology set out in '*R-Spaces*: The New Public Space Model' in section III, while following the design guidelines of section IV can – and should – be considered possible.

"People will seek out different stimuli...according to their own sensory needs at any particular time. Whilst we cannot design every space to suit everybody, we can usually employ design strategies to create calm environments in general together with a range of particularly well-placed stimuli... [Spaces] could provide different opportunities for varying degrees of social interaction, ***solitary activity****, sleep,* ***rest****, work, exercise,* ***reflection****, etc. No one space can provide for all of these activities at once where other people are around. However, we can provide alternative spaces."*

– Steve Maslin in *Designing Mind-Friendly Environments*[732]

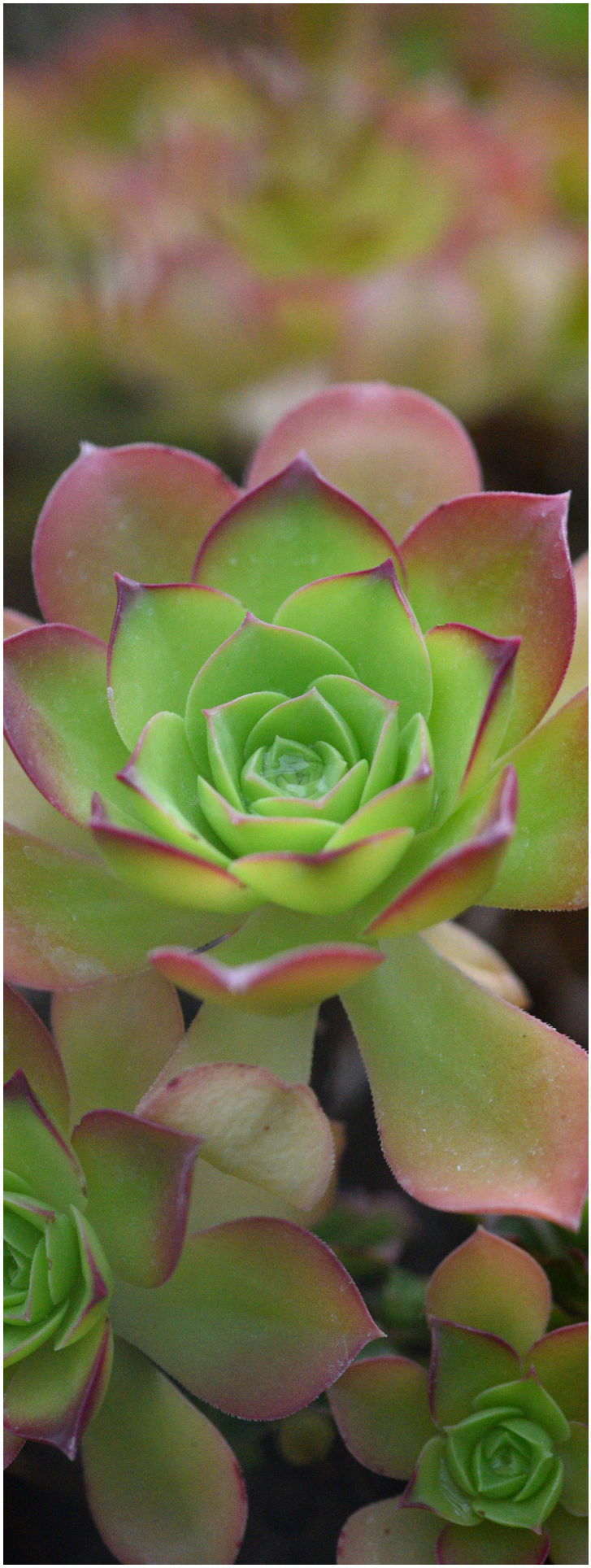
➤ Revive

- How can this experience be elevated beyond seating?
- How can it address mental needs in addition to physical needs?
- Playing with different types of seating could make these spaces more interesting than other public seating like basic park benches.
- Remember to prioritize for the individual over socialized group seating.
- How can you manipulate the thermal sense to cool people down (or warm them up)? Can this be done without high energy usage (such as closing it in entirely and adding air conditioning?

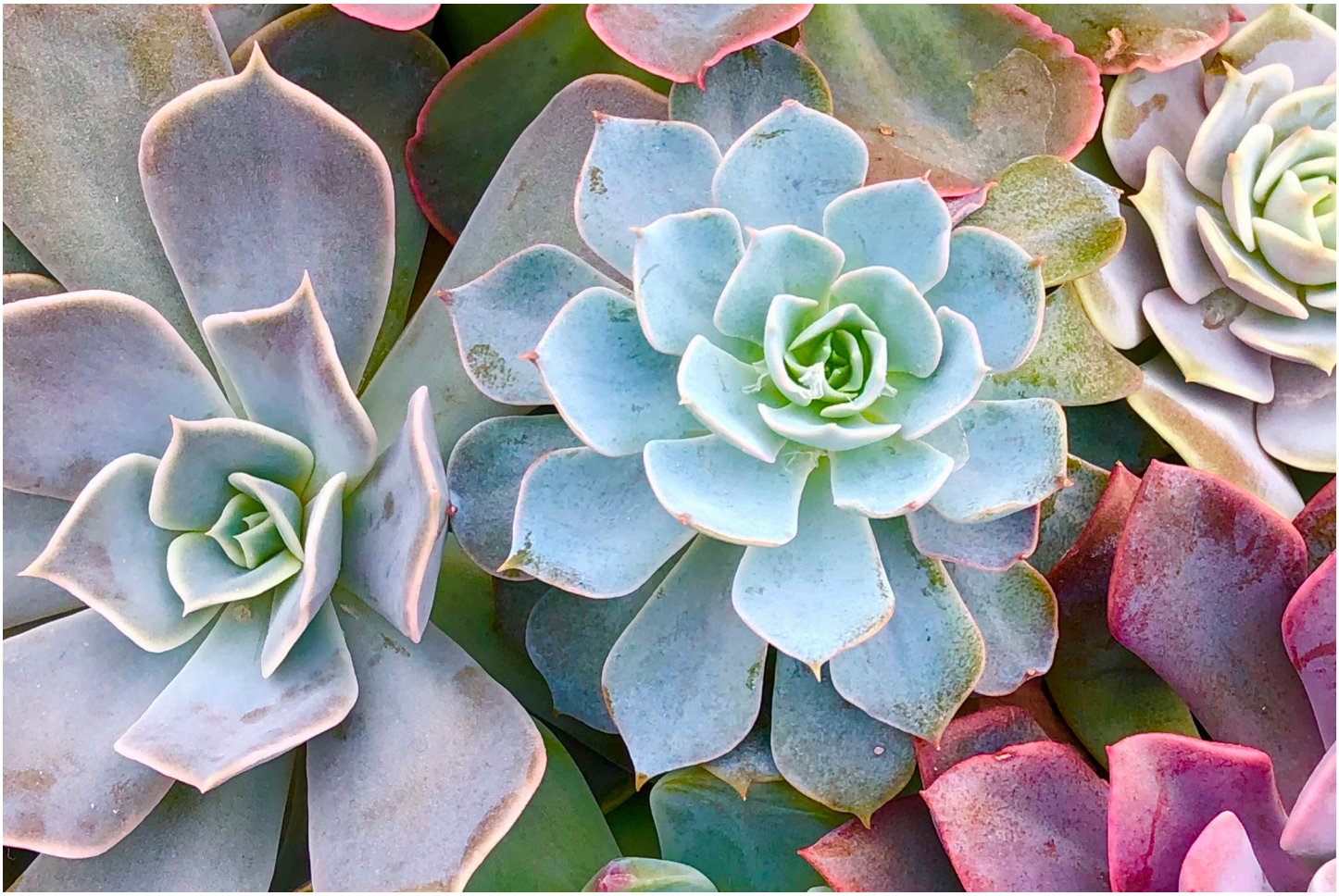
- Consider uses of natural ventilation from non-Western urban design (see fig. 109 for one example) or ancient techniques. With cities getting continually hotter, how can these methods be modified to keep up?
- What are some ways to offset humidity specifically?
- Focus heavily on the sixth design tenet (seating is important). How can the seating be accessible for different physical needs? Ensure regular maintenance to keep seating clean & safe.
- How creative can you get with seating types and levels? Hanging, different heights (and designed for different body types), attached to the wall, floor level, etc.?
- Can there be positive sensory stimuli that helps encourage physical restoration?
- How will these differ from 'cooling stations'? Or can they be included in this network if the city has one?

➤ Relax

- Simpler design might be more beneficial for individuals trying to escape excess stimuli. This includes:
  - Natural materials only
  - Gentle colors
  - Soft, pleasant background noise
  - Adjustable lighting that can be dimmed for a low-light environment when desired
  - Visual & acoustic privacy[733]



- How could the design incorporate some of the things people find restful, such as:
  - Listening to music
  - Exposure to the warm glow of fire
  - Looking at natural scenery
  - Recreational reading
  - Smelling aromatic plants
  - Gentle exercise/motion[734]
- Could there be a meditation space within a *Relax Space*? Is it sectioned off or part of the entire experience?
- Clearly convey the space is for relaxation only (and not for work or socialization)
- Consider a partnership with KultureCity (a nonprofit focused on sensory accessibility & acceptance for people with invisible disabilities)[735]
  - They have a model called Mobile Sensory Stations (M.S.S.), which are pre-made to create sensory rooms on the go. An M.S.S. is an installable unit that creates an atmosphere, not an actual room or space. They are designed to supplement venues & organizations, and cite example locations as classrooms & medical exam rooms[736].
  - Another of their programs are 'sensory bags', which are filled with items to help with sensory overload[737].
  - For both programs, KultureCity notes easy cleaning & sterilization between uses[738]. How would this be handled in a public space?
- If not the above partnership, could there be items included in the space inspired by 'sensory bags' such as headphones and fidget toys?
- Could inspiration come from KultureCity's M.S.S.? Watch the video on their website for imagery, which includes:
  - Low overall lighting
  - Colored, moving light strands
  - Bubbling aquarium tubes with fish
- Flexible furniture & natural lighting both help with stress reduction[739]



➤ Restore

- Soundproofing materials & techniques, as well as music or white noise enhance the experience of privacy[740].
- Who most needs to feel privacy in public? How can these spaces serve them?
- How could themes of grief be explored here? Is there a way to suggest unity in shared struggles? What does grief look like in the public sphere? This is likely to vary by culture.
- Consider how to balance a need to not feel perceived by outside eyes with safety concerns. Can there be pockets hidden completely from eyes on the street? Is this need directly at odds with a need for perceived safety, or how can an experience or interior space address both?
- This typology is possibly the most nuanced of the four and could possibly be either correctly used or misinterpreted as a *Rest* or *Relax Space*. Is this something you'll lean into in your design or will you make the different designation and purpose clear – and how?

➤ Revive

In *Designing Mind-Friendly Environments*, Maslin argues that the root cause of boredom is a "lack of sensory exercise and alternatives," saying boredom can arise if there is not a choice of opportunity[741]. Chase and Rivenburgh point out, in *Envisioning Better Cities*, that exploring new places adds variety to peoples' days, and that new visual inputs promote creative thinking[742].

Figure 209: A visitor to Little Island in New York City plays on the interactive dance chimes; *Photo credit: Liz Ligon / Little Island*

- Designers can especially play with color and patterns in these spaces. The entire experience could revolve around one color scheme or pattern, move between varying systems, or even only be introduced in moments of surprise & discovery.
- Research shows that experiencing other people's creative expression (art, poetry, music, etc.) inspires the viewer/listener's own creative thinking abilities[743]
- Proven creative catalysts that can be applied to *R-Spaces* (and other urban design projects) include:
  - Encouraging the unexpected
  - Functional art
  - Visual variety
  - Uncommon spaces & functions in unusual locations
  - A combination of art + humor + nature
  - Opportunities for play (this was specifically identified as a prompt for creative thinking by cognitive scientists)[744]
- How can play be incorporated into the experience?
  - Labyrinths or mazes
  - Murals that engage curiosity[746]
  - 'Urban hammock' installations – these could be actual hammocks or suspended nets (see fig. 98-102)
  - Trampoline(s) – from slightly bouncy flooring (clearly

➤ Creative catalysts: conditions (visual prompts or environmental conditions) that promote creative thinking or inspire writing, music, painting, and/or innovation (by firing up parts of the brain known for creativity versus more analytical thought processes)[745]

marked for stable accessibility considerations) all the way to full trampolines
    - Solo games & challenges
- The use of art objects, art installations, or interactive element in spatial design all evoke emotions such as surprise that "provoke reflections, intrigue, and break the routine." This response can also be achieved with unconventional space solutions and things that encourage non-obvious or different-than-expected behaviors[747].
- Spatial elements that show the most positive effect on creativity, problem-solving, and understanding abilities consist of the use of warm & cold colors together, in combination with natural materials[748].
- According to a 2010 study, creative performance is higher in spaces with exposed wood or stone surfaces (when compared with artificial surfaces such as drywall, glass, plastic laminate, carpet, & synthetic fibers)[749].
- How can the space offer a moment of excitement or joy? How can this be fleeting and encourage the user to go forward with their day without dwelling?
- How can designers focus on making this a space for mental health revitalization and not an Instagrammable moment with a queue of people waiting to take their photo in a line? This is a delicate line to tread with the rise of 'experiences' (especially paid ones) that are just backdrops for photo sharing. While the creativity and innovation of these spaces should lead to a level of excitement, it is a space for people to gain something breaking them from monotony, whenever they need it in a day to day experience, not a destination or trend for influencers and social media mavens.

