We must keep every scrap of nature in and around our cities. Nature holds the key to our aesthetic, intellectual, cognitive and even spiritual satisfaction.

- E.O. Wilson in The Biophilia Hypothesis (1984)

## THE BENEFIT in High Density OF NATURE Urban Areas

**Cornelia Hahn Oberlander**, Project Director Landscape Architect, O.C. O.B.C. FCLSA FSALA BCSLA, Inaugural Recipient of the Governor General's Medal in Landscape Architecture

Deanne Manzer, Project Researcher MLA

Kaitlyn Gillis, Project Advisor Director, Wellbeing + Sustainability, Light House Sustainability Building Centre

June 26, 2017

Entertainment + culture + events
Job opportunities
Education opportunities
Variety of services + shops
Public Transit
Access to healthcare

-3

### Benefits of Urban Living

## Health Benefits of Urban Living

**longer lives** Urban residents live up to 5 years longer than rural residents

- Lower obesity
- Healthier diets
- More physical activity
- Decreased smoking



Source: BC Ministry of Health 2012; Russ et al. 2012.

## Mental Health Implications of Urban Living



## Mental Illness in Canada

1 in 5

Canadians will have a mental illness this year Increases to 28% for people aged 20 to 29

1 in 2

Canadians will experience mental illness before 40



Mental Illness costs Canada almost \$50 billion/year
\$19.7 billion healthcare costs for demetia care
\$22.6 billion healthcare costs for other mental illnesses

• \$ 6.3 billion in lost business productivity

Sources: Mental Health Commission of Canada 2013; Smetanin et al. 2011

## Stress in Canada



Canadians feel high stress most days Too much stress has many results, including:

- Negative thinking
- Decline in cognitive performance
- Withdrawal from social circles
- High blood pressure

Stress is a risk factor for obesity, mental illness, asthma, and heart disease



Sources: Statistics Canada (2014); Statistics Canada (2015); Health Canada, Centre for Addiction and Mental Health

## Social Implications of Highrise Living



#### Decreased interaction with neighbours (Chu et al 2004; Bonnes et al 1991)



#### Increased Ioneliness

(Chu et al 2004; Bonnes et al 1991)

### Loneliness increases...

mortality (Holt-Lunstad et al. 2015)

high blood pressure (Hawkley et al 2010)

depression (Green et al 1992)

+ is as bad for your health as smoking 15 cigarettes a day (Holt-Lundstad et al. 2010)

> More information here: http://www.campaigntoendloneliness.org/

up to

26%

## Factors that Impact Health



Individual factors (genetics, biology, life experiences)



Socioeconomic status



Environment

better design = better health

Sources: http://www.cmha.ca/mental\_health/myths-about-mental-illness/ http://www.urbandesignmentalhealth.com/facts-and-figures.html

## Health Inequalities

Health inequality is the health gap between different groups based on income, employment, and education factors.

#### In Canada, health inequalities are linked to:

- **5x** Lower self-rated mental health
- **1.3x** Hospitalized heart attacks
- **1.5x** Higher rates of obesity in women

- ↑ 2x Smoking rates
- **1.4x** Motor vehicle injury hospitalization
- **2x** Higher rates of diabetes
- More alcohol-attributable 1 2x hospitalization

\*\* \*\* shows increased rate for lowest income group as compared with highest income group More information: Canadian Institute for Health Information https://www.cihi.ca/en/trendsin-income-related-health-inequalities-in-canada



## Green Space the Great Equalizer

"Populations that are exposed to the greenest environments also have lowest levels of health inequality related to income deprivation."

– Richard Mitchell, University of Glasgow

& Frank Popham, University of St. Andrew

## **Health Benefits of Nature**









One study showed a 12% lower mortality rate for those living in the greenest areas. (James et al 2015)

Walkable green space is linked to longer lives in seniors. (Takano et al 2002)



1/2 hour weekly in nature linked to a 9% decrease in high blood pressure rates

(Shanahan et al. 2016)





5 minute nature walk boosts mood + self-esteem (Barton and Pretty 2010)



½ hour of nature weekly reducesdepression risk by 7% & results inincreased comfort in socialsituations(Shananhan et al. 2016)



Views of greenspace resulted in lower cortisol levels (Honold et al. 2015)





More Neighbourhood Social Ties & Social Interaction (Kuo et al. 1998; Halpern 1995; Hartig 2014)

Decreased property crime & aggression (Kuo and Sullivan 2001a, 2001b; Hartig 2014)



One study found 2x use of green common spaces for play than common spaces without grass and trees (Taylor et al. 2002)

## Health Benefits of Near-Home Green for Children

- Healthier Birth Weights (James et al. 2015)
- Increased Cognitive Functioning (Wells 2000)
- Lower Obesity (Nielsen and Bruun Hansen 2007)
- Decreased ADD & ADHD symptoms (Kuo and Taylor 2004)
- Lower Stress (Wells + Evans 2003)

#### **Greener School Grounds**

#### **Better Academic Outcomes**

- Enhanced focus
- Increased academic success
- Increased enthusiasm and engagement with learning

Source: http://www.childrenandnature.org/

Note: We did not focus specifically on children, but the benefits of nature on children are well documented. More information: *Last Child in the Woods* by Richard Louv, www.childrenandnature.org

# **Typical Vancouver Streetscape**

Seymour Street

Source: Google Street View

Exposed balconies Grey views De: Limited space to grow No balcony plants 4 No evergreen No street level shrubs or ground vegetation cover Seymour Street

Source: Google Street View

## **Near-Home Green Opportunities**



Semi-Private / Courtyard Spaces



## Streetscape

#### Considerations

- Larger set-backs and more parklets
- Buffer sidewalks with green shrubs and perennials on both sides
- Use evergreen shrubs to provide year-round green



Bute Street Pedestrian Walkway, Vancouver Source: Google Street View

#### **CURRENT SITUATION**



#### SUPERBLOCK



Green Streets Eixample Neighbourhood, Barcelona – Super blocks Source: http://inhabitat.com/how-barcelonas-pedestrian-friendly-superblocks-reducepollution-and-return-streets-to-the-people/

#### **Green Streets Program**

City of Vancouver partners with volunteers to plant gardens in boulevards, traffic circles and corner bulges



Pacific Blvd, Under Burrard Bridge, Vancouver

## Semi-Private / Courtyard Spaces



Shared Gardening Space Toccata Townhouses, 2929 156th Street, Surrey, BC Courtesy of Jill Deuling



## **Green Balconies**





#### Vijayawada Garden Estate, India Penda Architects

**Courtesy of Penda Architects** 

#### Vertical Balcony Gardens Penda Architects

Courtesy of Penda Architects





#### Nanjing Green Towers, Nanjing, China Stefano Boeri Architects

Courtesy of Stefano Boeri Architects



#### Balcony & Private Outdoor Spaces

As sites get smaller, the quality of outdoor spaces is even more important.

- Auckland Design Manual

http://www.aucklanddesignmanual.co.nz/project-type/buildings-andsites/housing/apartments/guidance/outdoor-spaces/balconies-private-outdoor-spaces



#### Notable Recommendations

Utility:	Every apartment should have usable private
	outdoor space
Size:	Create balconies with enough space for circulation and furniture
Privacy:	Recessed outdoor spaces are most private
Outdoor Taps:	Consider resident's desires for outdoor taps
Safety:	Ensure balconies do not provide climbing access to units.

http://www.aucklanddesignmanual.co.nz/project-type/buildings-andsites/housing/apartments/guidance/outdoor-spaces/balconies-private-outdoor-spaces

#### **Also consider**

Microclimatic analysis to determine best placement for balconies and outdoor spaces.
Opaque railings instead of transparent glass



## Green Floor





#### Capitagreen, Singapore Toyo Ito & Associates, Architects



#### Courtesy of CapitaLand Commercial Trust

#### **CAPITAGREEN - BUILDING DETAILS**





## Green View







Green Window Views provide micro-restorative moments that are linked with:

- Speedier Recovery Times (Ulrich 1984)
- Lower stress (Honold 2015)
- Increased directed attention (Kaplan 2001)
- Increased well-being (Kaplan 2001)
- Increased residential satisfaction (Kaplan 2001)