Further Reading:

- Chapter 3: Inspiring people in *Envisioning Better Cities* by Patricia Chase & Nancy K. Rivenburgh, pg. 36-61[750]
- Chapter 7: The playable city in *Restorative Cities* by Jenny Roe & Layla McCay, pg. 135-158[751]

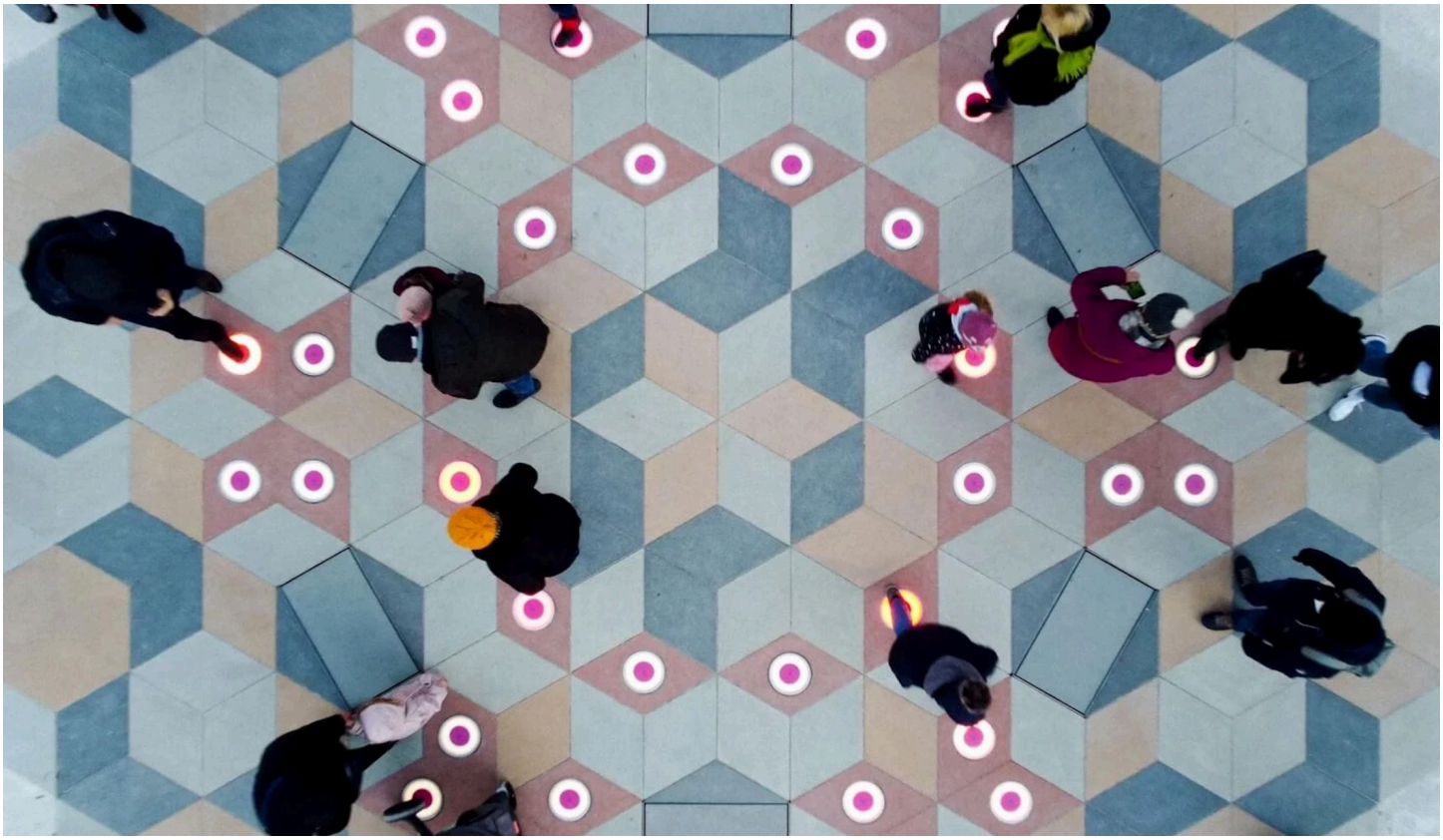


Figure 210: The 36 interactive units with sensors & responsive light rings embedded into concrete tiles of Cimbalom by Daily tous les jours in Budapest, Hungary are an excellent use of play in a public space. When people tap on the tiles, a sound corresponding to various instruments (guitar, kalimba, vibraphone, bass, harp, piano, and the cimbalom in the center) is played. Individuals can compose melodies by striking multiple sensors at once, while the integrated LEDs simultaneously display patterns of light[752]. *Photo credit: Azure Magazine.*

Important note regarding potential design issues:
Further research and collaborative input is needed on topics such as safety, visibility, access, and equity.

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V. Implementation

Locating These Spaces

→ City-wide approach for convenience

"A network of well-designed and well-managed spaces adds to the character of places where people want to live, work, and visit. Public spaces should be planned and designed as a systematic network, as elements of a larger system where they establish relations of complementarity and inter-dependency."

– Global Public Space Toolkit[753]

Zeisel's 1975 behavioral approach to urban design specifically includes convenience as one of six common human needs[754]. *R-Spaces* can help make cities more convenient by providing public spaces for people in a city-wide network. According to the seven pathways connecting the built environment and

Figures 211 & 212: Fitting spaces to breathe in a dense urban setting can be challenging, but is clearly much needed, as seen with BREATHE by SO – IL in Milan, Italy. *Photo credit: ©Laurian Ghinitoiu via Architizer.*

subjective well-being, city satisfaction can affect levels of subjective well-being. This includes the characteristics of the city overall – not just an individual neighborhood[755]. As people move around the city, they should not only feel comfortable, welcomed, and relaxed in their own neighborhoods. There may be a need for someone to use an *R-Space* in their own neighborhood to escape a crowded home life, but the point is that the location is part of a city-wide network and not 'owned' by any one neighborhood, which can lead to feeling of exclusion for potential users who are not from that neighborhood. Following a city-wide approach for implementing *R-Spaces* helps with convenience, city satisfaction, overall comfort, and walkability.

What is walkable?

Generally accepted walking distances range from 400 m / 0.25 mi to 500 m / 0.3 mi has generally been considered the acceptable walking distance. In 1994, Atash quoted 400 m / 0.25 mi as the distance "the average American will walk rather than drive," which was also cited by the Ontario Ministry of Transportation & Ontario Ministry of Municipal Affairs as the maximum distance transit users are likely to walk to a transit stop[756]. However, this distance does not take disabilities, age, mobility, or severe weather into account, meaning it is more of a bare minimum than a standard. Jan Gehl and the authors of *Creating Great Places* put the figure at 500 m / 0.3

mi, although they do allow that this depends on the context including "the quality of the route, if the area is interesting, and the walking surface is in good condition…[as well as] the amount of shade and hills."[757] Whatever the 'acceptable' distance (which is subjective), cities clearly do not offer seating (or public spaces beyond sidewalks) every 400-500 m / 0.25-0.3 mi. If people know their cities are being better designed with their comfort and well-being in mind through the addition of places like *R-Space*, this could encourage more walking. Walkability is currently a topic of much interest to many urbanists, and *R-Spaces* can contribute to this effort by adding another layer to the cityscape and urban dwellers' experience. In addition to equity concerns, this is another reason to have the spaces well distributed across the city as part of a wider network.

Wayfinding

Another consideration for planners and designers is how people can easily find *R-Spaces*, from understanding their purpose to seeking out the closest one to them in a time of need. This is a problem with privately owned public spaces (POPS), a concept implemented in urban centers worldwide, from London to Hong Kong. In New York City, for example, many residents are barely aware of their existence, and there is a perception of needing insider knowledge to discover the ones that are actually designed well. From their inception, there should be some sort of wayfinding for *R-Spaces* to introduce them to cities, where people can understand their purpose and be aware of their availability. As a city develops a network of multiple locations, having an accompanying app and online list will be a good idea. They should also be incorporated into city maps, such as the wayfinding signs in many downtown areas.

→ Mapping stressors & emotional responses

If cities could map emotional responses to places, it could help illuminate where these *R-Spaces* are most needed. Currently, more research is needed, as it is difficult to gather and map emotions, and there is a lack of understanding around emotions and connection to place. It is further complicated because it is hard to distill emotional responses down to stressors, as people

react differently, especially when their emotions are informed by other associations with place. Still, if researchers can map 'power places' – places at which study participants could relax and recharge – it would suggest similar techniques could possibly be used in the pursuit of finding where new 'power places' are needed[758]. Sensory mapping scientists utilize a range of approaches, from ethnographic observation & interviews to high-tech wearable biometric devices. A chart comparing methodologies is included in Appendix B (fig. 244).

For potential sites, passerby could be asked to map how they feel about the place using Russell's 1980 Circumplex Model of Affect, which is still used in social psychology today[759] (fig. 213).

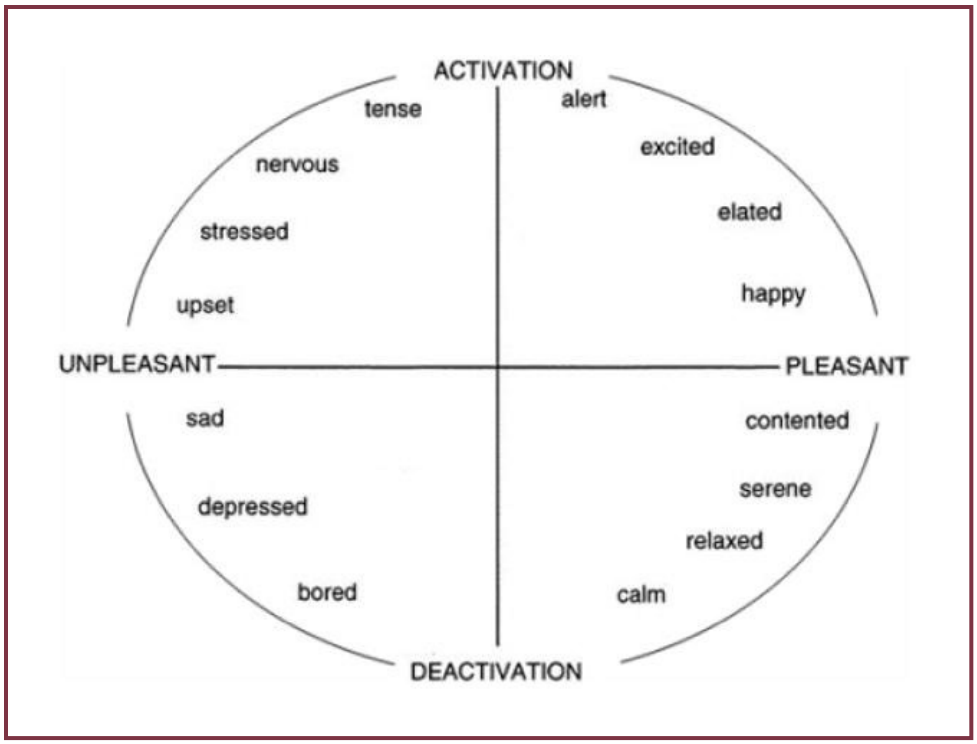


Figure 213: Circumplex model of affect – the horizontal axis represents the valence dimension & the vertical axis represents the arousal/activation dimension; *Image credit: Figure 1 from "The circumplex model of affect" scientific journal article*[760]

Community engagement & big data

Urbanist Lucinda Hartley created Neighborlytics, a social analytics platform, to address the "human data gap" in urban planning. She makes the point that urban planners use data related to the physical built environment like property values, land use zoning, and transport patterns, but do not have

comparable data about communities, cultures, experiences, and lifestyles. While placemakers use more ethnographic approaches, such as observation, surveys, community engagement sessions, and interviews to better inform the needs of a community, this alone cannot give a complete picture. Hartley explains that there is a big difference between what people say and what they actually think, feel, or do – think, for example, about people answering how many times they go to the gym in an interview or survey versus how often it happens in reality. Furthermore, engagement is often limited in terms of the number of people professionals can reach, as well as who is accessible due to factors such as language, education, or time constraints. Neighborlytics' dual big data + social consultation approach combines the important, but opinion- and exasperation-skewed, traditional methods with behavior & lifestyle pattern data from phone activity, social media, & other sources. She says that big data shows things that could not be seen before and helps to remove some of the innate bias.

Without the extra dimension of big data, opinions are usually coming more from people who understand the process, want airtime or attention, are comfortable speaking up, etc., than people who are more passive, have cultural backgrounds fearing authorities, or whose voice never gets heard because they were not part of the community engagement process[761]. This is an important consideration for any community engagement in urban planning, and the recommendation for *R-Spaces* is to include multiple sources for a more informed picture. This includes the mapping to inform locations (as discussed above), as well as any portrait being developed of city needs in regard to mental health and well-being. For example, if a city wants to figure out priorities in the needs to inform the number of each typology they'll implement in their network (e.g. areas with higher aging populations may want more *Rest Spaces*, while a more chaotic city may choose to maximize the number of *Relax Spaces*), they should look to big data and scientific study data as well as sources like community surveys. Of course, with a changing world and mixed opinions on the ethical use of big data and smart cities, more research is needed on how to do this responsibly.

Further Reading:

- Chapter: Big Data-Informed Urban Design in *Future Cities Laboratory 01: Indicia*, pg. 103-112[762]

→ Potential focus areas

➤ Central Business Districts (CBDs) or other downtown areas

Figure 214: Potential location for *R-Space* rendered on image of a downtown business quarter in Russia; *Rendering credit: author*

Central Business Districts (CBDs) and other downtown areas are often stressful places, making them strong opportunities for *R-Spaces*. As central hubs, high numbers of urbanites pass through them, usually en route to work, making them an ideal place for an improvement to commuters' everyday experience. Furthermore, *The Monocle Guide to Building Better Cities* discusses the movement to remake CBDs as places people actually want to spend time in – making them hang-out destinations[763]. If a downtown area is already vibrant, the combination of foot traffic and stimuli make it optimal for *R-Spaces*. If the area has died out and is undergoing a

revitalization project, *R-Spaces* can be part of the effort to make the CBD/downtown more desirable.