Research suggests you never habituate to green views and always derive health benefits, even when looking at the same view over and over (Kuo 2001)

Elements that help create green views include:

- street trees
- climbing vines
- green walls in public areas
- green roofs







Habitat 67, Montreal, Canada Moshe Safdie, Architect

Source: Brian Pirie via Flickr

#### Sky Habitat, Bishan, Singapore Safdie Architects



Source: Edward Hendricks, Photographer



Courtesy of Safdie Architects

#### Parkroyal on Pickering, Singapore WOHA Architects

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Courtesy of WOHA, Photographer: Patrick Bingham-Hall



#### Distance to Parks



#### World Health Organization Recommendation Every resident to have a freely visitable green space (0.5ha+) within 300m (5 min walk) of their home

**1. Serene** Spaces that are calm, peaceful and quiet.

## Qualities of Greenspace that Support Mental Health

#### **2. Space** Greenspace which provides room to mov and where elements are logically connected.

## Qualities of Greenspace that Support Mental Health

3. Nature Greenspaces that look as close as possible to undisturbed natural landscapes

## Qualities of Greenspace that Support Mental Health

**4. Refuge** Sheltered, safe space that one can lookout from.

## Qualities of Greenspace that Support Mental Health

**5. Rich in Species:** Landscapes that display living nature in as many ways as possible (birds, butterflies, colourful flowers, etc.)

## Qualities of Greenspace that Support Mental Health

# 5 Strategies for Planting



**Plant Vistas:** plant with the window in mind – create peaceful places to look out at. Green roofs, green walls and green balconies all provide opportunities in the city.



**Seasonality**: select species that attract birds, bees and other insects all year long. Birds and insects help us engage with nature and leaving our thoughts & emails behind for a moment.



**Larger trees**: plant larger trees and give trees space to grow big and to grow old. People consistently prefer landscapes with larger trees (Kaplan). Larger trees are linked with decreased neighbourhood crime (Troy et al.)



**Evergreen shrubs**: use evergreen shrubs and ground cover for year round health benefits to increase green gardens along sidewalks and increased air quality.



**Small relaxation pockets**: create mini-gardens with benches nestled in trees and shrubs where people can look out onto nature and be visually hidden from the busy city.

# Policy

"I've spoken to a lot of architects and urban planners about the [Urban design for mental health] framework, and they say, 'Sure, that sounds great, but the client has to want it.' So it has to come from the top down. This is an opportunity for leaders such as mayors and other politicians to make it a policy. Physical health is becoming a standard policy, and mental health should be part of that policy, too."

- Layla McCay, Centre for Urban Design and Mental Health



## **Greening Strategies**

#### **Greenest City Action Plan**

Vancouver (2010-2020)

# Greening the City

Paris (2014-2020)

#### Sustainable Singapore Blueprint (2015-2030)



- Every home within a 5 min walk to a greenspace
- Restore or enhance 25ha of natural areas
- 30ha of additional public park
  20,000 trees planted
  200 public greening projects
  100 ha of green roofs and walls, including 33 ha
  - dedicated to urban agriculture

200 ha of skyrise greenway (1/2 the size of Stanley park)

- 400km of park connectors
- 0.8ha of parkland / 1,000 residents

## Green Roof Requirements

#### Toronto:

- New building over 2000m<sup>2</sup> must have green roof coverage of 20-60% or cool roof.

#### **Port Coquitlam:**

- Commercial & Industrial Buildings over 5000m<sup>2</sup> required to have 75% roof coverage.

#### Singapore:

- 100% replacement of building footprint as greenspace in sky terraces, landscaped terraces, and roof gardens.