R-Spaces in CBDs & downtowns	
Opportunities & benefits	Drawbacks & difficulties
• Addresses the need for a better everyday experience • High foot traffic areas (or potential for increased foot traffic when revitalized) + transportation hubs • High level of stimuli increases the need for breaks • Improves work commutes • Downtowns often have organization that could provide a funding source	• CBDs/downtowns which are not vibrant or being revitalized may lack foot traffic and/or funding (some are seen as undesirable places) • There may be a lack of space due to building density

Figure 215: Examining viability of *R-Spaces* in CBDs & downtowns

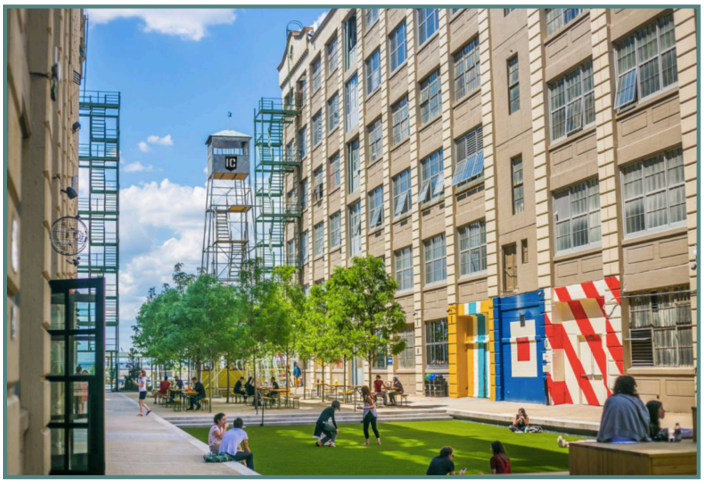
➤ Hubs & innovation districts

Confusing terminology: the 'micro-hub' - 'creative hub' - 'campus' - 'cluster'

This is a nuanced category, so specific examples below will illustrate the point. The idea is placing *R-Spaces* in central public spaces of new 'mini districts' (this is not a technical industry term, but rather one chosen to group multiple examples here). Terms such as '*micro-hub*', '*creative hub*', '*campus*', and '*cluster*' have varying meanings in different places and unclear definitions. For example, *The Monocle Guide to Building Better Cities* uses '*micro-hub*' to define a disused site with a "handful of diverse businesses" and various food or drink options[764]. However, Google searches of '*micro-hubs*' (with '*micro hubs*' and '*microhubs*' used interchangeably) focus on a definition of a logistics facility that improves urban freight sustainability by consolidating businesses and goods. Although the latter seems to be the more prevalent definition, the former is the concept being conveyed here.

By the *Monocle Guide*'s definition, Gabriel's Wharf (fig. 217) is

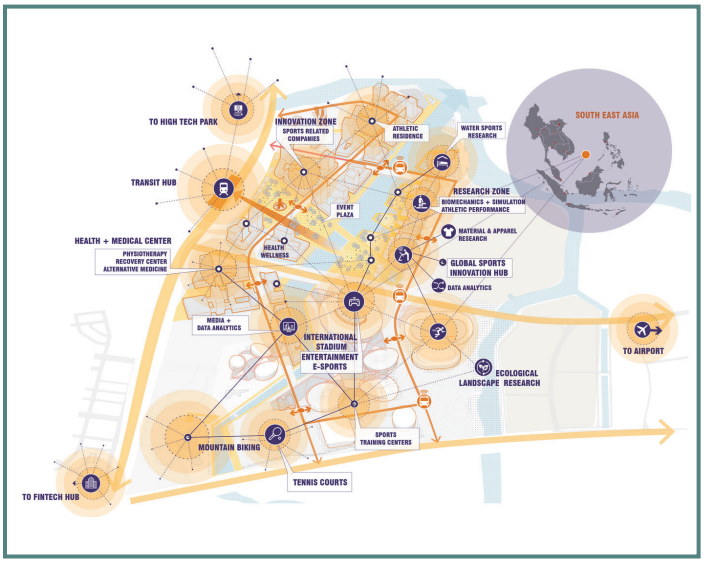
an excellent example of a 'micro-hub', yet elsewhere, there is no consistent term for the London area, with various designations as an "arty enclave," "riverside destination,"[765] "London's oldest pop-up," a "town square along the water," and a "community of retail workshops, attractive stalls, and riverside restaurants."[766] *The Monocle Guide* goes on to define the 'micro-hub' as "a small development housing a group of businesses of the same ilk (art, fashion, or tech) alongside a nice spot for food and coffee (usually for outside consumers too, not just tenants)."[767] This grouping would also include places like Brooklyn, New York's Industry City (fig. 218) – referred to as a 'business park' on Google, and a 'creative hub', 'campus', and 'ecosystem' on their website[768] – and Station F in Paris (fig. 219), which has a goal of being the biggest 'startup hub' in the world[769].



Figures 216-219 – *top row:* (L) (216) PAKT is a sustainable hub with rooftop gardens developed from a former industrial site in Antwerp, Belgium, *Photo credit: Johnny Smets via Live The World;* (R) (217) Gabriel's Wharf, South Bank, London was created on 20,000 square ft of empty Thames-side space in 1988, *Photo credit: Social Life Project; bottom row:* (L) (218) Industry City, Brooklyn, New York, USA, *Photo credit: Industry City via Forbes;* (R) (219) Station F, Paris, France, *Photo credit: Patrick Tourneboeuf via Forbes*

The term *'creative hub'* is also sometimes used interchangeably with *'co-working space'* – or in some cases, differentiated as being different than a *'coworking cluster'*. The list of analogous – or slightly nuanced – terms seems to go on and on. A *Forbes* article discusses a "new wave of innovation hubs," swapping in terms like *'co-location concept'* and *'multi-sector innovation hub'*[770]. So what are they? They are work spaces, but they are not quite offices; in this contemporary digital age with nomadic workers, this is a different experience than a traditional office. The extra dimension of co-work spaces (whether *'hubs'*, *'communities'*, *'districts'* or some other name) that adds amenities and focuses on inspiration is what makes them suitable for locating and hosting *R-Spaces*.

Innovation districts can be controversial in the field of urbanism. While they are highly lauded by the business world, and have potential for sustainability, co-creation, and economic growth, critics note they can also contribute to gentrification and displacement of lower income communities. However, the opportunity remains for *R-Spaces* to be incorporated into new innovation districts as they are developed.



Figures 220 & 221: (L) The winning design by Sasaki for a 2019 competition designing 22,000 hectares of Ho Chi Minh City into a new Innovation District[771]. *Photo credit: Sasaki via ArchDaily.* (R) Oslo Science City by BIG + A-Lab aims to be a net zero-emission district for 150,000 scientists, students, & entrepreneurs[772]. *Photo credit: BIG*

R-Spaces in hubs & innovation districts	
Opportunities & benefits	Drawbacks & difficulties
• Areas designed for walkability, meaning *R-Spaces* fit in well • Add to the diversity of a hub which is meant to thrive on diverse opportunities • As new ones are designed & built, there may be funding available • Appropriate timing – cutting edge, fits the narrative, opportunity to add to new plans or insert into recently completed ones • Concentration of businesses has similar benefits to the CBD / downtown (above)	• If developed as a larger project, issues of equity, displacement, & gentrification would need to be explored & addressed • Need to ensure equitable access & distribution outside any coworking spaces – do not limit only to people who can/do access coworking hubs • If coworking spaces are designed well with concepts like relaxation & well-being integrated already (like Morocco's SunDesk or Ikigai in Nairobi, Kenya), *R-Spaces* may not be needed • Further research needed

Figure 222: Examining viability of *R-Spaces* in hubs & innovation districts

Further Reading:

- "What are Innovation Districts?" by Ankitha Gattupalli, ArchDaily[773]

➤ Transit stations (rail – above or underground stations, ferry landings, bus terminals)

"Train stations are no longer just used as the start and end of a rail journey – they are becoming leisure destinations and profitable hubs for businesses."

– Global Railway Review[774]

Figure 223: Potential location for *R-Space* rendered on image of Central Train Station in Antwerp, Belgium; *Rendering credit: author*

Arup refers to railway stations as 'multifaceted developments', saying that due to connective features and retail, office, and hospitality spaces, they are "blurring the lines between transport and the city."[775] According to the Global Railway Review, which hosted a webinar on "Train stations as destinations: the impact of design on users' experience" in 2022, train stations are evolving and can benefit from focusing on improving user experience[776].

From 2000 to 2020, there was a 91% increase in global rail passenger activity[777]. Arup also warns that the growth of the stations can lead to stressful experiences[778], which would make them an ideal location to situate an *R-Space* – especially a *Relax Space*. If not building a specific *R-Space*, can the principles of *R-Spaces* be integrated into the rail station design itself? For example, Arup recommends embedding biophilic design features into the stations to lower stress levels.

Figures 224 & 225: Train stations with embedded biophilia; (L) Atocha Train Station with a botanical garden & turtle sanctuary, Madrid, Spain, *Photo credit: Getty Images via Conde Nast Traveler;* (R) Train bridge in Jewel Changi Airport, Singapore, *Photo credit: Samuel Toh, Unsplash*

In addition to the interior of stations, there could also be ideal exterior spaces just outside stations (fig. 226 for example).

Figure 226: Kanazawa Station, Kanazawa, Japan; *Photo credit: Ishikawa Travel*

R-Spaces in or outside transit stations	
Opportunities & benefits	Drawbacks & difficulties
• High volume of potential users – helps detract from stressful situation • Inside offers interior space that still has high perception of publicness – do not have to deal with outdoor issues like climate/weather • Convenient for commuters • Particularly addresses need #3 (a better everyday experience, especially while getting around) • Could be managed as part of the station	• Potentially too high of a user volume – how to keep the spaces from becoming crowded? • Noise levels from trains, crowds, announcements, etc. • Outside a station might be redundant if the interior offers well-designed spaces, comfort, and/or other services

Figure 227: Examining viability of *R-Spaces* in or outside transit stations

Further Reading:

- "The Amazing Psychology of Japanese Train Stations" by Allan Richarz, Bloomberg[779]

➤ Converted laneways & other potentially neglected spaces

"Back alleys, neglected courtyards, and stairways may escape our notice...yet if they are claimed, and owned, and developed, they can be harnessed to strengthen and enrich their communities."

– "Placemaking and the Future of Cities," Project for Public Spaces[780]

From Toronto to Melbourne, laneways (or alleys) are being given their time in the sun with revitalization projects.

Although the majority of existing conversions have focused on socialization (as with many placemaking projects), if designed with safety measures, these could also be ideal *R-Spaces*. Compared to larger city arteries like main streets, lanes, alleys, and back streets are at a more human scale, and *Envisioning Better Cities* says projects in these areas in Chicago, Seattle, Montreal, Los Angeles, and Washington, DC are creating human-scale enclosures[781].

"The revitalization of its historic laneways is just one reason why Melbourne is one of the most livable cities in the world."

– Chase and Rivenburgh in *Envisioning Better Cities*[782]

Melbourne, Australia is widely considered a successful case study in converted laneways (see fig. 227). In 1994, only 300 meters (0.19 miles) of central Melbourne laneways were considered accessible & activated; however, by 2004, they had increased 10-fold to approximately 3 km (almost 2 miles)[783]. These laneways are unique public spaces that have helped revitalize the area and provide a better pedestrian experience, which is vital for the future of cities.

Figure 227: A laneway in Melbourne, a city internationally renowned for laneway culture; *Photo credit: The Laneway Project*

Laneway improvements can create:

- better local walkability & connectivity
- more space for informal physical activity
- local-scale urban green spaces
- opportunities for patios, pop-up shops, & micro-businesses
- space for public art
- locations for community events & entertainment[784]
- infill *R-Spaces*?

Placement in laneways, alleys, & neglected corners:

- If the lane is needed for pedestrian connectivity, it needs to be wide enough to accommodate pedestrian traffic (to universal design standards) alongside an *R-Space* (which will likely be limited in footprint). Examples: Laneway activations of 20ft. Wide, Austin, Texas & More Awesome Now, Vancouver, Canada (fig. 229)
- *R-Spaces* should only block a laneway or passage if it is determined unnecessary for connectivity (or currently inaccessible for pedestrians) (for example, fig. 230 was installed in an unused passageway).

Figures 229 & 230: Comparing wide and narrow laneways; (L) More Awesome Now activation in Vancouver, Canada laneway, *Photo credit: hcma;* (R) 'Types of Spaces' by Palma & Hanghar installed in unused passageway in Logroño, Spain, *Photo credit: Luis Díaz Díaz via Dezeen*

Possible partners:

- The Laneway Project[785]
- Business Improvement Districts (BIDs)
- Municipalities

R-Spaces in converted laneways	
Opportunities & benefits	Drawbacks & difficulties
• Infill opportunity takes advantage of existing spaces in cities without needing expansion • Many of these spaces are currently overlooked • Offers an area off the pedestrian main ways in highly-trafficked areas, which provides user base & a need for breaks • Depending on ownership & historical status of surrounding buildings, could potentially build off/between walls, requiring less structural builds • Helps with city revitalization projects, specifically for CBDs	• Alleys and laneways have a high perception (& reality) of safety concerns – eyes on the street, lighting, and other safety concerns will be paramount with this location • If the laneway is still needed for traffic flow/connectivity, space is highly limited

Figure 231: Examining viability of *R-Spaces* in converted laneways

Further Reading:

- *Turning Laneways Into Public Places* (Toolkit) by The Laneway Project[786]

➤ Other locations to consider

- Libraries
- Schools
- University campuses

Management & Funding

Ideally, municipalities could create a specific department or organization handling *R-Spaces*, from research & community engagement to management. *R-Spaces* could potentially involve many different city departments (from transportation authorities to mental health divisions), partners (such as universities or community organizations), and funding sources. Therefore, it would be advisable to have them managed by their own body, a subset of other public space management entities for the city. Unfortunately, as is seen with many public

spaces, municipality structures are varied and often siloed. The implementation of *R-Spaces* will likely be drastically different depending on the city, and a future complete toolkit would benefit from a section recommending strategies for different city types or categorizations, based on further research. Although *R-Spaces*, as with all public spaces, *should* be supported by public funding to avoid further creep of privatization of public spaces, the reality might be more complex and difficult. Creative thinking is key for situations where municipalities have very limited budgets. For example, similar to existing *'Adopt-a-Station'* programs around the world, could there be *'Adopt-an-R-Space'* programs?