# Hopeful Signs

Terrace House Vancouver Shigeru Ban Architects

Courtesy of PortLiving



## Thank you

Questions/Comments: Deanne.Manzer@gmail.com

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## A Few Good References

#### American Society of Landscape Architects' Health Benefits of Nature

https://www.asla.org/healthbenefitsofnature.aspx

#### **Children & Nature Network**

http://www.childrenandnature.org/learn/research/

#### World Health Organization's Urban Green Spaces and Health a Review of Evidence

http://www.euro.who.int/en/health-topics/environment-and-health/urban-health/publications/ 2016/urban-green-spaces-and-health-a-review-of-evidence-2016

# Works Cited: Greenspace & General and Mental Health

#### **Green Space and General Health**

Chawla, L. "Benefits of Nature Contact for Children." *Journal of Planning Literature*, vol. 30, no. 4, 2015, pp. 433–452. *Urban green spaces and health*. Copenhagen: WHO Regional Office for Europe, 2016

#### **Green Space and Mental Health**

Annerstedt, Matilda, et al. "Green Qualities in the Neighbourhood and Mental Health – Results from a Longitudinal Cohort Study in Southern Sweden Green Qualities in the Neighbourhood and Mental Health – Results from a Longitudinal Cohort Study in Southern Sweden." *BMC Public Health*, vol. 12, 2012.

Barton, Jo, and Jules Pretty. "What Is the Best Dose of Nature and Green Exercise for Improving Mental Health- A Multi-Study Analysis." *Environmental Science and Technology*, vol. 44, no. 10, 2010, pp. 3947–3955.

Evans, Gary W. "The Built Environment and Mental Health." *Journal of Urban Health : Bulletin of the New York Academy of Medicine*, vol. 80, no. 4, 2003, pp. 536–555.

Grahn, Patrik, and Ulrika K. Stigsdotter. "The Relation between Perceived Sensory Dimensions of Urban Green Space and Stress Restoration." *Landscape and Urban Planning*, vol. 94, no. 3–4, 2010, pp. 264–275.

Gillis, Kaitlyn. The Effect of Biophilic Design on the Perceived Restorative Potential of Living and Work Environments. Vol. 1, University of Surrey, 2015.

Honold, Jasmin, et al. "Restoration in Urban Spaces Nature Views From Home, Greenways, and Public Parks." *Environment and Behavior*, vol. 48, no. 6, 2016, p. 796-825.

Kaplan, Rachel. "The nature of the view from home: Psychological benefits." *Environment and Behavior*, vol. 33, no. 4, 2001, pp. 507–542.

Kaplan, Rachel, et al. With People in Mind. Island Press, 1998.

Kuo, Frances E., and Andrea Faber Taylor. "A Potential Natural Treatment for Attention-Deficit/hyperactivity Disorder: Evidence from a National Study." *American Journal of Public Health*, vol. 94, no. 9, 2004, pp. 1580–1586.

Shanahan, Danielle F., et al. "Health Benefits from Nature Experiences Depend on Dose." *Scientific Reports*, vol. 6, no. February, Nature Publishing Group, 2016, p. 28551.

Van Den Berg, Magdalena, et al. "Health Benefits of Green Spaces in the Living Environment: A Systematic Review of Epidemiological Studies." *Urban Forestry & Urban Greening*, vol. 14, no. 4, Elsevier GmbH., 2015, pp. 806–816.

Wells, Nancy M. "Effects of 'Greenness' on Children' S Cognitive Functioning." *Environment and Behavior*, vol. 32, no. 6, 2000, pp. 775–795.

Wells, Nancy and Gary Evans. "Nearby Nature: A Buffer of Life Stress Among Rural Children." *Environment and Behavior*, vol. 35, no. 3, 2003, pp. 311–330.

# Works Cited: Greenspace & Physical Health

Hartig, Terry, et al. "Nature and Health." *Annual Review of Public Health*, vol. 35, 2014, pp. 207–28. James, Peter et al. "A Review of the Health Benefits of Greenness." *Environmental Epidemiology*, vol. 2, 2015, pp. 131–142.

James, Peter; Hart, Jaime E.; Banay, Rachel F.; and Laden, Francine. "Exposure to Greenness and Mortality in a Nationwide Prospective Cohort Study of Women." *Environmental Health Perspectives*, no. October 2015, 2015.

Mitchell, Richard, and Frank Popham. "Effect of Exposure to Natural Environment on Health Inequalities: An Observational Population Study." *The Lancet*, vol. 372, no. 9650, Elsevier Ltd, 2008, pp. 1655–1660.

Nielsen, Thomas Sick, and Karsten Bruun Hansen. "Do Green Areas Affect Health? Results from a Danish Survey on the Use of Green Areas and Health Indicators." *Health and Place*, vol. 13, no. 4, 2007, pp. 839–850.

Shanahan, Danielle F., et al. "Health Benefits from Nature Experiences Depend on Dose." *Scientific Reports*, vol. 6, no. February, Nature Publishing Group, 2016, p. 28551.

Takano, T., et al. "Urban Residential Environments and Senior Citizens' Longevity in Megacity Areas: The Importance of Walkable Green Spaces." *Journal of Epidemiology and Community Health*, vol. 56, no. 12, 2002, pp. 913–918.

Ulrich, Roger S. "View through a Window May Influence Recovery from Surgery Author." *Science*, vol. 224, no. 4647, 1984, pp. 420–421.

Williams, K.M., et al. "Association between myopia, ultraviolet B radiation exposure, serum vitamin D concentrations, and genetic polymorphisms in vitamin D metabolic pathways in a multicountry European study." *JAMA Ophthalmology*, 135(1), 2017, 47-53.

# Works Cited: Greenspace & Social Health

Ding, Ning, et al. "One-Year Reciprocal Relationship between Community Participation and Mental Wellbeing in Australia: A Panel Analysis." *Social Science and Medicine*, vol. 128, 2015, pp. 246–254.

Halpern, David. Mental Health and the Built Environment: More than Bricks and Mortar. Taylor & Francis Ltd, 1995.

Hartig, Terry, et al. "Nature and Health." Annual Review of Public Health, vol. 35, 2014, pp. 207–28.

Kuo, Frances E. "Coping with Poverty: Impacts of Environment and Attention in the Inner City." *Environment and Behavior*, vol. 33, no. 1, 2001, pp. 5–34.

Kuo, Frances, et al. "Fertile Ground for Community: Inner-City Neighborhood Common Spaces." *American Journal of Community Psychology*, vol. 26, no. 6, 1998, pp. 823–851.

Kuo, Frances E., and William C. Sullivan. "Aggression and Violence in The Inner City: Effects of Environment via Mental Fatigue." *Environment and Behavior*, vol. 33, no. 4, 2001, pp. 543–571.

Kuo, Frances E., and William C. Sullivan. "Environment and Crime in the Inner City: Does Vegetation Reduce Crime?" *Environment and Behavior*, vol. 33, no. 3, 2001, pp. 343–367.

Lindberg, Ruth a, et al. "Housing Interventions at the Neighborhood Level and Health: A Review of the Evidence." *Journal of Public Health Management and Practice : JPHMP*, vol. 16, no. 5 Suppl, 2010, pp. S44–S52.

Taylor, Andrea Faber, et al. "Views of Nature and Self-Discipline: Evidence From Inner City Children." *Journal of Environmental Psychology*, vol. 22, 2002, pp. 49–63.

Troy, Austin, et al. "The Relationship between Tree Canopy and Crime Rates across an Urban-Rural Gradient in the Greater Baltimore Region." *Landscape and Urban Planning*, vol. 106, no. 3, Elsevier B.V., 2012, pp. 262–270.

# Works Cited: General + Social

#### **General Health**

Canadian Institute for Health Information. *Trends in Income-Related Health Inequalities in Canada : Provincial Highlights Document*. 2015.

Canadian Mental Health Association. *Myths About Mental Illness - Canadian Mental Health Association Canadian Mental Health Association*. 2017, http://www.cmha.ca/mental\_health/myths-about-mental-illness/.

McCay, Layla and Todd Litman. *Facts and Figures. The Centre for Urban Design and Mental Health* 2017, http://www.urbandesignmentalhealth.com/facts-and-figures.html

#### **Loneliness and Health**

Green, BH et al. "Risk Factors for Depression in Elderly People: A Prospective Study." *Acta Psychiatrica Scandinavica*, vol. 86, no. 3, 1992, pp. 213–7.

Hawkley, Louise C., et al. "Loneliness Predicts Increased Blood Pressure: Five-Year Cross- Lagged Analyses in Middle-Aged and Older Adults." *Psychol Aging*, vol. 25, no. 1, 2010, pp. 132–141.

Holt-Lunstad, Julianne, et al. "Social Relationships and Mortality Risk: A Meta-Analytic Review." *PLoS Medicine*, vol. 7, no. 7, Public Library of Science, July 2010, p. e1000316.