This report acknowledges that a large part of making *R-Spaces* successful will depend on the management and funding of the spaces. Funding will need to be secured for both the initial construction and the ongoing maintenance and monitoring of these spaces. For maintenance, these spaces need to be regularly checked and cleaned, at the minimum; some may require additional security measures depending on location and design. This is expensive, and a frequent downfall for public spaces in general. Envisioning Better Cities recommends always involving non-profit organizations for any cross-sector collaboration because they advocate for marginalized groups who are not typically involved in city projects, such as:

- Low-income residents
- Various ages (from children to the elderly)
- Persons experiencing homelessness[787]

This topic needs much deeper research and development with future partners to complete the toolkit for implementing *R-Spaces*. Below are some ideas, which are not exhaustive.

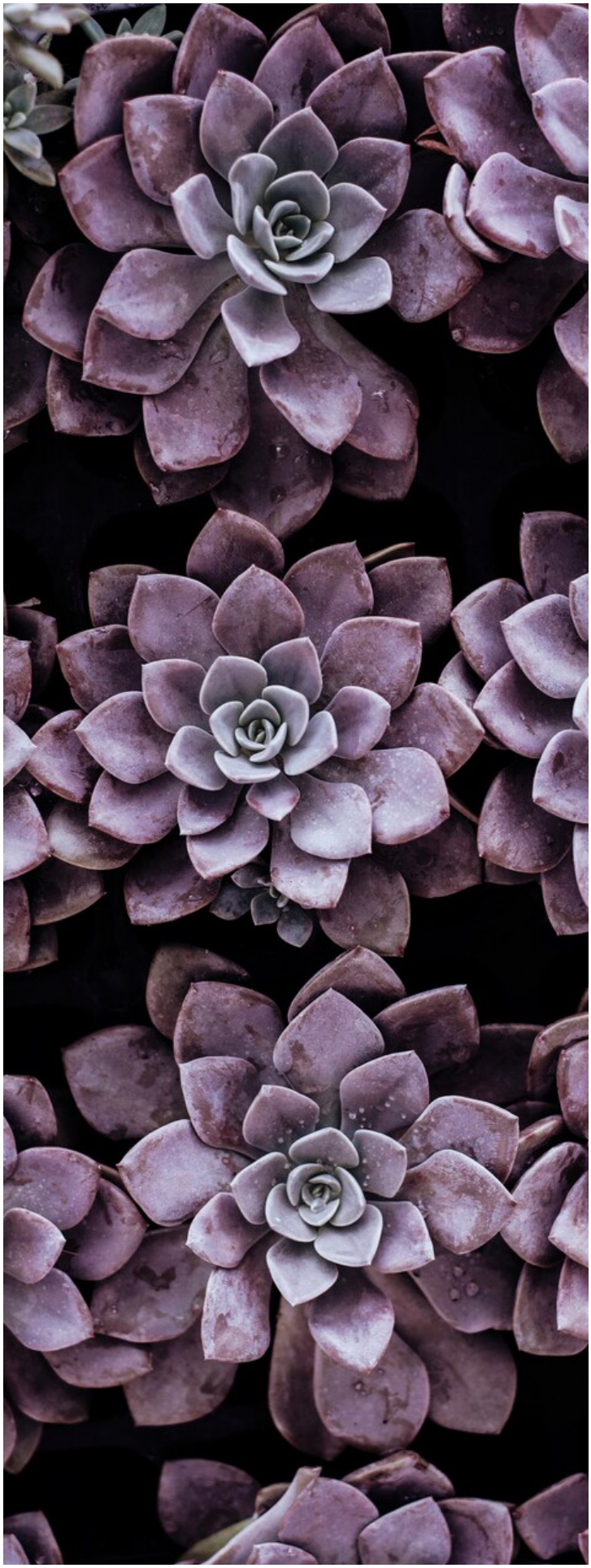
Potential managing and funding bodies:

- Municipal Transportation Authorities or Departments of Transportation (could be the managing partner only or include funding from their budgets)
    - *R-Spaces* at bus stops, in train/subway stations, or related to other public transportation infrastructure
    - Idea of *R-Spaces* making cities more pleasant for walking – more walkable cities leading to higher use of public transit (as opposed to driving)

- Universities
  - Working with local universities involves young people, plus many have think tanks or research groups which could help with co-creation, prototyping versions, and community engagement, in addition to management & funding roles
- Municipal Departments of Infrastructure
  - Could be related to above transportation authorities, but could also include bodies that manage street networks and other city infrastructure
- Non-profit organizations
  - Various non-profits funding one independent *R-Space* or a network of them
  - Or a non-profit in the city specifically dedicated to them (or a as a dedicated partner to a local government division)
- Mental health organizations or municipal/state mental health departments
- Cooperative (co-op) model (potentially structured similar to food coops)

Potential funding sources only (no management authority):

- Corporate sponsorship
- Other private donations or sources
  - In general, to keep the space as public as possible, reducing the number of private partners (and limiting them from management) will keep the spaces



from becoming privately monetized or prohibitive to certain users

- Local, state, or federal government funds/grants
- Arts initiatives (funds/grants)
  - When public art is incorporated into the *R-Spaces* (as exteriors or even interiors – or the structure itself from an arts competition)

Further Reading:

- *An Exploratory Look at the Growth and Success of Crowdfunding in Public Spaces* by Martin Mayer[788]
- *Compendium for the Civic Economy: What our cities, towns and neighborhoods can learn from 25 trailblazers* by Ahrensbach et al.[789]
- *Economics for the Common Good* by Jean Tirole[790]

Future Areas of Research

As mentioned throughout this report, the following areas will need further research and development, preferably with the involvement of subject-matter experts:

- Design choices that encourage quicker turnover of use (and not promoting long lingering stays for hours at a time when others may need a turn)
- Categorization of city typologies to better guide a city in

the implementation of *R-Spaces* (for their specific type)

- Specific management models & ongoing maintenance strategies
- Funding sources
- Security measures (preferably kept to a minimum)
- Policy recommendations
- Equity implications & implementation
- The use & ethics of big data
- *R-Spaces* on university campuses, in schools, and/or in libraries

Research for this report has shown that further research is needed in the following topics:

- Mental health as part of urban health overall
- Mental health research focused on well-being & non-severe mental health disorders
- Interdisciplinary collaboration across disciplines
- Designing infrastructure for well-being
- Ideological shifts towards better habitats for humans
- Design ideas for the extra senses (vestibular, proprioception, interoception, thermoception, chronoception)
- Mapping stressors & emotional responses (particularly which is best for informing the location of particular spaces or the needs of specific neighborhoods)

Because of the interdisciplinary nature of this project, there are many future research topics (or reports) which could build on this research (or be inspired) to further the field of placemaking. The following are just some examples:

- Biophilic urban design beyond parks & trees
- City infrastructure designed for physical & neurological diversity
- City-wide healing gardens
- Dealing with increased heat
- Experiential public spaces

- Fleeting social contact & transitory connections
- Grief in public spaces
- Improving everyday experiences
- Improving walkability conditions in cities
- Indoor public spaces
- Indoor-outdoor hybrid spatial models
- Innovative third places
- Interactive placemaking interventions that don't require groups of people or knowing the community (i.e. for solo travelers, introverts, people who do not currently have a well-connected community)
- Meeting varied needs in public spaces
- Neurodiverse placemaking
- Placemaking around re-purposed car-based structures (e.g. under viaducts, on highway caps, in converted parking lots, on pedestrian-reclaimed streets)
- Placemaking as a creative catalyst
- Placemaking for aging in place & a growing aging population
- Placemaking for better commutes
- Placemaking for climate change
- Placemaking for individuals (as well as communities)
- Placemaking for the UN's 17 SDGs
- Placemaking in vacant storefronts & building lobbies
- Play in cities (especially in public spaces and for adults as well as children)
- Privacy in public (and all of its implications for well-being, underserved populations, & safety)
- Public funding (and resisting the shift towards privitization, as well as how to address a revitalization of existing, but underfunded public space resources such as libraries)
- Public furniture beyond basic benches (e.g. thoughts to comfort, integration with other infrastructure or into sustainability measures, etc.)
- Resilient & restorative cities

- Revitalizing downtown strategies beyond economic development
- Sensory urbanism
- Soundscapes and sound in public spaces
- Stress reduction in public space
- Systemic changes necessary for better public spaces
- Wayfinding for public space networks in cities

Notes (Section V)

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Appendices

Appendix A:
Locating Existing Places Used For Respite

The following chart is an amalgamation of 22 of online lists representing 196 places in 40 cities around the world[791]. The lists were selected based on the usage of words such as *peace, quiet, relaxing, escape, serene, unwind, places to clear your head, chill out, calm,* and *introvert's space/ guide*. While far from scientific, these lists represent popular opinions shared on the internet to wide audiences, and can give an idea of the places people are currently seeking refuge and respite in major cities.

Cities represented:

- Atlanta, GA, USA
- Austin, TX, USA
- Baltimore, MD, USA
- Beijing, China
- Beirut, Lebanon
- Boise, ID, USA
- Boston, MA, USA
- Chicago, IL, USA
- Delhi, India
- Denver, CO, USA
- Detroit, MI, USA
- Hanoi, Vietnam
- Ho Chi Minh City (Saigon), Vietnam
- Hong Kong, China
- Istanbul, Turkey
- Jakarta, Indonesia
- Johannesburg, South Africa
- Kathmandu, Nepal
- Kolkata (Calcutta), India
- Lagos, Nigeria
- Las Vegas, NV, USA
- London, England
- Los Angeles, CA, USA
- Madrid, Spain
- Manila, Philippines
- Mexico City, Mexico
- Mumbai, India
- New Orleans, LV, USA
- New York City, NY, USA
- Phoenix, AZ, USA
- Portland, OR, USA
- Rome, Italy
- San Diego, CA, USA
- San Francisco, CA, USA
- Sao Paolo, Brazil
- Seoul, Korea
- Shanghai, China
- Tokyo, Japan
- Washington, D.C., USA
- Yangon, Myanmar

Categorizations

Each place was categorized into one or more of the following **type categories**:

- **Bookstores**
- **Cafes, Teahouses, Restaurants, & Bars**
  (recognizing that cafes & teahouses make up the majority of this category)
- **Cemeteries & Tombs**
- **Gardens & Arboretums**
- **Libraries**
- **Museums & Galleries**
- **Natural Landscapes** (Beaches, Forests, Mountains)
- **Neighborhoods & Districts**
- **Parks & Greenways**
- **Places of Worship**
- **Privately Owned Public Spaces (POPS)**

- **Other Indoor Spaces; including:**
  - Art studios
  - Bouldering wall
  - Cinemas & performance spaces
  - Cultural centers
  - Government building
  - Guesthouse
  - Indoor heritage sites
  - Spas, baths, & saunas
  - Stores (beyond bookstores)
  - Underground passageway
  - Zen centers, yoga studios, & meditation rooms
- **Other Outdoor Attractions; including:**
  - Caverns
  - Ghat
  - Market
  - Outdoor art project
  - Outdoor heritage sites & ruins
  - Plazas & streets
  - Recreation ground
  - Sculptures & sculptural spaces
  - Trees & Treehouses
  - University campuses

Accessibility

The following **access limitations** were considered:

- **Car needed (+ distance)**
  Car needed will always imply distance; distance does not always imply car needed - see below
- **Distance**
  (often in conjunction with car needed, but not always - some can be accessed by public transit, but are more likely chosen destinations for day trips, rather than easy-to-get-to escapes within the main parts of the city)
- **Entrance fee/cost**
  (there is a specific, required fee/cost to attend or enter the space; often in conjunction with a reservation or ticket needed, but not always - those without can be entered whenever as long as the fee/cost is paid in the moment)
- **Expectation of spending money**
  (wherein a person can enter without paying, but there is an expectation of purchase; not truly a public space)
- **Limited times**
  (sometimes explicit, such as a street that is only closed to cars one day a week or something that is only open to public one day a week; sometimes accessible at other times, but not in the context of respite/relaxation/quiet due to crowds, noise, etc.)
- **Perception of publicness**
  (a person might be unsure if the space is open to them)
- **Possible discomfort with religious affiliation**
- **[Possible] physical limitations**
  (there are possible physical impediments such as lack of accessibility to wheelchairs/walking support devices, uneven surfaces, expectation of fitness level, etc.; when "possible" is left off, there is a definite expectation of physical capabilities)
- **Reservation or ticket required**
  (requires booking ahead of time; prohibitive to those who were not aware of the policy or do not have internet access to reserve ahead of time; often in conjunction with an entrance fee/cost, but not always; also means places can't be used at random when a break is needed in the moment)

- **Other; including:**
  - Dress code
  - Many group events (which may not be conducive to desired alone time and may contribute to feelings of loneliness if unable to find a group to participate with themselves)

Note: Places were evaluated based on information available online, and not in person, meaning certain evaluations, such as those for cognitive/mental/processing disabilities or limitations were not able to be evaluated. The efficacy of these places for users (in terms of respite, mental health, or breaks from the chaos of cities) is not within the scope of this data set.

City	Place	Type Category	Access Limitations	Source
Atlanta, GA, USA				
	Oakland Cemetery	Cemeteries & Tombs		Thrillist
Austin, TX, USA				
	Austin Central Library (especially Rooftop Butterfly Garden)	Libraries; Gardens & Arboretums		DO512
	Austin Zen Center	Other Indoor Spaces	Perception of publicness; Dress code; Many group events	DO512
	BookPeople	Bookstores; Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	DO512
	Elisabet Ney Museum	Museums & Galleries		DO512
	Fo Guang Shan Xiang Yun Temple	Places of Worship		DO512
	Inner Space Caverns	Other Outdoor Attractions	Car needed (+ distance); Entrance fee/cost	DO512
	Kinokuniya Book Store	Bookstores	Expectation of spending money	DO512
	Lady Bird Johnson Wildflower Center	Gardens & Arboretums	Entrance fee/cost; Reservation or ticket required	DO512
	Laguna Gloria, The Contemporary Austin	Gardens & Arboretums; Museums & Galleries	Entrance fee/cost; Reservation or ticket required	DO512

City	Place	Type Category	Access Limitations	Source
	The Blanton at the University of Texas	Museums & Galleries	Entrance fee/cost; Perception of publicness; Reservation or ticket required	DO512
	The Treehouse at Pease Park	Parks & Greenways; Other Outdoor Attractions		Thrillist
	Umlauf Sculpture Garden	Gardens & Arboretums; Museums & Galleries	Entrance fee/cost	DO512
	West China Tea	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	DO512
	Zilker Botanical Gardens	Gardens & Arboretums	Entrance fee/cost; Reservation or ticket required	DO512
Baltimore, MD, USA				
	George Peabody Library at Johns Hopkins Mt. Vernon Campus	Libraries	Perception of publicness	Thrillist
Beijing, China				
	Lama Temple	Places of Worship	Possible discomfort with religious affiliation	WildGreatWall
	Olympic Forest Park	Parks & Greenways		WildGreatWall
	Temple of Confucius	Places of Worship	Possible discomfort with religious affiliation	WildGreatWall
	Temple of Earth (Ditan Park) a.k.a. Altar of the Earth	Parks & Greenways; Places of Worship	Entrance fee/cost	WildGreatWall
	The Imperial College (Beijing Guozijian)	Other Indoor Spaces; Other Outdoor Attractions	Entrance fee/cost; Reservation or ticket required	WildGreatWall
Beirut, Lebanon				
	Green Oval at American University of Beirut	Other Outdoor Attractions; Privately Owned Public Spaces	Perception of publicness	NY Magazine Intelligencer

City	Place	Type Category	Access Limitations	Source
Boise, ID, USA				
	Boise River Greenbelt	Parks & Greenways		Sunset
Boston, MA, USA				
	Schlesinger Library	Libraries	Perception of publicness	Thrillist
Chicago, IL, USA				
	Amethyst Room at King Spa	Other Indoor Spaces	Entrance fee/cost; Reservation or ticket required	Discoverer
	Bohemian National Cemetery	Cemeteries & Tombs		Discoverer
	Chicago Bahá'í Temple	Places of Worship	Possible discomfort with religious affiliation	Discoverer
	Garden of the Phoenix and Sky Landing	Gardens & Arboretums		Discoverer
	Garfield Park Conservatory	Gardens & Arboretums	Reservation or ticket required	Discoverer
	Humboldt Park	Parks & Greenways		Discoverer
	Judy Istock Butterfly Haven at Peggy Notebaert Nature Museum	Museums & Galleries	Entrance fee/cost	Discoverer
	Rainbow Beach Dunes	Natural Landscapes		Discoverer
	The Art Institute of Chicago	Museums & Galleries	Entrance fee/cost; Reservation or ticket required	Discoverer
	Winter Garden at Harold Washington Library Center	Libraries; Gardens & Arboretums		Thrillist
Delhi, India				
	Humayun's Tomb	Cemeteries & Tombs	Entrance fee/cost	Oyster
	Lodhi Gardens	Parks & Greenways; Cemeteries & Tombs		Oyster
Denver, CO, USA				
	Tattered Cover Bookstore	Bookstores	Expectation of spending money	Sunset

City	Place	Type Category	Access Limitations	Source
Detroit, MI, USA				
	The Heidelberg Project	Neighborhoods & Districts; Other Outdoor Attractions		Thrillist
Hanoi, Vietnam				
	Cafe Pho Co (or other rooftop cafes)	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	NY Magazine Intelligencer
Ho Chi Minh City (Saigon), Vietnam				
	Ky Quang Pagoda	Places of Worship	Possible discomfort with religious affiliation	Matador Network
	Nhã Nam Café a.k.a. The Book Café	Bookstores	Expectation of spending money	Matador Network
	Phú Mỹ Hưng a.k.a. The District (District 7)	Neighborhoods & Districts	Limited times (daytime only, loud music starting early evening)	Matador Network
	The Bitexco Financial Tower	Privately Owned Public Spaces	Entrance fee/cost (for sky deck)	Matador Network
	The General Science Library	Libraries		Matador Network
	The Boathouse, The Deck, or Chay Garden	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	Matador Network
	Văn Thánh Park	Parks & Greenways	Limited times (crowded on weekends)	Matador Network
Hong Kong, China				
	Cyberport	Neighborhoods & Districts	Distance	Culture Trip
	Hong Kong Park	Parks & Greenways	Free entrance, but activities inside cost money	Culture Trip
	Kowloon Park	Parks & Greenways		Culture Trip
	Kowloon Walled City Park	Parks & Greenways		Culture Trip
	Long Ke Wan (Beach)	Natural Landscapes	Distance; Physical limitations (hike in option); Entrance fee/cost (speedboat option)	Culture Trip

City	Place	Type Category	Access Limitations	Source
	Nan Lian Garden	Gardens & Arboretums		Culture Trip
	Tap Mun (Grass Island)	Neighborhoods & Districts	Distance; Entrance fee/cost (only accessible by paid ferry)	Culture Trip
	Tsz Shan Monastery	Places of Worship	Reservation or ticket required	Culture Trip
	Upstairs Garden at Pacific Place	Gardens & Arboretums; Privately Owned Public Spaces	Perception of publicness	Culture Trip
	Victoria Peak Garden	Gardens & Arboretums		Culture Trip
Istanbul, Turkey				
	Baltalimanı Japanese Garden	Gardens & Arboretums		Departful
	Maçka Park	Parks & Greenways		Departful
	Moda Seaside	Neighborhoods & Districts		Departful
	Otağtepe Tema Park	Parks & Greenways		Departful
	Fenerbahçe Park	Parks & Greenways	Distance	Departful
Jakarta, Indonesia				
	Taman Suropati	Parks & Greenways		Oyster
Johannesburg, South Africa				
	Bioscope, Cinema Nouveau, or Nu Metro	Other Indoor Spaces	Entrance fee/cost; Reservation or ticket required	In Your Pocket
	Bridge Books	Bookstores	Expectation of spending money	In Your Pocket
	Foakes Coffee Bar & Roastery	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	In Your Pocket
	Global Cheese Continental Deli	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	In Your Pocket
	Goodman Gallery (+ Gift/Coffee Shop)	Cafes, Teahouses, Restaurants, & Bars; Museums & Galleries	Expectation of spending money (gift/coffee shop); Limited times (during the day to avoid busy times);	In Your Pocket

City	Place	Type Category	Access Limitations	Source
	Issy's Coffee & Gift Shop	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	In Your Pocket
	Joburg Contemporary Art Foundation	Museums & Galleries	Limited times (exhibits open for a few months only); Reservation or ticket required	In Your Pocket
	Red Door Café	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	In Your Pocket
	Sandton Library	Libraries		In Your Pocket
	Satyagraha House	Other Indoor Spaces	Entrance fee/cost; Reservation or ticket required	In Your Pocket
	The Library of Things We Forgot to Remember at 44 Stanley	Museums & Galleries		In Your Pocket
	Walter Sisulu Botanical Garden	Gardens & Arboretums	Entrance fee/cost; Reservation or ticket required	In Your Pocket
	Wits Art Museum (WAM)	Museums & Galleries	Perception of publicness (university campus)	In Your Pocket
Kathmandu, Nepal				
	Bhaktapur	Neighborhoods & Districts		BBC
	Boudnath (Buddhist Stupa)	Places of Worship	Limited times (busy much of the time)	BBC
	Changu Narayan Temple	Places of Worship	Distance	BBC
	Nagarjun Forest Reserve	Natural Landscapes	Car needed (+ distance); Entrance fee/cost; Physical limitations (hike required); Guide recommended	BBC
	Swayambhunath (Buddhist Stupa)	Places of Worship	Possible discomfort with religious affiliation; Possible physical limitations	BBC

City	Place	Type Category	Access Limitations	Source
	The Garden of Dreams	Gardens & Arboretums	Entrance fee/cost; Reservation or ticket required	BBC
Kolkata (Calcutta), India				
	Belur Math	Places of Worship	Possible discomfort with religious affiliation	Buzztribe News
	James Princep Ghat	Other Outdoor Attractions	Possible physical limitations	Buzztribe News
	Maidan	Neighborhoods & Districts		Buzztribe News
	Nipponzan Myohoji Buddhist Temple	Places of Worship	Possible discomfort with religious affiliation	Buzztribe News
	St. Paul's Cathedral	Places of Worship	Possible discomfort with religious affiliation	Buzztribe News
Lagos, Nigeria				
	Lekki Conservation Centre	Natural Landscapes	Entrance fee/cost; Tourist hot spot (possible crowds)	LagosLife
	Nike Art Gallery	Museums & Galleries	Expectation of spending money	LagosLife
	The Jazzhole	Bookstores; Other Indoor Spaces	Expectation of spending money	LagosLife
	Freedom Park	Parks & Greenways		LagosLife
	Terra Kulture	Other Indoor Spaces	Entrance fee/cost (performances); Expectation of spending money (restaurant); Reservation or ticket required (performances)	LagosLife
Las Vegas, NV, USA				
	Ethel M Chocolates Cactus Garden	Gardens & Arboretums	Car needed (+ distance); Entrance fee/cost	Sunset
London, England				
	Bushy Park	Parks & Greenways		TimeOut

City	Place	Type Category	Access Limitations	Source
	Holdspace	Other Indoor Spaces	Entrance fee/cost; Reservation or ticket required; Many group events	TimeOut
	Phytology Medicinal Garden	Gardens & Arboretums	Limited times (only open to public on Saturdays)	TimeOut
	Postman's Park	Parks & Greenways		TimeOut
	Royal Foundation of St Katharine	Places of Worship	Entrance fee/cost; Reservation or ticket required; Limited times (for non-religious days)	TimeOut
	Southbank Centre's National Poetry Library	Libraries		TimeOut
	Southwark Woods, Camberwell Old Cemetery	Cemeteries & Tombs		TimeOut
	St Dunstan-in-the-East	Places of Worship	Possible discomfort with religious affiliation	TimeOut
	Wat Buddhapadipa	Places of Worship	Possible discomfort with religious affiliation	TimeOut
	Word on the Water	Bookstores	Expectation of spending money	TimeOut
Los Angeles, CA, USA				
	Central Library at Los Angeles Public Library	Libraries		Sunset
	Descanso Gardens	Gardens & Arboretums	Car needed (+ distance); Entrance fee/cost (cashless)	Sunset
	Peace Awareness Labyrinth & Gardens	Gardens & Arboretums	Entrance fee/cost; Limited times (open to public 3 days a week); Reservation or ticket required	Thrillist; Locale Magazine

City	Place	Type Category	Access Limitations	Source
	Tea at Shiloh	Cafes, Teahouses, Restaurants & Bars	Expectation of spending money; Reservation or ticket required	Locale Magazine
	Cerritos Public Library	Libraries		Locale Magazine
	Mary Lane Cafe	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	Locale Magazine
	Averill Park	Parks & Greenways		Locale Magazine
	Hideko Spa	Other Indoor Spaces	Entrance fee/cost; Reservation or ticket required	Locale Magazine
	Lake Shrine Meditation Gardens	Gardens & Arboretums	Perception of publicness; Reservation or ticket required	Locale Magazine
	Getty Villa Museum	Museums & Galleries		Locale Magazine
	SOAR at South Coast Botanic Garden	Gardens & Arboretums	Entrance fee/cost; Reservation or ticket required	Locale Magazine
	Lost Books	Bookstores	Expectation of spending money	Locale Magazine
	El Matador State Beach	Natural Landscapes	Car needed (+ distance)	Locale Magazine
Madrid, Spain				
	Fundación Mapfre or Fundación Juan March (especially their cafes)	Museums & Galleries	Entrance fee/ cost; Expectation of spending money (cafes); Reservation or ticket required	NY Magazine Intelligencer
Manila, Philippines				
	Afri Café by Miranda's Garden	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	Klook
	Café I'm Here	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	Klook
	Cinema Centenario	Other Indoor Spaces	Entrance fee/cost; Reservation or ticket required	Klook

City	Place	Type Category	Access Limitations	Source
	Eskinita Art Gallery	Museums & Galleries	Expectation of spending money	Klook
	Filipinas Heritage Library	Libraries		Klook
	Gubat	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	Klook
	Paco Park	Gardens & Arboretums	Entrance fee/cost	Oyster
	Wabi Sabi (Pottery Studio)	Other Indoor Spaces	Entrance fee/cost; Reservation or ticket required	Klook
	Yoga Manila	Other Indoor Spaces	Entrance fee/cost; Reservation or ticket required	Klook
Mexico City, Mexico				
	Audiorama, Bosque de Chapultepec	Other Outdoor Attractions		Culture Trip
	Claustro Museo Franz Mayer	Museums & Galleries	Entrance fee; Limited times (weekday mornings are less crowded); Reservation or ticket required	Culture Trip
	Espacio Escultórico, UNAM	Other Outdoor Attractions	Distance	Culture Trip
	El Claustro de Sor Juana	Other Outdoor Attractions		Culture Trip
	La Secretaría de Educación Pública	Other Indoor Spaces	Perception of publicness	Culture Trip
	Los Dinamos	Neighborhoods & Districts		Culture Trip
	Los Viveros de Coyoacán	Parks & Greenways		Culture Trip
	Parque Lincoln	Parks & Greenways		Culture Trip
	Tomás Casa Editora de Té	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	Culture Trip
Mumbai, India				
	Aarey Colony	Parks & Greenways		Tripoto
	Girivihar Podar College Bouldering Wall	Other Indoor Spaces	Entrance fee/cost; Physical limitations; Limited times	NY Magazine Intelligencer