#### Social Implications of High-rise Living

Bonnes, Mirilia, Marino Bonaiuto and Anna Paolo Ercolani. "Crowding and Residential Satisfaction in the Urban Environment: A Contextual Approach." *Environment and Behavior*, vol. 23, no. 5, 1991, pp. 531–552.

Chu, Annette, et al. "The Impact on Mental Well-Being of the Urban and Physical Environment: An Assessment of the Evidence." *Journal of Mental Health Promotion*, vol. 3, no. 2, 2004, pp. 17–32.

# Works Cited: Mental Health

BC Ministry of Health. *Rural Health Services in BC. A Policy Framework to Provide a System of Quality Care.* 2015, pp. 1–45.

Health Canada. "A Report on Mental Illnesses in Canada." Health San Francisco, no. October, 2002.

Krabbendam, Lydia, and Jim Van Os. "Schizophrenia and Urbanicity: A Major Environmental Influence - Conditional on Genetic Risk." *Schizophrenia Bulletin*, vol. 31, no. 4, 2005, pp. 795–799.

Lederbogen, Florian, et al. "City Living and Urban Upbringing Affect Neural Social Stress Processing in Humans." *Nature*, vol. 474, no. 7352, 2011, pp. 498–501.

Mental Health Commission of Canada. "Making the Case for Investing in Mental Health in Canada." *Mental Health Commission of Canada*, 2010, pp. 1–27.

Peen, J., et al. "The Current Status of Urban-Rural Differences in Psychiatric Disorders." *Acta Psychiatrica Scandinavica*, vol. 121, no. 2, 2010, pp. 84–93.

Russ, Tom C., et al. "Geographical Variation in Dementia: Systematic Review with Meta-Analysis." *International Journal of Epidemiology*, vol. 41, no. 4, 2012, pp. 1012–1032.

Smetanin, P, Stiff, D, Briante, C, Adair, C, Ahmad, S & Khan, M. *The Life and Economic Impact of Major Mental Illnesses in Canada*. no. December, 2011.

# Works Cited: Stress + Other

#### Stress

Centre for Addiction and Mental Health. "More on Stress." *Collaborative Mental Health*, https://www.porticonetwork.ca/web/collaborative-mental-health/mental-health-conditions/stress/more-detail. Accessed 18 June 2017.

Health Canada. *It's Your Health - Mental Health - Coping With Stress*. 2008, p. 3, http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/life-vie/stress-eng.php.

Statistics Canada. *Leading Causes of Death, by Sex (Both Sexes)*. 2015, http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/hlth36a-eng.htm.

Statistics Canada. *Perceived Life Stress, 2014*. 2015, http://www.statcan.gc.ca/pub/82-625-x/2015001/article/14188-eng.htm#n1.

#### Other

Kellert, Stephen R, and Edward O. Wilson. The Biophilia Hypothesis. Washington, D.C: Island Press, 1993. Print.

## Works Cited: Precedents

"Balconies & Private Outdoor Spaces." *Auckland Design Manual*, http://www.aucklanddesignmanual.co.nz/projecttype/buildings-and-sites/housing/apartments/guidance/outdoor-spaces/balconies-private-outdoor-spaces. Accessed 20 May 2017.

City of Toronto. Green Roof Bylaw - Green Roofs.

https://www1.toronto.ca/wps/portal/contentonly?vgnextoid=83520621f3161410VgnVCM10000071d60f89RCRD. Accessed 23 June 2017.

City of Vancouver. Greenest City: 2020 Action Plan. 2012.

Corporation of the City of Port Coquitlam. Zoning Bylaw, 2008, No.3630. p. 90.

Kirk, Mimi. "How to Support Mental Health Through Urban Planning." CityLab, 23 Dec. 2016,

https://www.citylab.com/design/2016/12/how-to-support-mental-health-through-urban-

planning/510833/?utm\_source=SFTwitter

Mairie de Paris. Végétalisons La Ville. 2017, https://www.paris.fr/duvertpresdechezmoi.

Ministry of Environment and Water Resources and Ministry of National Development. Sustainable Singapore Blueprint.