City	Place	Type Category	Access Limitations	Source
	Horniman Gardens	Parks & Greenways		Tripoto
	Oval Maidan (Recreation Ground)	Other Outdoor Attractions		Tripoto
	Priyadarshini Park	Parks & Greenways		Tripoto
	Sanjay Gandhi National Park	Natural Landscapes	Entrance fee/cost	Tripoto
New Orleans, LV, USA				
	The Singing Oak in City Park	Other Outdoor Attraction		Thrillist
New York City, NY, USA				
	New York Chinese Scholar's Garden at Snug Harbor Cultural Center & Botanical Garden	Gardens & Arboretums	Entrance fee/cost; Reservation or ticket recommended, not required	NY Magazine Intelligencer
	Paley Park	Privately Owned Public Spaces		Thrillist
	Garden at the Church of St. Luke in the Fields	Gardens & Arboretums; Places of Worship		Bloomberg CityLab
	United Nations Meditation Room	Other Indoor Spaces	Perception of publicness; Security line entrance	Bloomberg CityLab
	Teardrop Park	Parks & Greenways		Bloomberg CityLab
	Church of St. John the Baptist / Church of St. Francis of Assisi	Places of Worship	Possible discomfort with religious affiliation	Bloomberg CityLab
	Waldorf-Astoria Lobby Bathroom	Privately Owned Public Spaces	Perception of publicness	Bloomberg CityLab
	Passageway Under 1251 Avenue of the Americas	Other Indoor Spaces		Bloomberg CityLab
	Conservatory Garden in Central Park	Gardens & Arboretums		Bloomberg CityLab
	The Astor Chinese Garden Court at the Metropolitan Museum of Art	Gardens & Arboretums; Museums & Galleries	Entrance fee/cost; Reservation or ticket required	Bloomberg CityLab

City	Place	Type Category	Access Limitations	Source
	Rose Main Reading Room at the New York Public Library	Libraries		Bloomberg CityLab
Phoenix, AZ, USA				
	The Japanese Friendship Garden of Phoenix	Gardens & Arboretums	Entrance fee/cost; Reservation or ticket required	Thrillist
Portland, OR, USA				
	Hoyt Arboretum	Gardens & Arboretums	Possible physical limitations	Sunset
Rome, Italy				
	Ara Pacis	Museums & Galleries	Entrance fee/cost; Reservation or ticket required	Orbitz
	Galleria Nazionale d'Arte Antica	Museums & Galleries	Entrance fee/cost; Reservation or ticket required	Orbitz
	Museo Orto Botanico di Roma	Gardens & Arboretums	Entrance fee/cost; Reservation or ticket required	Orbitz
	Parco degli Acquedotti	Other Outdoor Attraction		Orbitz
	Piazza Farnese	Other Outdoor Attraction		Orbitz
	Villa Aldobrandini	Parks & Greenways		Orbitz
	Villa Borghese Gardens	Gardens & Arboretums		Orbitz
San Diego, CA, USA				
	Japanese Friendship Garden	Gardens & Arboretums	Entrance fee/cost	Sunset
San Francisco, CA, USA				
	The Sun Terrace at One Kearny	Private Owned Public Spaces	Perception of publicness	Sunset
	The Two Labyrinths at Grace Cathedral	Places of Worship	Possible discomfort with religious affiliation	Sunset
	The Wave Organ	Other Outdoor Attractions		Thrillist
Sao Paolo, Brazil				
	Botecos (all over)	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	Culture Trip

City	Place	Type Category	Access Limitations	Source
	Centro Cultural São Paulo	Cafes, Teahouses, Restaurants, & Bars; Gardens & Arboretums Libraries; Other Indoor Spaces;		Culture Trip
	Coffee Lab	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	Culture Trip
	Feira Benedito Calixto (Antique Market)	Other Outdoor Attractions	Limited times (Saturdays only)	Culture Trip
	Ibirapuera Park	Parks & Greenways		Culture Trip
	Paulista Avenue	Other Outdoor Attraction	Limited times (car-free Sundays)	Culture Trip
	Pitico	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money; Limited times (too busy on weekend evenings)	Culture Trip
	Villa-Lobos Park	Parks & Greenways		Culture Trip
	S.E.S.C. Pompeia	Other Indoor Spaces		Culture Trip
Seoul, Korea				
	Inwangsan Mountain	Natural Landscapes	Physical limitations (hike required)	Oyster
Shanghai, China				
	Shanghai Propaganda Poster Art Centre	Museums & Galleries	Entrance fee/cost; Perception of publicness	NY Magazine Intelligencer
	1984 Bookstore	Bookstores; Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	Oyster
	Xiangyang Park	Parks & Greenways		Oyster
Tokyo, Japan				
	Hamarikyu Gardens	Gardens & Arboretums	Entrance fee/ cost (free to those with disabilities)	Oyster
	Hibiya Park	Parks & Greenways		Oyster
	Hikawa Jinja Shinto Shrine	Places of Worship	Possible discomfort with religious affiliation	NY Magazine Intelligencer

City	Place	Type Category	Access Limitations	Source
	Inokashira Park	Parks & Greenways		Wandering Earl
	Marui Rooftop Garden	Gardens & Arboretums; Privately Owned Public Spaces	Perception of publicness	Wandering Earl
	Meikyoku Kissa Lion	Cafes, Teahouses, Restaurants, & Bars	Expectation of spending money	Wandering Earl
	Mt. Takao	Natural Landscapes	Distance; Possible physical limitations	Wandering Earl
	Rikugien Gardens	Gardens & Arboretums	Entrance fee/ cost (free to those with disabilities)	Oyster
	Shinjuku Picadilly Cinema	Other Indoor Spaces	Entrance fee/cost; Reservation or ticket required	Wandering Earl
	Thermae-Yu (Hot Springs)	Other Indoor Spaces	Entrance fee/cost; Reservation or ticket required	Wandering Earl
Washington, D.C., USA				
	Dumbarton Oaks Park	Parks & Greenways		Thrillist
Yangon, Myanmar				
	Kandawgyi Lake Boardwalks	Parks & Greenways		NY Magazine Intelligencer

Figure 232: Evaluation of 196 existing places used for respite; *Credit: author*

Appendix B:
Supporting & Informing Charts

➤ Mental health & well-being

Table 1: Urbanization mental health impacts

Increased risks	Reduced risks
• Self-reported unhappiness (in affluent countries) • Psychosis (e.g. schizophrenia) & mood disorders (e.g. stress & depression) • Cocaine & heroin addiction	• Self-reported unhappiness (in poor countries) • Dementia & Alzheimer disease • Alcohol & methamphetamine abuse • Suicide rates

Figure 233: Reproduced from reproduced from "Urban Sanity" from Victoria Transport Policy Institute (table ES-1)[792]

Table 2: Factors affecting urban mental health

Self-selection factors	Economic & social factors	Environmental factors
Differences in the types of people who locate in different community types. Does not reflect causation.	Differences in how people live and interact. May reflect causation, but often changes over time.	Factors innate to urban locations. These do not reflect causation, but can change over time.
• Poverty & income • Age & life stage • Mobility (duration of residency) • Family & community connections	• Higher income & disparities • Higher costs of living • More subcultures • Higher crime rates	• More interactions with strangers • More racial & cultural diversity • Noise & air pollution • Less interaction with nature

Figure 234: Reproduced from "Urban Sanity" from Victoria Transport Policy Institute[793]

THE FULL FRAME INITIATIVE

Designing for a fair shot at wellbeing

Principle 1: Start with what matters to people: wellbeing.

Do we:

1. Tap into people's inherent drive for belonging and connection, safety, stability, purpose and choice and meaningful access to resources?
2. Uncover and build on how a community defines wellbeing for itself?
3. Guard against pushing progress that requires tradeoffs likely to be unsustainable, or that will be borne primarily by those who historically and currently have less power and fewer resources?
4. Focus on removing systemic barriers to equitable access to wellbeing more than individual action or choice?
5. Think at the level of the family and community, not just the individual?

Principle 2: Design and implement with, not for.

Do we:

1. Partner with community to vision and frame issues, rather than engaging community for feedback around solutions designed by others?
2. Ensure that those most impacted dictate what matters, rather than externally determining what "should" matter?
3. Shift power to community and shift risk and burdens out of community?
4. Allow communities to be complex and non-monolithic?
5. Value – not exploit – people's and communities' vulnerability and shared experience?
6. Hire/fully compensate people with lived expertise in navigating structural challenges and changing systems and history?

Principle 3: Heal and regenerate.

Do we:

1. Understand the history of an issue and the perspectives from those who bear that history?
2. Incorporate healing into process and outcomes?
3. Explicitly tie our work to shifting harmful patterns of the past?
4. Use restorative and transformative practices within our communities and with others?
5. Respect Indigenous and informal cultural norms and values?
6. Push against concentrating harms in communities already facing the greatest adversity?
7. Use mindful language?

Continuing on next page

Principle 4: Foster social connections and social capital.

Do we:

1. Support people helping people before adding programs to help people, including removing obstacles to family/community members helping one another?
2. Recognize that no relationship, person or social connection is "perfect" or "perfectly healthy"?
3. Build on and not undermine social connectedness, belonging and social capital in community?
4. Support bridging and linking capital (relationships that connect us across differences of identity, experience and power), not just bonding capital (relationships with those most like us)?
5. Focus less on individual change and consider how changes in relationships between and among people might be more useful?

Principle 5: Span boundaries.

Do we:

1. Seek out uncommon partners and solutions?
2. Integrate with and advocate across other systems, and leverage other fields and sectors?
3. Expect and accelerate change coming from people and spaces not usually consulted?
4. Resist centering fields and programs, and instead center people and intersectionality?
5. Leverage different aspects of the human experience, including arts, culture and joy?
6. Identify and advocate when policies of one system (including the one in which we work) create barriers in other systems?

Principle 6: Build (on) assets and innovation.

Do we:

1. Start with what communities already have and diligently seek ways to avoid circumventing what works well, as defined by the people who are impacted?
2. Address policies that undermine people's and communities' ability to accumulate wealth, knowledge, data and other kinds of capital?
3. Resist always favoring adding something, when doing nothing or taking something away can be the most important innovation?
4. Preserve innovations sparked by the pandemic or other calamities?
5. Reflect a new way of understanding a problem, not an improved delivery on an old mindset?

FULL FRAME INITIATIVE

fullframeinitiative.org /FullFrameInitiative @FullFrameInitv the-full-frame-initiative

The Full Frame Initiative is a social change organization that partners with a growing cohort of pioneering organizations, systems and communities across the country to fundamentally shift their focus from fixing problems to fostering wellbeing – the needs and experiences essential for health and hope. Together, we are creating possibilities for lasting change in people's lives and sparking a broader movement that replaces poverty, violence, trauma and oppression with wellbeing and justice.

Figure 235: The Full Frame Initiative's six principles for designing for a fair shot at well-being; credit: The Full Frame Initiative[794]

The cyclic relationship between the pillars of neuroarchitecture

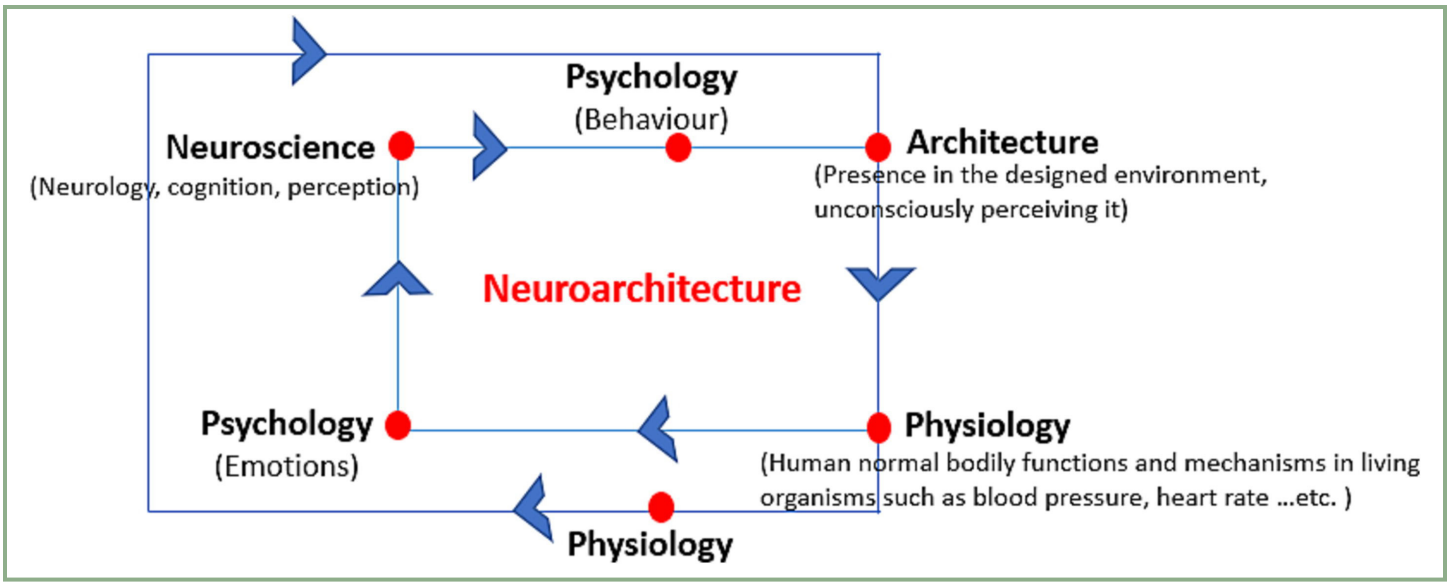


Figure 236: Directly sourced from Assem et. al (2022)[795]

➤ Biophilia

Table 3: Ways to increase interaction with nature

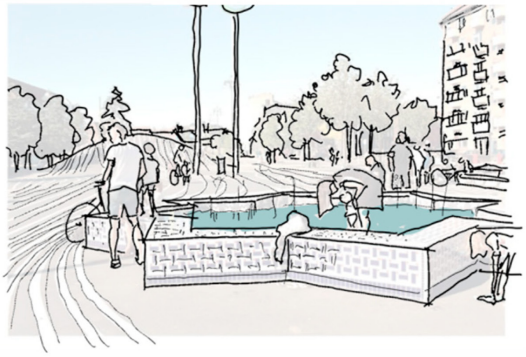
Approach	Advantages	Disadvantages
Lower density development, such as housing with large private gardens or near farms and forests	Private gardens tend to provide more privacy, plus physical and emotional involvement	Increases per capita land consumption and costs associated with dispersed development
Higher density development with public greenspace, such as apartments near urban parks	Reduces land consumption per capita and provides benefits of compact urban development	Increases costs associated with compact development; requires more planning
Green infrastructure, such as green roofs, and street trees	Provides greenspace within developed areas	Can increase infrastructure costs
Nature area visiting, such as parks programs & holidays	Allows more people to experience natural environments	Tend to be infrequent; increases transport costs

Figure 237: Reproduced from Table 5 in "Urban Sanity" from Victoria Transport Policy Institute[796]

Table 4: Biophilic design elements and their corresponding attributes

Environmental features	Natural shapes & forms	Natural patterns & processes
• Color • Water • Air • Sunlight • Plants • Animals • Natural materials • Views & vistas • Façade greening • Geology & landscape • Habitats & ecosystems	• Botanical motifs • Tree & columnar supports • Animal (mainly vertebrate) motifs • Shells & spirals • Egg, oval, & tubular forms • Arches, vaults, domes • Shapes resisting straight lines & right angles • Simulation of natural features • Biomorphy • Geomorphology	• Sensory variability • Information richness • Age, change, the patina of time • Growth & efflorescence • Central focal point • Patterned wholes • Bounded spaces • Transitional spaces • Linked series & chains • Integration of parts to wholes • Complementary contrasts • Dynamic balance & tension • Fractals • Hierarchically organized ratios & scales
Light & space	**Place-based relationships**	**Evolved human-nature relationships**
• Natural light • Filtered & diffused light • Light & shadow • Reflected light • Light pools • Warm light • Light as shape & form • Spaciousness • Spatial variability • Space as shape & form • Spatial harmony • Inside-outside spaces	• Geographic connection to place • Historic connection to place • Ecological connection to place • Cultural connection to place • Indigenous materials • Landscape orientation • Landscape features that define building form • Landscape ecology • Integration of culture & ecology • Spirit of place • Avoiding placelessness	• Prospect & refuge • Order & complexity • Curiosity & enticement • Change & metamorphosis • Security & protection • Mastery & control • Affection & attachment • Attraction & beauty • Exploration & discovery • Information & cognition • Fear & awe • Reverence & spirituality

Figure 238: Recreated from Biophilic Design Guidebook[797]



Superkilen
Copenhanen,
Denmark
2007– 2012
By: TOPOTEK 1,
BIG Bjarke Ingels
Group, Superflex

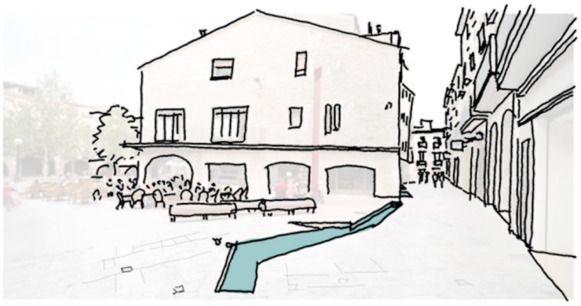
Basin fountain

Exchange Value	Use Value	Image Value	Social Value	Environmental Value	Cultural Value
(+)	++	(+)	+	o	(+)

Freyberg Place
Auckland,
New Zealand
2014-17
By: John Reynolds

Cascade

Exchange Value	Use Value	Image Value	Social Value	Environmental Value	Cultural Value
(+)	++	(+)	+	+	(+)



Plaza Mayor
Banyoles, Spain
1998-2008
By: Josep Mias
Gifre

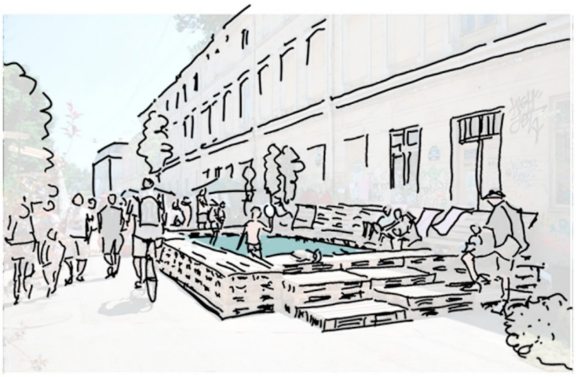
Urban trickle

Exchange Value	Use Value	Image Value	Social Value	Environmental Value	Cultural Value
(+)	++	(+)	+	+	(+)

Foot of Longdale
San Francisco, CA, USA
2014-18
Patkau Architects
/ V.Helton & Assoc.

Pavement fountain

Exchange Value	Use Value	Image Value	Social Value	Environmental Value	Cultural Value
(+)	++	(+)	+	(–)	(+)



Temporary Pool at
Verona Street,
Bucharest,
Romania
2012
By: studioBASAR

Swimming pool

Exchange Value	Use Value	Image Value	Social Value	Environmental Value	Cultural Value
(+)	++	(+)	+	+	(+)

Olympic Handover
Thames River
London, UK
2012
By: NN

2D, 3D Screen

Exchange Value	Use Value	Image Value	Social Value	Environmental Value	Cultural Value
(+)	++	(++)	+	+	(+)

Figure 239: Morphological types of water elements in hardscaped urban public spaces, as identified by Langie, Rybak-Niedziółka, and Věra Hubačíková in their 2022 study; also shows a summary of their potential influence on values of public space with + for moderate positive impact, ++ for significant impact, – for moderate negative impact, values in parethesis are significantly dependent on the detailed design; *Credit: included as Figure 2 in "Principles of Designing Water Elements in Urban Public Spaces"*[798]

➤ Sensory design & materiality

The use of essential oils and aromatherapy dates back thousands of years across numerous cultures. Scientific data is mixed and generally inconclusive in terms of medical application[799]. However, there are studies that have shown benefits of aromatherapy of certain essential oils (not as a replacement for medical treatment).

Table 5: Essential oils for common problems (specifically those related to the goals of *R-Spaces*)

Condition	Essential oils
Anxiety, agitation, stress	**Angelica** *(Angelica archangelica rad.)* **Basil** *(Ocimum basilicum)* **Bergamot** *(Citrus bergamia)* **Geranium** *(Pelargonium graveolens)* **Labdanum** *(Cistus ladaniferus)* **Lavender** *(Lavandula angustifolia)* **Lemon-scented ironbark** *(Eucalyptus staigeriana)* **May chang** *(Litsea cubeba)* **Orange bigarade** *(Citrus aurantium var. amara per.)* **Palmarosa** *(Cymbopogon martinii)* **Patchouli** *(Pogostemon patchouli)* **Petitgrain bigarade** *(Citrus aurantium var. amara fol.)* **Roman chamomile** *(Anthemis nobilis)* **Sweet orange** *(Citrus sinensis)* **Sweet marjoram** *(Origanum majorana)* **Valerian** *(Valeriana officinalis)* **Ylang-ylang** *(Cananga odorata)*
Depression, mood issues (and oils that help with feelings of well-being)	**Lavender** *(Lavandula angustifolia)* **Lemon** *(Citrus limon)* **Roman chamomile** *(Anthemis nobilis)* **Ylang-ylang** *(Cananga odorata)*
Fatigue - exhaustion..... - mental..... - nervous.....	 **Grapefruit** *(Citrus paradisi)* **Coriander** *(Coriandrum sativum)* **Spearmint** *(Mentha spicata)* **Angelica** *(Angelica archangelica rad.)* **Clary** *(Salvia sclarea)* **Geranium** *(Pelargonium graveolens)*

Condition	Essential oils
(Fatigue continuing) - regular.....	**Citronella** *(Cymbopogon nardus)* **Ginger** *(Zingiber officinale)* **Gully gum** *(Eucalyptus smithii)* **Juniper twig** *(Juniperus communis ram.)* **Neroli begarade** *(Citrus aurantium var. amara)* **Rosemary** *(Rosmarinus officinalis ct. cineole, ct. camphor, ct. verbenone)* **Scots pine** *(Pinus sylvestris)*
Mental exhaustion, burnout	**Basil** *(Ocimum basilicum)* **Everlasting** *(Helichrysum angustifolium)* **Peppermint** *(M.piperita)*

Figure 240: Reproduced from information in Table 2 in "Essential oils used in aromatherapy: A systemic review"[800]

Results from one study connecting material textures to emotional responses

The material textures with the highest correlations, which have a relation to one or more of the *R-Space* typologies, are as follows (with the percentage of respondents who selected this emotion).

Calm/comfort *(potential in Rest, Relax, & Restore spaces)*:

- Fabric (cotton), smooth (70%)
- Wood, smooth (30%) (plus another 29% chose "satisfaction")
- Glass, matte/frosted (30%) (plus another 25% chose "satisfaction")
- Stone (marble), honed/matte (45%)
- Ceramic – matte (34%)

Joy/excitement *(potential in Revive spaces)*:

- Fabric (cotton), velvet (41%)
- Glass, plain/glossy (41%)
- Ceramic, glossy (32%)

Continuing on next page

Discomfort/unease *(maybe avoid – especially in Rest, Relax, & Restore spaces)*:

- Fabric (cotton), rough (29%) (although the highest category selected was actually "satisfaction" with 36%, so this is inconclusive)
- Wood, rough (39%)
- Metal (steel), rusted (32%) (plus another 30% chose "fear/danger/anxiety")

Some which show conflicting results

- Stone (marble), sandblasted/textured: 25% calm/comfort, 25% satisfaction, 25% discomfort/unease (mix of positive and negative)
- Stone (marble), polished/glossy: 29%, excitement/joy, 27% calm/comfort, 25% satisfaction (mostly positive, but opposite ends of the spectrum)

Disclaimer: While a good starting point for connecting emotional reactions to material perception, this data is from only one study of 56 participants in one country (which could be impacted by culture). It is not enough to confidently apply as conclusions for use of these materials in a wide, systematic approach. Furthermore, this author disagrees with some of the selected samples for participants (i.e. a rusted iron chain for rusted metal instead of an upcycled rusted surface, smooth cotton shown on a bed – could account for high number of comfort responses, etc.).

Overall, this study should probably not be deemed conclusive or reliable, but the concept behind it and idea of testing is interesting and has potential for future investigations. Considering users' reactions to various materials could be one factor of community engagement or contextual studies when developing an *R-Space* in a specific city.

Figure 241: Data sourced from analysis of "The Tactile Sensory Experience in Interior Design: Exploring the Impact of Touch on Emotional Responses"[801]

How wood is beneficial for well-being

- Studies from Italy and China both found that wood reduced heart rate & sweat levels without study participants' conscious awareness[802].
- A clinical trial from Brown University (USA) and study from the University of British Columbia (Canada) showed "the visual presence of wooden elements can lower stress more effectively than plants"[803].
- In one study in Japan, participants were blindfolded while they touched stainless steel, tile, marble, and white oak. With the oak, they showed increased activity in the rest & calming areas of the nervous system[804].

Continuing on next page

- A 2017 study of building experts and general members of the public, across five countries, found that "the smell, touch, and feel of wood are regarded as pleasant and many people have generally positive associations with wood."[805]
- Wood emits the natural compounds phytoncides, which were shown in Japanese forest bathing research to decrease anxiety, reduce stress hormones, and improve concentration & mood[806].
- A study published in the Journal of Sustainable Forestry showed a potential reduction in global emissions by 14 to 31% if sustainably forested wood replaced materials used in buildings and bridges[807].

Figure 242: Scientific data on benefits of wood

➤ Other

A complementary model

The discovery of a complementary model, following some parallels of ideas, was discovered at the eleventh hour of this project. It provides further reinforcement of these concepts and their immediate relevance in current and future design. This model was developed by designer & researcher Maighdlyn Hadley to complement restorative architecture and the existing foundations of LEED and WELL. Further elaborations of her findings are provided in her article, "Hurry Up and Wait: Spatial Strategies for Urban Stress Relief, Part 1" published in Humanics Lab on Medium[808].

Graphic of model is on the following page for size purposes.

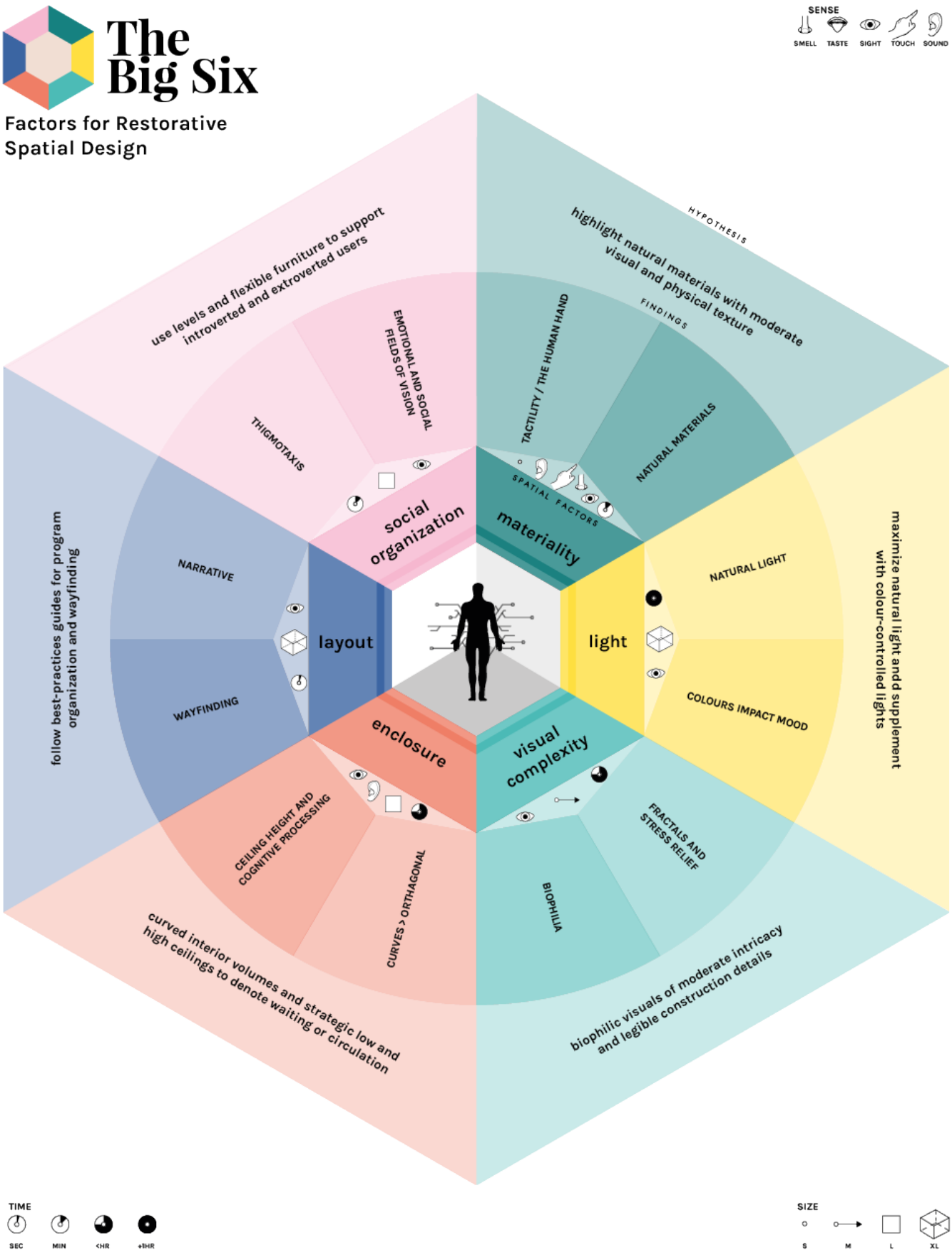


Figure 243: The Big Six: Factors for Restorative Spatial Design; *Credit: Maighdlyn Hadley via Medium*

Table 6: Mapping techniques

Methodology	Pros	Cons	Example
Agent-based models (ABM): Computer simulations that allow multiple interactions at level of individual or agent (biological & behavioral characteristics, SES) and social factors (neighborhood social & physical characteristics) to show unexpected patterns of population health	• could be helpful to model effect of interventions that may be difficult to investigate in real world • can model effects of stimulated scenarios • multi-dimensional • could help with understanding • considers wider populations than individual interviews, one-on-one interactions, etc.	• simulations are not always accurate & cannot possibly account for many more nuanced factors in the human experience • gap in urban uses in literature • controversial • still largely confined to academia - further research needed on applicability to real world	Unclear if it has yet been applied beyond analytics - further research needed
Ecological momentary assessment (EMA): Repeated sampling of current experiences in real-time, real-world contexts, can be enriched with geographical info (GEMA, GIS) to link subjective experiences with objective measures of mobility & place	• high ecological validity because it is in context • links subjective with objective better than some other methods	• more complex, further understanding needed (will likely need to be conducted by scientists) • possibly more connected to change over time than understanding subjective experience	A study using EEG devises while participants walk in urban vs. natural environments & talk about their experiences (Shiffman, Stone, Hufford 2008)

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Methodology	Pros	Cons	Example
EDA mapping, GSR mapping EDA mapping: measures electrodermal activity; psycho-physiological research method observing momentary emotional states as they are reflected in physiological changes - measures electrical charges of skin (sweat glands & blood flow) GSR mapping: measures galvanic skin response or how much people sweat	• more scientifically reliable data than retrospectively made assessments • mainly related to emotional, novelty, or attentional fields • measures in real time instead of a lab making it more in line with real-life situations	• relies on study volunteers • difficult to delineate between and interpret positive vs negative stimuli (both responses can cause similar physiological responses meaning study participants would need to give further context on their emotional responses) • sweat glands & blood flow do not encapsulate an entire experience	The 6 month project featured in "Emotions of the urban pedestrian: sensory mapping" study; Report author suggests this methodology for use as one study says: "as a tool for indicating urban environments which are more likely to be negatively experienced"
Experience-based studies, in situ experiences Individuals provide quantitative or qualitative info while they walk specific neighborhoods or landscapes	• "much more fine-grained insight"[809] • crucial for understanding in context • provides real time responses, does not rely on later recall	• difficult to scale up • highly subjective • limited population reach • costly / high cost of labor • time-consuming • conscious experience of feelings (meaning people may experience something differently because they are consciously thinking about it)	

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Methodology	Pros	Cons	Example
Three-Person walking: Proposed by JP Thibaud – see "Architectural and urban atmospheres" article for detailed methodology of 3 walks ("i-walk", "you-walk", "he- or she-walk")	• multi-dimensional • allows for subjectivity of experience	• time consuming	Franco-Swiss research action funded by the National Research Agency in "Architectural and urban atmospheres" study (in *Measuring Walking*)
Traditional mapping via surveys, interviews, questionnaires (mind mapping)	• basic & low tech • easy to understand • allows participants to accurately describe emotions (from list of emotions, words of choice) • can be used as a part of a democratic, bottom-up planning approach (e.g. mental maps drawn by participants during interviews)	• relies on memory • highly subjective • limited population reach • costly / high cost of labor • time-consuming • interviewer effects • conscious experience of feelings (meaning people may experience something differently because they are consciously thinking about it)	55 sketches of various public places in Heidelberg (from the study "Viability of public spaces in cities under increasing heat"

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Methodology	Pros	Cons	Example
Social network data analysis	• wide population sample • reductions in cost, time, & error • useful for comparing cities • does not require finding participants	• limited extractions (based on 4 emotions only, might miss nuance) • accuracy of facial mapping as correctly conveying experience • relies on shared photos (who does this account for? mostly tourists?) • would this work for certain emotional states? across neurodiversity?	56,766 images from 12 cities around the world over 6 years used to analyze cities' emotional structure & similarity in "Emotional maps based on social networks data..." study published in *Cities* journal
This is a limited list – researching a wider variety of mapping methodologies is recommended. There is also the possibility of combining multiple methodologies and the overlap between various methods and tools listed above (EDR, GSA, GEMA, EEG, etc - utilizing various tools and methods for similar types of research). Urban Mind's "Your Emotional City Study"[810] is recommended for further reading. To stay abreast of emerging technologies in mapping, start with the TedTalk playlist, "Adventures in mapping"[811].			

Figure 244: A comparison of some mapping methodologies, which could potentially inform a study of where to place R-Spaces in specific cities. This chart is informed by numerous sources: "Agent-based modelling for Urban Analytics", "Architectural and urban atmospheres" in Measuring Walking, "Cartographies of Fuzziness", "Emotional maps based on social networks data", "Emotions of the urban pedestrian: sensory mapping" in Measuring Walking, "Understanding urbanicity", and "Viability of public spaces in cities under increasing heat"[812].

Appendix C:
Existing digital apps and tools

Looking at app developments in recent years, an argument can be made that there is a hunt for calmness in cities.

"These trends work towards a calmer and slower urban life, even with the smallest tools."

– Adela Hankus, Pop Up City[813]

➤ Community Noise Lab (Lab/Tools)

About & how it works:

- Lab at Brown University School of Public Health studying community noise & health
- Two of their products:
  - 2014 Noise and the City website: updates greater Boston residents on Harvard dissertation research with a survey & blog (now archived)
  - Noise Score: smartphone app maintained by Boston University for real-time monitoring & exposure modeling[814]

Goal: to holistically explore the relationship between community noise & health impacts by working directly with communities[815]

Takeaway(s):

- There is research interest in relationships between sound & health at the community level

➤ EarthFM (Online Database)

About & how it works:

- Analysis & online interactive map that shows cities (with populations over 250,000) with high noise levels and places people identified in & around them as quiet, peaceful, or relaxing
- Places are given 'quiet scores' – the higher the score, the more peaceful the place

- Has specific lists of the most peaceful spots in Europe's & the USA's loudest cities – limited to these continents so far with a hope of expanding in the future
- Also has a sound recording database of 700+ nature sounds[816]

Goal: to "open a doorway into the tranquil places that can be found in even the unlikeliest of urban locations"[817]

Takeaway(s):

- Research is being done on finding quiet places in loud cities
- When natural sounds override artificial ones, the nervous system can de-stress & recalibrate[818]

➤ HushCity (App)

"Are calm and quiet becoming a luxury that's available to less and less urban dwellers?"

– Hankus, Pop Up City[819]

About & how it works:

- People report a quiet space, fill out a questionnaire about how it makes them feel, take photo, & share a brief audio recording of the area
- Can browse quiet spaces shared by other users
- Creator hopes these maps will help city officials figure out how to preserve these quiet areas, while making it easier for residents to find one near them[820]

Goal: to "make quiet urban spaces accessible to anyone that needs a break away from the noises of the city"[821]

Takeaway(s):

- People prefer natural sounds like birdsong and human voices over complete silence – feeling of community characteristic to selected quiet areas[822]
- Common characteristics include: secluded, secure, clean, and well landscaped[823]

➤ Stereopublic (App)

About & how it works:

- Free smartphone app that lets users geo-locate & share favorite tranquil city space with a 30-second recording & photo
- City 2.0 winner presented at TEDGlobal 2013
- Created by Australian composer & sound artist Jason Sweeney
- Users can choose a mood to reflect how they feel in the space & request someone to create a sound composition for it[824]
- No longer available in the United States

Goal: to raise awareness about the importance of noiseless zones & inspire healthier communities[825]

Takeaway(s):

- Crowd-sourcing as a potential source for space-based sound compositions

➤ Tranquil City (Collective)

"Cities are incredible but they can also be intense. Sometimes we all need a place to slow down, notice our surroundings and take a moment for ourselves."

– Tranquil City philosophy[826]

About & how it works:

- Grassroots urban initiative in London
- Founded by Grant Waters, an acoustic engineer
- Includes work like 'Tranquil Pavement London' – a crowdsource data map that combines tranquil spaces with city-wide datasets like noise & air pollution (people can post a photo or video to Instagram or Twitter with a GPS location & the hashtag #tranquilcitylondon)
- Other projects include 'Clean Air Walking Routes', 'Beat

the Commute Routes', and city-based projects in London, Exeter, Bristol, Barcelona, & others[827]

Goal: to curate urban calm for healthier city living[828]

Takeaway(s):

- Difficult to define tranquility, as it varies person to person
- Problem with crowd-sourcing – some people reluctant to share their 'secret space' to avoid them being ruined by crowds

Apps and tools related to health in cities and calm tend to focus on noise/sound. Digital health tools marketed towards mental health are less city-focused and more individual-focused, and meditation is a common theme; examples include Headspace, Mindfulness, Calm, and Mood Tracker[829].

More urban-focused apps which do attempt to connect the urban environment with well-being include Urban Mind, Mappiness, and Shmapped. However, previous data collection and results have primarily focused on the impact of nature and green spaces[830], which is the most studied intersection of urbanism and mental well-being.

Digital tools in general are limited to either personal mental activities or, in terms of the built environment, listing or recommending existing places, which have been proven to be insufficient.

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Originally from New Zealand, Dennae grew up in North Carolina, lives in NYC, and travels to new places as often as possible. As a designer, Dennae is inspired by non-traditional collaboration, beautiful books, and the interactions of disciplines. With a varied background in exhibition design, urbanism, graphic design, interior design, and philosophy, she works as a multi-disciplinary designer and urbanist, and finds herself interested in a wide range of topics.

Dennae is most interested in impactful exhibitions, spaces, and interventions that improve society by engaging citizens and offering opportunities for exploration. This includes the exploration of culture and learning about new things, as well as providing breaks from the mundane or negative circumstances in our world. Working with physical space, in-context interaction, materiality, and public pedagogy, she creates strong project-specific identities that are supported by thorough research. She is a supporter of crossmodalism and creating new ways to communicate with design.

Dennae is a vegetarian Leo, who loves animals and cares about the environment. In her free time, she enjoys exploring coffee shops & bookstores, curating playlists, playing games & trying out escape rooms, napping & hammocking, and experiencing new things & places.

Interested in collaborating? Want to get involved with *R-Spaces*? Reach out to dennaeadaire@gmail.com.

➤ **Crossmodalism**: a movement born from the synthesis of art, science, and entrepreneurship. It is based in learning and collaboration across non-traditionally linked disciplines, ideas, and communities. Through this foundation, crossmodalism fosters an appreciation of the full human experience in connection to its sensorial and natural environment.